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The public health problem of burnout in health professionals

Edited by
Oriol Yuguero, Alexander Hodkinson, Maria Panagioti, Josep Pifarre and David Peters

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The public health problem of burnout in health professionals

Topic editors

Oriol Yuguero — Lleida Institute for Biomedical Research (IRBLleida), Spain
Alexander Hodkinson — The University of Manchester, United Kingdom
Maria Panagioti — The University of Manchester, United Kingdom
Josep Pifarre — Universitat de Lleida, Spain
David Peters — University of Westminster, United Kingdom

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Table of contents

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África Martos Martínez,
University of Almeria, Spain

*CORRESPONDENCE
Oriol Yuguero
✉ oriol.yuguero@udl.cat

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Editorial: The public health problem of burnout in health professionals

Alexander Hodkinson[1], David Peters[2], Maria Panagioti[1], Josep Pifarre[3] and Oriol Yuguero[4]*

[1]Division of Population Health, Health Services Research & Primary Care, The University of Manchester, Manchester, United Kingdom, [2]Centre for Resilience, University of Westminster, London, United Kingdom, [3]Medicine and Surgery Department, Universitat de Lleida, Lleida, Spain, [4]ErLab, Lleida Institute for Biomedical Research IRBLLEIDA, Lleida, Spain

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Editorial on the Research Topic
The public health problem of burnout in health professionals

Introduction

With this title we launch a Research Topic to talk about burnout among health professionals. With rising levels of burnout it has become a veritable public health problem, and of growing concern not only to healthcare staff and occupational health specialists.

I would like to thank the team of editors who have participated in this Research Topic, Dr. David Peters, of the University of Westminster, Dr. Josep Pifarré of the University of Lleida, and Dr. Maria Panagioti and Dr. Alexander Hodkinson, from the University of Manchester and, of course, the more than 100 authors who have contributed their manuscripts to our Research Topic. We all share their desire to shed light on the complex matter of burnout among healthcare practitioners.

Since Maslach carried out her first studies on health professional burnout and published the Maslach Burnout Inventory in 1981, a multitude of research discussions and studies (1) have been published. In 2017, Shanafelt and Noseworthy (2) proposed organizational strategies and policies to help reduce burnout among healthcare professionals in a widely cited study. In this Research Topic we have seen that the concept of burnout sometimes overlaps with compassion fatigue or post-traumatic stress in the face of adverse circumstances. Moreover, actually the controversy about burnout include a large overlap with depression too.

Around the world, the spiraling demands on healthcare systems during the SARS-CoV-2 pandemic pushed health professionals to the limit, especially younger professionals and those on the frontline of care. It also revealed that in many countries the health and care systems were sustained only thanks to the dedication, vocation and overwork of their professionals. In response, we proposed this Research Topic to try to provide evidence-based answers for combating the global burnout epidemic now affecting thousands of health professionals.

The main aim of this Research Topic is to showcase research currently being conducted on burnout among health professionals, as an occupational health and public health problem, and various reviews (3) and articles have been published in recent years presenting different proposals and recommendations for burnout prevention and mitigation.

Burnout, a global problem

One of the key conclusions of our Research Topic is that although burnout affects health professionals around the world, some groups such as emergency professionals and primary care professionals may be affected more adversely. Thus, another objective is to ascertain the variations across different countries. The 16 articles submitted have provided us with evidence from teams in China, Africa, South America and Europe. In the face of this global pandemic the World Health Organization has promoted the recognition of burnout as an occupational illness by incorporating it into the international classification of diseases (ICD-11) (4).

In many countries, where health professionals have to perform non-healthcare-related tasks, a lack of job satisfaction may contribute to low professional realization, one of Maslach's underlying causes of burnout. We know too that professionals' lack of alignment with the values of their employer and reduced involvement in their work plan are strongly related to burnout.

Proposals to reduce burnout

Burnout is a complex problem that cannot be addressed only by financial input alone, but requires health care organizations to commit to, and invest in its prevention in recognition of a deeper need to promote healthy work environments and co-produce organizational improvements in partnership with health professionals. Health professionals' alignment with the values and mission of their non-clinical employer can be enhanced with the recognition of the important work done on a daily basis, by managers and leaders. The active participation of clinicians and front-line professionals in making management decisions that may affect them is another an essential aspect in the prevention of burnout. Moreover, there is a need to challenge the culture of workaholism still so prevalent among those who enter health care but which, over time can invite burnout.

On the bright side, this issue presents factors that may protect health care professionals from burnout. For example, we can learn from the skills of those professionals who continue to perform enthusiastically in their daily practice, and perhaps surprisingly from first-generation immigrant professionals. At present many health professionals choose to migrate between countries, and there is evidence to suggest that new immigrant professionals present lesser degrees of burnout.

Although we highlighted the importance of organizational improvements, individual psychological interventions such as mindfulness have proven to be effective in reducing burnout and improving the wellbeing of professionals and medical students. They should be also promoted under time-protected schemes across health care organizations.

Conclusions

With this Research Topic we conclude that burnout is a global problem of all health care systems, affecting almost all professional categories, including students of health sciences.

We need to uncover and widely implement a work culture that promotes job satisfaction and active participation in decision-making among health professionals. Finally, health organizations and institutions play a fundamental role in promoting initiatives for enhancing the emotional wellbeing of their workers and appointing leaders (5) who share the view that health professionals are the cornerstone of health care systems everywhere.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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ORIGINAL RESEARCH
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Examining the Constructs of Burnout, Compassion Fatigue, Secondary Traumatic Stress in Physicians Using Factor Analyses

Fadwa Ahmed[1]*, *Jay Baruch*[2] *and Paul Armstrong*[3]

[1] Warren Alpert Medical School of Brown University, Providence, RI, United States, [2] Department of Emergency Medicine, Warren Alpert Medical School of Brown University, Providence, RI, United States, [3] Department of English, Brown University, Providence, RI, United States

Background: Adverse affective experiences have been well-documented in healthcare providers. Research describes them under a variety of terms, including burnout, secondary traumatic stress (STS), and compassion fatigue (CF). The present study evaluates conflicting models of STS, CF, and burnout constructs in physicians.

Methods: Surveys were mailed to all allopathic physicians with active Rhode Island medical licenses. Three hundred and seventy-five complete responses were received. The survey included common measures of STS, CF, and burnout. Confirmatory Factor Analysis (CFA) was used to evaluate discriminant validity of the three constructs and test 5 *a priori* (1-, 2-, and 3-factor) theoretical models, and Exploratory Factor Analysis (EFA) was planned assess underlying factor structure in the case that CFA did not provide evidence supporting any existing model.

Results: By CFA, all five *a priori* models of burnout, CF, and STS fail to demonstrate adequate model fit (Standardized Root Mean Square Residual >0.10, Tucker-Lewis Index <0.90). EFA with parallel analysis extracts four factors underlying the three burnout, STS, and CF measures. The four factors describe 54.3% of variance and can be described as (1) depressive mood; (2) primary traumatic stress-like symptoms; (3) responses to patients' trauma; and (4) sleep disturbances.

Conclusion: In spite of abundant discussion surrounding burnout, CF, and STS in physicians, measures of these constructs did not uphold their theoretical factor structures in the present study. Future research might explore other constructs and measures that may describe adverse affective physician experiences.

Keywords: burnout, compassion fatigue, secondary traumatic stress, physicians, factor analysis

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Josep Pifarre, Universitat de Lleida, Spain

Reviewed by:
Juan Gómez-Salgado, University of Huelva, Spain
Basem Gohar, University of Guelph, Canada

***Correspondence:**
Fadwa Ahmed
fadwa_ahmed@brown.edu

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INTRODUCTION

Work-related adverse experiences have been well-documented in populations of healthcare providers. Research of these adverse effects describes them under a variety of terms, the most prominent of which include secondary traumatic stress (STS), compassion fatigue (CF), and burnout. Although they are frequently discussed together in relation to physicians, there has

been little agreement about the differences and relationships between STS, CF, and burnout in this population.

Burnout is generally used to describe work-induced exhaustion and demotivation that can affect one's ability and willingness to do their work (1–3). Often, it is regarded as a multidimensional construct, containing elements of physical exhaustion, emotional and spiritual disturbance, depersonalization, and a reduced sense of personal fulfillment (4–7). Though burnout is generally defined as a function of work-related and professional factors, the distinction between burnout and non-work-related syndromes such as depression remains a subject of contention (8).

Charles Figley's early descriptions of *secondary traumatic stress* (STS) define it as the "stress from helping or wanting to help a traumatized person" (9). More recent literature has defined it as a state similar to Post-Traumatic Stress (PTS) that is induced by secondary, rather than primary, exposure to trauma (10). Analogous to burnout and depression, PTS and STS have been regarded as similar but distinct phenomena, their primary difference pertaining to their etiological factors (11).

Compassion fatigue (CF) describes some broader range of negative affective experiences that results from attempts to assist others undergoing difficulty (12, 13). Most definitions of CF in physicians refer to a healthcare provider's loss of capacity to engage compassionately with patients (14).

Research has shown that CF, STS, and burnout correlate with each other, and whether or not they constitute fundamentally distinct phenomena remains unclear (15–17). In Figley's initial model, he regards CF and STS as interchangeable terms, defining burnout as a distinct but related phenomenon (9). Other literature has instead proposed that CF represents a syndrome that arises from the co-occurrence of burnout and STS and contains symptoms of both (18, 19). The Professional Quality of Life Scale, perhaps the most widely used of any CF measure, models CF as a composite of burnout and STS symptoms (12).

Several other authors, however, propose that CF, STS, and burnout represent distinct phenomena (14, 20). A number of theories point to differences in etiology, time course, influencing factors, and qualitative attributes as distinguishing features. For instance, CF and STS have been distinguished based on the differential importance of risk factors such as provider empathy and exposure to patients' trauma (20, 21). Similarly, burnout and compassion fatigue, while sometimes regarded as synonyms (22, 23), have been differentiated in terms of onset and time course (24–26) as well as the circumstances that lead to them (14, 27–29). Some have regarded burnout as a precursor to compassion fatigue, and others vice versa (14, 24, 30–35). Others still suggest the absence of a strong correlation between the two (21, 36).

Considering the variety of terms and models used to describe negative affective experiences among physicians, the extent to which each represents its own distinct construct remains unclear. The present study seeks to clarify the discriminant validity and factor structure of burnout, CF, and STS constructs. Using cross-sectional survey data from a sample of Rhode Island physicians, the present study seeks to evaluated whether confirmatory factor analysis (CFA) provides supporting evidence to any of the multiple conflicting models of burnout, CF, and STS (9, 12, 22, 23, 37, 38) (**Figure 1**).

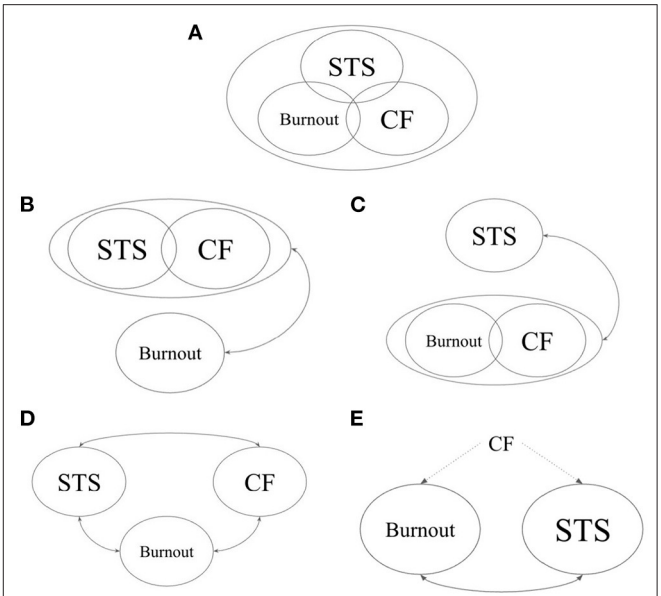

FIGURE 1 | *A-priori* models tested in confirmatory factor analyses. **(A)** Model 1: STS, CF, and burnout represent a single underlying construct (37). **(B)** Model 2: STS and CF represent a single underlying construct, while burnout represents a separate and correlated construct (9). **(C)** Model 3: Burnout and CF represent a single underlying construct, while STS represents a separate and correlated construct (22, 23). **(D)** Model 4: STS, CF, and burnout each represent a separate construct (38). **(E)** Model 5: CF describes a bifactorial construct in which burnout and STS are distinct but correlated factors (12). STS, secondary traumatic stress; CF, compassion fatigue.

In the case that CFA did not support any existing models, we planned to conduct an exploratory factor analysis (EFA) to gain insight into the factor structure underlying current measures of burnout, CF, and STS.

METHODS

Study Sample and Recruitment Procedure

For this study, surveys were distributed to Rhode Island physicians both by paper mail and electronically between July and August 2019. A sample size of at least 300 participants was sought to achieve adequate power for factor analyses (39). A list of all allopathic physicians with full, active Rhode Island licenses was obtained through the Rhode Island Department of Health (RIDOH) online database. Surveys were sent *via* postal mail to all physicians with mailing addresses listed in the database ($N = 3{,}598$). An online version of the survey hosted on Qualtrics survey software was also sent to all physicians with e-mail addresses listed in the RIDOH database ($N = 1{,}877$). Confidentiality was maintained and participation was voluntary. The survey was sent to a total of 3,598 physicians, 387 of whom were ineligible because they were not at the listed address, deceased, or no longer active in patient care, yielding an eligible sample of 3,211. Responses were collected

through October 2019. The institutional review board of Brown University approved this study and waived the requirement for written informed consent, as participation was voluntary and completion of the survey implied consent. This study followed Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

Measures

In addition to questions pertaining to demographic and medical practice information, the survey included self-report measures for burnout, STS, and CF, selected based on their widespread use and strong prior demonstrations of unidimensional construct validity.

Secondary Traumatic Stress Scale

The measure consists of 17 items, and prompts responders to answer based on how frequently each item statement was true for them in the prior 7 days (40). Answers range from "Never" to "Very Often" on a five-point Likert scale. Several items refer directly to work-related experiences with "client(s)" in whom responders are in "helping relationships with." In this study, the word "clients" was replaced with "patients." The measure has high internal consistency ($\alpha = 0.89$) and consists of three subscales: Intrusion ($\alpha = 0.68$), Avoidance ($\alpha = 0.78$), and Arousal ($\alpha = 0.76$). Subscales were not analyzed separately in the present study, since the unified construct of STS was the variable of interest.

Burnout Measure, Short Version

The scale is a 10-item, short version of the Burnout Measure (4) with high internal consistency ($\alpha = 0.90$) (2). Each item is a continuation of the statement "When you think about your work overall, how often in the last month have you felt…", with answers on a seven-point Likert scale ranging from "Never" to "Always." It assesses physical, mental, and emotional exhaustion to evaluate burnout and is a satisfactory measurement of burnout as a unidimensional construct (2, 13).

Professional Quality of Life, Revised (ProQOL-21)

This is a revised version of the ProQOL (12) with 21-items scored on three-to-five point Likert scales, depending on the item (13). It is composed of two subscales that offer a more robust measurement of Compassion Satisfaction (CS; 10 items; $\alpha = 0.88$) and CF (11 items; $\alpha = 0.80$). Heritage, Rees, and Hegney (13) modified the original ProQOL such that the CF subscale more precisely targets a unidimensional construct. Though the CF and CS items are included together on the ProQOL-21, the two subscales target separate constructs, and scores for each subscale are to be interpreted separately rather than added to produce a total score. Only the CF subscale of the ProQOL-21 was of interest in the present study. To facilitate interpretation, the items of the ProQOL-21 are labeled with their original ProQOL item numbers throughout this article. The ProQOL-21 was selected over the original due to its robust demonstration of a unidimensional CF construct, which was the variable of interest in the present analysis.

Statistical Analyses

Since several theories exist regarding the factor structure and measurement properties of burnout, CF, and STS, CFA was deemed to be the most appropriate initial approach to evaluate these theories (41–43). CFA evaluates whether observed variables (data obtained through measurement scales) are linked to higher-order latent factors as postulated in theoretical models, and is a more appropriate initial approach than EFA in cases where such *a priori* models exist (42). Five *a-priori* models, based on the several proposed theories pertaining to burnout, CF, and STS, are tested using CFA in the present study (See **Figure 1** for graphical depictions of each model).

In Models 1–4, CF, STS, and burnout each represented a latent variable onto which all items from their associated scales (ProQOL-21 CF subscale, STSS, and BM-SV, respectively) were permitted to load onto. In all models, latent variable means and variances were standardized to zero and one, respectively. In Model 1, covariances between latent Burnout, CF, and STS factors were all constrained to one and thus represented a single underlying latent factor (37). In Model 2, only the covariance between CF and STS was constrained to one (9), and in Model 3, only the covariance between latent CF and burnout factors was constrained to one (22, 23). Model 4 tests burnout, CF, and STS as three distinct latent factors permitted to covary freely with one another (38).

Given that the original ProQOL was designed based on the premise that CF represents a bifactorial construct consisting of burnout and STS (12), a fifth model (Model 5) was tested in which STS and burnout each represent a latent variable. STSS items and STS-specific ProQOL-21 items permitted to load onto the former, and BM-SV items and burnout-specific ProQOL-21 items permitted to load onto the latter.

Because the data was ordinal and observations demonstrated non-normal distributions, a diagonally weighted least square (DWLS) approach was used to estimate model parameters, and the full weight matrix used to compute robust standard errors and a mean- and variance-adjusted test statistic (44). Assessment of model fit was based on interpretation of multiple fit indices, bearing in mind the following conventional criteria of good fit: χ^2/d.f. ≤ 3, Tucker-Lewis Index (TLI) ≥ 0.95, Root Mean Square Error of Approximation (RMSEA) ≤ 0.08, and Standardized Root Mean Square Residual (SRMR) <0.10. Because Models 1 through 4 were nested, these models were compared to one another using the χ^2 difference test (45). In the absence of a well-fitting CFA, we planned to perform an EFA using principal axis factoring (PAF).

Because all variables had $<2\%$ missing data, and because fewer than 5% of participants had missing data, these missing data were deemed negligible and only complete cases were included in final analyses. Sensitivity analyses were performed including incomplete cases, with missing data imputed using multiple hot deck imputation across five datasets.

Hot deck imputation and CFA was conducted in R version 4.1.1 using the hot.deck package version 1.2 (46) and lavaan latent variable analysis package version 0.6.8 (47), respectively. All other statistics were performed using SPSS 28.0. SPSS syntax provided

by O'Connor (48) were used to run Velicar's minimum average partial test and parallel analyses to determine the number of factors to retain for EFA.

RESULTS

Sample Characteristics

A total of 270 paper and 135 electronic responses were recorded, 16 of which did not contain answers to any items on relevant burnout, CF, and STS scales and were thus excluded as non-responses. Of a remaining total of 389 responses, 13 were missing between 1 and 10 responses for individual items on relevant scales (2.6–24.6%) and one was missing 36 items (94.7%). These 14 partial responses were excluded, leaving a total of 375 complete responses included in the final analysis, 265 (70.7%) postal mail and 110 (29.3%) electronic responses. The calculated response rate (American Association for Public Opinion Research equation RR3) was 20%. Demographic and professional characteristics of participants are listed in **Table 1**.

TABLE 1 | Demographic and professional characteristics of physician survey responders included in final analysis ($N = 375$).

Characteristic	No. (%)
Age, mean (SD), y	52.43 (11.70)
Female	159 (42.4)
Race/ethnicity	
White	298 (79.5)
Black	6 (1.6)
Hispanic/Latino	17 (4.5)
Asian	37 (9.9)
Other/blank	17 (4.5)
Years in practice, mean (SD)	24.1 (12.2)
Practice setting[a]	
Hospital-based	162 (42.6)
Large group practice (6+ physicians)	96 (25.3)
Small group practice (<6 physicians)	64 (16.8)
Individual/solo practice	39 (10.3)
Other[b]/blank	30 (7.9)
Role[a]	
Attending physician/hospitalist	257 (66.1)
Head of department	31 (9.0)
Medical director	71 (18.3)
Fellow	9 (2.3)
Unspecified	26 (6.7)
Specialty, no. (%)	
Anesthesiology	9 (4.8)
Dermatology	5 (1.3)
Emergency medicine	12 (3.2)
Family/general practice	26 (6.9)
Internal medicine	91 (24.3)
Neurology	9 (2.4)
Obstetrics/gynecology	19 (5.1)
Ophthalmology	11 (2.9)
Otolaryngology	5 (1.3)
Pathology	7 (1.9)
Pediatrics	59 (15.7)
Psychiatry	49 (13.1)
Radiology	5 (1.3)
Surgery	28 (7.5)
Surgical subspecialty[c]	10 (2.7)
Other[d]/missing	30 (8.0)

[a] *Numbers add up to >100% because some reported more than one setting and/or role.*
[b] *Includes community health centers, federally-qualified health centers, and urgent care.*
[c] *Neurological, plastic, and orthopedic surgery.*
[d] *Includes clinical genetics, urology, physical medicine and rehabilitation, and occupational medicine.*
No., number; y, years; SD, standard deviation.

Confirmatory Factor Analyses

All *a-priori* models of burnout, compassion fatigue, and secondary traumatic stress failed to demonstrate adequate model fit in CFA. Model fit indices are summarized in **Table 2** and **Figure 2** contains a graphical summary of standardized path coefficients for each model. All three latent factors in Model 4 were highly correlated with one another; the correlation was 0.821 between the Burnout and STS factors, 0.770 between CF and STS factors, and 0.864 between CF and Burnout factors. Results of the same CFAs using the five hot-deck imputed datasets did not demonstrate any substantial differences.

Exploratory Factor Analyses

In the absence of a factor model with acceptable performance on CFA, an EFA was conducted using the correlation matrix of data from CF, STS, and burnout scales. Kaiser-Meyer-Olkin measure of sampling adequacy was 0.930, and Barlett's test of sphericity was significant [$\chi^2_{(703)} = 7{,}340.9$, $p < 0.001$], both of which suggested appropriateness of proceeding with the EFA. An initial unrotated PAF solution extracted seven factors with eigenvalues >1 [Eigenvalues (% of variance explained): 12.64 (33.3), 2.84 (7.5), 1.82 (4.8), 1.77 (4.7), 1.38 (3.6), 1.18 (3.1), and 1.14 (3.0), respectively]; however, only five of these factors are retained by Velicar's minimum average partial test, and only four factors by parallel analysis and scree test. Subsequent EFA was tested with five and four factors; ultimately, four factors were selected due to low primary factor loadings and high cross-loadings on a fifth extracted factor. The correlation matrix from the initial, unrotated PAF solution including all items are included in **Supplementary Table 1**.

Repeat EFA was set to extract four factors. Promax rotation was used to analyze interfactor correlations, which demonstrated substantial correlations between factors (range 0.212–0.633). Thus, an oblique rotation was deemed more appropriate than an orthogonal rotation, and promax was ultimately used in the final PAF solution. Investigation of factor pattern loadings revealed that a total of 11 items did not meet criteria for retention. Namely, item 21 of the ProQOL, item 1 of the BM-SV, and items 3, 5, 10, 13, and 15 of the STSS had secondary factor loadings >0.3; and items 7 and 8 of the BM-SV as well as items 2 and 12 of the STSS had primary factor loadings that were under 0.5. Items that were

TABLE 2 | Model fit estimates from confirmatory factor analyses of five theoretical models of burnout, compassion fatigue, and secondary traumatic stress.

Model	χ^2	*df*	χ^2/df	TLI	SRMR	RMSEA(90% CI)
1	2,583*	665	3.88	0.86	0.112	0.088 (0.084–0.091)
2	2,457*	664	3.70	0.87	0.108	0.085 (0.081–0.089)
3	2,307*	664	3.47	0.88	0.104	0.081 (0.078–0.085)
4	2,244*	662	3.39	0.89	0.103	0.080 (0.076–0.084)
5[a]	2,302*	664	3.47	0.88	0.102	0.081 (0.078–0.085)
Model comparisons[a]	$\Delta\chi^2$	Δdf				
2–1	−126*	1				
3–1	−276*	1				
4–2	−213*	2				
4–3	−63*	2				
4–1	−339*	3				

*$p < 0.001$.

[a]*Model 5 is not nested within previous models and therefore not compared by* $\Delta\chi^2$. *See* ***Figure 1*** *for graphical depictions of Models 1–5.*

CFI, Comparative Fit Index; TLI, Tucker-Lewis Index; SRMR, Standardized Root Mean Square Residual; RMSEA, Root Mean Square Error of Approximation; CI, confidence interval.

removed from the final solution and their primary and secondary factor loadings are outlined in **Supplementary Table 2**.

The pattern correlation matrix of the final four-factor solution using the remaining 27 items is represented in **Table 3**, along with the Eigenvalues and variance explained by each factor. The structure correlation matrix for the same EFA solution is included in **Supplementary Table 3**.

Items loading onto the first factor described feeling trapped, hopeless, helpless, worn out, depressed, "on edge," "bogged down," and disappointed, as measured by items from both the BM-SV and the ProQOL-21. Items from all three STSS subscales (seven from the Avoidance subscale, two from the Arousal subscale, and one from the Intrusion subscale) loaded onto the second factor, with "little interest in being around others" having the highest loading. Six ProQOL-21 items loaded onto the third factor; items pertained to emotional responses specifically relating to patients' traumatic experiences. One item from tbe BM-SV and one from the STSS-Arousal subscale loaded most highly onto the final factor. A summary of the four factors that emerged from EFA and their intercorrelations are described in **Table 4**.

Repeat EFAs conducted using the five imputed datasets did not result in any appreciable qualitative differences.

DISCUSSION

While burnout, CF, and STS have been discussed at length, there is little consensus regarding their definitions. They have been variably described as three separate constructs, a single construct, or two constructs (with either burnout and CF or STS and CF representing a single underlying factor) (9, 12, 15–17, 22). None of these proposed theoretical factor structures are upheld by CFA in the present study of physicians. Mixed findings regarding relationships between CF, STS, and burnout in physicians may thus be attributable to a lack of construct validity that these terms and their associated measures suffer from in this population (10, 49, 50). In the absence of clearly delineated concepts, further attempts to discern correlations, influencing factors, and consequences of adverse physician experiences using existing tools will be limited by psychometric shortcomings and phenomenological gaps.

The present study's EFA is subject to the psychometric limitations of the measures used. As such, the factors that emerged from these analyses should not be interpreted as conclusive, alternative definitions of adverse physician experiences. Rather, examining the manner in which items from burnout, CF, and STS scales dissolve across dimensions that do not clearly correspond with any of the three concepts may offer insight into where and how existing constructs fracture. The items loading onto the first factor from EFA describes negative affective experiences related to work—feelings of stagnation, depletion, despondence. Rather than "burnout" or "compassion fatigue", this factor seems more clearly summarized by the term "depressed mood". Indeed, the distinction between burnout and depression, and whether this distinction is pragmatically or clinically relevant from a psychiatric standpoint, is a matter of its own contention, with recent literature suggesting that the two may not represent distinct phenomena (8). To define physicians' negative affective experiences, the relationships between these experiences and primary depression require clarification and consensus.

The second and third factors from EFA share common ground in their relationship to trauma. Items loading onto the second factor describe negative affective responses to patient care that mirror symptoms of primary traumatic stress, while those loading onto the third describe negative affective responses specific to patients' experiences of trauma. Thus, factors differ in terms of what appears to comprise the traumatic event: the patient care encounter or the patients' trauma. While prior definitions of STS have concatenated the two sets of responses into a single phenomenon, this analysis points toward

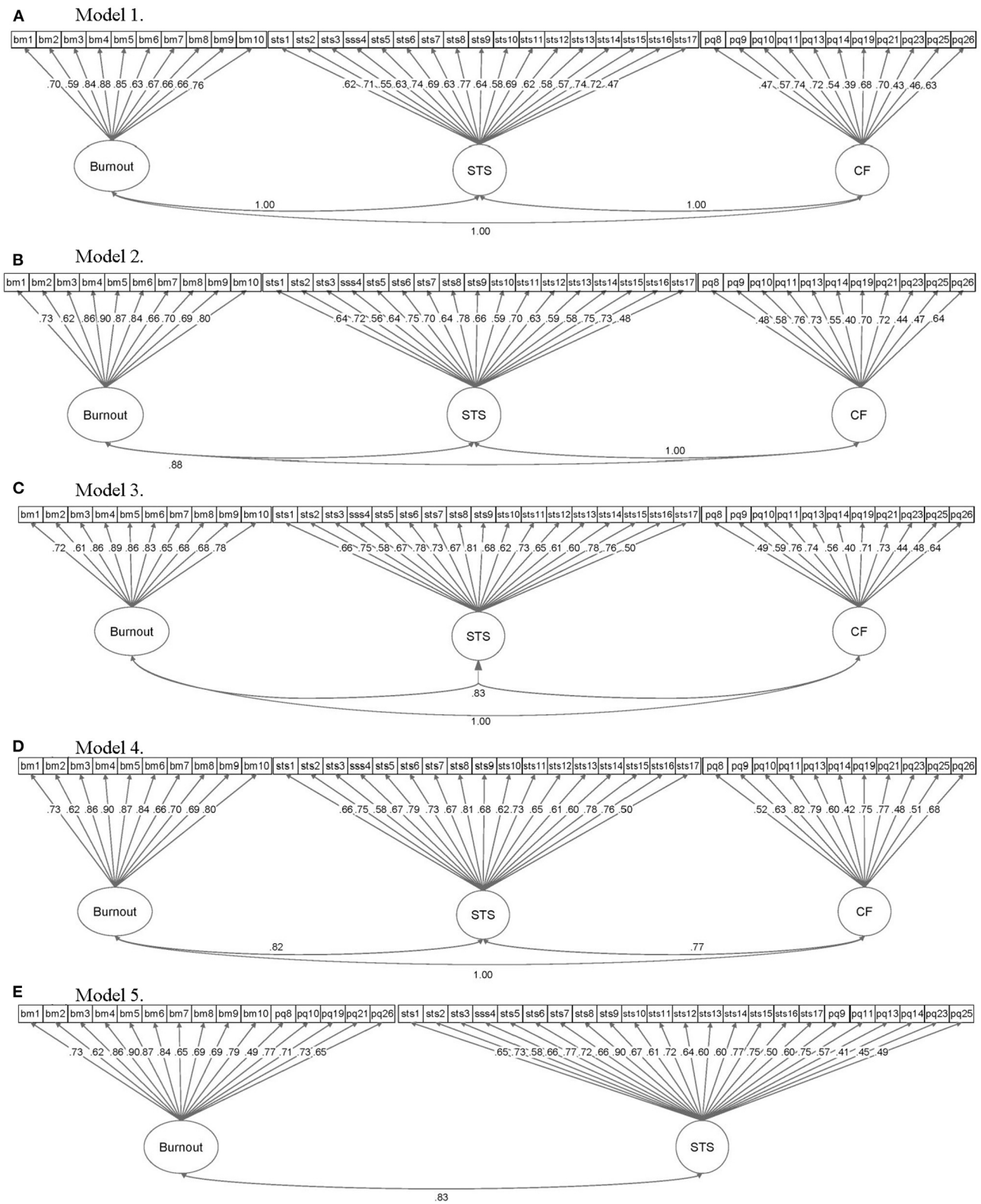

FIGURE 2 | Graphical summary of confirmatory factor analyses results for Models 1–5 of burnout, compassion fatigue, and secondary traumatic stress. Elliptical objects represent latent variables, while rectangular objects represent observed variables (i.e., survey scale items). CF, compassion fatigue; STS, secondary traumatic stress; bm, Burnout Measure-Short Version; pq, ProQOL (although the ProQOL-21 was used, item numbers correspond to original ProQOL item numbers); stss, Secondary Traumatic Stress Scale.

TABLE 3 | Exploratory factor analysis of the BM-SV, ProQOL-21, and STSS: factor loadings from the pattern matrix of the final four-factor principal axis factoring promax-rotated solution.

Scale item	Factor				*h2*
	1	2	3	4	
BM-SV4: Trapped	0.96				0.81
ProQOL10: I feel trapped by my job as a physician.	0.84				0.62
BM-SV3: Hopeless	0.77				0.68
BM-SV5: Helpless	0.77				0.67
BM-SV10: "I've had it"	0.75				0.61
BM-SV6: Depressed	0.65				0.59
ProQOL19 I feel worn out because of my work as a physician.	0.64				0.50
ProQOL11 Because of my medical practice, I have felt "on edge" about various things.	0.60				0.46
BM-SV2: Disappointed with people	0.57				0.50
ProQOL26 I feel "bogged down" by the system.	0.55				0.44
STSS7: I had little interest in being around others.		0.73			0.51
STSS8: I felt jumpy.		0.66			0.43
STSS14: I wanted to avoid working with some patients.		0.61			0.40
STSS6: Reminders of my work with patients upset me.		0.57	0.25		0.35
STSS16: I expected something bad to happen		0.56			0.37
STSS17: I noticed gaps in my memory about patient sessions.		0.56			0.45
STSS11: I had trouble concentrating.		0.55			0.36
STSS1: I felt emotionally numb.	0.25	0.55			0.35
STSS9: I was less active than usual.		0.54			0.47
ProQOL14: I feel as though I am experiencing the trauma of a patient.			0.64		0.37
ProQOL9: I think that I might have been affected by the traumatic stress of patients.			0.60		0.26
ProQOL13: I feel depressed because of the traumatic experiences of my patients.			0.57		0.25
ProQOL8: I am not as productive at work because I am losing sleep over traumatic experiences of a patient.			0.49		0.24
ProQOL25: As a result of my medical practice, I have intrusive, frightening thoughts.			0.47		0.20
ProQOL23: I avoid certain activities or situations because they remind me of frightening experiences of my patients.			0.46		0.33
BM-SV9: Difficulties sleeping				0.86	0.81
STSS4: I had trouble sleeping.				0.81	0.68
Eigenvalue	9.20	2.29	1.66	1.52	
% variance explained	34.1	8.5	6.1	5.6	
Cumulative % variance explained	34.1	42.5	48.7	54.3	

Factor loadings <0.20 are suppressed.
BM-SV, Burnout Measure-Short Version; ProQOL, Professional Quality of Life Scale (though ProQOL-21 was used, item numbers are from original ProQOL); STSS, Secondary Traumatic Stress Scale; h2, communality.

TABLE 4 | Descriptive statistics and intercorrelations for factors extracted from final exploratory principal axis factoring solution.

Factor	No. items	Cronbach's alpha	Factor intercorrelations			
			1	2	3	4
1. Depressive symptoms	8	0.892	1.00	0.64	0.41	0.35
2. PTS-like symptoms	9	0.851	0.64	1.00	0.53	0.41
3. Reactions to patients' trauma	6	0.707	0.41	0.53	1.00	0.33
4. Sleep disturbance	2	0.867	0.35	0.41	0.33	1.00

Based on standardized item responses.
No., number; PTS, Primary Traumatic Stress.

the possibility of a difference (9–11). Separation of the data across these two different dimensions suggests that a physician's response to work that is symptomatically similar to primary traumatic stress may not necessarily represent a response to patients' experiences or narratives of primary trauma. Further investigations of PTS-like symptoms and physicians' responses to

patients' trauma requires critical examination of various sources of distress physicians are exposed to and qualitative differences in their emotional, mental, and behavioral responses to them. The fourth factor emerging from EFA requires little interpretation, with both items loading onto it pertaining to sleep difficulties. To determine how insomnia fits into the scheme of adverse physician experiences, phenomenological clarity of these experiences, their roots, and their consequences must first be established.

If burnout, CF, STS are neither themselves nor one another, this begs the question: What are they? There is little doubt regarding the existence and prevalence of adverse physician experiences, though the terms used to describe these experiences may fall short of defining them. The failure of existing measures to capture clear factors underlying these terms may reflect the lack of theoretical consensus regarding these constructs, how they are related, and how they are different (9, 12, 14–22, 27, 28, 30–33). Alternatively, the lack of evidence for existing models in the present study may be attributable to the fact that the terms "burnout," "CF," and "STS" initially emerged to describe experiences of non-physician professionals (9, 29, 51). The lack of model fit for burnout, CF, and STS constructs observed in the present study thus cannot be generalized to non-physician healthcare providers, whose observable experiences may exhibit better fit with existing models and more discrimination between constructs. Given that existing quantitative measures emerged from constructs without consistent and demonstrable theoretical underpinnings, and that the terms "burnout," "CF," and "STS" initially emerged to describe non-physician professionals' experiences, further investigation of adverse physician experiences may benefit from characterization of potential underlying constructs using rigorous quantitative and/or open, generative qualitative approaches centering physicians. Through such investigations, cohesive descriptions and unifying constructs may be more clearly defined and provide a foundation for models of affective experiences among physicians. The ensuing clarity of terms and measures used to discuss and quantify negative affective physician experiences may then give way to a more robust pursuit of potential solutions.

Limitations of the present study include the relatively low response rate to the survey. This was anticipated in part, due to the low response rates of physicians in general, and because we could not implement incentives or additional participation-maximizing recruitment strategies due to resource constraints. However, the primary purpose of the study was not to survey and/or characterize the population, but rather to determine whether negative affective experiences were well-characterized by existing measures. A sample size of at least 300 was thus sought a priori to meet recommended power for factor analyses, and this goal was surpassed (39). Interpretation of the results should bear in mind that, by nature of the study design, results are subject to response bias. In our case, one way this may have manifested is a higher response rate from physicians who have a particular interest in burnout, CF, STS, and related topics.

An additional limitation of the study is that, to keep the survey at a reasonable length, we were only able to use one measure for each of the three constructs tested (burnout, CF, and STS). There are, however, multiple existing scales for each that we might have selected from. We selected the BM-SV, ProQOL-21, and STSS based on previous evidence that they performed well as unidimensional constructs (2, 3, 13). However, the unidimensionality of each construct was not upheld when the scales were examined in conjunction. It is unclear whether results would have varied should different scales had been used, and whether the problem of construct validity in the present study is a primarily psychometric one rather than a theoretical one with clear clinical implications. Further research should explore the replicability of these findings using different existing measures of burnout, CF, and STSS and in samples of different professional populations, such as nurses and psychotherapists. Additionally, the clinical implications of distinctions (or lack thereof) between burnout, CF, STS, and other pathologies in physicians are difficult to ascertain at this point, in the midst of conflicting theories and evidence. Future analyses of burnout, CF, STS, and related constructs in physicians should consider the clinical implications of symptom overlap and syndromic delineations.

CONCLUSIONS

Existing models of burnout, compassion fatigue, and secondary traumatic stress constructs were not upheld by confirmatory factor analyses in our sample of Rhode Island allopathic physicians. Exploratory factor analysis revealed that responses varied along dimensions that do not clearly correspond with existing definitions of burnout, compassion fatigue, and secondary traumatic stress. Adverse affective experiences of physicians may not be well described by current conceptions of burnout, compassion fatigue, and secondary traumatic stress. Qualitative investigation based on physician narratives may guide identification of patterns and themes across adverse affective physician experiences.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Institutional Review Board of Brown University. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

FA led the study, conducted analyses, and drafted the manuscript. JB and PA contributed to study design, data interpretation, and manuscript edits. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.893165/full#supplementary-material

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Global Insights Into Rural Health Workers' Job Satisfaction: A Scientometric Perspective

Yuquan Chen[1,2†], *Yanwei You*[3†], *Yiche Wang*[4], *Yutong Wang*[5] *and Tao Dai*[1*]

[1] *Institute of Medical Information/Library, Chinese Academy of Medical Sciences, Beijing, China,* [2] *Peking Union Medical College, Beijing, China,* [3] *School of Social Sciences, Tsinghua University, Beijing, China,* [4] *Department of Economics and Management, Shanghai University of Sport, Shanghai, China,* [5] *School of Health Preservation and Rehabilitation, Chengdu University of Traditional Chinese Medicine, Chengdu, China*

Introduction: Rural health workers (RHWs) play an irreplaceable role in ensuring and improving the health level of rural residents as the most basic and extensive medical service providers in rural areas. However, rural health institutions are facing significant worker shortages worldwide, not only in low- and middle-income countries but also in developed countries. As an important variable to explain RHWs' work status and predict turnover behavior, job satisfaction has received more and more attention currently.

Methods: Publications from 1 January 1995 to 31 December 2021 were identified from the Science Citation Index Expanded (SCI-Expanded), the Social Sciences Citation Index (SSCI), and the Emerging Sources Citation Index (ESCI) of the Web of Science Core Collection (WoSCC); CiteSpace, VOSviewer, and R software were applied to conduct this study.

Results: A total of 251 publications were obtained from the WoSCC database. The number of publications had a statistically significant increase in the study period. Ranking in the top three of the most productive countries or regions in this field was the United States, the United Kingdom, and China. "Health Care Sciences & Services," "Nursing," and "Public, Environmental & Occupational Health" seemed to be the major subjects. According to the reference co-citation analysis, "motivation," "rural and remote areas," and "work environment" were three noteworthy topics during the development of the research field. Moreover, through the keyword analysis, the underlying relationship among "job satisfaction," "job burnout," and "turnover intention" was explored.

Conclusion: Publications about job satisfaction associated with RHWs had remarkably indicated that this research field had great development potential and broad prospects. As an emerging topic related to RHWs' job status, job satisfaction and its related affected factors were systematically summarized by cluster and keywords analysis. We also highlighted that job satisfaction had a negative predictive effect on RHWs' job burnout and turnover intention, and job burnout played a positive role in predicting turnover intention. In addition, the job satisfaction and working environment of RHWs under the COVID-19 pandemic should receive more attention in the future.

Keywords: rural health workers, job satisfaction, scientometric, web of science, job burnout

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***Correspondence:**
Tao Dai
dai.tao@imicams.ac.cn

[†] *These authors have contributed equally to this work*

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INTRODUCTION

Rural health workers (RHWs), including doctors, nurses, public healthcare workers, and administrative staff, play an irreplaceable role in ensuring and improving the health level of rural residents as the most basic and extensive medical service providers in rural areas. They offer a series of primary healthcare services, including the establishment of rural health archives, education of health knowledge, prevention and control of infectious diseases, healthcare for the elderly, and management of chronic diseases (1–3). However, rural health institutions are facing significant worker shortages worldwide, not only in low- and middle-income countries (4, 5) but also in developed countries (6, 7).

Job satisfaction is the extent to which people like (satisfaction) or dislike (dissatisfaction) their jobs and refers to an attitude or emotional response to one's tasks as well as to the physical and social conditions of the workplace (8–10). It is one of the most important predictors of medical staff burnout and refers to a series of psychological and physiological reactions caused by the pressure of the interpersonal relationship and work itself (11). Turnover intention refers to the idea that an individual has to resign from his current job and look for another job (12). Job burnout, which is a kind of psychological syndrome (11), refers to a series of psychological and physiological reactions caused by the pressure of the interpersonal relationship and work itself. Some studies have explored the relationship among them, e.g., a survey of 1,148 rural primary care providers (PCPs) found that there was a significant direct effect of job satisfaction on burnout and turnover intention and a significant indirect effect of job satisfaction on turnover intention through burnout as a mediator (13).

The current situation of RHWs' job satisfaction around the world has its own characteristics. Among rural American physicians, the increased workload and longer hours contributed to lower job satisfaction, poor retention rates, and decreased physician wellness (6). Another national survey indicated that the proportion of the rural nursing workforce in Canada is continuing to decline in relation to the proportion of the Canadian population in rural and remote settings, although their levels of satisfaction with their nursing practice and community are generally high (7). Job satisfaction among RHWs in developing countries cannot be ignored, e.g., China, which had a rural resident population of 509.79 million by the end of 2020; a job satisfaction survey of 5,046 RHWs in 11 provinces found that the average score of the overall job satisfaction of RHWs was 3.20 ± 0.55 (total score was 5.00), namely with a degree of 64.1%, indicating that the RHWs were slightly satisfied with their jobs, and job satisfaction proved to be negative predictors of turnover intention (14). Similarly, in rural British Columbia, the job satisfaction of physicians was also low, and a 7-point Likert-type scale showed that its average score was only 3.7 ± 1.0 combined with a 55% self-reported burnout rate.

In recent years, the high turnover rate of RHWs all over the world, especially in developing countries, has hit the healthcare system in rural areas, and the decline in job satisfaction makes them lack enthusiasm and willingness to strive to provide high-level services, which indirectly hinders health promotion and increases their tendency to leave (15, 16). However, compared with their colleagues who are in urban secondary or tertiary public hospitals, they might benefit less from their current job (17, 18), and it seems that there are more relevant studies (19). Nonetheless, for RHWs who are equally important, the current situation of important factors affecting turnover behavior and work efficiency, namely, job satisfaction, is not only the inadequate original survey but also insufficient medical staff (20). In this condition, it is urgent to explore the risk factors affecting RHWs' poor job satisfaction and find their internal relationship. Unfortunately, few scholars have comprehensively evaluated the current situation and detected the underlying reasons from a global insight. Therefore, our team plans to undertake this important topic to make up for the gaps and defects in this research field.

MATERIALS AND METHODS

Data Source and Search Strategy

All publications were retrieved online through the Science Citation Index Expanded (SCI-Expanded), the Social Sciences Citation Index (SSCI), and the Emerging Sources Citation Index (ESCI) of the Web of Science Core Collection (WoSCC) on 3 January 2022. The search strategy was based on a combination of [TS=(rural OR countryside OR district OR community OR village OR grassroots)] AND [TS=(doctor OR physician OR nurse OR practitioner OR "health worker" OR "health officer" OR "health personnel" OR "medical personnel" OR "medical worker" OR "medical staff" OR "physician assistant")] AND [TS=("job satisfaction" OR "work satisfaction" OR "professional satisfaction" OR "career satisfaction" OR "job burnout" OR "turnover intention" OR "departure intention" OR "demission intention" OR "job demission intension" OR "turnover tendency" OR "departure intention tendency" OR "demission tendency" OR "job demission tendency")] AND [TS=("risk factor" OR influence OR correlate*)]. The two authors, YC and YY, participated in the material search and data extraction process. The pre-retrieval results found that there was no publication before 1 January 1995; hence, the search time frame in this study was set from 1 January 1995 solstice to 31 December 2021. According to previous literature (21–23), "articles or reviews" were used as inclusion criteria, and the language was limited to "English." Related data were extracted and downloaded within 1 day to avoid bias due to frequent database updates. Basic information of each research included was retrieved as "full record and cited references" for further analysis. The retrieval framework is shown in **Figure 1**.

Analysis Tools

The research methods used in this article were scientometric and bibliometric strategies. Scientometric is an emerging way that can both quantitatively and qualitatively analyze the research trends and study the status of certain topics by using mathematics and statistics methods. Compared with traditional meta-based analysis, scientometrics or bibliometrics have a relatively broad horizon of the current hotspots and

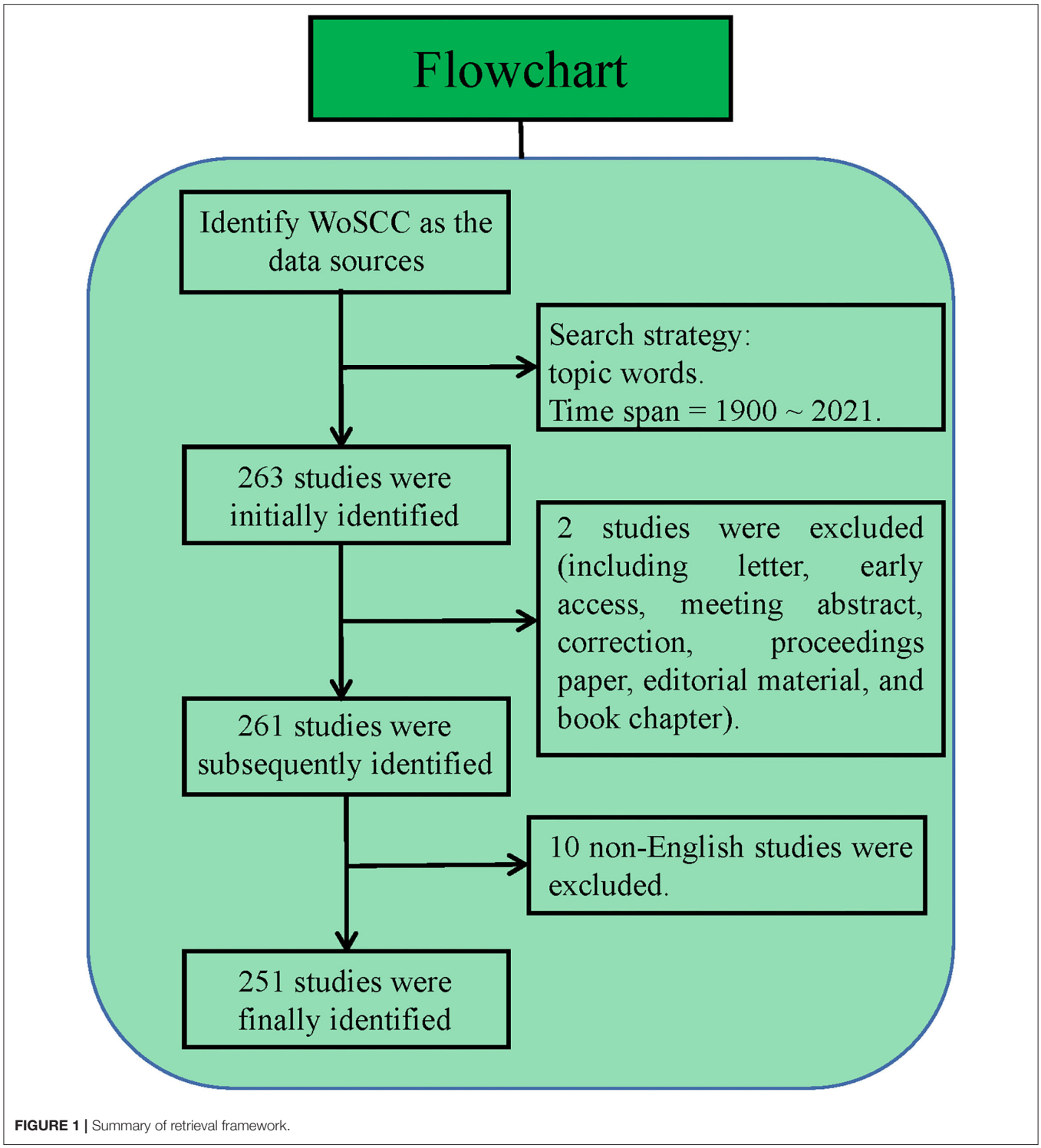

FIGURE 1 | Summary of retrieval framework.

research domains (22). In this study, two Java-based visualization tools, namely, CiteSpace and VOSviewer, were applied to reveal the results from bibliometric analysis. Visualization of knowledge domains, collaborative networks among regions and institutions, research categories, and reference co-citations were analyzed, and then the landmark literature, influence factors, and implicated enlightenment of the job satisfaction of RHWs were presented.

Referring to the classic settings by Chaomei Chen, the designer of CiteSpace, the basic parameter of CiteSpace was set as follows: link retaining factor (LRF) = 1, maximal link per node (L/R) = 10, look back years = 5, and top N [n

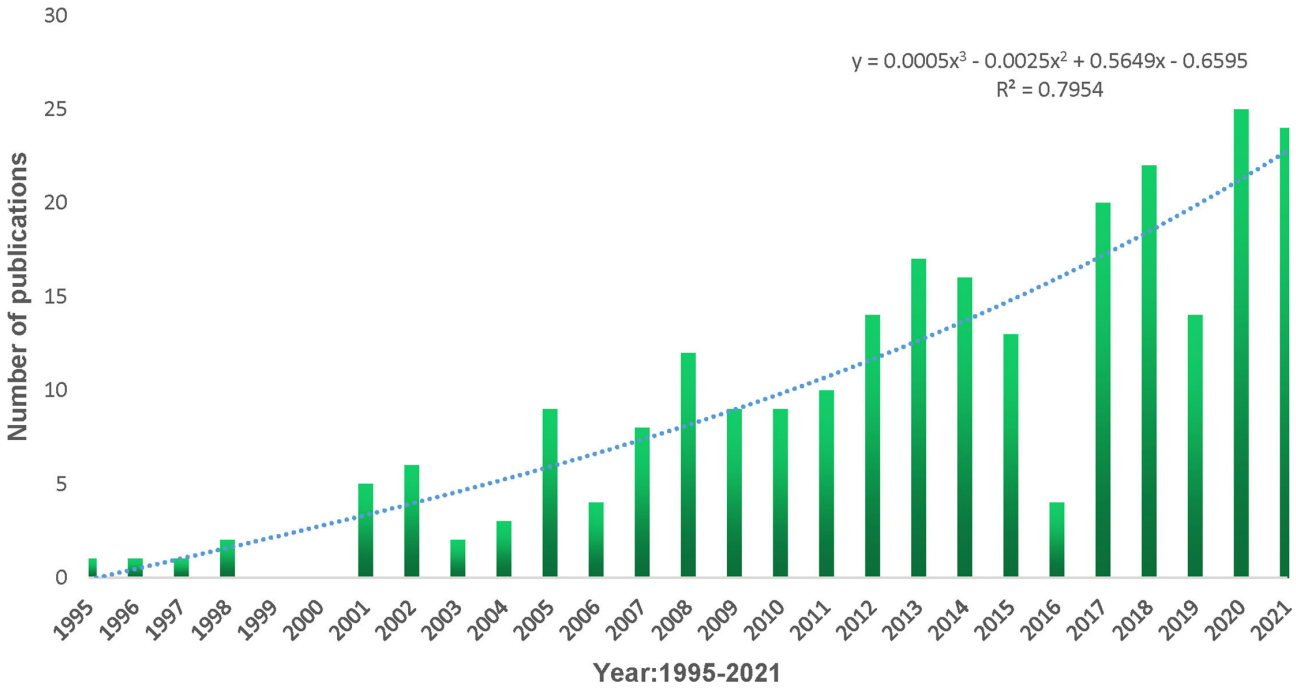

FIGURE 2 | Annual output of publications and growth trends.

$| f(n) \geq e] = 1$, the scale factor $k = 25$. In addition, the network and overlay visualization was also set by the VOSviewer manuals. The co-occurrence function of VOSviewer was applied to explore the keyword associations, the counting method was set as full counting, and the unit of analysis was author keywords (AKs). The size variation determined the strength of the connection effect by each node. Association strength was used for normalizing the strength of the links between items, and this method was identical to the Van Eck and Walkman's criteria (24).

In the collaboration analysis, each node in a map represents an individual and the size of the node speaks on behalf of the centrality (25, 26). A larger size indicates higher occurrence or citation frequency. There are a number of measurements to calculate the centrality index, namely, eigenvector centrality, closeness centrality, and degree. Referring to previous literature, the centrality applied in this study was the classic betweenness centrality (27). When it comes to the lines, each line builds a bridge between two nodes and reflects connections of them. Similarly, the wider the line, the stronger the connection between two nodes.

The *R* software (version 4.0.3) was used for the co-occurrence keywords analysis. The cosine similarity algorithm was applied to generate the keywords' co-occurrence matrix. A heat map was provided to reflect the degree of inter-relationship of the high occurrence keywords. The Microsoft Excel 2016 was used to describe the research trend. The function model was set as follows: $f(x) = ax^3 + bx^2 + cx + d$. In this function, x represented the publication year and $f(x)$ showed the cumulative amount. In this way, we conducted a scientometric analysis on job satisfaction of RHWs' research in the past several decades to discover the research status, current hotspots, and influence factors, which can further provide researchers and healthcare policy makers with meaningful advices.

RESULTS

Annual Outputs Analysis

A total of 251 publications between 1995 and 2021 met the inclusion criteria. Two studies (one early assessment and one editor material) and 10 non-English papers were excluded. **Figure 2** represents the annual publishing trend. On the basis of the statistical analysis, results showed that the number of literatures rose from 1 in 1995 to 24 in 2021. We performed the linear regression analysis and confirmed that the percentage of publications had a statistically significant increase in the study period ($P < 0.001$, $t = 8.374$). However, it should be noted that the number of publications in 2016 and 2019 decreased compared with adjacent years.

Analysis of Countries and Institutions

All studies included in this study were produced by 70 different countries. The collaboration status was generated by CiteSpace with 70 nodes and 113 links, which indicated that the total publications were published in 70 countries or regions with 113 connections among them. **Figure 3A** reflects the five most prolific countries related to job satisfaction of RHW groups, with the top three from the United States (86, 34.2%), the United Kingdom (26, 10.4%), and China (24, 9.6%). From **Table 1**, it can be found that the top five countries' contributions

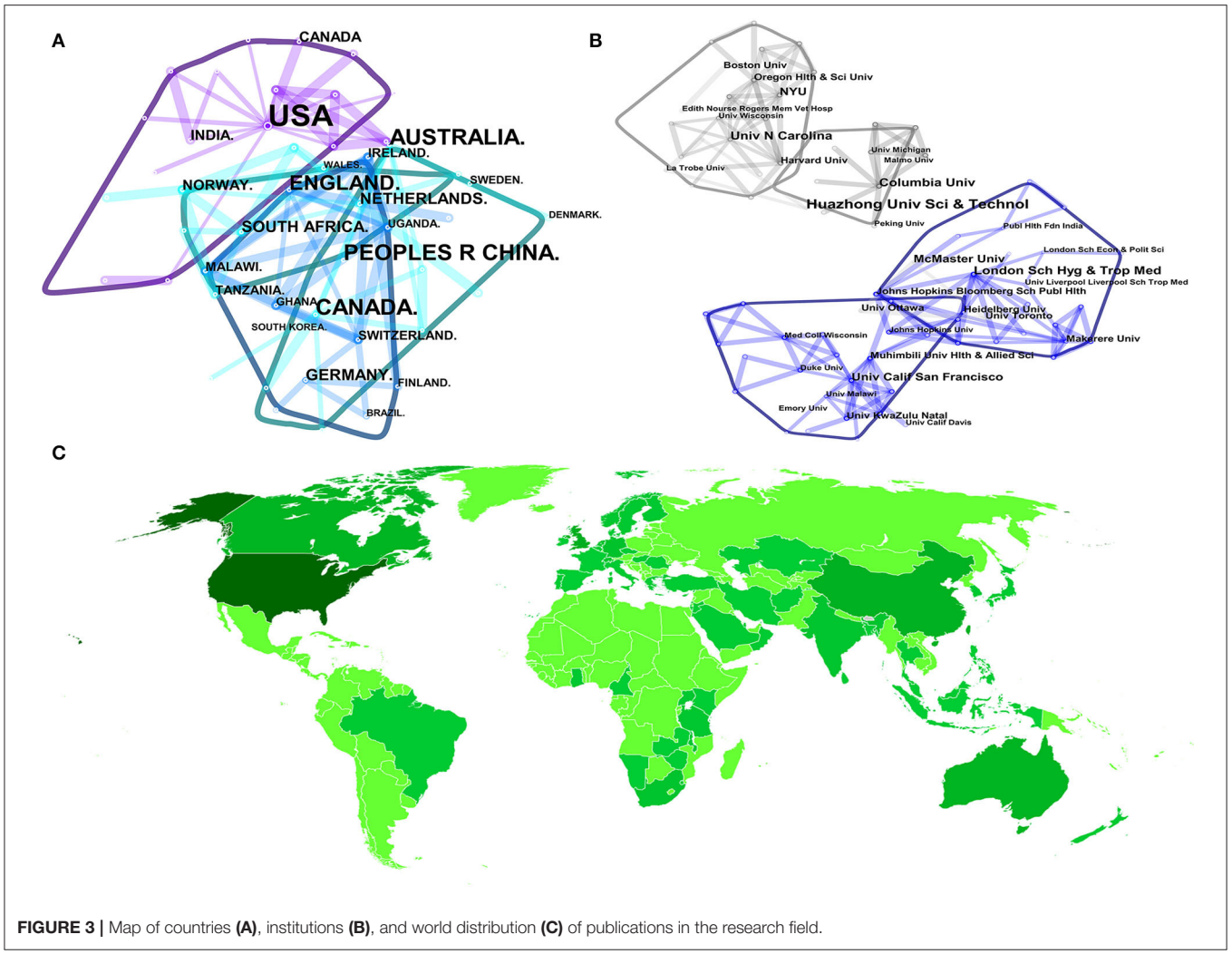

FIGURE 3 | Map of countries **(A)**, institutions **(B)**, and world distribution **(C)** of publications in the research field.

have made up over 70% of total publications, which indicated that they contributed chiefly to the research domain.

A total of 380 different institutions contributed to RHWs' career satisfaction during the past four decades. **Figure 3B** details the relationship among these institutions with 380 nodes and 445 links. Johns Hopkins University engaged in the most studies with seven documents, followed by Huazhong University Science & Technology with six literatures. Besides that, Columbia University, London School of Hygiene & Tropical Medicine, and Harvard University were also productive institutions with the same six publications, respectively. Among these five institutions, three of them were in the United States, and one of which was located in the United Kingdom and China, respectively. However, different partners seemed to have weak academic collaborations with each other, which might partially be due to the total amount of the research and insignificant attention.

Figure 3C represents the degree of contribution among the regions engaged in this domain from a global scale. From **Figure 3C**, it can be seen that countries and institutions in North America, Western Europe, and East Asia were dominated in the RHWs' job satisfaction field.

Analysis of Categories and Journals

The subject category could help researchers better know the focus and trends of recent studies (28). Subjects involved in publishing literature on RHWs' job satisfaction are displayed in **Figure 4A**. According to **Figure 4A**, it was obvious that "Health Care Sciences & Services," "Nursing," and "Public, Environmental & Occupational Health" seemed to be the major subjects. The subject network was made up of 63 nodes and 118 links, which indicated that 63 sub-disciplines participated in this research field with 118 connections built closely.

Subsequently, journals in the research field were analyzed. In this research, we defined journals as citing journals and cited journals. Citing journal was the journal publishing papers in the field of RHWs' job satisfaction, and cited journal was the journal where the references cited in this research field were published. The top 10 active journals published 85 papers, which accounted for 33.86% of the total publication outputs (**Table 2**). **Figure 4B** demonstrates the status of cited journals. In **Figure 4B**, 471 nodes and 2,939 links were built simultaneously, which meant that there were 471 cited journals in this domain. From **Table 2**, we can find that *Journal of*

TABLE 1 | Ranking of top five countries and institutions of the research domain.

Rank	Country	Publications	Percentage	Rank	Institution	Publications	Percentage
1	United States	86	34.2	1	Johns Hopkins Univ	7	2.8
2	United Kingdom	26	10.4	2	Huazhong Univ Sci & Technol	6	2.4
3	China	24	9.6	3	Columbia Univ	5	2.0
4	Australia	22	8.8	4**	London Sch Hyg & Trop Med	5	2.0
5*	Canada	22	8.8	5**	Harvard Univ	5	2.0

*Indicates a tie for fourth place.
**Indicates a tie for third place.

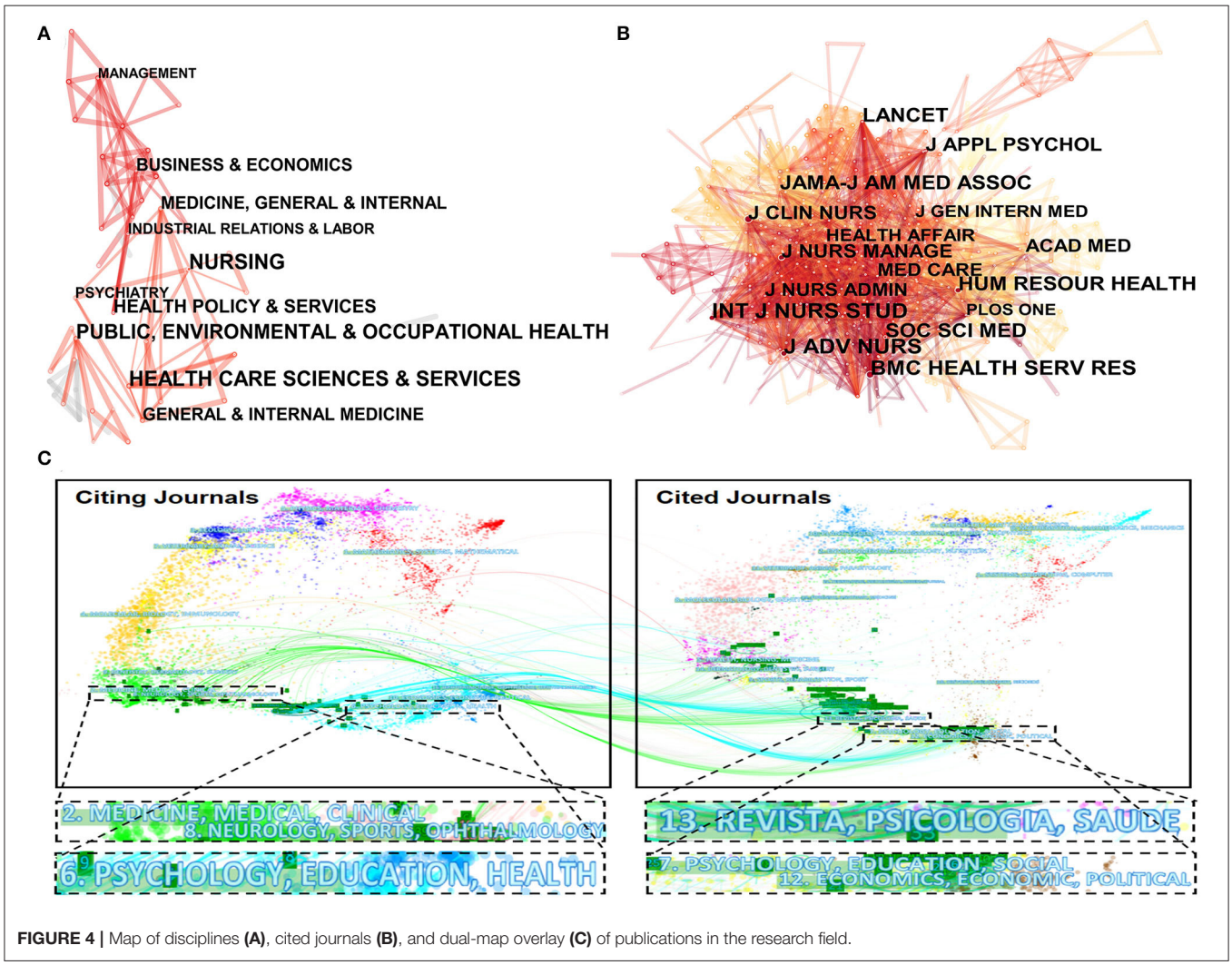

FIGURE 4 | Map of disciplines **(A)**, cited journals **(B)**, and dual-map overlay **(C)** of publications in the research field.

Advanced Nursing led the way with 82 co-citation counts, and *International Journal of Nursing Studies* and *BMC Health Services Research* also contributed to 78 and 73 counts, respectively. A famous international medical journal, including *LANCET* and *JAMA* sub-journal, also contributed to the top 10 co-citation counts. All these top 10 citing and cited journals were recognized as mainstream journals in the domain of RHWs' job satisfaction.

Figure 4C shows a dual-map overlay of the relationship between citing journals and cited journals in the research domain. In **Figure 4C**, there were two major citation paths worthy of attention. The green paths represented that research published in "medicine, medical, clinical" and "neurology, sports, ophthalmology" journals preferred to quote journals in the domains of "Revista, Psicolologia, Saude (Portuguese)." The blue paths showcased that studies published in "Psychology,

TABLE 2 | Ranking of top 10 journals and co-cited journals.

Rank	Citing journal	Publications	Rank	Cited journal	Co-citation counts
1	Human Resources for Health	16	1	Journal of Advanced Nursing	82
2	BMC Health Services Research	15	2	International Journal of Nursing Studies	78
3	Journal of Nursing Management	13	3	BMC Health Services Research	73
4	Rural and Remote Health	7	4	Human Resources for Health	62
5	Journal of Nursing Administration	6	5	Social Science & Medicine	61
6	Journal of Rural Health	6	6	LANCET	57
7	BMC Family Practice	5	7	JAMA-Journal of the American Medical Association	57
8	International Journal of Nursing Studies	5	8	Journal of Applied Psychology	53
9	Academic Medicine	4	9	Journal of Clinical Nursing	51
10*	BMJ Open	4	10	Journal of Nursing Management	49
11*	International Journal of Environmental Research and Public Health	4			

**Indicates a tie for ninth place.*

Education, Health" journals tended to cite journals mostly in the domains of "Psychology, Education, Social" and "Economics, Economic, Political." It is noteworthy that RHWs' job satisfaction is actually a comprehensive field, and more interdisciplinary collaborations are pending to promote.

Reference Co-Citation Analysis

The analysis of co-cited references can help us know the citation status of different scientific documents (26). The co-citation index was thought to be a critical indicator in several previous knowledge map studies that allows the researcher to better understand hotspots in specific research fields. Among algorithms to generate reference co-citation clusters, the log-likelihood ratio was applied in this study that can cover the "uniqueness and coverage" of all labels created. **Figure 5** represents the top 12 clusters in a timeline view. Modularity value (*Q* value) and weighted mean silhouette value (*S*-value) were applied to assess the rationality of clustering. Referring to the *Q* and *S* reported in the previous literature (29), the *Q* in our study equaled 0.9566 and *S* equaled 0.9889, which represented a relatively high level of clustering homogeneity, which in other words verified the rationality of clustering. In **Figure 5**, all clusters were labeled by index terms extracted from the references. The top three clusters were "motivation" #0, "rural and remote areas" #1, and "work environment" #2, respectively.

Keywords Analysis

Keywords can reflect major interests and current tendencies of a knowledge field. The VOSviewer software was applied to generate a network map of the co-occurrence keyword. By using a thesaurus to clean and purify the data, 92 keywords met the threshold and are presented in **Figure 6A**. There were 321 connections among these keywords, and the thickness of links demonstrated the occurrence frequency. Among all keywords included, "job satisfaction" (121 times), "retention" (62 times), "burnout" (42 times), and "turnover intention" (37 times) were the top 4 high-frequency keywords.

We next investigated the correlation among the top 20 keywords. The *Pheatmap* package of the *R* software 3.6.3 was used to generate the heat map. As shown in **Figure 6B**, *k*-means clustering algorithm was further applied to cluster these keywords included. In this figure, we can divide all clusters into three parts, the first part included "China" and "Quality of care"; the second part included "Job satisfaction," "Work satisfaction," "Stress," and "Rural"; and the third cluster included the remaining 14 keywords. Moreover, the first cluster reflected the area and districts in this research field and the second part emphasized the most concerned central phrases. Meanwhile, the third cluster mainly identified and illustrated the influencing factors of this research topic. We could find that people especially in China represent RHWs, such as rural health personnel and village doctors, whose job or work satisfaction was more relevant to their turnover intention, burnout, workforce, work environment, and so on. In addition, the quality of care especially primary healthcare seemed to have a stronger correlation with RHWs' job satisfaction and its corresponding influencing factors.

From **Figures 6A,B**, we further concluded the underlying relationship among these keywords. As shown in **Figure 6C**, the relationship can be simplified into three subjects, namely, "Job satisfaction," "Job burnout," and "Turnover intention." We could predict research frontiers through an in-depth understanding of the relationship among these keywords. The detailed analysis of relationship and influencing factors of these keywords are discussed in the next section.

DISCUSSIONS

This study provides a bibliometric analysis of publications on global RHWs' job satisfaction from 1995 to 2021. Based on the annual output analysis, we could find that the publication–year distribution has experienced a rapid growth during the past

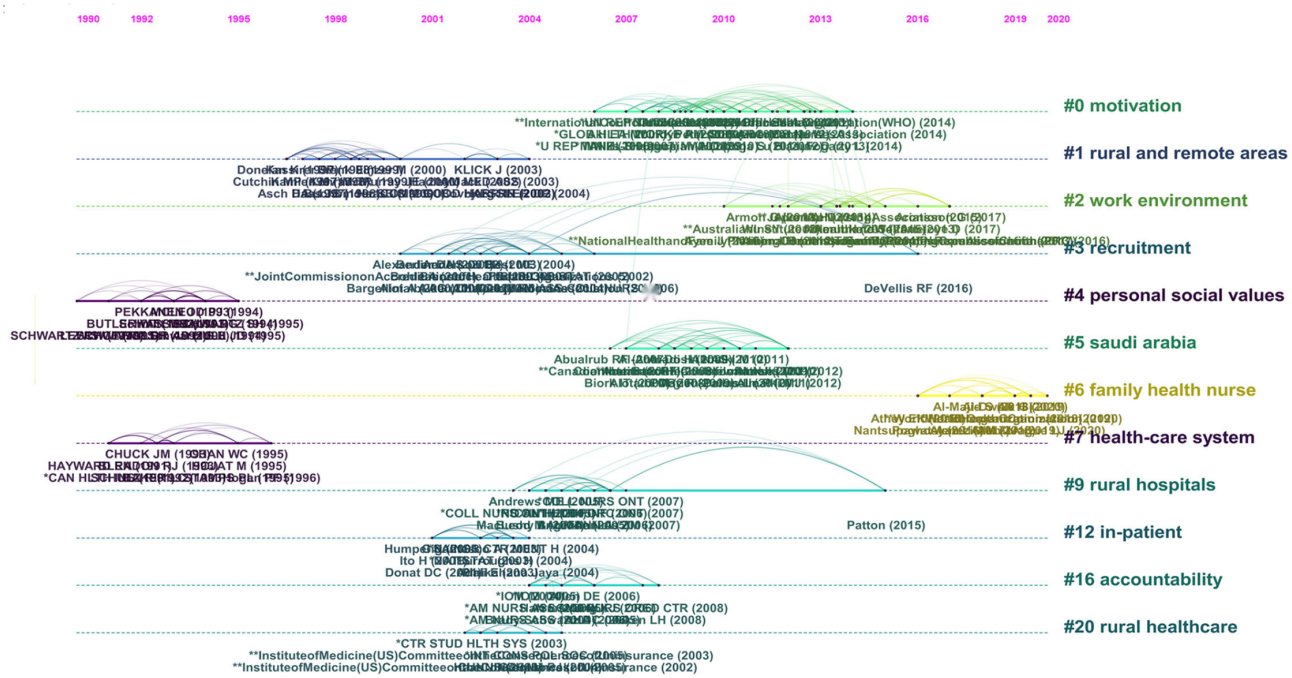

FIGURE 5 | The timeline view of the knowledge map is based on reference co-citation analysis.

27 years. Thus, studies on this issue have received increasing attention. Obviously, the developed countries represented by the United States and Britain have undertaken most of the research on this issue. As a country with 509.79 million rural people, accounting for 36.11% of the total population (30), Chinese studies on this important issue has only ranked third, even though this number has ranked first in developing countries. Simultaneously, more and more authoritative journals with high impact factors have participated in the discussion on RHWs' job satisfaction and, hence, this issue has also become more important.

From regional analysis, we can further get information about the global status of this special topic. Although RHWs were common in developing countries, institutions in developed regions seemed to invest more resources in caring about the job satisfaction of this special population. Strikingly, as the largest developing country, China also made specific contributions in this domain. China faces arduous challenges in the rapid loss of RHWs. A recent meta-analysis indicated that the prevalence of turnover intention of rural primary healthcare workers was about 23.4%−42.1% (28). Other studies had also shown the low job satisfaction of RHWs in China (1, 2, 31, 32). From the existing research, both of them had become an important reason to aggravate the occurrence of turnover behaviors.

In the following section, we further conducted the discussions based on the reference co-citation results and keywords' co-occurrence status. From **Figure 5**, three high-frequency clusters were summarized and analyzed. "Motivation," "rural and remote areas," and "work environment" were three noteworthy topics during the development of the research field.

The "motivation" cluster went from nearly 2005 to 2015. Positive motivation and job-satisfied healthcare staff represent a basis for the success of modern health institutions. One meta-analysis of motivation and retention for developing countries showed that seven major motivational themes could improve healthcare workers' job satisfaction and retention (33). Previous research on whether there were differences in job motivation and job satisfaction between urban and RHWs in Serbia showed that urban healthcare professionals were significantly more motivated and job satisfied than respondents from rural areas and positive motivation would be beneficial to promote job satisfaction (34). Another discrete choice experiment on the retention and motivation of healthcare workers in remote and rural areas of Nigeria also indicated that positive motivation could improve job satisfaction and enhance retention behaviors (35). A number of studies directed at RHWs in China also supported that motivation and job satisfaction were inseparable. Under the condition of insufficient objective resources, strong motivation was an important subjective condition to improve job satisfaction and reduce turnover intention (2, 14, 31, 32, 36–38).

"Rural and remote areas" was another topic worthy of concern. The shortage of healthcare workers combined with low satisfaction is a worldwide problem but is particularly critical in rural and remote areas. One qualitative study in Mali, sub-Saharan Africa emphasized this result prominently, and individual-level factors, unattractive living and working conditions, community recognition and participation, and quality of leadership could all contribute to this phenomenon (39). Although the supply of pharmacists in Australia exceeded the demand, the supply of pharmacists in rural and remote

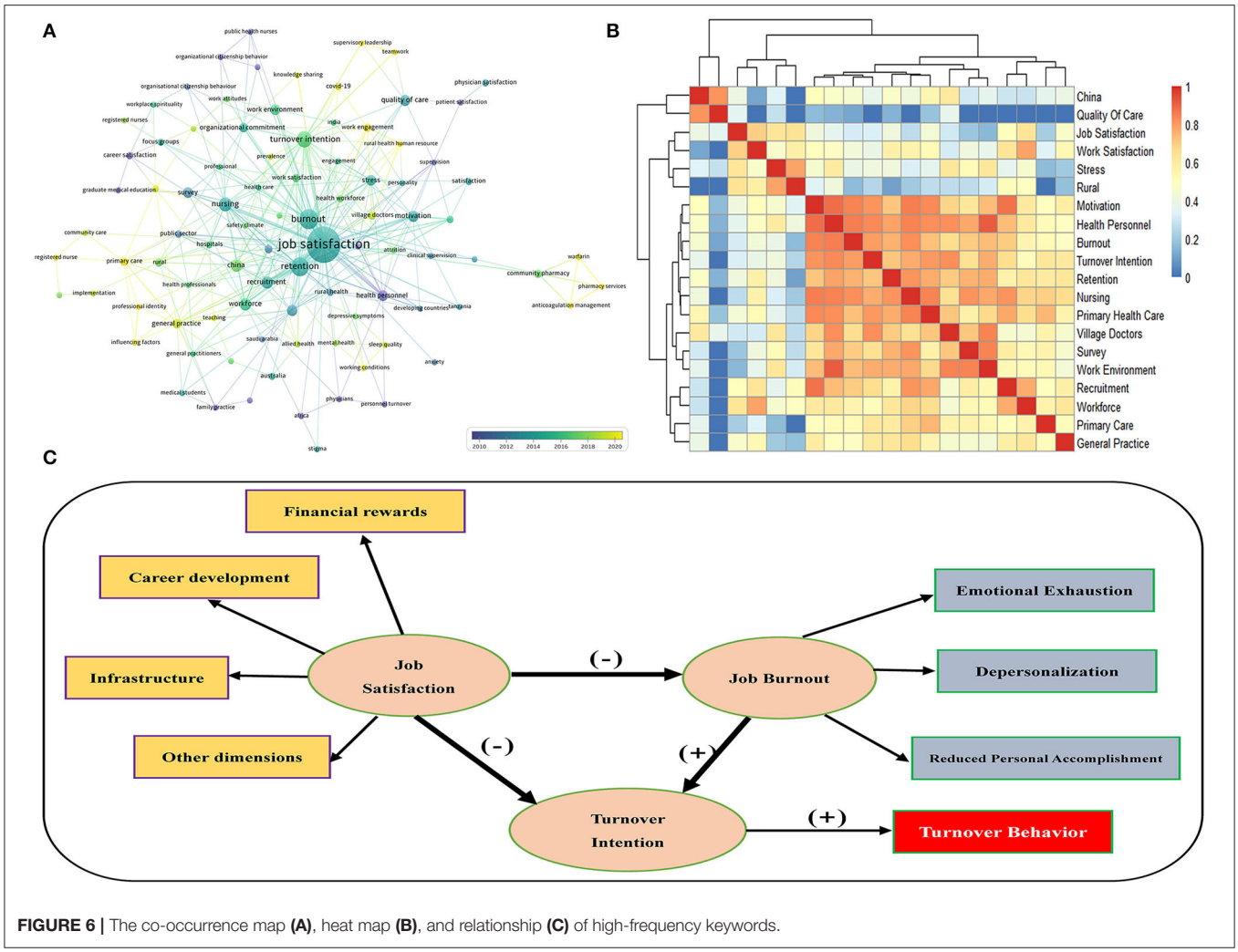

FIGURE 6 | The co-occurrence map **(A)**, heat map **(B)**, and relationship **(C)** of high-frequency keywords.

areas was still insufficient, even if their job satisfaction level was high (40, 41). In the remote rural areas of Western China, the job satisfaction of RHWs was significantly lower than that of economically developed provinces or regions in the East (1, 2, 36, 38, 42).

"Work environment" was an emerging topic which sprung up in recent years. A survey for exploring the association between RHWs and work environment in rural Papua New Guinea indicated that work environment and supportive supervision are the most important influences of job satisfaction for rural nurses in a low- and middle-income country; consequently, the provision of a conducive environment requires attention to the aspects of human relationships (43). Another study directed at rural nurses in Brazil had shown that working conditions, infrastructure, forms of access to the workplace, and distance from the decision center were factors that stood out as difficulties of work, and they were also key factors affecting job satisfaction (44). In addition, some studies on Chinese village doctors also found that various indicators of the working environment were important factors affecting job satisfaction (2, 31, 32, 37, 45). However, in the context of the COVID-19 pandemic, there were few studies on the impact of the work environment on job satisfaction, especially in developing countries.

Discovery and exploration of the relationship among influencing factors were carried out in this study. The following three subjects "Job satisfaction," "Job burnout," and "Turnover intention" seemed to be the major factors. Job burnout is characterized by three dimensions, namely, emotional exhaustion, depersonalization, and reduced personal accomplishment (46), and is affected by work factors, individual factors, organizational factors, and social factors (11, 47). In the classical turnover theory, turnover intention is usually regarded as an important cognitive process before turnover behavior. It is the most effective antecedent variable to predict turnover behavior, that is, the higher the turnover intention, the greater the probability of an individual taking turnover behavior (20, 48). According to the resource conservation theory, the individual's own resources are relatively limited. When the external environment poses a potential threat to it or the resources are not supplemented accordingly, it will cause the individual to feel pressure and even lead to the occurrence of job burnout. Resignation is the most common behavior for

individuals to deal with job burnout and protect their physical and mental resources.

According to our research results, we could clearly get the relationship between the three factors, that was, job satisfaction had a significant negative predictive effect on RHWs' job burnout and turnover intention, and job burnout had a significant positive predictive effect on turnover intention, and we could deduce the relationship among each other in **Figure 6C**. Several studies were consistent with conclusions in this study. Evidence supported that job burnout of medical workers was closely related to turnover intention, and there was a significant positive correlation between them, namely, the higher the degree of job burnout, the stronger the turnover intention (13, 49–51). One study on the relationship between job burnout and turnover intention of medical workers covering 25 provincial administrative regions from 2007 to 2020 in China showed that the correlation coefficient *R*-value between job burnout and turnover intention reached 0.43, which meant a high correlation effect (49). Job burnout leads to the disappearance of work enthusiasm and alienation from the organization and occupation, which increases the degree of turnover intentions or turnover behaviors (13, 20, 51–53). One survey about primary healthcare providers in rural China using structural equation modeling demonstrated that job satisfaction proved to be negative predictors of turnover intention, whereas reduced personal accomplishment of job burnout was identified as a positive predictor. Another study on job burnout, satisfaction, and turnover intention of primary healthcare staff in Central China also confirmed this conclusion (51).

Several highly cited references of bibliometrics have brought us enlightenment about the status and probable risk factors of global RHWs' job satisfaction. The first-ranked article was published in the *International Journal of Nursing Studies* and has been cited 420 times as of the time of writing (54). It comprehensively reviewed the literature related to nursing turnover and clarified a series of determinants of it, including job satisfaction, burnout, and so on. In particular, it included a number of literatures, such as the analysis of the differences in job satisfaction and turnover rates between urban and rural hospitals and nursing units in the United States (55), the relationships between job satisfaction and turnover intention among primary healthcare nurses in a rural area of South Africa (56), and the predictors of turnover intention of nurses in all rural and remote practice settings in Canada (57). Based on this study, working environment, professional rank, turnover intention, working pressure, and job burnout were all the important influencing factors of RHWs' job satisfaction, and this was consistent with the findings of this article (54–57). The second-ranked study, which was cited 273 times, also explored the variables related to nurses' job satisfaction through meta-analysis and found that job satisfaction was most strongly correlated with job stress, followed by nurse-physician collaboration, and autonomy (58). The third-ranked study, which was published in the journal of *Archives of Internal Medicine* and was cited 210 times, compared career satisfaction across specialties among 12,474 US physicians (59). Unlike most other developing countries whose RHWs had poor job satisfaction status, they had higher job satisfaction in the US and varied across specialty as well as age, income, and region. Similar to the findings of this study, the fourth-ranked study, which was published in *British Medical Journal* (BMJ) and was cited 157 times, found that RHWs in England also had higher job satisfaction and the rise in intentions to quit was due mainly to a reduction in job satisfaction (60). The fifth-ranked study was cited 133 times and found that low job satisfaction, poor opportunities for development, lack of affective professional commitment, or other factors were the reasons why young nurses had often thought of giving up nursing in Finland (61). In short, there is a strong correlation or prediction between turnover intention, job burnout, and job satisfaction among RHWs, and based on the global perspective, the job satisfaction of RHWs in developed countries is generally higher than that in developing countries.

Collectively, the status of RHWs' job satisfaction is a rarely known but increasingly important issue in today's public health affairs. The world is certainly a better place to live than it used to be, with some previously impoverished parts of the world also experiencing positive developments. The RHWs' career status was one of the most important indicators in this topic. By doing this research, the global research status in this field was vividly demonstrated from the scientometric perspective. In addition, job satisfaction and its related affecting or risk factors were identified and deeply analyzed. This study contributed to informing the broader and more specialized audience involved in health policy decisions. We appealed to all regions worldwide to strive to improve the working environment and current situation of rural doctors and make unremitting efforts to achieve health equity in the coming future.

There were also some limitations in this study. First, the database analyzed in our research was limited to the SCI-Expanded of WOS, and we did not include data from other relevant search engines. However, this data source has been recognized for the quality of its papers, which has been widely applied for most scientometric studies. Second, there was a linguistic bias due to the fact that we only included English publications, despite English remaining the most commonly used language in the world. Besides, only article and review were selected as document type for analysis, while these two types may not fully represent all studies in this research domain. However, article and review were considered the mainstream of publications. Referring to the novel strategy of scientometric and several previous articles (62), the future study can conduct the analysis of journal impact to better reflect the correlation between the quantity or quality of publications, and burst analysis to further discover the emerging trends and grasp the research hotspots. Despite these limitations, we were still confident that the findings of this study can provide an effective perspective of rural healthcare workers' job satisfaction from a global insight.

CONCLUSION

This study performed a scientometric analysis from 1995 to 2021 in rural healthcare workers' job satisfaction and demonstrated that this research field had great development potential and broad prospects. The amounts of publications increased from 1 in 1995 to 24 in 2021. The most frequent study category was

"Health Care Sciences & Services." The USA, China, Australia, Canada, and the UK are made up of the core research forces. As an emerging topic related to RHWs' job status, job satisfaction and its related affected factors were systematically summarized by cluster and keywords analysis. During the development of this research field, "motivation," "rural and remote areas," and "work environment" were three noteworthy topics. We also highlighted the relationship among job satisfaction, job burnout, and turnover intention in this special group, which can provide scholars with potential directions for future topic selection. In addition, the job satisfaction and working environment of RHWs under COVID-19 pandemic should receive more attention in the future.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

YC and YY: conceptualization, material search, data extraction, and writing—original draft preparation. YC, YY, and YiW: methodology. YC, YY, and YuW: data analysis. YC, YY, YuW, and YiW: writing—review and editing. TD: supervision, project administration, and funding acquisition. All authors have read and agreed to the published version of the manuscript.

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EDITED BY
Oriol Yuguero,
Lleida Institute for Biomedical Research (IRBLleida), Spain

REVIEWED BY
Lei Shi,
Southern Medical University, China
Sharad Raj Onta,
Tribhuvan University, Nepal

*CORRESPONDENCE
Fengjie Yang
yangfjml@126.com
Nan Jiang
jianmam@163.com

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Job satisfaction and its related factors among emergency department physicians in China

Kang Li[1], Hongmei Chen[2], Zhen Tan[3], Xiaoxv Yin[4], Yanhong Gong[4], Nan Jiang[4]* and Fengjie Yang[5]*

[1]Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China, [2]School of Nursing, Wuchang University of Technology, Wuhan, China, [3]Shenzhen University General Hospital, Shenzhen University, Shenzhen, China, [4]Department of Social Medicine and Health Management, School of Public Health, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China, [5]Department of Pediatrics, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China

Background: Job satisfaction is recognized as an important factor affecting the performance and quality of medical services of emergency department physicians. However, little is known about the status of job satisfaction among emergency department physicians in China. This study aimed to explore the current level of job satisfaction and its associated factors among emergency department physicians in China.

Methods: A nationwide cross-sectional survey was conducted in China from July to August 2018. A total of 10,457 emergency department physicians completed the questionnaire. The structured online questionnaire collected information on socio-demographic characteristics, work-related factors, work-family conflict, and job satisfaction. Student's *t*-test or ANOVA were used to compare the job satisfaction scores in different characters. The generalized linear model was used to investigate the related factors of job satisfaction among emergency department physicians.

Results: The respondents' job satisfaction average score was 12.2 ± 3.6, of which 42.01% were satisfied of which the job. The results showed that emergency department physicians over 41 years old, with a higher income and working in central and western regions were positively associated with job satisfaction. In contrast, bachelor degree and above, fixed posts, long years of service, a high frequency of night shift, perceived shortage of physicians, perceived medical errors, and higher work-family conflict scores were negatively correlated with job satisfaction among emergency department physicians.

Conclusion: Job satisfaction of emergency department physicians in China is low. It is suggested that hospital administrators could improve the job satisfaction of emergency department physicians by establishing an acceptable shift system, ensuring adequate emergency department staffing, increasing their income appropriately and alleviating work-family conflict.

KEYWORDS

job satisfaction, physicians, emergency department, China, cross-sectional study

Introduction

Job satisfaction is a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences (1). It has been reported that the job satisfaction of emergency department physicians has a significant impact on job performance. High level of job satisfaction can improve employee productivity and creativity (2) and are also associated with an efficient organization (3). Besides, high level of job satisfaction contributes to the stability of the emergency medical team due to its significant correlation with a low turnover rate (4). Correspondingly, dissatisfaction with the job can lead to a lower sense of belonging to the organization and a higher willingness to resign (5), affecting the quality of medical services provided by emergency department physicians. In severe cases, it can also threaten the safety of patients' lives (6). Therefore, hospital administrators should explore the status of job satisfaction of emergency department physicians (7).

Although some studies have reported on the level of job satisfaction among emergency department staff, few have been conducted on emergency department physicians, especially in China. A survey conducted in Beijing revealed that 6.8% of emergency department physicians were satisfied or very satisfied with their job (8), much lower than in the developed countries (9–11). What's more, with the growing demand for emergency medical services and the worsening shortage of emergency department physicians, the job satisfaction of emergency department physicians in China will become worse (12). It has been reported that from 2005 to 2017, the number of emergency department attendances has tripled from 51.9 to 166.5 million (13). In large cities in China, the workforce shortage in the emergency department is severe, with annual staff turnover rates approaching 50% (14).

After years of research, numerous variables regarding the individuals and work-related factors are identified to be associated with job satisfaction. A survey conducted in the United States showed that age and sex were predictors of emergency department physicians' job satisfaction (15). Increased age and clinical hours worked per year were associated with low job satisfaction of emergency department physicians based on an investigation in Canada (10). In addition, other factors including income, marital status and frequency of night shift had significant effects on job satisfaction among emergency department physicians in Jordan (16). The conflict between work and family often puts emergency department physicians under high levels of pressure, which is also disadvantage to their job satisfaction (17, 18). Few studies reported the related factors of job satisfaction among emergency department physicians in China (8, 19), and they have been conducted in certain hospitals in a few provinces and cities. The representative data on a national scale is lacking. This study was conducted nationwide to gain a comprehensive understanding of job satisfaction among emergency department physicians in China. The aim of this study is to evaluate the current status of job satisfaction among emergency department physicians and explore its associated factors.

Methods

Ethics statement

Study approval was obtained from the Research Ethics Committee of Hainan Medical University (Approval Number: HYLL-2018-035). All emergency department physicians participating in the survey obtained informed consent, and all the data would be kept confidential.

Study design

This national cross-sectional study was conducted from July to August 2018 with the assistance of the Medical Administration Bureau of the National Health Commission of the People's Republic of China.

Participants and data collection

The Questionnaire Star (https://www.wjx.cn/), an online investigative tool in China, was used to collect data. The electronic questionnaire was posted on the emergency department physicians' working platform, inviting emergency department physicians to take part in the survey anonymously. Every seven days, the questionnaire link was re-posted to the working platform to remind emergency department physicians to respond until the survey was completed. Before participating in the survey, all respondents needed to read and agree to the electronic informed consent statement. Respondents could not submit the questionnaire unless it was completed. All data were saved and managed by the Questionnaire Star. A total of 15,288 emergency department physicians clicked on the link of the questionnaire during the survey and 10,457 completed the questionnaire. The completion rate was 68.40%.

Measures

The electronic questionnaire was designed based on literature review and pre-surveyed among 30 emergency department physicians. Based on the pre-survey results, the questionnaire was modified to ensure its understandable. Next, it was applied to data collection in formal surveys.

The questionnaire covered socio-demographic characteristics, work-related factors, work-family conflict, and job satisfaction. Specifically, the socio-demographic characteristics included age, gender, educational level, marital

status and geographical region. According to the China Health and Family Planning Statistical Yearbook, we divided China into three regions, the eastern region (11 provinces), the central region (8 provinces), and the western region (12 provinces) (20). Work-related factors covered authorized strength, way of appointment, monthly income, years of service, frequency of night shift, perceived shortage of physicians, and perceived medical errors. The question: "Do you think the current number of physicians in the emergency department can meet the needs of daily work?" was used to assess the perceived shortage of physicians. The perceived medical errors were examined by one question: "In the past 3 months, have you worried that you have made a serious medical error?"

The Work-Family Conflict Scale designed by Netemeyer et al. (21) was used to assess the work-family conflict of emergency department physicians. Five items made up the scale and a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used to score each item. The total score ranged from 5 to 30. The higher the score, the more prominent the conflict between family and work. The scale has been proved to be reliable and valid in previous studies in China (22, 23). The Cronbach's α for the scale was 0.94 in this study.

The Leiden Quality of Work Questionnaire was used to assess the job satisfaction of emergency department physicians (24, 25). The scale consists of 6 items, including "If I had to choose, I'd choose this job again"/"I would like to change my job"/"I'm satisfied with my job"/"I would recommend this job to a friend"/"When I applied, this was the job that I wanted"/"I often have to do work that I'd rather not do". Each item was scored on a 4-point Likert scale, ranging from 1 (totally disagree) to 4 (totally agree). The total score ranged from 4 to 24. A higher score reflected a higher level of job satisfaction and a score above the average was defined as being satisfied with the job (26). In this study, the scale had a Cronbach's alpha value of 0.86.

Data analysis

The Statistical Analysis System (SAS) version 9.4 for Windows (SAS Institute Inc., Cary, NC, USA) was used to perform the statistical analyses. In descriptive statistics, we used frequencies and percentages to describe categorical variables. Means and standard deviations were used to describe continuous variables. Student's *t*-test or ANOVA were used to compare the job satisfaction scores of physicians in different characters, and the Satterthwaite test was conducted when the homogeneity test of variances was significant. Kolmogorov-Smirnov test was used to test the normality of job satisfaction. A generalized linear model was used to analyze the associated factors of job satisfaction of physicians in the emergency department because the distribution of job satisfaction was abnormal (K-S = 0.098611, $P < 0.0100$). All comparisons were two-tailed, and a $P < 0.05$ was determined to be statistically significant.

Results

Characteristics of the participants

The general characteristics of the participants are shown in Table 1. A total of 10,457 emergency department physicians participated in the survey, with an average age of 36.5 ± 7.5 years. The largest proportion of respondents was in the 31–41 years age group, making up 42.71%. 72.98% of the respondents were male and 27.02% were female. Nearly 75% of the respondents had a bachelor's degree. The marital status of the emergency department physicians was mainly married, accounting for 84.42%. Among them, physicians from the eastern region and the western region each accounted for about 36%. Approximately two-thirds of respondents had an establishment, and nearly three-quarters had a fixed position. Only 29.00% of emergency department physicians had a monthly income of more than 6,000 RMB and more than half worked night shifts 6–10 times a month. The years of service of the respondents were mainly more than 6 years (48.24%) and most of them (73.32%) perceived a shortage of emergency department physicians. Besides, 43.63% of the respondents perceived medical errors.

Job satisfaction of emergency department physicians

The job satisfaction of emergency department physicians with different characteristics is presented in the Table 1. The average score of the job satisfaction of respondents was 12.2 (SD = 3.6). 42.01% of the respondents were satisfied with the job. In addition, the univariable analysis shows that there were significant differences in the job satisfaction among emergency department physicians in terms of age, gender, educational level, marital status, geographical region, authorized strength, way of appointment, years of service, frequency of night shift, perceived shortage of physicians and perceived medical errors.

Factors associated with the job satisfaction among emergency department physicians are presented in Table 2. The emergency department physicians over 41 years old showed higher job satisfaction ($P = 0.0006$). In comparison to emergency department physicians with vocational diploma or below, physicians attending a bachelor degree ($P < 0.0001$) and master degree or above ($P < 0.0001$) were less satisfied with their job. Besides, physicians in the eastern region had lower job satisfaction than those in the central region ($P < 0.0001$) and western region ($P < 0.0001$). In terms of work-related variables, physicians with a fixed post ($P = 0.0002$),

TABLE 1 Univariate analysis of job satisfaction of emergency department physicians ($n = 10,457$).

Variables	Number (%)	Job satisfaction scores (mean ± SD)	Statistical values (F/t)
Socio-demographic variables			
Age			45.38**
≤31	3,111 (29.75)	12.39 ± 3.58	
31–41	4,466 (42.71)	11.79 ± 3.55	
≥41	2,880 (27.54)	12.52 ± 3.56	
Gender			−8.39**
Male	7,632 (72.98)	11.99 ± 3.62	
Female	2,825 (27.02)	12.64 ± 3.42	
Educational level			99.62**
Associate degree or below	1,684 (16.10)	13.28 ± 3.62	
Bachelor degree	7,789 (74.49)	11.94 ± 3.51	
Master degree or above	984 (9.41)	12.11 ± 3.64	
Marital status			4.06**
Unmarried/other	1,629 (15.58)	12.51 ± 3.71	
Married	8,828 (84.42)	12.11 ± 3.55	
Geographical region			
Eastern region	3,807 (36.41)	11.96 ± 3.60	24.70**
Central region	2,830 (27.06)	12.56 ± 3.56	
Western region	3,820 (36.53)	12.09 ± 3.54	
Work-related variables			
Authorized strength			−3.09*
Yes	6,714 (64.21)	12.09 ± 3.56	
No	3,743 (35.79)	12.31 ± 3.60	
Way of appointment			7.97**
Rotate	2,511 (24.01)	12.66 ± 3.63	
Fixed post	7,946 (75.99)	12.01 ± 3.55	
Monthly income (RMB)			0.84
≤4,000	3,862 (36.93)	12.23 ± 3.67	
4,001–6,000	3,562 (34.06)	12.13 ± 3.51	
≥6,001	3,033 (29.00)	12.14 ± 3.53	
Years of service			63.01**
≤1	1,448 (13.85)	12.98 ± 3.51	
1–5	3,965 (37.92)	12.29 ± 3.57	
≥6	5,044 (48.24)	11.83 ± 3.56	
Frequency of night shift (per month)			189.76**
0–5	2,033 (19.44)	13.45 ± 3.59	
6–10	5,633 (53.87)	12.04 ± 3.47	
≥11	2,791 (26.69)	11.50 ± 3.54	
Perceived shortage of physicians			35.48**
No	2,790 (26.68)	14.11 ± 3.39	
Yes	7,667 (73.32)	11.46 ± 3.38	
Perceived medical errors			−24.85**
Yes	4,562 (43.63)	11.22 ± 3.33	
No	5,895 (56.37)	12.90 ± 3.59	

**p < 0.001 level (two-tailed).
*p < 0.05 level (two-tailed).

TABLE 2 Generalized linear regression examining factors associated with job satisfaction.

Variables	β	SE	t	p-value
Socio-demographic variables				
Age (ref: ≤31)				
31–41	0.057	0.078	0.74	0.4613
≥41	0.323	0.095	3.42	0.0006
Gender (ref = male)				
Female	0.085	0.066	1.30	0.1927
Educational level (ref = vocational diploma or below)				
Bachelor degree	−0.657	0.082	−8.01	< 0.0001
Master degree or above	−0.823	0.124	−6.63	< 0.0001
Marital status (ref = unmarried/other)				
Married	0.091	0.085	1.07	0.2854
Geographical region (ref = Eastern region)				
Central region	0.399	0.074	5.41	< 0.0001
Western region	0.268	0.067	4.01	< 0.0001
Work-related variables				
Authorized strength (ref = yes)				
No	−0.007	0.064	−0.11	0.9115
Way of appointment (ref = rotate)				
Fixed post	−0.266	0.072	−3.67	0.0002
Monthly income (RMB) (ref: ≤4,000)				
4,001–6,000	0.174	0.069	2.51	0.0122
≥6,001	0.164	0.076	2.15	0.0315
Years of service (ref: ≤1)				
1–5	−0.201	0.094	−2.13	0.0331
≥6	−0.500	0.104	−4.83	< 0.0001
Frequency of night shift (per month) (ref: 0–5)				
6–10	−0.611	0.077	−7.94	< 0.0001
≥11	−0.700	0.089	−7.91	< 0.0001
Perceived shortage of physicians (ref = no)				
Yes	−1.249	0.069	−18.13	< 0.0001
Perceived medical errors (ref = no)				
Yes	−0.795	0.059	−13.49	< 0.0001
Work-family conflict	−0.398	0.008	−50.80	< 0.0001

$F = 378.48$, $p < 0.0001$. R^2 was 0.395.
Ref is a reference.

a work experience of 1–5 years ($P = 0.0331$) and more than 6 years ($P < 0.0001$), 6–10 night shifts ($P < 0.0001$) and ≥11 night shifts ($P < 0.0001$) per month presented lower job satisfaction scores. Emergency department physicians with a monthly income of between 4,001 and 6,000 RMB ($P = 0.0122$) and more than 6,000 RMB ($P = 0.0315$) had higher job satisfaction than those with ≤4,000 RMB. Besides, physicians who perceived the shortage of physicians ($P < 0.0001$) and medical errors ($P < 0.0001$) were less satisfied with their job. Work-family conflict ($P < 0.0001$) also had negative impacts on job satisfaction.

Discussion

This study reported the current situation of job satisfaction among emergency department physicians in China and explored its relationship with both socio-demographic characteristics and work-related factors. According to our study, less than half of the emergency department physicians were satisfied with their jobs, much lower than in other countries, including the United States (65.2%) (9) and Canada (75.5%) (10). This finding suggested that more attention should be paid to improving emergency department physicians' job satisfaction in China.

In the present study, emergency department physicians aged more than 41 years old had higher job satisfaction. This result was consistent with the previous study (27) and highlighted the importance of enhancing job satisfaction of young emergency department physicians. In addition, emergency department physicians with bachelor degrees or above were less satisfied with the job than those with vocational diplomas or below. It may be because emergency department physicians with higher education levels have more expectations of their careers. They are less likely to reach a state of satisfaction with their work (28). The higher the educational level, the greater the likelihood that the emergency department physicians will feel dissatisfied with daily routine tasks (29, 30). Therefore, hospital administrators should provide more opportunities for highly educated emergency department physicians to fulfill their job expectations.

Furthermore, emergency department physicians working in the eastern region showed lower job satisfaction than physicians in the central and western regions. This may be due to the heavier workload of emergency physicians in the eastern region. It is estimated that in 2018, the average number of patient visits undertaken per day by each physician in the eastern region was 8.1, higher than 5.6 in the central region and 6.5 in the western region (31). According to the job demand-control model theory, workload, as one of the key determinants of demand, is considered a source of stress and dissatisfaction (32). It has been reported that high levels of physician workload are significantly associated with reduced job satisfaction (33, 34). As a result, hospital administrators and policymakers should reduce the workload of emergency department physicians in the eastern region.

Our study also observed that work-related factors were significantly associated with the job satisfaction of emergency department physicians. Firstly, emergency department physicians with fixed posts seemed to be less satisfied with the job. This may be related to the work content and working environment of emergency department physicians. Emergency department physicians not only handle patients with acute and critical illnesses, but also work in a chaotic environment that is prone to violence (35, 36). Physicians with fixed posts means they have to be faced with the poor working environment all the time, which contributes to low job satisfaction. Secondly, those with long years of service possessed lower job satisfaction in this study. According to the previous study, emergency department physicians with long years of service reported more working hours, which could result in emotional exhaustion and fatigue (37). It has been validated that emotional exhaustion and fatigue are negatively associated with job satisfaction. Thirdly, the high frequency of night shifts and a perceived shortage of physicians were detrimental factors for job satisfaction. Similar results were observed in other studies (38–40) and it can be explained by the increasing workload resulting from the above two factors. Moreover, the long-term heavy workload can also damage the physical health of emergency department physicians, which in turn reduces their job satisfaction. In order to improve the job satisfaction of emergency department physicians, hospital managers should improve their working environment, develop a scientific night shift system and ensure adequate staffing.

This study also found that physicians with a monthly income of between 4,001 and 6,000 RMB and more than 6,000 RMB had higher job satisfaction. The result is consistent with previous research (27, 28, 41). According to the effort-reward imbalance theory (42), income is an important component of emergency department physicians' perceived rewards for their work. The lower the income, the more likely emergency department physicians are to lack reciprocity between effort and reward, resulting in them being in a state of emotional distress and more likely to be dissatisfied with the job (43). In contrast, emergency department physicians with a higher income are easier to perceive a balance between efforts and rewards in work, resulting in higher job satisfaction (44, 45). Accordingly, increasing the income of emergency department physicians may help improve their job satisfaction.

In our study, perceived medical errors were negatively correlated with job satisfaction. Undoubtedly, medical errors could lead to patients' dissatisfaction with treatment, affecting the doctor-patient relationship (46). According to previous research (26, 47), a bad doctor-patient relationship was to the disadvantage of the job satisfaction of emergency department physicians. In addition, medical errors can also make physicians less confident about their future career development, resulting in dissatisfaction with the job. Consistent with prior research findings (48, 49), work-family conflict had a negative influence on job satisfaction. Role stress theory, which assumed a disagreement between the requirements and values of an individual's work role and family role could explain the effects of work-family conflict on job satisfaction (50). When a physician thought his or her energy and time participating in family activities were interfered with by work, he or she might feel unhappy and dissatisfied with the job. Consequently, a more reasonable work allocation and vacation system for physicians to better balance work and life is necessary.

The completion rate of this study was 68.40%, which was higher than that of similar web-based survey studies (51–55). However, nearly one-third of emergency department physicians

did not complete the questionnaire, possibly due to the following three reasons. Firstly, emergency department physicians are very busy in China, typically working 40–50 h per week (56). At the same time, they also have to bear the burden of family (41), so some emergency department physicians did not have sufficient time to participate in the investigation. Secondly, participants were required to complete all of the questions before submitting. Some emergency department physicians failed to submit the questionnaires because they missed some questions. Thirdly, quality control questions were randomly set in the questionnaire, and data for incorrectly completed these questions were not included in the analysis.

Strengths and limitations

To the best of our knowledge, this study was the first to investigate the job satisfaction of emergency department physicians on a nationwide scale. The related factors of job satisfaction will provide a valuable basis for formulating interventions. However, there were some limitations in the study. Firstly, this study was a cross-sectional study and clear causal conclusions could not be drawn. Further prospective research is needed. Secondly, nearly one-third of emergency department physicians in this study did not complete the questionnaire, which may cause some impacts on the results of the study. However, the incompletion rate is similar to previous studies of web-based survey of other population (51–55). In the future, we can apply incentives and other measures to further increase the completion rate of web-based surveys to obtain more accurate results. Thirdly, the results only reflected the situations in China. Due to different implementation of policy and health system reforms in different countries, conclusions might not adapt to other countries.

Conclusion

The job satisfaction of emergency department physicians in China is at a low level. Based on the survey results, hospital administrators need to take targeted measures to improve the job satisfaction of emergency department physicians. On the one hand, reasonable work arrangements and adequate staffing of the emergency department are needed. On the other hand, an acceptable shift system and a scientific reward mechanism are also helpful to improve the job satisfaction of emergency department physicians.

Data availability statement

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

Ethics statement

The study was approved by the Research Ethics Committee in Hainan Medical University, Hainan, China (Approval Number: HYLL-2018-035). All participants provided their informed consent before participating in this study.

Author contributions

KL, XY, NJ, and FY participated in the design of the study. XY, ZT, and YG collected the data. KL, HC, ZT, and NJ were involved in the data analysis. XY, ZT, NJ, and FY were involved in the supervision of the study. KL, XY, and NJ participated in the manuscript writing. XY, NJ, and FY contributed to the critical revisions of the manuscript. All authors read and approved the final manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Oriol Yuguero,
Lleida Institute for Biomedical Research (IRBLleida), Spain

REVIEWED BY
Athanasia Pataka,
Aristotle University of Thessaloniki, Greece
Isis Gil-Miravet,
University of Jaume I, Spain
Carlos Roncero,
University of Salamanca, Spain

*CORRESPONDENCE
Iván Echeverria
gomechiva@alumnos.uchceu.es

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Burnout, psychopathology and purpose in life in healthcare workers during COVID-19 pandemic

Marcelo O'Higgins[1], Luz Angela Rojas[2], Iván Echeverria[3,4]*, Lorena Roselló-Jiménez[5], Ana Benito[4,6] and Gonzalo Haro[3,4]

[1]Department of Psychiatry, School of Medical Sciences, National University of Asunción, Asunción, Paraguay, [2]Fundación Universitaria del Área Andina, Bogotá, Colombia, [3]Department of Mental Health, Consorcio Hospitalario Provincial de Castellón, Castellón de la Plana, Spain, [4]TXP Research Group, Universidad Cardenal Herrera-CEU, CEU Universities, Castellón de la Plana, Spain, [5]Department of Basic Psychology, Clinic and Psychobiology, Jaume I University, Castellón de la Plana, Spain, [6]Torrente Mental Health Unit, Hospital General de Valencia, Torrente, Spain

Background: The COVID-19 pandemic has led to a significant increase in the workload of healthcare workers that, together with the risks associated with exposure to this new virus, has affected their mental health.

Objectives: The objective of the current study was to determine the prevalence of psychopathology and burnout syndrome in healthcare workers and the predictive role of purpose in life and moral courage in this relationship.

Methods: A cross-sectional study was carried out in 115 Spanish healthcare workers.

Results: Participants with burnout had higher anxiety ($p = 0.001$), depression ($p < 0.001$), post-traumatic stress ($p = 0.01$) and alcohol consumption ($p = 0.03$) levels. The different components of burnout (emotional fatigue and despersonalization) were associated with the occurrence of anxiety (OR = 0.31) and depression (OR = 0.26), respectively. A strong purpose in life decreased emotional fatigue (OR = −0.39) depersonalization (OR = −0.23) scores, increased personal accomplishment (OR = 0.52), subsequently reducing burnout levels (OR = −0.45).

Conclusions: Purpose in life was most strongly related to decreased levels of burnout. Furthermore, an association between anxiety, depression and the components of burnout was found.

KEYWORDS

acute stress, anxiety, burnout, COVID-19, depression, healthcare workers, psychopathology, purpose in life

Introduction

Since the start of the COVID-19 pandemic in March 2020, health systems worldwide have experienced levels of demand that, in many cases, have exceeded the care capacity for which they were designed (1). This translated into a significant increase in the workloads and job demands put on healthcare workers which, together with exposure to this unknown infectious agent, impacted their mental health (2). Previous work

has already described how the inadequate availability of devices and resources to deal with the pandemic in care institutions, care work involving continuous exposure to COVID-19, increased working hours, concern about work-life balance, and the risk of exposing loved ones because of their work, negatively affected the mental health of healthcare workers (3–5). To date, multiple studies have been published on the psychopathologies healthcare professionals have developed in relation to the COVID-19 pandemic, observing an increase in the rates of anxiety, depression, and post-traumatic stress, especially in healthcare workers on the front line (6–8).

It is possible that the work requirements, together with the risk of acquiring the disease, can lead healthcare professionals to develop burnout syndrome (9) as a response to interpersonal and work stressors (10). Previous studies carried out in Spanish healthcare workers during the early stages of the pandemic showed medium to high levels of burnout syndrome in this population (11). Different scales have been designed to measure burnout as a construct, such as the *Maslach Burnout Inventory—Human Services Survey* (MBI-HSS), which has three subscales that assess emotional exhaustion, depersonalization, and personal accomplishment (12). Likewise, various studies have reported the relationship between high levels of burnout and the development of anxiety, depression, and post-traumatic stress disorder in healthcare professionals during the COVID-19 pandemic (13). However, certain characteristics of these healthcare workers, such as purpose in life (PIL) and moral courage (MC), could be involved in the impact burnout syndrome has on the mental health of these professionals.

On the one hand, PIL is defined as the perception that an individual has about the purpose and value of their life, playing a guiding role in life goals and in making decisions about the use of personal resources (14, 15). Indeed, high levels of PIL in healthcare workers who faced the COVID-19 pandemic were associated with a lower prevalence of psychopathology (16). On the other hand, MC is the ability to face danger or social disapproval when performing what one believes to be their duty (17). Paradoxically, not being able to act in accordance with these moral values can generate psychopathology through the concept of moral distress, as has been seen during the COVID-19 pandemic (16). This was particularly true in the early stages of the pandemic when healthcare professionals had to decide whether to put their lives at risk to save those of others or when they had to assess which patients received care and which could not be cared for due to a lack of resources.

Although some studies have already evaluated the relationship between burnout syndrome and the development of psychopathology in healthcare workers during the COVID-19 pandemic, given all the above, constructs such as PIL and MC could still be helpful in understanding this relationship. Therefore, the objective of this study was to determine the prevalence of psychopathology and burnout syndrome in healthcare workers and the predictive role PIL and MC might have in this context. We hypothesized that (a) healthcare workers had a high prevalence of mental disorders as well as burnout syndrome during the COVID-19 pandemic; (b) the presence of psychopathology in healthcare workers is related to the extent of the burnout syndrome; and (c) PIL and MC are factors that can predict the relationship between psychopathology and burnout syndrome.

Methods

Study design and participants

This was a cross-sectional observational study which followed the STROBE guidelines for observational studies. A total of 115 Spanish healthcare workers were recruited using a snowball strategy, focusing on recruiting all the healthcare personnel in the Provincial Consortium Hospital of Castellon (Spain) ($n = 97$), the second largest hospital in the city, and in other dependent Department of Health centers in Castellon ($n = 18$) between 20 September and 18 November 2021, the dates delimiting the two highest peaks of COVID-19 contagion in Spain. This hospital is responsible for mental health care in the province of Castellon [included in this study 38 health providers with 14 nurses (36.8%), 10 doctors (26.3%), 10 nurse auxiliary technicians (26.3%), 2 psychologist (5.2%), 1 occupational therapists (2.6%) and 1 administrators (2.6%)], ICU [included in this study 10 health providers with 5 nurses (50%), 3 nurse auxiliary technicians (30%) and 2 doctors (20%)], and Internal Medicine [included in this study 7 health providers with 4 doctors (57.1%), 2 nurses (28.5%), 1 nurse auxiliary technicians (14.2%)] among other specialties including Ophthalmology ($n = 5$), Emergency Department ($n = 4$), Oncology ($n = 2$) Preventive medicine ($n = 2$), Digestive Medicine ($n = 1$), and other departments ($n = 29$).

To calculate the sample size we used G*Power software (v3.1.9.4) (18) to calculate that a sample size of 96 would be required when considering an expected effect size of $d = 0.55$, an alpha of 5%, and beta of 20% for 2 groups with an allocation ratio of 1.8, when performing Mann–Whitney *U*-tests.

Variable measurements

After signing the informed consent, the healthcare workers who participated in the study completed a series of self-administered instruments in Spanish, including a questionnaire of sociodemographic variables that asked about age, sex, religiosity, marital status, occupation, history of physical illness and mental disorders, addictions, and variations in mental health compared to the start of the pandemic. All these instruments were validated for Spanish speakers.

TABLE 1 Sociodemographic characteristics of the study participants according to the presence of burnout and differences between the study cohort groups.

Variables	Total $n = 115$ % (n)/Median (IQR)	With burnout $n = 42$ % (n)/Median (IQR)	Without burnout $n = 67$ % (n)/Median (IQR)	χ^2/Mann-Whitney U test (p)
Age	42 (21)	41 (24)	43 (20)	549.5 (0.486)
Sex				
Female	65.2% (75)	56.1% (23)	72.7% (48)	3.13 (0.077)
Male	32.2% (37)	43.9% (18)	27.3% (18)	
Religiosity yes	53% (61)	43.9% (18)	63.1% (41)	3.74 (0.053)
Marital status				
Single	33% (38)	**45.2% (19)**	22.4% (15)	**8.37 (0.039)**
Married	55% (64)	45.2% (19)	**65.7% (44)**	
Divorced	9.6% (11)	7.1% (3)	11.9% (8)	
Widowed	0.9% (1)	2.4% (1)	0% (0)	
Physical illness yes	2.6% (3)	2.4% (1)	1.6% (1)	0.092 (0.76)
Smoker yes	15.7% (18)	14.6% (6)	18.5% (12)	0.26 (0.60)
History of addiction yes	0% (0)	0% (0)	0% (0)	
History of mental disorder yes	9 (7.8%)	9.5% (4)	7.7% (5)	0.11 (0.73)

The groups from among the categorical variables in which the corrected typified residuals were significant (less than −1.96 or greater than 1.96) are shown in bold. n, sample; IQR, Interquartile range; χ^2, Pearson chi-squared test.

To assess anxiety, depression, and post-traumatic stress disorder (PTSD) we used the *Beck Anxiety Inventory* [BAI; cut-off point (CP) = 8] (19), *Beck Depression Inventory* (BDI-II; CP = 14) (20), and the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria for post-traumatic stress disorder (PTSD), respectively. Drug abuse was assessed using the *Drug Abuse Screening Test* (DAST-10; CP = 1) (21) and alcohol abuse was tested using the *Alcohol Use Disorders Identification Test* (AUDIT; CP for women = 6, CP for men = 8) (22). Total scores and dichotomous variables were calculated to divide the participants into a group of individuals whose score exceeded the scale of the CPs and a group that did not.

Purpose in life was analyzed using the *Purpose in Life scale* (PIL; CP = 113) (23), calculating a dichotomous variable to differentiate between individuals who had a sense of PIL and those who did not. Moral courage was assessed with the *Moral Courage Scale for Physicians* (MCSP) (24) and the *Professional Moral Courage Scale* (PMCS) (25). To evaluate the presence of burnout syndrome, the Spanish version of the MBI-HSS was used, applying a CP for each subscale: ≥27 for emotional exhaustion, ≥10 for depersonalization and ≤33 for personal fulfillment (12).

Data analysis

SPSS software (version 23) for Microsoft (IBM Corp., Armonk, NY) was used for all the statistical analyses. After the exploratory and descriptive study, the quantitative variables were compared using Mann–Whitney U-tests because the data presented asymmetry. The categorical variables were compared using Pearson chi-squared tests. After verifying that the statistical assumptions were met, logistic and linear regression models were created to predict the presence of burnout, the total burnout score, and the extent of emotional exhaustion, depersonalization, and personal fulfillment. Finally, the data were modeled using the PROCESS add-on (v3.4) for SPSS (26) to test how the variables studied were related to each other.

The ethical principles set out in the Declaration of Helsinki and the Council of Europe Convention were followed and the informed consent of all participants was obtained. Moreover, data confidentiality was guaranteed according to the General Data Protection Regulation (GDPR; 2018). This study was authorized by the Investigation Commission at the Provincial Hospital Consortium in Castellon (ref. A-15/04/20) and the Clinical Research Ethics Committee at the Cardenal Herrera-CEU University (ref. CEI20/068).

Results

Sociodemographic characteristics and the presence of psychopathology in the sample cohort

For the total of 115 Spanish healthcare workers evaluated, the median age was 42 years, and the majority were female (65.2%, $n = 75$). Regarding occupation, 35.8% ($n = 39$) were

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TABLE 2 Scores for moral courage, purpose in life, and psychopathological variables according to the presence of burnout and differences between the cohort groups.

Variables	Total $n = 115$ % (n)/Median (IQR)	With burnout $n = 42$ % (n)/Median (IQR)	Without burnout $n = 67$ % (n)/Median (IQR)	χ^2/Mann-Whitney U test (p)
Mental health variation				4.12 (0.12)
Worsened	31.3% (36)	45% (18)	26.2% (17)	
Improved	20% (23)	20% (8)	23.1% (15)	
No variation	45.2% (52)	35% (14)	50.8% (33)	
MCSP	8 (2)	8 (2)	8 (2)	1,270.5 (0.772)
PMCS	11 (1)	10 (2)	11 (2)	1,081 (0.077)
PIL	112 (24)	102 (26)	**116 (16)**	**741.5 (<0.001)**
PIL yes	47.8% (55)	28.6% (12)	**62.7% (42)**	**12.02 (0.001)**
BAI	5 (10)	**10.5 (13.2)**	3 (7)	**837 (0.001)**
Anxiety yes	36.5% (42)	**54.8% (23)**	26.9% (18)	**8.56 (0.003)**
BDI-II	5 (9)	**10 (9.75)**	3 (5)	**618 (<0.001)**
Depression yes	15.7% (18)	**31% (13)**	7.5% (5)	**10.33 (0.001)**
PTSD	4 (6.25)	**5.5 (8.25)**	2 (6)	**951 (0.011)**
PTSD Yes	21.7% (25)	**33.3% (14)**	16.4% (11)	**4.17 (0.0041)**
AUDIT	2 (3)	**3 (2.5)**	2 (2)	**1,014.5 (0.031)**
Alcohol yes	7.8% (9)	9.5% (4)	7.5% (5)	0.14 (0.70)
DAST-10	0 (0)	0 (0)	0 (0)	1,205 (0.067)
Drugs yes	8.7% (10)	14.3% (6)	6% (4)	2.14 (0.14)
Psychopathology yes	47.8% (55)	**66.7% (28)**	38.8% (26)	**8.01 (0.005)**

The groups from among the categorical variables in which the corrected typified residuals were significant (less than −1.96 or greater than 1.96) are shown in bold; n, sample; IQR, Interquartile range; χ^2, Pearson chi-squared test; MCSP, Moral Courage Scale for Physicians; PMCS, Professional Moral Courage Scale; PIL, Purpose In Life; BAI, Beck Anxiety Inventory; BDI-II, Beck Depression Inventory-II; PTSD, Post-Traumatic Stress Disorder; DAST-10, Drug Abuse Screening Test; AUDIT, Alcohol Use Disorders Identification Test.

TABLE 3 Significant odds ratios from logistic and linear regression models predicting burnout.

Response	Predictors	Odds ratio/beta (95% confidence interval)	P-value
Presence of burnout	Purpose in life	0.94 (0.91, 0.97)	<0.001
Total burnout	Purpose in life	−0.45 (−0.80, −0.36)	<0.001
	Beck Anxiety Inventory	0.26 (0.18, 0.87)	0.003
Emotional exhaustion	Purpose in life	−0.39 (−0.42, −0.15)	<0.001
	Beck Anxiety Inventory	0.31 (0.14, 0.55)	0.001
Depersonalization	Purpose in life	−0.23 (−0.15, −0.006)	0.034
	Beck Depression Inventory-II	0.26 (0.03, 0.33)	0.018
Personal fulfillment	Purpose in life	0.52 (0.14, 0.27)	<0.001
	Marital status	0.16 (0.01, 3.39)	0.048

nursing staff, 29.4% ($n = 32$) were physicians, and 13.8% ($n = 15$) were auxiliary nursing care technicians. In relation to their marital status, the majority were married (55%, $n = 64$). All 115 healthcare workers were vaccinated.

In relation to psychopathology, 47.8% ($n = 55$) presented at least one mental disorder among those evaluated in this study; 36.5% presented anxiety ($n = 42$), 15.7% depression ($n = 18$), and 21.7% met the criteria for post-traumatic stress disorder ($n = 25$). There were no differences in the presence of these disorders among the different professional categories (at least one mental disorder: $\chi^2 = 3.55$, $p = 0.31$; anxiety: $\chi^2 = 6.82$, $p = 0.07$; depression: $\chi^2 = 4.81$, $p = 0.18$; post-traumatic stress disorder: $\chi^2 = 7.32$, $p = 0.06$). There were also no differences between the younger and older

participants (at least one mental disorder: $\chi^2 = 3.35$, $p = 0.06$; anxiety: $\chi^2 = 0.23$, $p = 0.62$; depression: $\chi^2 = 0.38$, $p = 0.53$; post-traumatic stress disorder: $\chi^2 = 0.01$, $p = 0.91$). Only 6.1% ($n = 7$) of the participants were previously in psychological/psychiatric treatment and they accounted for only 9.1% ($n = 5$) of those with at least one disorder.

Regarding the variation in mental health status compared to the first year of the COVID-19 pandemic, 31.3% ($n = 36$) reported worsening, 45.2% ($n = 52$) reported no change, and 20% reported having improved ($n = 23$). 15.7% ($n = 18$) of the sample were smokers. Considering the consumption of other substances, according to the AUDIT and DAST-10, we observed that 7.8% ($n = 9$) and 8.7% ($n = 10$) presented risky consumption of alcohol and drugs, respectively. Of the total sample, 38.53% ($n = 42$) of the participants exceeded the CP in at least one of the burnout syndrome dimensions. Specifically, 19.3% ($n = 21$) exceeded the emotional exhaustion CP, 30.3% ($n = 33$) the depersonalization CP, and 15.7% ($n = 18$) the personal accomplishment CP.

The sociodemographic characteristics, purpose in life, moral courage, and psychopathological variables of the groups according to the presence or absence of burnout

Table 1 shows the sociodemographic characteristics of the participants according to the presence of burnout. Both groups differed in their marital status, with a higher percentage of singles in the group with burnout (45.2%) compared to the group without burnout in which the majority were married (65.7%; $\chi^2 = 8.37$, $p = 0.03$). Occupation was not associated with the presence of burnout ($\chi^2 = 12.09$, $p = 0.17$). No significant differences were found for the rest of the sociodemographic variables.

Table 2 shows the differences in the psychopathological variables of the participants according to the presence of burnout. The group without burnout showed a higher score for PIL (Me = 116. IQR = 16) than the burnout group (Me = 102, IQR = 26). When the CP of the PIL scale was used, the group without burnout presented a higher percentage of high PIL (62.7%; $n = 42$) than the group with burnout (28.6%; $n = 12$) ($\chi^2 = 12.02$, $p = 0.001$). Participants without burnout more often reported that their mental health had remained unchanged or had even improved, although the difference between the groups was not significant ($\chi^2 = 4.12$, $p = 0.12$).

We observed a global increase in psychopathology in the group of participants with burnout (66.7%, $n = 28$) compared to the group without burnout (38.8%, $n = 26$) ($\chi^2 = 8.01$, $p = 0.005$). Moreover, the group with burnout presented a higher score in the BAI ($p = 0.001$) and a higher percentage of participants with anxiety ($\chi^2 = 8.56$, $p = 0.003$). The burnout group presented a higher score in the BDI-II ($p < 0.001$) and there were more participants with depression ($\chi^2 = 10.33$, $p = 0.001$). Likewise, the group of participants with burnout had a higher PTSD score ($p = 0.01$) and showed a higher percentage of PTSD ($\chi^2 = 4.17$, $p = 0.004$).

Binary and linear logistic regressions and data modeling

Table 3 shows the variables that allowed burnout and its dimensions to be predicted. High PIL scores were associated with a decreased probability of burnout [OR = −0.45; 95% CI (−0.80, −0.36); $p < 0.001$], emotional fatigue [OR = −0.39; 95% CI (−0.42, −0.15); $p < 0.001$], and depersonalization [OR = −0.23; 95% CI (−0.15, −0.006); $p = 0.034$], and were associated with an increased probability of presenting personal fulfillment [OR = 0.52; 95% CI (0.14, 0.27); $p < 0.001$]. High BAI scores were associated with an increased likelihood of burnout [OR = 0.26; 95% CI (0.18, 0.87); $p = 0.003$] and emotional fatigue [OR = 0.31; 95% CI (0.14, 0.55); $p = 0.001$], and high scores on the BDI-II were associated with an increased likelihood of depersonalization [OR = 0.26; 95% CI (0.03, 0.33); $p = 0.01$]. Finally, being married was associated with an increased probability of presenting personal fulfillment [OR = 0.16; 95% CI (0.01, 3.39); $p = 0.04$].

We modeled the data according to the results obtained in the logistic regressions and the models with the best fit are shown in Figure 1. No moderation or mediation effects were found in models 1 (total burnout, PIL, and BAI), 2 (emotional exhaustion, PIL, and BAI), or 3 (depersonalization, PIL, and BDI-II), although these three variables did influence each other. In model 4 we found that personal fulfillment had a reciprocal influence on both marital status and PIL, while marital status and PIL were not related to each other.

Discussion

When considering the results in the healthcare workers participating in this study, we observed that the prevalence of burnout (38.53%) was lower than the average reported in a recent systematic review in which a prevalence of 54% was reported during the COVID-19 pandemic (27). Similarly, a Canadian study found a 51.8% prevalence of burnout, with at least 1 day of symptoms of emotional exhaustion and depersonalization (28). However, in a study conducted in Japan where a prevalence of 50% was found in workers caring for patients with COVID-19 in the early stages of the pandemic, in subsequent measurements burnout had reduced to 30%. This figure was related to the decrease in the number of patients with COVID-19 being treated and later increased to 43.1% in a

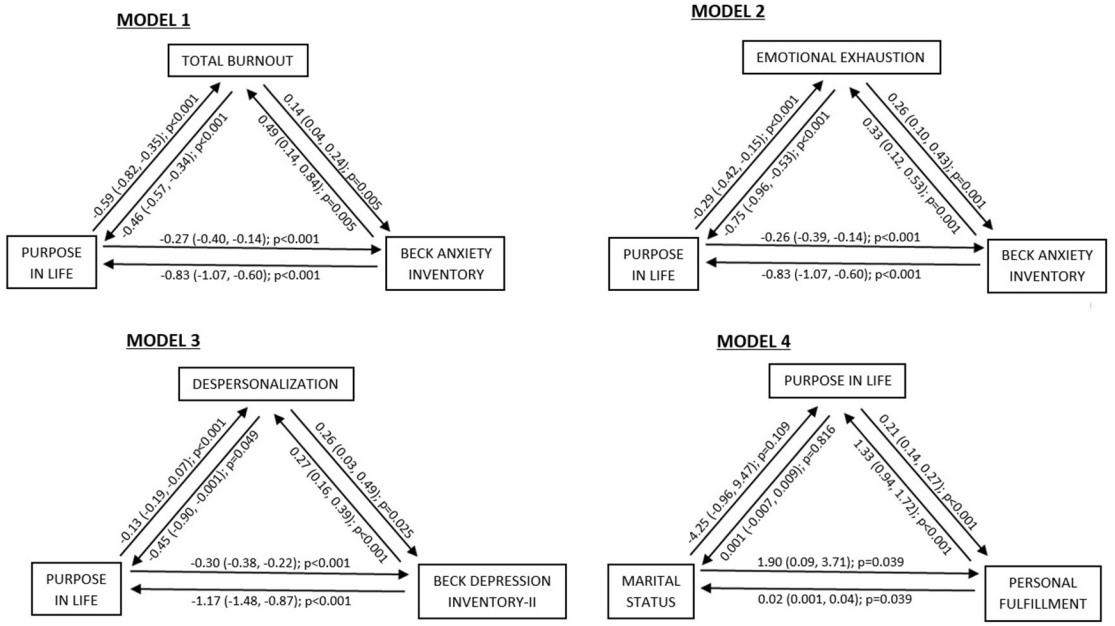

FIGURE 1
Exploratory models of psychopathology in healthcare workers.

new epidemiological wave of the virus (29). The figure reported during this inter-peak period is similar to that found in our study and could be explained by the lower number of cases of COVID-19 infections at the time of data collection. Therefore, the prevalence of burnout was still high and was consistent with the figures previously reported in other studies. Another study comparing different waves of the pandemic found an increase in measures of anxiety, depression and stress between two consecutive waves (30). It could also be speculated that burnout could be maintained over time or even worsen in subsequent waves if appropriate measures are not taken to intervene in maintaining factors affecting health providers.

For global psychopathology, we found a prevalence of 47.8% in our healthcare workers, compared to a study in Canada with a similar population in which a prevalence of 35.6% had been reported. Of these, 24.3% presented PTSD, 23.3% anxiety, and 10.6% depression (28). In our study, the figures for PTSD and depression were similar to those reported by Cyr et al. (28), but were higher for anxiety. A similar study in Ireland found higher prevalence values for depression with a prevalence between 22 and 28% in the general population during the pandemic (31). It should also be noted that in countries such as Brazil, India, and the United States, variation was observed in the figures for depression in relation to the moment the data were collected during the pandemic, where an increase was presented during the peaks of COVID-19 contagion (32). A series of cases of psychotic depression in healthcare workers during the pandemic showed that a number of factors could influence the development of a mental disorder in at-risk populations, in this case, healthcare workers with significant pandemic-related stress (33). This stressful context could also have influenced the participants in the current study.

Regarding emotional exhaustion, depersonalization, and lack of personal fulfillment, figures of 19.3%, 30.3%, and 15.7%, respectively we report here were lower compared to the figures of 51%, 52%, and 21% reported by Ghahramani et al. (27). They were also very similar to a study conducted in Libya which reported 67.1% emotional exhaustion, 47.4% depersonalization, and 22.7% for lack of accomplishment (34). In this aforementioned study, the fear of COVID-19 was associated with high scores in the dimensions of emotional exhaustion and depersonalization, while being older than 35 years was associated with higher figures for depersonalization (34). This was also observed in a study conducted in Poland, in which participants with more than 20 years of experience reported higher scores in all three dimensions of the scale (35).

The logistic regressions we carried out showed that PIL was most consistently related to burnout, with the total PIL score and the score for its emotional exhaustion, depersonalization, and personal fulfillment dimensions representing predictors of the presence of burnout. Some previous studies that sought to relate PIL to the presence of psychopathology indicated that high levels of PIL were related to a reduction in the appearance of symptoms of anxiety and depression (36–38). PIL has also been linked to lower levels of hopelessness and worry in patients with eating disorders (39). Additionally, BAI has also been shown to be a

predictor of burnout. In this sense, a study conducted in Italy during the COVID-19 pandemic found a significant association between higher levels of anxiety and burnout, especially the emotional exhaustion dimension of burnout (40).

Likewise, the logistic regressions indicated that the presence of depersonalization was associated with high BDI-II scores, which agrees with previous studies indicating a relationship between depersonalization and symptomatology of depression and anxiety (41). Other studies have also previously related the presence of the symptoms of depression and depersonalization with other components of burnout syndrome such as emotional exhaustion (42). Moreover, marital status was also associated with personal accomplishment in this current work, which is consistent with a study conducted in Korea which found that marital status, gender, workload related to the care of patients with COVID-19, and the presence of the symptoms of anxiety and depression were able to predict emotional exhaustion. This same study indicated that profession, job satisfaction, anxiety, and depression were also related to high levels of depersonalization (43).

Other studies have highlighted the role that PIL could have as a mediator factor in the mental health of healthcare workers during the COVID-19 pandemic (15), indicating that higher levels of PIL could act as a protective factor for the mental health of these workers. Indeed, the positive perspectives of the present and the past could moderate PIL, allowing individuals to experience a greater degree of resilience and better perspectives for the future, which would be very useful when devising ways to face the difficulties derived from the pandemic (43). However, a study conducted on adolescents reported that PIL failed to moderate the relationship between the impact of the COVID-19 pandemic and depressive symptoms, anxiety, sleep problems, and behavioral disturbances (44).

Higher levels of PIL are related to increased levels of personal accomplishment, therefore explaining why lower levels of burnout are found in some healthcare professionals. In this sense, a study in China reported moderate levels of compassion satisfaction (that is, wellbeing at work) and low levels of burnout in nursing healthcare professionals, which was explained by the presence of professional collaboration, a sense of solidarity, opportunities for professional growth, and awareness of professional purpose in these participants (45). These results are similar to other work in Spanish caregivers, which reported lower levels of burnout and higher levels of compassion satisfaction in nurses compared to medical staff (11). Therefore, the PIL could be useful for the construction of screening instruments or for the design of psychotherapeutic interventions aimed at enhancing individual mental health (46).

One way to address the increased symptoms of anxiety and depression in healthcare workers in order to reduce the burnout experienced and to increase the purpose in life of these people could be to use mindfulness-based techniques to reduce work-related stress and improve psychological wellbeing (47). Other techniques that have already been used with healthcare workers with favorable results were Yoga (48) and Tai Chi (49) sessions seeking to reduce anxiety symptoms and improving sleep quality. Protocols for teaching emotional regulation techniques to healthcare personnel have also been tried and have shown efficacy in their initial applications, so further research on these aspects is needed (50).

The main limitation of this current work was its cross-sectional design which prevented us from inferring any causal relationships between the metrics. The models obtained in this study did not show mediation or moderation effects but rather, a reciprocal influence between the variables and so longitudinal studies would be required to clarify these relationships. Another possible limitation of this work was that some healthcare professionals did not agree to participate due to the length of the questionnaires we used. However, studies that included questionnaires with different lengths reported that the length of the questionnaire and the number of items included had not affected the measurement parameters of the constructs or quality of the data obtained (51). No data were extracted from participants on job satisfaction and the frequency and number of shifts they made during the pandemic. This could have important implications for the development of burnout symptoms. Another limitation that can be noted is the determination of a clear exposure to patients with COVID-19. By the time this study was conducted, the medical center where the study was conducted had already gone through several waves of cases within the context of the COVID-19 pandemic. Most of them had already been exposed to working with COVID-19 patients, however, having a clear measure of exposure would be useful to compare those who treated COVID-19 patients with those who did not. It might even be of interest to see if there are differences between practitioners depending on the number of COVID-19 patients treated by the different practitioners. These aspects would be of interest to be addressed in future similar studies.

Conclusions

The PIL metric was most consistently related to low burnout in this work and so it could be an object of interest in future work aiming to prevent psychopathology, including burnout syndrome, in healthcare personnel. Additionally, the logistic regressions we performed demonstrated an association between anxiety, depression, marital status, and the components of burnout syndrome.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Investigation Commission at the Provincial Hospital Consortium in Castellon (ref. A-15/04/20) and the Clinical Research Ethics Committee at the Cardenal Herrera-CEU University (ref. CEI20/068). The patients/participants provided their written informed consent to participate in this study.

Author contributions

MO'H, LR, and LR-J: recruitment of participants, data collection, and writing of original draft. IE: conceptualization, recruitment of participants, review, and editing of manuscript. AB: conceptualization, formal analysis, and supervision. GH: conceptualization, supervision, and funding acquisition. All authors approved the contributions, read, and approved the final manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The reviewer IG-M declared a shared affiliation, though no other collaboration, with one of the authors LR-J to the handling Editor.

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EDITED BY
Maria Panagioti,
The University of Manchester,
United Kingdom

REVIEWED BY
Mohsen Khosravi,
Zahedan University of Medical Sciences, Iran
André Luiz Monezi Andrade,
Pontifical Catholic University of Campinas, Brazil
Nian Xiong,
Huazhong University of Science and Technology, China

*CORRESPONDENCE
Qun Yang
yangqun1125@hotmail.com
Lei Ren
rl_fmmu@163.com

†These authors have contributed equally to this work

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The relations between mental well-being and burnout in medical staff during the COVID-19 pandemic: A network analysis

Chen Chen[1†], Fengzhan Li[1†], Chang Liu[2], Kuiliang Li[3], Qun Yang[1*] and Lei Ren[1*]

[1]Military Medical Psychology School, Air Force Medical University, Xi'an, China, [2]Brain Park, Turner Institute for Brain and Mental Health and School of Psychological Sciences, Monash University, Clayton, VIC, Australia, [3]School of Psychology, Army Medical University, Chongqing, China

Background: Although poor mental well-being (MW) has been documented among individuals experiencing burnout during the coronavirus-19 (COVID-19) pandemic, little is known about the complex interrelationship between different components of MW and burnout. This study investigates this relationship among medical staff during the COVID-19 pandemic through network analysis.

Methods: A total of 420 medical staff were recruited for this study. Components of MW were measured by the 14-item Warwick-Edinburgh Mental Well-being Scale (WEMWBS), and components of burnout were measured by a 15-item Maslach Burnout Inventory-General Survey (MBI-GS) Questionnaire. Network structure was constructed *via* network analysis. Bridge variables were identified *via* the bridge centrality index.

Results: The edges across two communities (i.e., MW community and burnout community) are almost negative, such as edge MW2 ("Useful") – B14 ("Worthwhile") and edge MW1 ("Optimistic about future") – B13 ("Happy"). The edges within each community are nearly positive. In the MW community, components MW1 ("Optimistic about future") and MW6 ("Dealing with problems") have the lowest bridge centrality. And in the community of burnout, components B13 ("Happy") and B14 ("Worthwhile") have the lowest bridge expected influence.

Conclusion: We present the first study to apply the network approach to model the potential pathways between distinct components of MW and burnout. Our findings suggest that promoting optimistic attitudes and problem-solving skills may help reduce burnout among medical staff during the pandemic.

KEYWORDS

COVID-19, medical staff, mental well-being, burnout, network analysis

Introduction

The COVID-19 pandemic caused by the new SARS-CoV-2 virus puts tremendous pressure on the medical staff. Medical staff worldwide are facing unprecedented challenges, such as the lack of medical resources, heavy work, and the current tense epidemic situation (1). As a result, the physical health status of medical staff has become a public concern. According to previous systematic review research, as of May 8, 2020, there were no <152,888 infected cases and 1,413 deaths among medical staff worldwide (2). Furthermore, the psychological status of medical staff is not optimistic. At the early stage of the pandemic, mental health concerns (e.g., insomnia, anxiety, depression, and post-traumatic stress disorder symptoms) were frequently reported by medical staff (3–5). With the aggravation of the COVID-19 pandemic and the continuous impact on the medical and health system, medical staff inevitably have more hidden psychological problems, such as burnout (6). Burnout can be caused by several factors, including environmental factors, such as workplace conflict, increased burdens, and personal factors, such as work-life imbalance, perfectionism, or personality traits associated with the obsessive–compulsive disorder (7). During the COVID-19 pandemic, these factors were more pronounced (7). During the COVID-19 pandemic, the prevalence of burnout among medical staff has not been accurately investigated. However, according to the Medscape National Physician Burnout and Suicide Report, the burnout rate of medical staff has reached 43% (8). Maslach et al. (9) believed that burnout is characterized by emotional exhaustion, cynicism, and decreased professional efficacy of professional staff, which is also called Burnout Syndrome. Burnout has a significant effect on the medical staff, which manifests as a decrease in enthusiasm for patients (10), indifference to medical care, strained relationships with patients, heightened conflict with colleagues (11), pointless medical work, and low self-esteem (12). Considering these negative consequences, there is an urgent need to address burnout among medical staff during the pandemic (6, 13).

One candidate target to address burnout among medical staff is the positive psychological function, such as mental well-being (14). Many studies have shown that positive mental well-being may reduce burnout (15, 16). MW is defined as the positive process of recognizing and making choices for a healthy and cheering life (17). In real life, MW may reflect as positive life experiences that consist of good social support, positive emotions, and satisfaction in life and work (18). For this particular group of medical staff, MW plays an essential role in developing and maintaining medical personnel's sympathy and compassion for patients and their dedication to the strict aspects of medicine (19), both of which are crucial to alleviating burnout. Thus, it is feasible to alleviate burnout among medical staff by targeting MW from the theoretical perspective. And from a practical standpoint, the responsibility to promote nurses' MW has been written into Article 5 of the Code of Ethics for Nurses with Interpretive Statements to cope with nurses' burnout (20). In addition, some studies have also shown that some MW components (e.g., good social support) may alleviate the burnout of medical staff (21, 22).

Previous studies examined the relations between MW and burnout at a construct level (*via* sum scores of self-report measures) (23, 24). Inevitably, the utilization of sum scores ignores that MW and burnout have different components. In fact, MW is a complex psychological construct composed of psychological function, emotion, and interpersonal relationships (25). Burnout is also a heterogeneous syndrome that features distinct cognitive, emotional, and physical components (9). Therefore, ignoring the different components of MW and burnout (i.e., using total scores on self-report questionnaires) may be problematic as it may overlook the differential association between MW and burnout components and restrict the development of intervention methods. Therefore, a more fine-grained approach (i.e., examining the relationship between MW and burnout at the component level rather than the total-score level) should be adopted to move forward.

Network analysis is a novel statistical approach that models the relationships between psychological constructs at the component level. The network consists of two parts: nodes, representing variables, and edges, representing relationships between variables (26, 27). Several advantages of network analysis make it a suitable analytical technique for the current study. First, previous studies have explored the internal structures of MW and burnout, respectively, with network analysis and concluded that network analysis is a valuable tool for deepening understanding of these two psychological constructs (28, 29). Second, existing research mainly focused on examining the relationship between MW and burnout at a construct level (*via* sum scores). This may ignore the unique relationships among different components of MW and burnout (30, 31). Using network analysis may contribute to existing knowledge by elucidating the relationship between MW and burnout at a component level. Third, network analysis may reveal the relation between MW and burnout components by partial correlation and regularization process, which may effectively solve the traditional problem of over-interpretation and fail to replicate results (32). Fourth, the utilization of the bridge expected influence index (i.e., the sum of the value of all edges connecting a specific node with other community nodes) may help quantify the protective ability of different MW components on burnout from a network perspective and may provide some references for the potential intervention methods (33). In a word, network analysis could provide new theoretical viewpoints to comprehend the relations between MW and burnout at the component level.

Using network analysis, this study investigated the relationships between MW and burnout components. This study has two aims. First, to explore the relations between

different components of MW and burnout. Second, using bridge expected influence to identify the most influential node within the MW-burnout network. Existing research showed that MW is negatively associated with burnout (15, 16). Hence, we hypothesized that the edges between MW and burnout of medical staff are primarily negative. Furthermore, previous studies demonstrated that the relationship between MW and the emotional exhaustion dimension of burnout is more potent than between MW and other dimensions of burnout (34). Thus, we hypothesized that the emotional exhaustion dimension of burnout may have the strongest negative interrelationship with the MW community. Third, previous studies have shown that positive emotions and good problem-solving skills may alleviate burnout (35, 36). Thus, we hypothesized that MW components reflect positive emotions and problem-solving skills may be the bridging nodes to the burnout community.

Methods

Ethics statement

The data collection procedure followed the Declaration of Helsinki and was approved by the Ethics Committee of the First Affiliated Hospital of the Fourth Military Medical University (Project No. KY20202063-F-2).

Participants

Data were collected between 16 and 18 April 2021 *via* paper and pencil tests. Four hundred and fifty-eight medical staff from Xijing Hospital in Shaanxi Province of China participated in this study. All participants provided informed consent before taking part. Demographic data were collected at the beginning of the study. Thirty-eight participants were excluded due to failing the two honesty check items (e.g., The participants didn't choose the second option when asked to choose "Please choose the second option") or demographic items (e.g., In response to the "Age" question, participants filled in 10 years old). The final sample consisted of 420 participants. Our sample error is 4.8% when the confidence interval is 95%.

Measures

Components of mental well-being

The 14-item Warwick-Edinburgh Mental Well-being Scale (WEMWBS) is a short, efficient, psychological measurement scale used to measure MW (37, 38). The item is rated on a five-point Likert scale, ranging from 1 ("none of the time") to 5 ("all of the time"). The score should be based on the simple sum of the project, and the total score was used to evaluate MW. In this research, the Chinese version of WEMWBS was used to assess the diverse components of MW (37, 38). The Chinese version of WEMWBS has good reliability and validity. The Cronbach'sα of WEMWBS in this study was 0.96.

Components of burnout

Maslach Burnout Inventory-General Survey (MBI-GS), which is widely used to measure occupational burnout, is jointly compiled by American social psychologists, Maslach and Jaskson (9). Scores for each item range from 0 (never) to 6 (very frequently), the total score represents different levels of burnout. Through exploratory factor analysis, Li and colleagues found that the general MBI-GS scale has an item with a high cross load in the cynicism dimension. After deleting this item, a more ideal MBI-GS (Chinese version) is obtained. This Chinese version of MBI-GS consists of 15 items covering three dimensions: emotional exhaustion (from item 1 to item 5), cynicism (from item 6 to item 9), and reduced professional efficacy (from item 10 to item 15; reverse scoring). This study adopts the MBI-GS Chinese version because the scale has more localization characteristics with good reliability and validity (39, 40). The Cronbach's α of MBI-GS in this study was 0.93.

Data analysis

The present network was estimated *via* the Gaussian Graphical Model (GGM) (32). GGM belongs to an undirected network, and its edge represents the partial correlation between two nodes after statistical control of all other nodes in the network. As recommended by previous studies, the estimation of network structure was based on Spearman correlations to account for the ordinal nature of the present dataset (32, 41). The least absolute shrinkage and selection operator (LASSO) regularization algorithm was adopted to obtain a sparse network that reflects the true network structure. During the regularization process, edges (i.e., partial correlations between nodes after adjusting the effect of all other nodes) with small coefficients were removed, leaving the network with the most robust edges (32, 42). The tuning parameter for regularization was based on the Extended Bayesian Information Criterion (EBIC). Following the recommendation (32, 43), the tuning parameter value was set to 0.5 to balance the trade-off between sensitivity and specificity. The force-directed layout algorithm (i.e., the Fruchterman-Reingold algorithm) was adopted to generate the network layout (44). This layout algorithm lays nodes with stronger and more numerous relations more centrally in the network and weakly associated nodes on the periphery. Within the presented network, positive correlations were depicted as blue edges, while negative correlations were depicted as red edges. The magnitudes of correlations were reflected as edge thickness, with thicker edges representing

stronger correlations. The aforementioned steps were carried out *via* the R-package *qgraph* (45).

To examine the interrelationships between MW components and well-being components, we manually divided nodes into two communities, namely, the MW community (items from WEMWBS) and the burnout community (items from MBI-GS). A previous study has shown that the expected influence centrality is more appropriate for the network that has both positive and negative edges (46). Therefore, the bridge expected influence (i.e., the sum of the edge weights connecting a given node to all nodes in the opposite community) was calculated to quantify the relative importance of individual nodes in explaining cross-community co-occurrences (33). The higher the positive value of bridge expected influence, the greater the activation capacity to other communities; the higher the negative value of bridge expected influence, the greater the deactivation capacity to other communities (33). The aforementioned steps were carried out *via* the R-package *networktools* (33).

Three steps were taken to ensure the accuracy and stability of the present network *via* the R-package *bootnet* (47). First, we bootstrapped (with 2,000 bootstrap samples) the 95% confidence interval of all edges within the network to ensure the accuracy of edge weights. Second, we computed the correlation stability (CS) coefficient of bridge expected influence to ensure the stability of this index. This is achieved through a case-dropping bootstrap approach (with 2,000 bootstrap samples). According to the recommendation, the ideal CS-coefficient is above 0.5 and should not be below 0.25 (47). Third, we conducted bootstrapped difference tests (with 2,000 bootstrap samples) for edge weights and bridge expected influence to examine whether two edge weights or two node bridge expected influence differ significantly from one another.

Results

Descriptive statistics

The final sample consisted of 199 doctors (female = 130) and 221 nurses (female = 213) aged 22–50 (mean = 32.74, SD = 5.37) years old. Table 1 shows the demographic characteristics of the participants. Table 2 shows abbreviation, mean scores, and standard deviations for each variable selected in the current network.

TABLE 1 Demographic characteristics of the participants.

Characteristics	Variables	*N* (%) / Mean (SD)
Profession	Doctor	199 (47.4)
	Nurse	221 (52.6)
Gender	Female	343 (81.7)
	Male	77 (18.3)
Marriage	Married	304 (72.4)
	Single or divorced	116 (27.6)
Educational background	Undergraduate or less	269 (64.0)
	Postgraduate or more	151 (36.0)
Working years	<=5	135 (32.2)
	6–10	150 (35.6)
	>10	135 (32.2)
Job title	Junior	237 (56.4)
	Middle	163 (38.8)
	Senior	20 (4.8)
Age	18–30	155 (36.9)
	31–40	229 (54.5)
	40–50	34 (8.6)

Network structure

The network construction of diverse components of MW and burnout is shown in Figure 1A. There are 47 of 210 (22%) possible edges (weight range from -0.12 to 0.04) within the network. Overall, more negative edges (n = 43) were observed than positive edges (n = 4). The strongest negative between-community edges were MW2 ("Useful") – B14 ("Worthwhile"; weight = -0.12), MW1 ("Optimistic about future") – B13 ("Happy"; weight = -0.10), MW4 ("Interested") – B13 ("Happy"; weight = -0.10), MW6 ("Dealing with problems") – B10 ("Effectively"; weight = -0.08), MW6 ("Dealing with problems") – B14 ("Worthwhile"; weight = -0.08), MW1 ("Optimistic about future") – B5 ("Burned out"; weight = -0.07), MW5 ("Energy") – B2 ("Used up"; weight = -0.07), and MW7 ("Thinking clearly") – B15 ("Accomplish all tasks"; weight = -0.06). In addition, six strongest within-community positive edges have been found in the current network. Such as MW8 ("Good about myself") – MW10 ("Confident"; weight = 0.37) in the MW community and B1 ("Emotionally drained") – B2 ("Used up"; weight = 0.47) in the burnout community. The bootstrapped 95% confidence interval is relatively narrow, indicating that edges in the present network are considered to be accurate (Supplementary Figure S1). The bootstrap difference test of edge weight is shown in Supplementary Figure S2.

Bridge expected influence

Figure 1B shows the node bridge expected influence. In the MW community, MW1 ("Optimistic about future") and MW6 ("Dealing with problems") have the lowest bridge

TABLE 2 Abbreviation, mean scores, and standard deviations for each variable selected in the current network.

Variables	Abbr	M	SD
Mental well-being			
MW1: I have been feeling optimistic about the future	Optimistic about future	4.19	0.86
MW2: I have been feeling useful	Useful	4.18	0.83
MW3: I have been feeling relaxed	Relaxed	3.71	0.97
MW4: I have been feeling interested in other people	Interested	4.22	0.83
MW5: I have had energy to spare	Energy	3.85	0.86
MW6: I have been dealing with problems well	Dealing with problems	4.08	0.75
MW7: I have been thinking clearly	Thinking clearly	4.14	0.74
MW8: I have been feeling good about myself	Good about myself	3.83	0.87
MW9: I have been feeling close to other people	Close	3.88	0.85
MW10: I have been feeling confident	Confident	3.78	0.91
MW11: I have been able to make up my own mind about things	Make up	4.15	0.76
MW12: I have been feeling loved	Loved	3.96	0.84
MW13: I have been interested in new things	New things	4.09	0.87
MW14: I have been feeling cheerful	Cheerful	3.99	0.89
Burnout			
B1: I feel emotionally drained from my work	Emotionally drained	1.59	1.35
B2: I feel used up at the end of the day	Used up	1.80	1.52
B3: I feel tired when I get up in the morning and have to face another day at work	Tired	1.18	1.37
B4: Working with people all day is a real strain for me	Strain	1.23	1.39
B5: I feel burned out from my work	Burned out	0.75	1.15
B6: I have become more callous toward work since I took this job	Callous	0.70	1.10
B7: I have become less enthusiastic about my work	Less enthusiastic	0.81	1.15
B8: I doubt the significance of my work	Doubt significance	0.65	1.03
B9: I have become more and more indifferent in the contribution of my job	Indifferent	0.60	1.06
B10: I deal effectively with the problems of clients*	Effectively	1.07	1.22
B11: I feel that I am contributing to my company*	Contributing	1.15	1.30
B12: In my opinion, I am good at my job*	Good at job	1.05	1.21
B13: I feel very happy when I accomplish some tasks of my job*	Happy	0.93	1.22
B14: I have accomplished many worthwhile things in this job*	Worthwhile	1.28	1.34
B15: I am confident that I can accomplish all tasks effectively*	Accomplish all tasks	1.05	1.25

Abbr, Abbreviation; M, Mean, SD, standard deviation.
*Reverse scoring item.

expected influence. This displays those in the community of MW have the strongest negative link with burnout components from the network perspective. In the community of burnout, B13 ("Happy") and B14 ("Worthwhile") have the lowest bridge expected influences. This shows these two components have the strongest negative connections in the community of burnout with MW components from the network perspective. The CS-coefficient of node bridge expected influence is 0.52, manifesting the centrality index (i.e., bridge expected influence) is sufficiently stable (Supplementary Figure S3). The bootstrapped difference tests for node bridge expected influence have been shown in Supplementary Figure S4.

Discussion

To the best of our knowledge, this is the first study examining the component-level relationship between MW and burnout among medical staff during the COVID-19 pandemic. These findings may provide new theoretical viewpoints to comprehend the relations between MW and burnout.

Within the MW-burnout network, we found that most between-community edges were negative. It is reasonable that burnout negatively correlates with MW in medical staff during the COVID-19 pandemic (15, 16), which also verifies our first hypothesis. In addition, the strongest between-community edges are existing between positive emotions and functions and

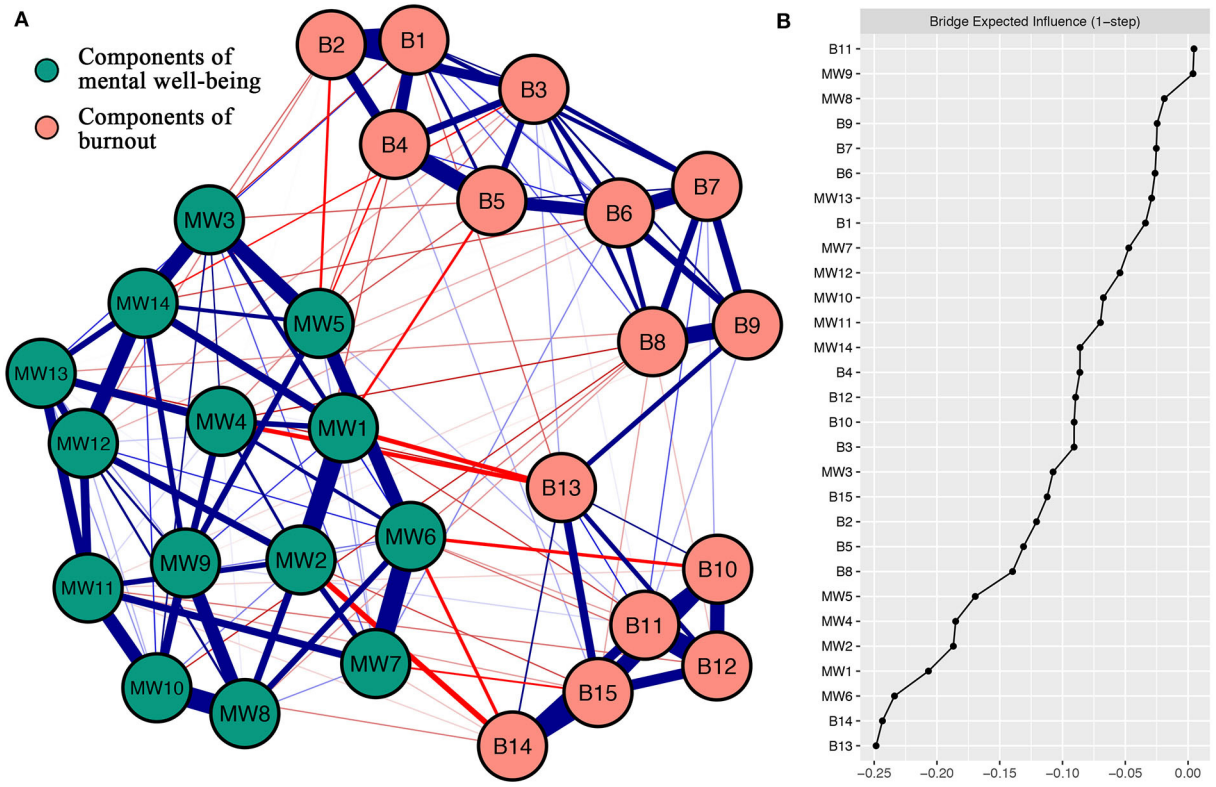

FIGURE 1
(A) Network construction of different components of mental well-being and burnout. Blue edges delegate positive correlations, and red edges delegate negative correlations. The magnitude of the correlation was reflected by the thickness of the edge. Cut value = 0.05. **(B)** Centrality plot drawing the bridge expected influence of per variable selected in the present network (raw score). The text of components of mental well-being and burnout can be seen in Table 1.

professional efficacy (i.e., MW2 "Useful" – B14 "Worthwhile"; MW1 "Optimistic about future" – B13 "Happy"). Unlike our second hypothesis, the strongest negative edges occur between MW and the decreased professional efficacy dimension of burnout in the current study. According to previous studies, the decreased professional efficacy of Chinese medical staff has become a core problem of burnout (48). Medical staff with a high sense of MW experience may respond to various life events in a positive way, resulting in increased job satisfaction and perceived professional efficacy during the COVID-19 pandemic (14, 35). This finding is similar to some studies of burnout in medical staff, which found that negative emotions, impaired interpersonal relationships, and self-denial relate to burnout (49, 50). Specifically, individual medical staff with positive emotions and functions are unlikely to have burnout in the face of work (49, 50). Edge MW2 ("Useful") – B14 ("Worthwhile") and MW6 ("Dealing with problems") – B14 ("Worthwhile") revealed a link between self-efficacy and professional efficacy, which was similar to previous studies (51). Individuals with high levels of self-efficacy feel more meaningful about their work, which may reduce burnout (51). Edge MW1 ("Optimistic about future") – B13 ("Happy") and MW4 ("Interested") – B13 ("Happy") demonstrates the association of positive emotions and good interpersonal relationships with professional efficacy. Previous studies have shown that positive emotions and good interpersonal relationships make it easier for individuals to find happiness at work and improve their sense of professional efficacy (52, 53).

Moreover, the final network structure showed that the within-community edges are primarily positive. Within the MW community, three positive edges with the strongest weights were MW8 ("Good about myself") – MW10 ("Confident"), MW6 ("Dealing with problems") – MW7 ("Thinking clearly"), and MW1 ("Optimistic about future") – MW2 ("Useful"). A previous study used network analysis to explore the network structure of MW in four UK cohorts, and also found strong associations between MW8 and MW10 as well as between MW6 and MW7 (29). Take MW1–MW2, for example, optimism about the future may be the embodiment of ability and associated with increased confidence (54, 55). Therefore, when a person is optimistic about his/her future, he/she may find himself/herself useful. Within the burnout community, three positive edges with the

highest weights were B1 ("Emotionally drained") – B2 ("Used up"), B11 ("Contributing") – B12 ("Good at the job"), and B14 ("Worthwhile") – B15 ("Accomplish all tasks"). Our previous study used network analysis to examine the network structure of burnout in Chinese nurses, and also found strong associations among these three edges. Take B1 ("Emotionally drained") – B2 ("Used up"), for example, two items describe the fatigue and lack of enthusiasm caused by work.

Within the current network, node bridge centrality may help to understand the relative importance of each MW component in relation to burnout (56–58). Addressing the bridge node could deactivate the propagation path and reduce co-occurrence (33). Therefore, bridge centrality may provide new insights on the intervention of medical staff's burnout from MW during the COVID-19 pandemic. Within the MW community, MW6 ("Dealing with problems") and MW1 ("Optimistic about future") have the lowest value of bridge expected influence, indicating positive emotions (optimistic) and good problem-solving ability of MW were the important nodes bridging the burnout community. The above findings are consistent with our third hypothesis. Thus, targeting these two MW components may be more effective at reducing burnout. Results from intervention-based studies suggested that fostering problem-solving skills and positive emotions may help alleviate burnout (35, 36). Theoretically, optimistic attitudes and problem-solving skills are fundamental for medical staff to maintain their mental health under pandemic-related stress (59, 60). Some targeted interventions for burnout are rooted in cultivating optimism and improving working ability (59, 60). Within the community of burnout, components B13 ("Happy") and B14 ("Worthwhile") have the lowest value of bridge expected influence. This indicates that these two components of burnout have stronger negative connections with MW components. Thus, B13 ("Happy") and B14 ("Worthwhile") might be more susceptible to the MW community.

This study has some limitations. First, the sample only included medical staff from China, which may limit the generalizability of our conclusion. When examined by the medical staff of other countries, the related network characteristics (such as edges and bridge expected influence) may be different. In addition, the samples in the present study are relatively small. Therefore, although the presented network meets the robustness requirement, conclusions drawn from this sample should be interpreted with caution. Future studies may benefit from adopting a multicenter study design with an increased sample size. Second, the network structure of components of MW and burnout was obtained from cross-sectional data. Thus, no causal relationship can be drawn from current results. Even though previous studies suggested that MW could affect burnout, it does not rule out that burnout may affect MW or they interact with each other. The directed acyclic graph (DAG) is a sophisticated approach for researchers to explore potential causal relationships among nodes in cross-sectional data and generate hypotheses (61, 62). As the current data did not meet the assumption posed by DAG (i.e., measure all confounds) (63–65), we did not apply the DAG approach to generate potential causal hypotheses (62). Future studies that meet the data requirement may consider using DAG to explore potential causal relationships between MW and burnout. Third, this network investigates the network characteristics at the group level. It is possible that these network features of individuals may not be replicated in the similar way. Fourth, other confounding factors, such as demographic characteristics (e.g., working years and working hours), personality, resilience, and empathy (66–69), may also influence the relation between MW and burnout. Therefore, future research could further explore the MW-burnout network under the control of these confounding factors. Last but not least, the current study used network analysis as a bottom-up data-driven approach for exploratory analysis. Thus, future confirmatory studies are required to validate the current findings.

Conclusion

Notwithstanding the limitations above, this research has important theoretical and clinical value. As far as we know, this research is the first article to study the network structure of MW and burnout in Chinese medical staff during the COVID-19 pandemic. On the one hand, the between-community edges may enrich the potential theoretical mechanism of the relationship between MW and burnout. On the other hand, the bridge expected influence centrality may provide some suggestions (i.e., promoting optimistic attitudes and problem-solving skills) for relevant prevention and intervention to address the requirements of reducing burnout in this special group during the COVID-19 pandemic.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Ethics Committee of the First Affiliated Hospital of the Fourth Military Medical University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

CC, LR, and QY developed the study idea and design. CC, LR, and FL wrote the original draft of this manuscript. All authors contributed to revising subsequent versions of the paper and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.919692/full#supplementary-material

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EDITED BY
Oriol Yuguero,
Lleida Institute for Biomedical Research (IRBLleida), Spain

REVIEWED BY
Bo Pu,
Sichuan Agricultural University, China
Yijin Wu,
Shandong University, China
Huiqiang Luo,
Sichuan University, China
Yuanlei Yue,
Hubei University of Chinese Medicine, China

*CORRESPONDENCE
Xuewen Zhang
zhangxuewen324@163.com

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The influence of professional identity, job satisfaction, burnout on turnover intention among village public health service providers in China in the context of COVID-19: A cross-sectional study

Xuewen Zhang[1]*, Wenjie Zhang[2], Li Xue[3], Zongyou Xu[4], Zhuang Tian[5], Chao Wei[1], Ying Zhang[1], Zhihuan Dong[6] and Shansong Gao[7]

[1]School of Integrated Traditional Chinese and Western Medicine, Jining Medical University, Jining, China, [2]Department of Academic Affairs, West China School of Medicine/West China Hospital, Sichuan University, Chengdu, China, [3]Medical Department of First Affiliated Hospital of Third Military Medical University, Southwest Hospital, Chongqing, China, [4]Medical School, Hubei University for Nationalities, Enshi, China, [5]School of Public Health, Jining Medical University, Jining, China, [6]School of the Second Clinical, Jining Medical University, Jining, China, [7]School of Clinical, Jining Medical University, Jining, China

Background: In China, COVID-19 has undoubtedly posed a huge challenge to the capacity of rural public health services. Village public health service providers are responsible for reporting and dealing with infectious diseases and public health emergencies. However, the turnover of village public health service providers is gravely threatening the stability of rural primary health system step by step. This study systematically evaluated the effects of professional identity, job satisfaction, burnout on turnover intention of village public health service providers, and further measured the mediating effect of job satisfaction and burnout between professional identity and turnover intention.

Methods: From May to June 2019, 1,244 village public health service providers in Shandong Province were selected as the research objects. Sociodemographic characteristics, professional identity, job satisfaction, burnout and turnover intention were quantitated by self-completed questionnaire and measured by Likert 5–7 scale. Person correlation analysis, One-way ANOVA, and Structural Equation Modeling (SEM) were used for statistical analysis and mediating effect evaluation.

Results: Five hundred and sixty-four (45.3%) village public health providers had high turnover intension. Professional identity had a direct positive effect on job satisfaction ($\beta = 0.146$, $p < 0.001$), job satisfaction had a direct negative effect on burnout ($\beta = 0.263$, $p < 0.001$), and turnover intension ($\beta = -0.453$, $p < 0.001$), while burnout had a direct positive effect on turnover intension ($\beta = 0.242$, $p < 0.001$). Between professional

identity and turnover intention, job satisfaction 95%CI: (−0.289)−(−0.11) had significant mediating effects. Job satisfaction 95%CI: (−0.216)−(−0.077) also had significant mediating effects between professional identity and burnout, and burnout had significant mediating effects between job satisfaction and turnover intension, 95%CI: (−0.116)−(−0.052). These results strongly confirm that professional identity, job satisfaction, and burnout are early and powerful predicators of turnover intention.

Conclusion: According to the results, medical administration and management departments should pay attention to improve the professional attraction of public health services by improving the public's understanding of the profession, reducing work intensity, timely granting of subsidy funds, improving old-age security, ensuring the income level, increasing the new force and so on, so as to reduce turnover intension and ensure the health equity of village residents.

KEYWORDS

professional identity, job satisfaction, burnout, turnover intention, village public health service providers

Background

On January 2, 2021, after a 61-year-old woman was diagnosed with COVID-19 in Xiaoguozhuang Village, Hebei Province, China, hundreds of confirmed cases emerged in just a few days, fully exposing the weakest link in China's public health system in the vast village areas. As the focus and difficulty of national public health construction, the "rural three-level medical network" is composed of county-level medical and health institutions, township health centers and village clinics, which shoulder the important task of providing basic public health services for rural residents (1). Especially the village clinics are the first barrier for disease control and prevention in rural, in a large number of village population flow to cities today, if this barrier can't play an effective role or loopholes, it will pose a threat to the public security of the society, even bring catastrophic danger. Village public health providers, composed of village doctors in village clinics (not all village doctors undertake this work), provide village residents with 12 major items and 45 small items of basic public health services stipulated by the state, including vaccination, health education and the establishment of health records etc., and they also undertake primary diagnosis and treatment of common and frequent diseases of village residents, which makes them play an important role in achieving equal access to basic public health services and safeguarding the health rights and interests of village residents (2).

After the implementation of the new medical reform policy aimed at strengthening the grass-roots level in 2009, the service capacity of village public health providers has become more important. On the one hand, it directly affects the success or failure of the national basic public health service projects, and on the other hand, it directly affects the health of village people, who account for about half of the national population. However, it has been proved that the investment in basic public health services in rural areas only accounts for about 1/4 of that in cities, which makes the per capita public health resources in village areas seriously inadequate, especially full-time public health human resources (3). This special situation makes village doctors become the backbone to guarantee basic public health services in village areas.

Excellent village public health providers can improve the quality of public health services in village areas. However, due to the heavy health work, poor living environment, low income, inadequate compensation for basic public health services, and lack of implementation of the pension system (4), many excellent village public health providers are unwilling to engage in basic public health services, or even leave their posts as village doctors (5). In recent years, village doctors in Henan and Gansu provinces of China have collectively left their jobs due to inadequate compensation for basic public health services, which leads to the lack of excellent health service providers and the inability to provide good health services for village residents

Abbreviations: COVID-19, Coronavirus Disease 2019; ANOVA, Analysis of Variance; MBI-GS, Maslach Burnout Scale general scale; SD, Standard Deviation; EFA, exploratory factor analysis; SEM, Structural Equation Modeling; AGFI, adjust goodness of fit index; GFI, goodness of fit index; NFI, normed fit index; CFI, comparative fit index; IFI, incremental; TLI, Tucker-Lewis's index; RMSEA, root mean square error of approximation; ANOVA, Analysis of Variance; IRB, Institutional Review Board; AVE, Average Variance Extracted; CR, Construct Reliability.

(6). Some regions have reduced the qualification standards for doctors to compensate for the shortage of public health service providers, so that some people with imperfect or incomplete health skills can serve as health service providers, which leads to the situation of three low levels (low educational background, low ability and low quality of service) in the village public health providers, and further aggravates the problems existing in the construction of basic public health service system in rural areas (5), and the ability of village emergency response to public health emergencies.

COVID-19 has undoubtedly posed a huge challenge to the capacity of village public health services. In January 2021, there were multiple clusters of outbreaks in village areas of Hebei province, and the recent outbreak in Henan province also started from village areas, which not only sounded the alarm bell for village epidemic prevention and control, but also exposed that village public health management has become a weak board in epidemic prevention and control. As the "health gatekeeper" of village residents, village public health providers are responsible for reporting and handling infectious diseases and public health emergencies, and their ability to provide emergency public health services will directly affect the physical and mental health and safety of village residents, as well as the spread and expansion of epidemic diseases (7). It can be seen that village public health providers' recognition of their profession, work satisfaction and burnout may not only affect their turnover intention and the stability of the team, but also affect the solid foundation of the regular epidemic prevention and control, as well as the life and property safety of village residents (6).

Turnover intention of employee has become one of the important topics in organizational research, and many scholars even believe that it is more meaningful to study turnover intention than the actual turnover behavior (8, 9). First, actual turnover behavior is affected by many external factors and is more difficult to predict than turnover intention. In view of this, Bluedorn (8), Price and Mueller (10) even suggested that turnover intention should replace actual turnover behavior in the study. Secondly, the turnover of the organization is the change in dynamic over time, and the study begins with different times, and the conclusions can be different (11). Thirdly, consistent with attitude, desire and behavior, turnover intention is usually regarded as the most direct "predictor" of turnover behavior and there is a very significant direct correlation between them, with the correlation coefficient reaching 0.50 (12).

In recent years, there have been many studies on turnover intension of medical staff, and the influencing factors include personal factors, organizational factors, and environmental factors. A systematic review involving six studies showed that factors affecting nurses' turnover intention were divided into individual factors and organizational factors, among which job satisfaction was the most important factor (13). A survey of 327 medical staff in Taiwan, China, showed that workload and job burnout both had a significant positive impact on turnover intention, leading to a high turnover rate of medical staff and a decline in medical quality (14). A survey of 1,152 primary medical staff in Anhui Province, China, showed that age, job position and burnout affected the correlation of turnover intention, psychological capital and social support were negatively correlated with turnover intention, and job burnout was positively correlated with turnover intention (15).

At present, the research on turnover intension of public health service providers is less than that of doctors, and the research on village public health providers is even rarer. A study of 3,212 urban community public health workers in five Chinese provinces found that 38.7% of them had an intention to leave their jobs. The influencing factors include: age, salary, post, professional title, learning and training opportunities, work pressure, etc. (16). Among 926 public health service providers in Shanghai, 42.44% had turnover intention. Vitality, dedication, depersonalization and low sense of personal accomplishment had significant predictive effects on turnover intention (17). In June 2018, 25.23% of the 436 primary medical staff engaged in the national basic public health service projects in Guangzhou had the intention to leave, the risk factors were high work pressure and the number of national basic public health service projects in charge $\geq$3 (18). In Thailand, more and more grass-roots public health workers are moving from village public health services to urban private hospitals, putting the village public service system at risk (19). 77.3% of doctors in Iran's Village Family Health Doctor Program, which began in 2005, plan to quit in the near future. Rare opportunities for continuing education, inappropriate and long working hours, irregular pay, lack of job security and high level of job responsibility were cited as the most important reasons (20). The Philippines has implemented the 'Doctors to The Barrios' (DTTB) Program for public health services for remote village populations. Participants joined the project out of interest in public health and a desire to serve rural residents, but a significant decrease in job satisfaction, salary, and development influenced participants to accelerate turnover (21). An American study found that the inability to recruit well-trained providers, low salary grade, aging labor force synergically affected the development of village public health service programs (22).

In the context of COVID-19, academic researches on medical staff mainly focus on the psychological status (23), psychological crisis (24), psychological intervention (3), job burnout (25), new positioning of professional identity, as well as knowledge and countermeasures of epidemic prevention and control of staff in different departments (26). For example, Wu Xuefen evaluated the mental health of 813 grass-roots medical staff in Shanghai and found that during the new crown

epidemic, medical staff were more fatigued, excessively worried, insomnia, and troubled (27). During COVID-19, Zhang Xiaoyan et al. measured the work pressure of 615 medical staff in 13 community health service centers in Wuhan and found that the work pressure of primary medical staff was very high, and was negatively correlated with the ability to respond to public health emergencies (28). Lei and Li found that 24.9% of community health service providers experienced psychological anxiety during COVID-19, job satisfaction and worry about inadequate reserve of protective materials were the factors that affect the psychological anxiety of them (29). However, the research on rural grassroots medical staff during the COVID-19 epidemic is relatively limited, and the research on rural public health services is even rarer in the academic circle. There are few studies on the working status of village public health service providers during the COVID-19 epidemic, especially turnover intention. Existing research mainly focused on the staff's age, salary, training, work environment and mostly use chi-square test, *T*-test, analysis of variance (ANOVA), multiple linear or multiple logistic regression analysis and other methods to analyze the working conditions and influencing factors of village public health service providers (13, 18–24). Compared with the above studies, the structural equation model (SEM) can not only measure the correlation between the study variables, but also mine the correlation between potential variables, and even explain the causal relationship between variables.

Professional identity is a second-order structure composed of four dimensions: professional practice, professional affirmation, commitment identification and commitment reflection. Many studies on doctors and nurses (30–32) have confirmed that professional identity had a negative impact on burnout and turnover intention and a positive impact on work engagement and satisfaction, and can indirectly affect burnout and turnover intention through these two mediating variables. Lack of professional identity leads to higher rates of job burnout and turnover intension, which affect both individuals and organizations. Moreover, an in-depth study had confirmed that professional identity was one of the strong predictors of the turnover of public health service supervisors in village China, and was an intermediary factor between job satisfaction, burnout, and turnover intention. It is suggested that the Chinese government can reduce the turnover intention of health inspectors by improving professional identity (33).

As another strong predictor of turnover intention, many medical occupational studies have confirmed that job satisfaction is strongly correlated with turnover intention, and it can also affect turnover intention and behavior through the mediating effect of other job-related factors (34). For example, there is a correlation between job satisfaction and organizational commitment, and the higher the job satisfaction, the higher the organizational commitment. On the contrary, there is a high reverse correlation between organizational commitment and turnover intension, which should be reduced by improving job satisfaction that affects organizational commitment (35). Another study confirmed that the hospital can improve nurses' job satisfaction by guiding them to pursue higher levels of work values, so as to minimize nurses' turnover intension and turnover rate (36). A study on rural health human resources in China strongly confirmed, as an early and strong predictor of turnover intention, job satisfaction of village doctors not only had a direct negative impact on turnover intention, but also had an indirect impact on turnover intention through work engagement (5).

Maslach and Jackson's three-dimensional view divided burnout into three core components, namely "emotional exhaustion, deindividuation and low personal achievement". Among them, emotional exhaustion refers to the excessive consumption of individual emotional resources, emotional exhaustion, and complete loss of work enthusiasm. Deindividuation refers to a negative, indifferent, overly distant attitude toward service objects. Low sense of personal achievement refers to the individual's decreased sense of competence and work achievement, and the tendency to negatively evaluate the meaning and value of their own work (37). Many studies have confirmed that job burnout is positively correlated with turnover intention (28), and job burnout significantly reduces the job satisfaction of medical staff and increases the turnover intention of them (29). Compassion fatigue of nurses will lead to burnout and thus increase the turnover intension (30). The stronger the psychological pressure of nurses, the stronger the job burnout, the lower the job satisfaction and the stronger the turnover intension (31). Therefore, humanistic management of nursing staff can effectively prevent the occurrence of job burnout and reduce the turnover intension (32).

COVID-19 is a huge challenge to the capacity of village public health services and an opportunity to enhance the capacity (38). Therefore, based on the above theories and literature conclusions, this study for the first time tries to propose the hypotheses of professional identity, job satisfaction, burnout, turnover intention, and constructs the dual intermediary data model shown in Table 1 and Figure 1. We hypothesized that professional identity, job satisfaction and burnout of village public health service providers have a direct impact on turnover intention. In addition, professional identity also indirectly affects turnover intention through the mediating effects of job satisfaction and burnout respectively. The results of this study will provide evidence support for improving the professional identity and job satisfaction of village public health service providers, solving their income and security problems, reducing turnover intension, improving the stability and work efficiency of the team, and enhancing their ability to prevent and control the epidemic. It also provides suggestions and opinions for establishing a comprehensive rural public health emergency system (38).

TABLE 1 The theoretical hypotheses.

Hypotheses
1. Village public health service providers' **professional identity** has a negative impact on **turnover intention**.
2. Village public health service providers' **job satisfaction** has a negative impact on **turnover intention**.
3. Village public health service providers' **burnout** has a positive impact on **turnover intention**.
4. Village public health service providers' **professional identity** has an indirect negative impact on **turnover intention** through the mediating effect of **job satisfaction**.
5. Village public health service providers' **professional identity** has an indirect negative impact on **turnover intention** through the mediating effect of burnout.
6. Village public health service providers' **professional identity** has an indirect negative impact on **burnout** through the mediating effect of **job satisfaction**.
7. Village public health service providers' **job satisfaction** has an indirect negative impact on **turnover intention** through the mediating effect of **burnout**.

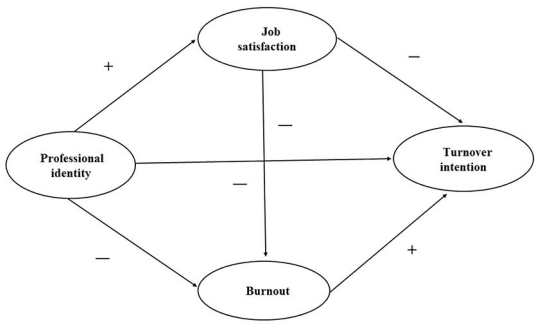

FIGURE 1
The theoretical model and hypotheses.

Methods

Setting and participants

Jining is in the inland southwest of Shandong Province, and the level of economic development lags several coastal cities in the east, especially in rural areas. The total population of the city is 8.356 million, among which the rural population is 3.3683 million, accounting for 40.3%. There are 6,489 villages and 5,307 village clinics serving the health of village residents. According to the statistical bulletin, by the end of 2018, the total number of medical providers in the city was 80,800, an increase of 2,100 compared with 2017, but the increase of medical providers was mainly concentrated in cities, while the number of village doctors was only 11,715, a decrease of 870 compared with 2017 (39). The average number of village doctors in each village was <2 (1.81), but the number of patients diagnosed and treated by village clinics in a year was far more than 20 million, with an average of 1,814.94 patients treated by each village doctor per year. While completing the daily clinical treatment, the basic public health services of village residents are also taken into account by some village doctors. Therefore, the work is heavy and the current situation of turnover is not ignored. In view of the above reasons, it is of great significance to select Jining City as the sample location to understand the turnover intension and influencing factors of village public health service providers.

With the assistance of Municipal Health and Health Commission, multi-stage stratified cluster random sampling method was used to select research objects. Firstly, 11 counties (districts) in Jining were divided into good, medium, and poor grades according to the level of economic development. Secondly, one county of each of the three grades was selected as the sample point of this study through simple random sampling method. Thirdly, all village doctors in the sample counties (districts) were selected by cluster random sampling. Finally, part-time basic public health service providers were selected as the final research objects of this study.

As the research objects were village doctors with a certain level of education and understanding, data were collected through on-site collective distribution and self-filling questionnaires, including cover letters, general sociological characteristics, and scales. In order to reduce the error and improve the recovery rate, we first explained the significance of the study in detail in the cover letter and the protection of personal information for anonymous survey, thus improving the response rate. Second, assigned special providers at the city, county, township, and village levels to be responsible for the distribution, recovery, and quality verification of questionnaires to ensure the quantity and quality of questionnaires.

In this study, 2,789 village doctors from 1,345 village clinics were included in the survey, 2,693 questionnaires were collected, of which 2,684 were valid, with an effective rate of 96.2%. Among 2,684 village doctors, 1,244 were engaged in public health services, so the final research object of this study was 1,244 village public health service providers.

Ethical and participatory consent

Our research group applied for ethical review to the Faculty Review Committee. The academic panel considered that since the study did not involve medical human-biological interventions, and the data presented in the paper could not be traced back to individuals, so the study could collect data based on participants' verbal consent. Before the on-site questionnaire survey, we introduced the purpose and significance of this study to all participants, and informed them that their participation was voluntary and anonymous,

and the statistical data produced by the study could not be traced to individuals. They had the right to refuse to participate in the survey or terminate the survey at any time, and the questionnaire completed by the exiting investigator was destroyed on the spot.

Measures

According to China's national health committee of the human resources for health questionnaire (6), the questionnaire consists of five parts, the first part: the survey of the population characteristics (age, gender, education level, and marital status) and job characteristics (professional, job title, salary, working years, and average weekly working hours). The second to fifth parts are scales of job satisfaction, professional identity, burnout, turnover intension, etc.

Professional identity

Professional identity is the basis for the normal functioning of professional roles. Studies have shown that nurses with better professional identity are more flexible in implementing professional role changes, which is reflected in best nursing practices and patients' health maintenance benefits (40). The Chinese version of the professional identity questionnaire includes three items: (1) My work has significant significance and influence on other people's lives; (2) The quality and effect of my work will affect many people; (3) My work is very meaningful and important. All these items were assessed on a five-point Likert scale 1 (highly disagree) to 5 (highly agree), with a higher score indicating a higher degree of agreement with the significance of the work undertaken. After verification by many studies, this questionnaire has good reliability and validity, and Cronbach's Alpha coefficient of this questionnaire is 0.831 (41).

Job satisfaction

Job satisfaction is an important psychological indicator of employees' professional life quality. If a person's job satisfaction level is high, he or she may be more positive about work, and vice versa. In this study, the Chinese version of Job Description Index scale with Cronbach's Alpha coefficient of 0.951 (42), which has been verified for many times, was used to measure the job satisfaction of village public health providers. It includes eight items: workload, colleagues, superiors, environment and facility, promotion, income, social security, training opportunities (6). All these items were assessed on a six-point Likert scale from 1 (highly disagree) to 6 (highly agree), with higher scores associated with higher job satisfaction and more likely to be positive about work.

Burnout

The Chinese version of Maslach Burnout Scale general scale (MBI-GS) was used to measure the burnout of village public health service providers, and the Cronbach's alpha value was 0.79–0.94 (43, 44). The scale includes three subscales: emotional exhaustion, depersonalization, and low personal achievement (reverse score). The answer is set to a 7 Likert score ranging from 0 (never) to 6 (daily). Among them, emotional exhaustion scores >25, depersonalization scores >11, low personal achievement scores >16 are defined as high burnout, respectively. Burnout can be diagnosed when the score of any dimension of the respondents is greater than the critical value (45).

Turnover intention

Chinese version of turnover intention questionnaire prepared by Cammannet and Mobley (33) was used to measure the turnover intention of the respondents. The scale has been modified for many times and perfected in Chinese, and the Cronbach alpha coefficient is 0.659 (46). It consists of four items: "Thought of leaving the organization you serve now," "Thought of leaving this industry," "Looking for a new job recently," "Looking for a new job next year". A six-point Likert scale ranging from 1 (highly disagree) to 6 (highly agree) was used to assess all of these items, with higher scores and higher turnover intentions (6).

Statistical analysis

The reliability and validity of the whole questionnaire were evaluated scientifically and accurately by exploratory factor analysis (EFA). The demographic characteristics and job-related characteristics of 1,244 village public health service providers were classified and described by descriptive statistical analysis method. Then, professional identity, job satisfaction, burnout and turnover intention were quantitatively analyzed, and the statistical results were presented as mean and standard deviation (SD). Pair-based correlations between the values of the main variables were measured by Pearson correlation and quantified by correlation coefficients. On this basis, a more scientific Structural Equation Model (SEM) was used to further explore the relationships among the four dimensions of professional identity, job satisfaction, burnout and turnover intention, and the maximum likelihood model based on Bootstrap was applied to SEM. Several key indexes of fit degree of measurement model and data, including goodness of fit index (GFI), standard fit index (NFI), Comparative fit index (CFI), Adjusted goodness of Fit index (AGFI), Tuck-Lewis index (TLI) and incremental index (IFI), were all >0.90. The approximate root mean square error (RMSEA) is 0.067, lower than 0.8, which turns out to be an acceptable model and fits the current data and assumptions. Bootstrap sampling method was used to test the mediating effect,

TABLE 2 Reliability and validity test.

Dimension	Item	Unstd.	S.E.	*Z*	*P*	Std.	Cronbach's α	SMC	CR	AVE
Turnover intension	T1	1.00				0.92	0.96	0.85	0.95	0.84
	T2	1.07	0.02	67.39	***	0.97		0.94		
	T3	1.02	0.02	56.19	***	0.91		0.84		
	T4	0.91	0.02	45.18	***	0.84		0.71		
Professional	P1	1.00				0.76	0.83	0.58	0.84	0.64
	P2	1.41	0.06	23.92	***	0.93		0.87		
	P3	1.23	0.05	24.17	***	0.69		0.47		
Burnout	B3	1.00				0.86	0.83	0.74	0.83	0.63
	B2	0.96	0.03	28.41	***	0.87		0.76		
	B1	0.58	0.03	21.92	***	0.61		0.37		
Job satisfaction	J1	1.00				0.77	0.91	0.59	0.90	0.54
	J2	0.61	0.03	18.21	***	0.52		0.27		
	J3	1.03	0.04	28.84	***	0.79		0.62		
	J4	0.72	0.03	22.20	***	0.63		0.39		
	J5	0.96	0.03	27.76	***	0.76		0.58		
	J6	1.07	0.04	30.22	***	0.82		0.67		
	J7	0.85	0.03	25.54	***	0.71		0.50		
	J8	1.10	0.04	31.28	***	0.84		0.71		

***indicates *P* values less than 0.001.

and the existence of the mediating effect was judged according to whether the 95% confidence interval of the product term (a*b) of regression coefficient A and regression coefficient B included the number 0. If the 95% confidence interval does not include the number 0, the mediating effect is indicated and if the 95% confidence interval includes the number 0, there is no mediating effect.

Reliability and validity

According to EFA results, Kaiser-Meyer-Olkin (KMO) of the questionnaire was 0.874, >0.70, and Bartlett sphericity test showed significant difference ($\chi^2 = 15{,}223.125$, $P < 0.001$), all which indicating a good possibility of data factor analysis (33, 47–49). The Cronbach's α-values of job satisfaction, turnover intention, job burnout and professional identity are as high as 0.907, 0.957, 0.834, and 0.831, all >0.7, indicating that the sample data has good reliability (50, 51). The Average Variance Extracted value of the mean variance extraction of each dimension is >0.5, indicating that each dimension of the measurement model has good Convergence Validity (51) (Table 2). Discriminant Validity can be used to accurately assess the degree of unique difference between a particular structure and other structures in the model (52). Discriminant validity was tested by comparing the square root of AVE for individual constructs with the correlations among the latent variables. By comparing the square root of AVE in Table 5 with all correlation coefficients, a reliable discriminant validity can be established when diagonal elements exceed off-diagonal elements (53, 54).

Results

Demographic characteristics of participants

Demographic characteristics of 1,244 village public health service providers are shown in Table 3. The average age was (45.3 ± 7.2) years old, and was mainly concentrated in the 40–49 years old group, accounting for 49.3. While only 0.6% were under 30 years old, and 27.4% were 50 years old and above. 66.3% of the respondents had only technical secondary education, while only 3.1% had university or higher education, 3.4% had intermediate or senior professional titles, and 40.9% had no title. Forty-two percent have worked between the ages of 20 and 29, 52.8% have a monthly income of <2,000 Yuan, and 72.4% must work 60 h or more per week.

Descriptive analysis of study variable

The total scores of job satisfaction, professional identity, burnout, and turnover intention were 31.56 ± 9.39, 9.27 ± 1.98, 42.29 ± 21.03, 11.91 ± 6.18, respectively. The sub-dimensional statistical results contained in each indicator are shown in Table 4, respectively. In terms of scores, 564 (45.3%)

TABLE 3 Demographic characteristics of participants ($n = 1,244$).

Socio-demographic	*N*	%
Gender		
Male	826	66.4
Female	397	31.9
Missing	21	1.7
Age, group		
<30 years	7	0.6
30–39 years	263	21.1
40–49 years	613	49.3
≥50 years	341	27.4
Missing	20	1.6
Professional ranks		
Senior title	4	0.3
Mid-level title	38	3.1
Primary title	619	49.8
No title	509	40.9
Missing	74	5.9
Years of work		
<10	26	2.1
10–19	404	32.5
20–29	522	42.0
≥30	255	20.5
Missing	37	3.0
Marital status		
Unmarried	27	2.2
Married	1,171	94.1
Missing	46	3.7
Education background		
University or above	39	3.1
Junior college	312	25.1
Technical secondary school	825	66.3
High school education or below	49	3.9
Missing	19	1.5
Monthly income (yuan)*		
<1,000	196	15.8
1,000–1,999	460	37.0
2,000–2,999	321	25.8
≥3,000	179	14.4
Missing	88	7.1
Weekly working hours		
<40	161	12.9
40–59	129	10.4
≥60	905	72.8
Missing	49	3.9

*As of the date of this paper writing, the exchange yuan-euro exchange rate according to the People's Bank of China was 0.1278.

village public health providers had high turnover intension, 347 (27.9%) had medium, and 333 (26.8%) had low turnover intension. Work load (3.72 ± 1.57), social security (3.45 ± 1.56), promotion (3.66 ± 1.56), and income (3.17 ± 1.57), were lower than other items of job satisfaction, and "Thought of leaving the organization you serve now" (3.06 ± 1.63) and "Thought of leaving this industry" (3.05 ± 1.66) were higher than other items of turnover intention.

TABLE 4 Item scores in job satisfaction, professional identity, job burnout, and turnover intention.

Items	Mean ± SD
Job satisfaction	31.56 ± 9.39
Workload	3.72 ± 1.57
Colleagues	4.67 ± 1.40
Superiors	4.65 ± 1.37
Environment and facility	4.02 ± 1.51
Promotion	3.66 ± 1.56
Income	3.17 ± 1.57
Social security	3.45 ± 1.56
Training opportunities	4.19 ± 144
Professional identity	9.27 ± 1.98
My work has a great impact on the lives of others	2.98 ± 0.82
The quality of my work will affect many people	3.10 ± 0.76
My work is very meaningful and important	3.20 ± 0.70
Burnout	42.29 ± 21.03
Emotional exhaustion	18.64 ± 12.43
Low personal achievement	18.01 ± 13.82
Depersonalization	5.64 ± 6.87
Turnover intention	11.91 ± 6.18
Thought of leaving the organization you serve now	3.06 ± 1.63
Thought of leaving this industry	3.05 ± 1.66
Looking for a new job recently	2.99 ± 1.67
Looking for a new job next year	2.82 ± 1.61

Correlations of study variables

The Pearson correlation coefficients of the four main observed variables of village public health service providers are shown in Table 5. Professional identity is positively correlated with job satisfaction, and negatively correlated with burnout and turnover intention. Finally, burnout is positively correlated with turnover intention.

Testing of the constructed study model

In the establishment of the structural equation model, including gender, age, income and other demographic and job-related characteristics, which are not predictive factors, but may have a mixed effect on turnover intention, therefore, we put these 8 factors (Table 3) into the equation and add their paths

TABLE 5 Correlation and discriminant validity between potential variables.

Item	Professional identity	Job satisfaction	Burnout	Turnover intension
Professional identity	**0.80***			
Job satisfaction	0.19	**0.74***		
Burnout	−0.24	−0.30	**0.79***	
Turnover intension	−0.09	−0.46	0.33	**0.91***

*The bold diagonal elements are the square roots of each AVE: construct correlations are shown off-diagonal.

to the turnover intention of the result variable. In this way, the relationship between the effects of the predicted variables (job satisfaction, professional identity, and job burnout) on the outcome variable (turnover intention) can be linked, quantified and evaluated after accurately controlling these variables (55). The generalized least square method was used to fit the data into the theoretical model constructed before, and the model was modified and improved according to the model fitting index. Finally, the established model indicates the relationship between the four variables and the path validity (Figure 2). The fitting indexes of the final modified hypothesis model were NFI = 0.931, RFI = 0.922, IFI = 0.948, TLI = 0.941, CFI = 0.948, and RMSEA = 0.048, all of which met the requirements of reference value and the model fit was good.

Maximum likelihood estimation was adopted, and each path was repeatedly guided by 200 bias correction bootstraps. The mediation analysis path and effect values are shown in Table 6. Professional identity had a direct positive effect on job satisfaction ($\beta = 0.146$, $p < 0.001$), job Satisfaction had a direct negative effect on burnout ($\beta = -0.263$, $p < 0.001$), and turnover intension ($\beta = -0.453$, $p < 0.001$), while burnout had a direct and significant positive effect on turnover intension ($\beta = 0.242$, $p < 0.001$).

Table 7 displays the significant test results of the two mediated pathways. In the intermediary path between professional identity and turnover intention, job satisfaction 95%CI: (−0.289)–(−0.11) had significant mediating effects. Job satisfaction 95%CI: (−0.216)–(−0.077) also had significant mediating effects between professional identity and burnout, and burnout had significant mediating effects between job satisfaction and turnover intension, 95%CI: (−0.116)–(−0.052).

Discussion

The COVID-19 outbreak is raging and developing rapidly, and China is joining forces from top to bottom to fight the virus. As the "health gatekeeper" of village residents, village public health service providers are the bottom of the health service system, playing an important fundamental role in volunteer screening, temperature monitoring, publicity and education. The important and unique value of this study lies not only in the fact that we selected public health service providers in rural China who are at the forefront of the fight against COVID-19 as research objects, but also in the fact that the four variables of job satisfaction, professional identity, burnout, and turnover intention are included into the structural equation model for the first time. On this basis, some suggestions are put forward to improve the village public health emergency system.

Both domestic and foreign epidemic prevention and control shows that villages are the first line of defense for village epidemic prevention and control, and village public health service providers always stand at the forefront to fight against the virus. The total score of turnover intention of village public health providers is 11.91 ± 6.18, was higher than the scores of township health inspectors in China (10.22 ± 5.49), and the scores of the four sub-dimensions were also higher than the latter (23). In terms of proportion distribution, the high turnover intention of village public health service providers (45.3%) is not only significantly higher than that of China's 1,109 urban community health service providers (4.3%) (56), but also higher than that of public health service providers in township health centers (35.1%) (57), and township health inspectors (11.3%) (23). It can be seen that the intention of village public health providers to quit their jobs is relatively severe. Although the survey time of this study was In May 2019, half a year earlier than the outbreak of the COVID-19 epidemic, it can be inferred from the data that the employment status of village public health service providers is not optimistic.

The results of structural equation model show that professional identity of village public health service providers has no direct influence on turnover intention and job burnout, but mediates through job satisfaction. At present, the research on the professional identity, turnover and burnout of medical personnel is mostly focused on the nurses in the oncology or emergency departments of the hospital, and it is concluded that there is a negative correlation between professional identity, job burnout and turnover intention (58), and the study of village public health service providers is relatively rare, the reason is that in the rural health service system in China, rural basic public health services do not have full-time staff, the village doctors concurrently engaged in public health services. The professional identity of village public health providers can be understood as their self-judgment on their knowledge and understanding of public health services, and is the recognition and inner acceptance of the role of public health given by

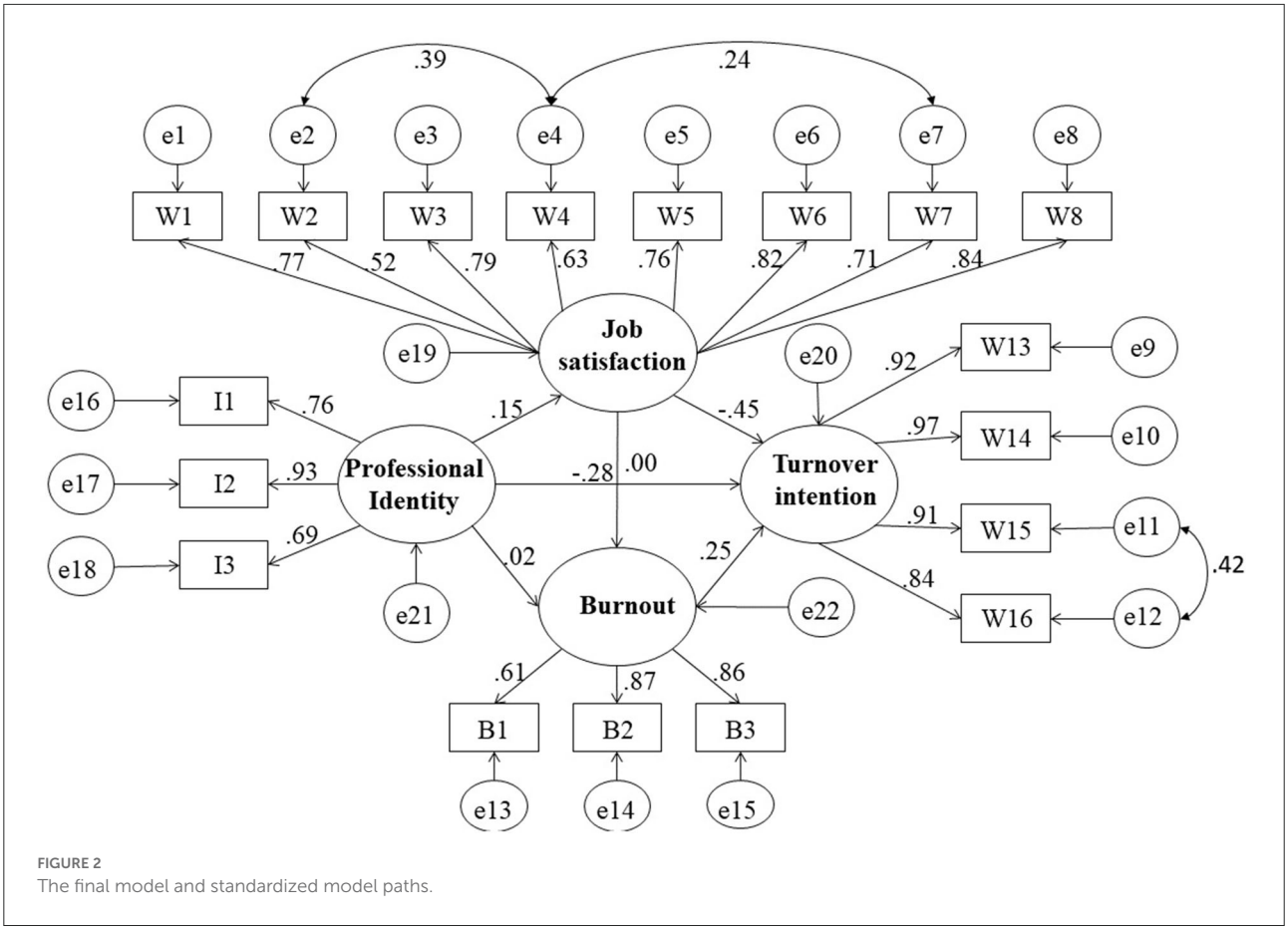

FIGURE 2
The final model and standardized model paths.

the society. Some scholars believe that village public health service providers have a large demand gap but low salary and professional identity, so it is imperative to strengthen the construction of the talent team (59). The pension insurance problem of village public service providers has not been solved for a long time, which fundamentally affects their identity (60). The COVID-19 epidemic has made the whole society, including the village public health service providers, realize the importance of public health, and their professional identity during the epidemic is significantly better than that before the epidemic. Participating in epidemic prevention and control work to protect the life safety of rural residents makes them tend to have more positive self-evaluation and professional identity (61). Thus, it can be seen, the professional identity of village public health providers can withstand the test of the epidemic, while some mediating factors affect their high burnout and turnover intension. How these mediating factors play a role in the relationship between professional identity and turnover intension, as well as how to prevent and control them need to be further studied and explored.

At present, the academic investigation on the job satisfaction of public health service providers mostly focuses on the staff of urban community health service centers and township health centers, while the investigation of the most basic village public health service providers is very insufficient. For example, in 2019, a study covering 553 cases of basic public health service providers in Zhejiang province, Shanxi Province and Chongqing municipality found that 39.5% of employees were dissatisfied with their overall work. Social respect, performance appraisal, work ability and work intensity are the important factors affecting overall job satisfaction (62). In order to improve the equality of public health services in rural areas, China has implemented a rural cooperation mechanism for service projects. Township health centers are the main body undertaking service projects and village health centers assist in completing projects and accept the guidance and assessment of township health centers. The quality of public health service can be effectively improved only when they have clear division of labor and cooperate with each other. That is not the case, however, a covering 365 village public health service provider's investigation reveals that the project responsibilities unclear, large work volume on health services, funds allocation is unreasonable, even be diverted, lack of effective training has seriously affected the job satisfaction of village public health service providers and their enthusiasm to participate in rural collaboration (63). In 2019, in many

TABLE 6 Significance test of the mediating test.

Model pathways	Estimated	95%CI
Total effects	0.146	0.069–0.219
Job satisfaction ← Professional identity		
Burnout ← Professional identity	−0.016	(−0.083)−0.051
Turnover intension ← Professional identity	−0.070	(−0.134)–(−0.006)
Burnout ← Job satisfaction	−0.263	(−0.330)–(−0.197)
Turnover intension ← Job satisfaction	−0.517	(−0.570)–(−0.460)
Turnover intension ← Burnout	0.242	0.182–0.299
Direct effects	0.146	0.076-−0.220
Job satisfaction ← Professional identity		
Burnout ← Professional identity	0.023	(−0.043)−0.091
Turnover intension ← Professional identity	0.000	(−0.053)−0.053
Burnout ← Job satisfaction	−0.263	(−0.326)–(−0.199)
Turnover intension ← Job satisfaction	−0.453	(−0.154)–(−0.394)
Turnover intension ← Burnout	0.242	0.182–0.299
Indirect effects	−0.038	(−0.061)–(−0.018)
Burnout ← Professional identity		
Turnover intension ← Professional identity	−0.070	(−0.114)–(−0.027)
Turnover intension ← Job satisfaction	−0.064	(−0.087)–(−0.043)

TABLE 7 Significance test of every mediating pathway.

Model pathways	95%CI
Turnover intention ← Job satisfaction ← Professional identity	(−0.289)–(−0.111)
Burnout ← Job satisfaction ← Professional identity	(−0.216)–(−0.077)
Turnover intension ← Burnout ← Job satisfaction	(−0.116)–(−0.052)

rural areas, due to insufficient public health funds and the withholding of public health subsidies from public health providers, causing them to leave their jobs collectively, and some villages could not find a single village doctor or public health service provider. Village public health service providers are the most important force and professionals at the forefront of COVID-19 prevention and control. How to improve their job satisfaction and enthusiasm, reduce turnover and stabilize the ranks has become a key issue concerning the success of epidemic prevention and control.

In this study, burnout not only has a direct positive effect on the turnover intention of village public health service providers, but also plays a mediating role in the negative effect of job satisfaction on the turnover intention. Job burnout is mainly manifested in treating work negatively and neglectfully, underestimating own work value, and treating others with indifference. When the employee's job burnout accumulates continuously, it may eventually lead to his/her resignation. The overall level of job burnout of emergency department nursing staff was relatively high, and their turnover intention was relatively strong (64). The burnout scores of village public health service providers in this study are similar to the burnout scores of village doctors in our previous study. However, among the three dimensions, The score of low sense of accomplishment of village public health service providers was 18.01 ± 13.823, which was slightly higher than that of village doctors (17.53 ± 13.419) (45), which meant that village public health service providers had a low sense of accomplishment. Many relevant studies show that the main factors affecting the low sense of achievement of basic public health service providers include annual income level, continuing education situation, uncooperative service objects, heavy workload, promotion space of the unit, health status, lack of family support and other factors (33, 45, 65, 66). Combined with the results of job satisfaction scale analysis in this study, it is not difficult to find that among the village-level public health service providers surveyed, the lowest score of job satisfaction was income 3.17 ± 1.57, followed by social security 3.45 ± 1.56, promotions 3.66 ± 1.56 and workload 3.72 ± 1.57. The low sense of achievement leads to the increase of burnout, which may eventually accumulate to a certain extent and cause resignation.

To sum up, the structural equation is used in this study to reveal the three influencing pathways of village public health provider's turnover intention, and it is confirmed that professional identity, job satisfaction and burnout are all accurate predictors of village-level public health provider's turnover. The results further verified the complex influence of professional identity on turnover intention, which is complicated because professional itself has no direct negative impact on turnover intention, but can indirectly affect turnover intention through the mediating effect of job satisfaction and burnout.

Two limitations should be considered in this study, first of all, although SEM is used in this study to test the complex relationship between variables, the design type of this study is a cross-sectional study, that is, at the beginning of the study, factors as "causes", including professional identity, job satisfaction and burnout, and factors as "outcomes", that is, turnover intention exist simultaneously, therefore, the sequence of cause and outcome factors could not be determined, and no control group was established for comparison and identification. Therefore, confirmatory conclusions of causality among factors cannot be determined based on cross-sectional design. Secondly, we collect data through questionnaires filled out by the respondents themselves instead of strict face-to-face survey, which may be unable to avoid the biased influence of subjective differences of the subjects on data quality.

Conclusions

The high turnover rate of village public health service providers is costly for the rural public health system, the epidemic prevention and control system, and rural residents, and will lead to an imminent passive situation in the rural response to major public health emergencies such as COVID-19. To ensure a high degree of "fit" between work and individual is an important guarantee to reduce the turnover rate.

In the absence of major epidemics or other public health crises, people generally do not pay enough attention to the public health profession, and there is a phenomenon of "emphasizing clinical practice over prevention". The professional identity of village public health providers should be strengthened and cultivated at the stage of medical education (67, 68), however, at present most of the research in public health education more focus on the pros and cons of China's public health professional education system, and the lack of research on public health professional students' professional identity (69), many students, especially students in lower grades for their professional sciolistic, lack of interest in learning, which also buried hidden trouble for his turnover after work (70).

Therefore, in the context of COVID-19, the government should strengthen the popularization of professional knowledge of public health to improve public awareness, especially for high school students, to increase their enthusiasm to apply for the major. At the same time, the medical colleges and universities should carry out pre-conceived professional education and guidance when the public health students enter the school, so that they can understand the nature, content, and far-reaching significance of the future work in advance (69). It is more necessary for schools to improve training programs, conduct in-depth studies on occupational and industrial standards of public health majors, and optimize curriculum setting and training mode from the perspective of job tasks, to improve the learning enthusiasm of students majoring in public health and improve their recognition of the profession after employment, then reduce burnout and turnover at work, and truly become the public health talents in line with the rural grassroots medical and health service system (69).

Government and society should pay attention to the development of village health service provider, improve their job satisfaction through multiple ways and channels, and influence their job prospects identity and work embedded degrees, so as to further enhance their willingness to stay in the village public health service jobs, to optimize the structure of community health services personnel.

For currently employed village public health service providers, the following six aspects can be adopted to improve their occupational environment, so as to improve their job satisfaction and reduce burnout and turnover. First, government departments of health will further optimize the coordination system of public health services between townships and villages. Scientific division of responsibilities, reasonable allocation of funds, effective training and guidance, standardized performance assessment system, reducing work load and other mechanisms make village public health service an attractive occupation (63). Second, we should enhance the public's respect for village public health service providers (71), give priority to solving their old-age security and living subsidies, solve their living difficulties, and attract and encourage excellent providers to stay at the grass-roots level. Third, equal pay for equal work should be achieved to ensure that the income of village public health service providers is no lower than that of township health center staff, and encourage them to do a good job in village public health services (72), especially in COVID-19 prevention and control. Fourth, let more new village doctors share public health tasks, so that existing public health service providers have time to attend training, so as to improve their knowledge and ability of epidemic prevention and control, and prevent the outbreak at the source. Fifth, through preferential policies, more highly educated and high-level public health personnel will be attracted to villages to provide guidance on public health services, replenish fresh blood, and improve the capacity and quality of rural public health service providers (73–76).

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by Medical Ethics Committee of Jining Medical University. All participants provided oral consent before any data were collected. Oral consent was obtained instead of written consent, because the survey was anonymous and did not involve personal privacy.

Author contributions

XZ, WZ, and LX conceptualized the idea. XZ performed the analyses and wrote the first draft of the manuscript. YZ, ZX, CW, and ZT checked and entered the data. ZD, XZ, and SG critically revised the manuscript. All the authors read and approved the final manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The reviewer HL declared a shared affiliation with the author WZ to the handling editor at the time of review.

Publisher's note

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EDITED BY
Oriol Yuguero,
Lleida Institute for Biomedical Research (IRBLleida), Spain

REVIEWED BY
Yayi Prabandari,
Gadjah Mada University, Indonesia
Ayu Indrayathi,
Udayana University, Indonesia

*CORRESPONDENCE
Yu-Lung Chiu
long_ruth0624@mail.ndmctsgh.edu.tw

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Factors influencing smoking cessation counselors' intention to stay: An application of a conceptual model of intention to stay verified with path analysis

Yi-Chun Liu[1], Shih-Hung Chiang[2], Chung-Yu Lai[3], Li-Chen Yen[4], Fang-Yih Liaw[5], Ming-Han Lin[2], Fu-Gong Lin[2], Ching-Huang Lai[2], Senyeong Kao[2,6], Yu-Tien Chang[2], Chia-Chao Wu[7] and Yu-Lung Chiu[2,6]*

[1]Graduate Institute of Medical Sciences, National Defense Medical Center, Taipei, Taiwan, [2]School of Public Health, National Defense Medical Center, Taipei, Taiwan, [3]Graduate Institute of Aerospace and Undersea Medicine, National Defense Medical Center, Taipei, Taiwan, [4]Department of Microbiology and Immunology, National Defense Medical Center, Taipei, Taiwan, [5]Department of Family and Community Medicine, Tri-Service General Hospital, Taipei, Taiwan, [6]Graduate Institute of Life Sciences, National Defense Medical Center, Taipei, Taiwan, [7]Division of Nephrology, Department of Internal Medicine, Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan

Background: The Taiwanese military trains smoking cessation counselors to counsel officers and soldiers on quitting smoking as part time. The intention to stay among smoking cessation counselors affects the promotion of smoking cessation. This study investigated smoking cessation counselors' intention to stay by applying a conceptual model of intent to stay (CMIS) to analyze influencing factors.

Methods: In this cross-sectional study, we applied the CMIS to design a questionnaire. We invited 577 smoking cessation counselors trained in the military from 2016 to 2017. The response rate was 46.7%, and the questionnaire responses of 260 military smoking cessation counselors were analyzed. We used path analysis to verify the relationships among the various aspects of the CMIS.

Results: We determined that smoking cessation counselors' intention to stay is directly affected by job satisfaction ($\beta = 0.150$, $p = 0.014$), job stress ($\beta = -0.225$, $p < 0.001$), and institutional identification ($\beta = 0.431$, $p < 0.001$). Career opportunities indirectly affect intention to stay through institutional identification, working environment indirectly affects intention to stay through job stress, and co-worker support and self-fulfillment indirectly affect intention to stay through job satisfaction and institutional identification. Our model could explain 36.7% of the variance in intent to stay among smoking cessation counselors.

Conclusion: Our results suggest that relevant policies should be formulated to enhance smoking cessation counselors' recognition, affirmation, and sense of belonging as related to smoking cessation counseling work, thereby raising their institutional identification and promoting their intention to stay.

KEYWORDS

smoking cessation, counselor, intention to stay, conceptual model of intent to stay, path analysis

Introduction

Smoking is notoriously harmful to health. According to the WHO, half of the deaths of people who smoke regularly can be attributed to their smoking habits. Globally, smoking-related diseases are the second leading cause of death, and smoking is also the fourth most common risk factor for disease. Approximately, 6 million adults die from smoking-related diseases each year (1).

According to a survey, the prevalence of cigarette smoking among young conscripts in military training centers and military officers in various services was 31.0–36.7% in Taiwan in 2014, which were considerably higher than Taiwan's national smoking rate and the U.S. army's smoking rate in the same year (16.4 and 13.9%, respectively) (2–4). The prevention and control of smoking in the Taiwan military must be implemented to address this trend.

In Taiwan, smoking cessation counselors are military personnel who were assigned by their units to receive training and to help officers and soldiers cope with the military mission and the particularity of the military workplace environment, maintain the health of them, increase the effectiveness of smoking cessation services and resources provided to basic units of the military, and encourage officers and soldiers to quit smoking, thereby reducing the military smoking rate. The Medical Affairs Bureau of the Ministry of National Defense manages the training of tobacco hazard prevention and control counselors. The officers, noncommissioned officers, soldiers, or others who intend to engage in smoking prevention and control were assigned by their unit to join the smoking cessation counselors training. An average of 300 smoking cessation counselors are trained each year. Four sessions are conducted in northern, central, southern, and eastern Taiwan annually, with free participation for tobacco hazard prevention and control counselors of all military units, psychological counseling staff, emergency medical technicians, and officers and soldiers who intend to engage in smoking prevention and control. The 3-h training courses cover awareness of smoking hazards and the relevance of smoking diseases, how to prompt motivation to quit, smoking cessation counseling and counseling skills, and other topics. Participants receive a smoking cessation counselor's training certificate if they pass the written test with a score of at least 80 points. Each military smoking cessation counselor serves officers and soldiers, assisting them with the task of quitting smoking through social support methods such as companionship, assistance, counseling, consultation, and referral (5). In order to assist military smoking cessation counselors in adjusting their coaching implementation, such as caring, companionship, assistance, counseling, or consultation, families of military smoking cessation counselors have been established, either through smoking cessation doctors in military hospitals or in grassroots troops serving as instructors. Moreover, military smoking cessation counselors can also refer smokers to specialists in military hospitals who can provide medication to help them quitting. Additionally, groups of military smoking cessation counselors discussed their work and shared their experiences, forming beneficial cycles (6).

A meta-analysis of 52 articles on the effectiveness of counseling and medications for smoking cessation revealed that the effect of medication and counseling on smoking cessation is stronger than that of general care [relative risk (RR) = 1.83] regardless of whether the treatment occurs in medical care institutions (RR = 1.97) or communities (RR = 1.53) (7). Because counseling can help people quit smoking more effectively than can other methods, the Ministry of National Defense has been training smoking cessation counselors every year since 2011 to enhance the military's smoking cessation rate because insufficient military medical officers are available to support a large number of officers and soldiers undergoing smoking cessation. Providing care, companionship, consultation, and referrals to the National Military Hospital are all part of a responsibilities of smoking cessation counselor. However, smoking cessation counseling is a part-time endeavor, and each counselor has a full-time job in the military. The willingness of counselors to continue counseling work affects the military's smoke prevention and control efforts.

Studies have reported that intention to stay is a predictor of resignation behavior (8). Numerous factors influence an employee's intention to stay. In 1999, Boyle et al. proposed a conceptual model of intent to stay (CMIS) to analyze intention to stay among nurses. In this theoretical framework, manager, organizational, nurse, and work characteristics influence individuals' intention to stay through factors, such as job satisfaction, job stress, and commitment. The overall explanatory power of the model is 52% (9). The model was also applied in a Swiss study of the factors that influence the intention to stay of various medical care employees in hospitals (10). However, previous studies have focused solely on full-time employment, and no studies have yet applied the model to analyze the intention to stay of part-time employees. Thus, this study investigated whether the CMIS can be used to predict and explore the factors affecting smoking cessation counselors' intention to stay.

Materials and methods

Study design and participants

Participants were not involved in the design or conduct of this study. The experiment design and procedures of this study were performed according to the guidelines of the Declaration of Helsinki. For this cross-sectional study, the inclusion criteria were smoking cessation counselors who have attended a training course and received training certificates conducted by the

Medical Affairs Bureau of the Ministry of National Defense in 2016–2017. The total number of smoking cessation counselors was 740. After the telephone interview, 29 counselors were veterans and 154 counselors were with missing phone number information; thus they were excluded. Finally, 577 counselors completed the survey.

Measurements

We contacted qualified counselors over the phone to request their participation in this study. After obtaining their consent, we emailed the online version of the questionnaire to the addresses provided by the counselors. The participants completed the questionnaire and submitted their responses online.

The questionnaire was developed with reference to relevant literature, which comprised basic characteristics, the CMIS (24 items gathered in eight dimensions: manager characteristics, workload, career opportunities, working environment, work organization, coworker support, self-fulfillment, and institutional identification), a job stress scale (six items), a job satisfaction scale (10 items), and a single item regarding intention to stay (10–13).

The counselors' basic characteristics included age, sex, educational attainment [senior high school, vocational high school, junior college, university of science and technology (including institute of technology), college, or graduate institute], higher education major (medical-related or nonmedical related), military service branch (army, navy, air force, military police, reserve force, and affiliated units of the Ministry of National Defense), military rank (officer, noncommissioned officer, soldier, or other), years of service, years of service as counselor, position (leadership or nonleadership), professional specialty [military doctor (including military health service) or nonmilitary doctor], location of military station (northern, central, southern, eastern, or outer islands), and workplace category (grassroots troop or nongrassroots troop).

The items on the questionnaire employed in this study were developed according to the CMIS. Face validity of the questionnaire was reviewed by health-care and health-care education experts. After several revisions, the content validity index of the questionnaire was determined to be 0.97.

A four-point scale was adopted for CMIS items (1 = strongly disagree to 4 = strongly agree). CMIS items included manager characteristics (seven items), workload (three items), career opportunities (two items), working environment (three items), work organization (two items), coworker support (two items), self-fulfillment (two items), and institutional identification (three items). Items of manager characteristics were as follows: (1) your manager is available when you need his/her help to perform counseling work, (2) your manager appreciates your smoking cessation counseling work, (3) your manager recognizes your competences as a counselor, (4) your manager supervises you sufficiently when you perform counseling work, (5) your manager is respectful with his/her members of the counseling team, (6) your manager behaves fairly with all members of the counseling team fairly, and (7) your manager leads and motivates his team members satisfactorily. The average score of the seven items was obtained, and Cronbach's α was 0.959. Items of workload were as follows: (1) you are able to accomplish your counseling work within the scheduled time, (2) the distribution of the workload to members is with equity in your counseling team, and (3) your work situation as a counselor (e.g., schedules, holidays, leisure) allow work and private life combination. The average score of these three items was obtained, and Cronbach's α was 0.872. Items of career opportunities were as follows: (1) your superiors encouraged your professional development as a counselor, and (2) in your opinion, counseling is a career perspective possible for you in the institution (e.g., promotion, mobility)? The average score of these two items was obtained, and Cronbach's α was 0.823. Items of working environment were as follows: (1) the organization climate well-suited to your work demands of counseling work, (2) the facilities and equipment in your working conditions well-suited to your work demands of counseling work, and (3) smoking cessation medications and other related consumables in your working conditions well-suited to your work demands of counseling work. The average score of these three items was obtained, and Cronbach's α was 0.885. Items of work organization were as follows: (1) globally, the work of counselors in your organization is well-organized, and (2) the information sharing regarding counseling work in your organization is well-organized. The average score of these two items was obtained, and Cronbach's α was 0.949. Items of coworker support were as follows: (1) you can count on your colleagues' support regarding counseling work, and (2) the relationships among counselors in your organization are respectful. The average score of these two items was obtained, and Cronbach's α was 0.904. Items of self-fulfillment were as follows: (1) when working as a counselor, you have the occasion to use your skills and abilities, and (2) you enjoy coming to work as a counselor. The average score of these two items was obtained, and Cronbach's α was 0.905. Items of institutional identification were as follows: (1) you are proud to serve as a counselor, (2) you share the idea conveyed in counseling work with others, and (3) the work of counselors contributes to the execution of the military's smoking cessation efforts. The average score of these three items was obtained, and Cronbach's α was 0.895. Cronbach's α of CMIS items are shown in Table 1.

A four-point scale was also adopted for job stress items (1 = strongly disagree to 4 = strongly agree). In contrast to the general scale, a higher job stress score indicated stronger disagreement. Items of job stress were as follows: (1) counseling work is physically demanding, (2) you are under constant time

TABLE 1 Cronbach's α of CMIS items.

CMIS items	Items	Cronbach's α
Manager characteristics	7	0.959
Workload	3	0.872
Career opportunities	2	0.823
Working environment	3	0.885
Work organization	2	0.949
Co-worker support	2	0.904
Self-fulfillment	2	0.905
Institutional identification	3	0.895

pressure due to a heavy workload associated with counseling, (3) you have very little freedom to decide how to do counseling work, (4) considering the heavy workload associated with counseling, you have to work very fast, (5) you often feel bothered or upset when working as a counselor, and (6) the demands of Counseling work interfere with your personal life. The average score of these six items was obtained, and Cronbach's α was 0.944.

A five-point Likert scale was adopted for job satisfaction items (1 = strongly dissatisfied to 5 = strongly satisfied). Items of job satisfaction were as follows: (1) autonomy associated with counseling work, (2) challenges associated with counseling work, (3) responsibilities associated with counseling work, (4) opportunities for advancement associated with counseling work, (5) occupational image associated with counseling work, (6) creativity associated with counseling work, (7) job security associated with counseling work, (8) professional growth associated with counseling work, (9) nature of work associated with counseling work, and (10) content of work associated with counseling work. The average score of these ten items was obtained, and Cronbach's α was 0.964.

With all reliability scores (Cronbach's α values) over 0.7, the scale had high reliability (14).

For intention to stay, only one item was listed: intention to stay as a smoking cessation counselor. The single item regarding intention to stay was scored on a 7-point scale (1 = strongly unwilling to 7 = strongly willing).

Data analysis

We employed SPSS 22.0 (IBM, Armonk, NY, USA) for statistical analysis. Continuous variables are expressed as means and standard deviations, and categorical variables are expressed as frequencies and percentages. Independent *t*-tests, one-way analysis of variance, and a Pearson correlation test were used to analyze the relationships among demographic characteristics, job satisfaction, job stress, institutional identification, and the intention to stay.

The CMIS was evaluated through path analysis using Amos 25.0 modeling software (IBM SPSS). The goodness-of-fit indices for the model were as follows: the *p*-value of the chi-square (χ^2) test was >0.05, the value of the relative χ^2 (χ^2/degrees of freedom) was <3, the root mean square error of approximation was <0.05, goodness-of-fit index was >0.90, and normed fit index was >0.90 (15).

Results

Demographics

Of the 557 counselors initially screened, 260 were included in the analysis. The response rate was 46.7%. The demographic characteristics of the study population are presented in Table 2. The average age of participants was 30.46 years, and the proportion of male participants (75.0%) was higher than that of female participants (25.0%). The most common level of education was college (39.0%), and most participants had majors that were not medical related (61.2%). Nearly half the participants served in the army ($n = 127$, 49.8%), 22.4% ($n = 57$) in the navy, 17.6% ($n = 45$) in the air force, and 10.2% ($n = 26$) in other military service branches. The most common military rank among the participants was noncommissioned officer (45.7%). The participants' average length of military service was 7.33 years, and the average length of service as a counselor was 1.91 years. Most participants were in nonleadership positions (71.9%) and were part of the military medical service (56.5%). The most common location of the military station was the south (30.0%). Most participants worked in grassroots troops (78.5%).

Descriptive statistics for the CMIS

The distribution of the CMIS dimension scores is presented in Table 3. The mean scores for seven dimensions of the CMIS (average scores 2.62–2.92 points), for job satisfaction (3.24 points), and for intention to stay (4.64 points) were above the scale midpoint. The results revealed that the smoking cessation counselors had a positive opinion regarding manager characteristics, career opportunities, working environment, work organization, coworker support, self-fulfillment, institutional identification, job satisfaction, and intention to stay. However, the average workload score was 2.19 points, and the average job stress score was 2.38 points, both of which were below the respective scales' midpoints.

Univariate analysis

The smoking cessation counselors' characteristics and the results of univariate analysis of job satisfaction, job stress,

TABLE 2 Demographic characteristics of study population.

Variables	*n* (%)/Mean ± SD
Age	30.46 ± 6.10
Sex	
Male	192 (75.0)
Female	64 (25.0)
Educational attainment	
Senior high school	16 (6.3)
Vocational high school	45 (17.7)
Junior college	45 (17.7)
University of Science and Technology	39 (15.4)
College	99 (39.0)
Graduate institute	10 (3.9)
Higher education major	
Medical-related	93 (38.8)
Nonmedical related	147 (61.2)
Military service branch	
Army	127 (49.8)
Navy	57 (22.4)
Air Force	45 (17.6)
Military Police	12 (4.7)
Reserve force	10 (3.9)
Affiliated units of the Ministry of National Defense	4 (1.6)
Military rank	
Officer	74 (28.9)
Noncommissioned officer	117 (45.7)
Soldier	61 (23.8)
Others	4 (1.6)
Years of service	7.33 ± 6.16
Years of service as counselor	1.91 ± 1.27
Position	
Leadership	73 (28.1)
Nonleadership	187 (71.9)
Professional specialty	
Military doctor	135 (56.5)
Nonmilitary doctor	104 (43.5)
Location of military station	
Northern	71 (27.3)
Central	41 (15.8)
Southern	78 (30.0)
Eastern	24 (9.2)
Outer islands	46 (17.7)
Workplace category	
Grassroots troop	56 (21.5)
Nongrassroots troop	204 (78.5)

SD, Standard deviation.

institutional identification, and intention to stay are presented in Table 4. The male military smoking cessation counselors' average job satisfaction score was significantly higher than that of their female counterparts (3.28 vs. 3.10, $p = 0.040$). Job stress and institutional identification exhibited no significant relationship with the basic characteristics of the smoking cessation counselors. Regarding intention to stay, significant differences in the smoking cessation counselors' intention to stay were identified among counselors with different higher education majors (medical-related or not, 4.91 vs. 4.48, $p = 0.024$), belonging to different professional specialty (military doctor or not, 4.90 vs. 4.38, $p = 0.011$), and with different location of military stations ($p = 0.038$).

Correlation analysis

The analysis of correlations between each CMIS dimension and intention to stay is presented in Table 5. The path analysis was conducted according to the analysis of correlations between each of the 10 dimensions and intention to stay, the significant basic characteristic variables listed in Table 4, and a road map of the CMIS framework.

Path analysis

Figure 1 presents the final model of the path analysis results. Table 6 presents the GIFs for the model, where χ^2 (10) is 7.538 ($p = 0.674$), χ^2/df is 0.754 (between 1 and 3), SRMR is 0.019 (<0.08), RMSEA is <0.001 (<0.05), GFI is 0.993 (>0.90), NFI is 0.993 (>0.90), non-normed fit index is 1.006 (>0.90), and comparative fit index is 1.000 (>0.95).

Table 7 details the direct and indirect effects of CMIS variables on intention to stay, institutional identification, job stress, and job satisfaction. Institutional identification ($\beta = 0.431$, $p < 0.001$), job stress ($\beta = -0.225$, $p < 0.001$), and job satisfaction ($\beta = 0.150$, $p = 0.014$) all had a significant and direct effect on intention to stay. Self-fulfillment had a significant indirect effect on intention to stay ($\beta = 0.290$) through institutional identification and job satisfaction, whereas self-fulfillment had significant direct effect on institutional identification ($\beta = 0.526$, $p < 0.001$) and job satisfaction ($\beta = 0.419$, $p < 0.001$). Coworker support had a significant indirect effect on intention to stay ($\beta = 0.144$) through job satisfaction and institutional identification, whereas coworker support had significant direct effect on job satisfaction ($\beta = 0.267$, $p < 0.001$) and institutional identification ($\beta = 0.242$, $p < 0.001$). Working environment had a significant indirect effect on intention to stay ($\beta = -0.059$) through job stress, whereas working environment had a significant direct effect on job stress ($\beta = 0.262$, $p < 0.001$). In addition, career

TABLE 3 Descriptive statistics for the effect of CMIS-based questionnaire items on intention to stay.

Variables	Mean ± SD
Manager characteristics[a]	
Your manager is available when you need his/her help to perform counseling work.	2.98 ± 0.57
Your manager appreciates your smoking cessation counseling work.	2.87 ± 0.63
Your manager recognizes your competences as a counselor.	2.92 ± 0.57
Your manager supervises you sufficiently when you perform counseling work.	2.90 ± 0.62
Your manager is respectful with his/her members of the counseling team.	2.95 ± 0.57
Your manager behaves fairly with all members of the counseling team fairly.	2.98 ± 0.57
Your manager leads and motivates his team members satisfactorily.	2.82 ± 0.66
Average score	2.92 ± 0.54
Workload[a]	
You are able to accomplish your counseling work within the scheduled time.	2.25 ± 0.58
The distribution of the workload to members is with equity in your counseling team.	2.16 ± 0.55
Your work situation as a counselor (e.g., schedules, holidays, leisure) allow work and private life combination.	2.16 ± 0.57
Average score	2.19 ± 0.50
Career opportunities[a]	
Your superiors encouraged your professional development as a counselor.	2.68 ± 0.61
In your opinion, counseling is a career perspective possible for you in the institution (e.g., promotion, mobility)?	2.70 ± 0.67
Average score	2.69 ± 0.59
Working environment[a]	
The organization climate well-suited to your work demands of counseling work.	2.71 ± 0.61
The facilities and equipment in your working conditions well-suited to your work demands of counseling work.	2.52 ± 0.72
Smoking cessation medications and other related consumables in your working conditions well-suited to your work demands of counseling work.	2.62 ± 0.70
Average score	2.62 ± 0.61
Work organization[a]	
Globally, the work of counselors in your organization is well-organized.	2.70 ± 0.61
The information sharing regarding counseling work in your organization is well-organized.	2.73 ± 0.61
Average score	2.71 ± 0.60
Co-worker support[a]	
You can count on your colleagues' support regarding counseling work.	2.90 ± 0.56
The relationships among counselors in your organization are respectful.	2.93 ± 0.54
Average score	2.92 ± 0.53
Self-fulfillment[a]	
When working as a counselor, you have the occasion to use your skills and abilities.	2.81 ± 0.58
You enjoy coming to work as a counselor.	2.81 ± 0.58
Average score	2.81 ± 0.55
Institutional identification[a]	
You are proud to serve as a counselor.	2.84 ± 0.55
You share the idea conveyed in counseling work with others.	2.90 ± 0.56
The work of counselors contributes to the execution of the military's smoking cessation efforts.	2.93 ± 0.53
Average score	2.89 ± 0.50
Job stress[a]	
Counseling work is physically demanding.	2.35 ± 0.72
You are under constant time pressure due to a heavy workload associated with counseling.	2.33 ± 0.71
You have very little freedom to decide how to do counseling work.	2.46 ± 0.73
Considering the heavy workload associated with counseling, you have to work very fast.	2.48 ± 0.71
You often feel bothered or upset when working as a counselor.	2.34 ± 0.73

(Continued)

TABLE 3 (Continued)

Variables	Mean ± SD
The demands of Counseling work interfere with your personal life.	2.32 ± 0.75
Average score	2.38 ± 0.64
Job satisfaction[b]	
Autonomy associated with counseling work	3.28 ± 0.79
Challenges associated with counseling work	3.29 ± 0.77
Responsibilities associated with counseling work	3.25 ± 0.74
Opportunities for advancement associated with counseling work	3.06 ± 0.78
Occupational image associated with counseling work	3.28 ± 0.77
Creativity associated with counseling work	3.23 ± 0.75
Job security associated with counseling work	3.12 ± 0.75
Professional growth associated with counseling work	3.30 ± 0.75
Nature of work associated with counseling work	3.29 ± 0.77
Content of work associated with counseling work	3.30 ± 0.77
Average score	3.24 ± 0.66
Intention to stay as a smoking cessation counselor[c]	4.64 ± 1.52

[a] 1 = strongly disagree to 4 = strongly agree.
[b] 1 = strongly dissatisfied to 5 = strongly satisfied.
[c] 1 = strongly unwilling to 7 = strongly willing.
SD, standard deviation.

opportunities had a significant indirect effect on intention to stay ($\beta = 0.059$) through institutional identification, whereas career opportunities had significant direct effect on institutional identification ($\beta = 0.137, p = 0.003$).

Discussion

This study revealed that the CMIS can be applied to analyze the factors that influence military smoking cessation counselors' intention to stay. Our research indicated that job satisfaction, job stress, and institutional identification can indirectly affect military smoking cessation counselors' intention to stay. Among these factors, institutional identification exerts the most significant effect, followed by job stress, whereas job satisfaction exerts the smallest effect. Career opportunities, coworker support, and self-fulfillment influence military smoking cessation counselors' intention to stay through institutional identification. Coworker support and self-fulfillment influence the military smoking cessation counselors' intention to stay through job satisfaction. Working environment influences the military smoking cessation counselors' intention to stay through job stress.

Military smoking cessation counselors' intention to stay is directly and positively influenced by institutional identification as an intervening variable, which is consistent with the results of previous studies (10, 16–18). According to the results of path analysis, among the effects of the three intervening variables on the smoking cessation counselors' intention to stay, that of institutional identification was the highest ($\beta = 0.431$). A related study that also used the CMIS and treated institutional identification as an intervening variable reported that the effect of institutional identification on the intention to stay was stronger among hospital nurses and psychosocial staff ($\beta = 0.28$ and 0.28, respectively) than among other hospital employees ($\beta = 0.19$ and 0.24 for physicians and administrative staff, respectively) (10). However, all of these values were much lower than the value obtained in this study ($\beta = 0.431$), reflecting our aforementioned conclusion that institutional identification exerted a strong effect on the military smoking cessation counselors' intention to stay. In Taiwan, the military smoking cessation counselors' work is a part-time endeavor; thus, they have opportunities to employ skills and abilities in addition to those employed in their principal job. Nevertheless, a sense of belonging and a sense of institutional identity exerted a stronger effect on the counselors' intention to stay than did job satisfaction and job stress. In addition, career opportunities, coworker support, and self-fulfillment all exerted a direct and positive effect on institutional identification, which is consistent with previous findings (19–23).

Military smoking cessation counselors' intention to stay is also positively influenced by job satisfaction as an intervening variable, and previous research has yielded similar results (9, 10, 24, 25). The path analysis revealed that among the effects of the three intervening variables, that of job satisfaction on intention to stay was the least ($\beta = 0.150$). However, prior researches that employed the CMIS and treated job satisfaction as an intervening variable reported that job satisfaction had the strongest effect on intention to stay among hospital physicians,

TABLE 4 Univariate analysis of the variables.

Variables	Job satisfaction		Job stress		Institutional identification		Intention to stay	
	r/Mean ± SD	*p*-value	*r*/Mean ± SD	*p*-value	*r*/Mean ± SD	*p*-value	*r*/Mean ± SD	*p*-value
Age	−0.040	0.528	0.018	0.774	−0.018	0.774	−0.062	0.326
Sex		0.040*		0.722		0.924		0.906
Male	3.28 ± 0.69		2.38 ± 0.66		2.89 ± 0.52		4.65 ± 1.54	
Female	3.10 ± 0.56		2.35 ± 0.59		2.89 ± 0.46		4.63 ± 1.48	
Educational attainment		0.803		0.393		0.468		0.288
Senior high school	3.11 ± 0.72		2.15 ± 0.61		2.88 ± 0.51		5.00 ± 1.51	
Vocational high school	3.25 ± 0.81		2.46 ± 0.81		2.83 ± 0.63		4.47 ± 1.63	
Junior college	3.18 ± 0.60		2.39 ± 0.63		2.87 ± 0.42		4.42 ± 1.70	
University of Science and Technology	3.18 ± 0.50		2.50 ± 0.51		2.89 ± 0.41		4.56 ± 1.45	
College	3.31 ± 0.64		2.31 ± 0.62		2.90 ± 0.51		4.75 ± 1.44	
Graduate institute	3.30 ± 1.03		2.45 ± 0.53		3.20 ± 0.36		5.50 ± 0.85	
Higher education major		0.320		0.935		0.387		0.024*
Medical-related	3.31 ± 0.68		2.38 ± 0.63		2.94 ± 0.47		4.91 ± 1.32	
Nonmedical related	3.22 ± 0.63		2.37 ± 0.64		2.88 ± 0.50		4.48 ± 1.65	
Military service branch		0.551		0.500		0.822		0.737
Army	3.21 ± 0.70		2.35 ± 0.66		2.87 ± 0.55		4.75 ± 1.41	
Navy	3.33 ± 0.59		2.37 ± 0.61		2.89 ± 0.46		4.53 ± 1.67	
Air Force	3.28 ± 0.66		2.52 ± 0.68		2.88 ± 0.50		4.47 ± 1.62	
Military Police	3.33 ± 0.48		2.17 ± 0.57		3.06 ± 0.31		4.75 ± 1.29	
Reserve force	3.20 ± 0.62		2.35 ± 0.55		2.83 ± 0.36		4.30 ± 1.83	
Affiliated units of the Ministry of National Defense	2.75 ± 0.54		2.63 ± 0.44		3.08 ± 0.42		4.00 ± 1.41	
Military rank		0.669		0.503		0.716		0.057
Officer	3.31 ± 0.66		2.32 ± 0.58		2.92 ± 0.51		5.03 ± 1.34	
Noncommissioned officer	3.19 ± 0.67		2.35 ± 0.67		2.86 ± 0.51		4.50 ± 1.56	
Soldier	3.25 ± 0.68		2.48 ± 0.65		2.90 ± 0.48		4.39 ± 1.62	
Others	3.38 ± 0.56		2.33 ± 0.38		3.08 ± 0.42		5.00 ± 1.63	
Years of service	−0.070	0.259	0.042	0.504	−0.037	0.549	−0.088	0.156
Years of service as counselor	−0.013	0.831	−0.005	0.930	0.005	0.940	−0.039	0.530
Position		0.411		0.384		0.468		0.503
Leadership	3.18 ± 0.70		2.32 ± 0.64		2.93 ± 0.50		4.74 ± 1.39	
Nonleadership	3.26 ± 0.65		2.40 ± 0.64		2.88 ± 0.50		4.60 ± 1.57	
Professional specialty		0.138		0.687		0.253		0.011*
Military doctor	3.28 ± 0.61		2.37 ± 0.60		2.91 ± 0.45		4.90 ± 1.39	
Nonmilitary doctor	3.15 ± 0.73		2.33 ± 0.69		2.83 ± 0.57		4.38 ± 1.67	
Location of military station		0.612		0.447		0.164		0.038*
Northern	3.25 ± 0.64		2.32 ± 0.65		2.91 ± 0.54		4.86 ± 1.56	
Central	3.18 ± 0.74		2.26 ± 0.56		2.76 ± 0.57		4.54 ± 1.29	
Southern	3.26 ± 0.61		2.45 ± 0.59		2.95 ± 0.44		4.58 ± 1.66	
Eastern	3.08 ± 0.66		2.44 ± 0.75		2.75 ± 0.54		3.83 ± 1.20	
Outer islands	3.33 ± 0.73		2.43 ± 0.70		2.96 ± 0.42		4.91 ± 1.43	
Workplace category		0.963		0.444		0.566		0.287
Grassroots troop	3.24 ± 0.61		2.44 ± 0.65		2.86 ± 0.55		4.45 ± 1.65	
Nongrassroots troop	3.24 ± 0.68		2.36 ± 0.63		2.90 ± 0.48		4.69 ± 1.48	

*$p < 0.05$.
SD, standard deviation.

TABLE 5 Correlation of the continuous variables.

Variables	1	2	3	4	5	6	7	8	9	10
1. Manager characteristics	1									
2. Workload	−0.638**	1								
3. Career opportunities	0.613**	−0.673**	1							
4. Working environment	0.577**	−0.663**	0.698**	1						
5. Work organization	0.617**	−0.698**	0.687**	0.790**	1					
6. Coworker support	0.674**	−0.672**	0.545**	0.566**	0.667**	1				
7. Self-fulfillment	0.569**	−0.679**	0.599**	0.599**	0.649**	0.706**	1			
8. Job satisfaction	0.455**	−0.513**	0.460**	0.423**	0.486**	0.563**	0.607**	1		
9. Job stress	0.238**	−0.107	0.227**	0.262**	0.177**	0.096	0.039	0.105	1	
10. Institutional identification	0.556**	−0.625**	0.593**	0.548**	0.631**	0.688**	0.779**	0.599**	0.069	1
11. Intention to stay	0.254**	−0.316**	0.256**	0.226**	0.260**	0.364**	0.506**	0.421**	−0.179**	0.554**

**$p < 0.01$.

TABLE 6 Goodness-of-fit indices for the model.

Fit index	Value	Recommended value
χ^2/df	0.754	1 < NC < 3
P	0.674	>0.50
SRMR	0.019	<0.08
RMSEA	<0.001	<0.05
GFI	0.993	>0.90
NFI	0.993	>0.90
NNFI	1.006	>0.90
CFI	1.000	>0.95

df, Degree of freedom; SRMR, Standardized root mean square residual; RMSEA, Root mean square error of approximation; GFI, Goodness-of-fit index; NFI, Normed fit index; NNFI, Non-normed fit index; CFI, Comparative fit index.

laboratory staff, psychosocial staff, and critical care nurses ($\beta = 0.24$, 0.25, 0.35, and 0.308, respectively) (9, 10). A study reported that among part-time dental hygiene faculty members, job satisfaction was the strongest predictor of intention to stay (26). One potential explanation for this discrepancy is that the military prioritizes obedience, responsibility, and discipline. Job satisfaction may not be as central as institutional identification and job stress in informing military-affiliated professionals' intention to stay. Nevertheless, in this study, coworker support and self-fulfillment exerted a direct and positive effect on job satisfaction, which is consistent with previous findings (9, 10).

Military smoking cessation counselors' intention to stay is negatively influenced by job stress as an intervening variable, and previous research has yielded similar results (27, 28). Path analysis indicated that, among the three intervening variables, job stress exerts only the second most significant effect on smoking cessation counselors' intention to stay ($\beta = -0.225$). However, prior research that employed the CMIS and treated job stress as an intervening variable indicated that job stress exerted a negative effect on nurses' intention to stay in the hospital ($\beta = -0.052$) even smaller than that identified in this study ($\beta = -0.225$) (9). Although the military smoking cessation counselors' part-time job stress was not the strongest intervening variable, if part-time cessation counseling employment enhances the counselors' stress, it may lower their intention to stay. This suggests that job stress exerts a stronger effect on intention to stay among part-time employees than among full-time employees. Furthermore, working environment exerts a direct and positive effect on job stress, which is consistent with prior findings that decreasing part-time work reduces work stress (29). For military smoking cessation counselors, the need to improve their working environment, equipment, smoking cessation medications, and other associated consumables enhances work-related stress.

This study used the CMIS to explore the military smoking cessation counselors' intention to stay, and 36.7% of the variance in intent to stay among the smoking cessation counselors was explained using the model. This is comparable to the explanatory power of the CMIS reported in a study on willingness to stay among hospital employees of different occupations, which ranged from 23.6 to 36.0% (23.6, 26.1, 27.8, 31.4, and 36.0% for physicians, laboratory staff, administrative staff, nurses, and psychosocial staff, respectively) (10). Therefore, the CMIS can be used to predict military smoking cessation counselors' intention to stay.

In this study, the smoking cessation counselors' average score for intention to stay was 4.64 points (1–7 points). Studies have reported that the average willingness-to-stay scores of critical care nurses in intensive care units at urban hospitals, regular nurses employed in long-term care facilities, nursing assistants in nursing homes, and nursing assistants in long-term care facilities were 13.96 points (4–20 points), 3.5 points (1–5 points), 2.84 points (1–4 points), and 9.78 points (3–13 points), respectively, all of which are higher

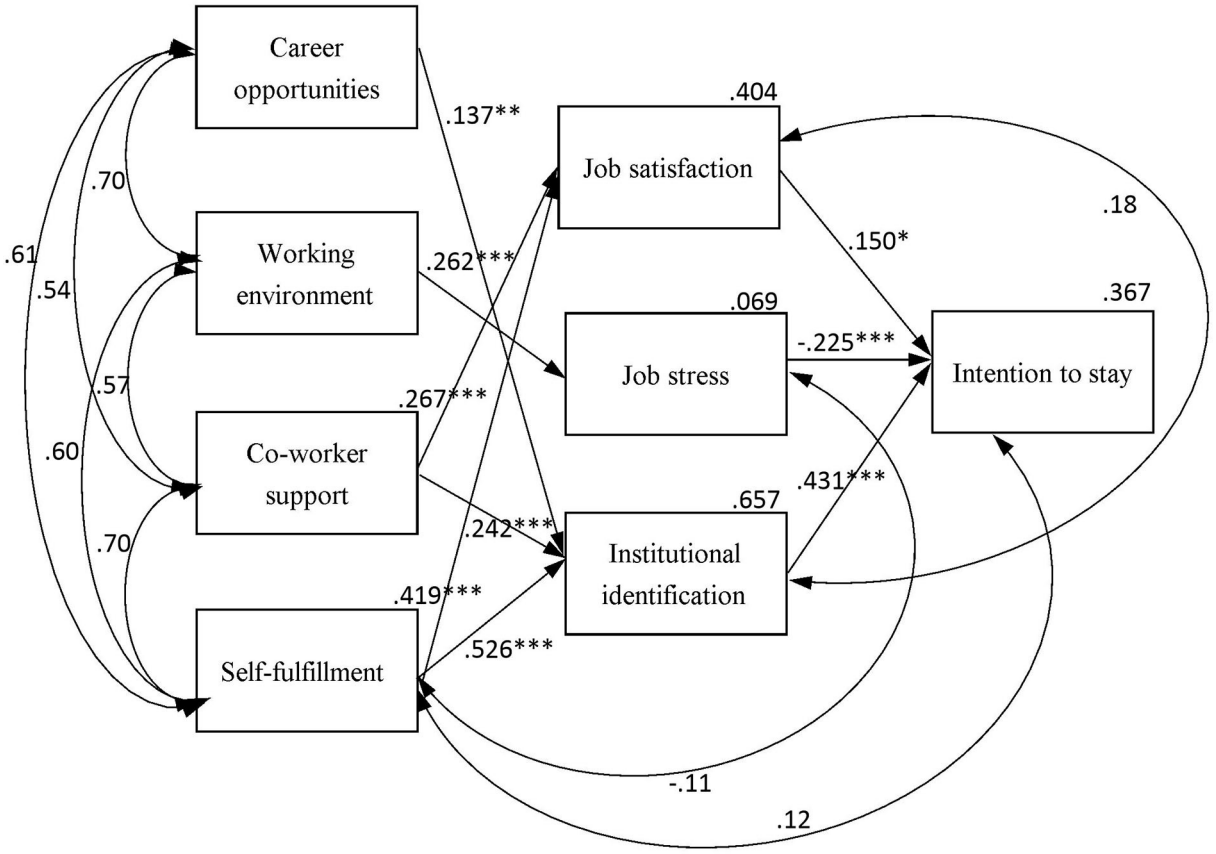

FIGURE 1
Path diagram of the conceptual model of intent to stay (CMIS) (path coefficients are indicated in the path diagram). *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

than our study population's average intention to stay (9, 30–32). These studies were conducted in the context of a nursing shortage and heavy workload, and the intention to stay was still higher than that of this study. This shows that the participants in the present study had low intention to stay. This low intention to stay may be attributable to the fact that the highest degrees of 61.3% of the participants in this study were in nonmedical fields or to the fact that smoking cessation counseling is part-time rather than full-time work (33).

Limitation

This study has the following limitations: (1) We used online questionnaires to collect data from counselors, but we were unable to regulate the time it took for them to respond, which resulted in a lower sample recovery rate that may have led to the research findings failing to accurately reflect the actual situation. (2) Because the participants in this study were military smoking cessation counselors from 2016 to 2017, the results may not apply to all counselors; however, the findings may still have practical implications. (3) The participants' feelings were investigated using a self-administered questionnaire. When completing the questionnaire, a participant's responses may be influenced by their external environment, personal cognition, emotional state, attitude, and other factors, and participants may have doubts about and biased understandings of the items, resulting in errors in the research results. However, the questionnaire employed in this study exhibited high reliability and validity, indicating that the questionnaire's quality was sufficient. As much as possible, the survey can be conducted face-to-face to reduce bias due to the external environment. For instance, we can conduct questionnaires after the training sessions. (4) This was a cross-sectional study; thus, conclusions cannot be drawn regarding cause-and-effect relationships between the variables.

TABLE 7 Path analysis result—direct and indirect effects.

Dependent variable	Independent variable	Direct effect	Indirect effect	Total effect
Intention to stay	Career opportunities		0.059	0.059
	Working environment		−0.059	−0.059
	Coworker support		0.144	0.144
	Self-fulfillment		0.290	0.290
	Job satisfaction	0.150		0.150
	Job stress	−0.225		−0.225
	Institutional identification	0.431		0.431
Institutional identification	Career opportunities	0.137		0.137
	Coworker support	0.242		0.242
	Self-fulfillment	0.526		0.526
Job stress	Working environment	0.262		0.262
Job satisfaction	Coworker support	0.267		0.267
	Self-fulfillment	0.419		0.419

Conclusion

This study verified that the CMIS can be used to predict military smoking cessation counselors' intention to stay. The results indicated that intention to stay was directly affected by job satisfaction, job stress, and institutional identification. Career opportunities indirectly affected intention to stay through institutional identification; the working environment indirectly affected intention to stay through job stress; and coworker support and self-fulfillment indirectly affected intention to stay through job satisfaction and institutional identification. The most effective strategy to improve smoking cessation counselors' intention to stay is to increase their institutional identification by encouraging military decision makers to implement policies designed to establish suitable reward and support systems. Policy makers in the military can establish a suitable reward based on military smoking cessation counselors' performance, such as how many smokers they helped successfully quit smoking, and award varying degrees of additional bonuses or gift certificates. Policy makers in the military can even more regularly praise the highly effective military smoking cessation counselors in public and award medals. In terms of promotion system, it is necessary to regularly and publicly commend those excellent military smoking cessation counselors in order to progress them to advanced status and give them more power and duty. In addition, future studies can assess the effect of smoking cessation counseling on smoking cessation rates and persistence.

Data availability statement

The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by Institutional Review Board of the Tri-Service General Hospital, National Defense Medical Center. The patients/participants provided their written informed consent to participate in this study.

Author contributions

Y-CL, Y-LC, SK, S-HC, F-GL, and C-HL designed the study and wrote the protocol. Y-CL, S-HC, C-YL, L-CY, F-YL, Y-TC, C-CW, and M-HL conducted literature searches and provided summaries of previous research studies. Y-LC, S-HC, and Y-CL conducted the statistical analysis. Y-CL wrote the first draft of the manuscript. All authors contributed to interpreting the results, read and agreed to the published version of the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Oriol Yuguero,
Lleida Institute for Biomedical Research (IRBLleida), Spain

REVIEWED BY
Katalin Dr. Papp,
University of Debrecen, Hungary
Adriano Friganovic,
University Hospital Centre Zagreb, Croatia

*CORRESPONDENCE
Jinxia Jiang
jiangjinxia99@163.com
Li Zeng
aiyinsinian1986@163.com

†These authors have contributed equally to this work

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Occupational benefit perception of acute and critical care nurses: A qualitative meta-synthesis

Shuyang Liu[1†], Xia Duan[2†], Peng Han[1], Haiyan Shao[1], Jinxia Jiang[1*] and Li Zeng[3*]

[1]Emergency Department, Shanghai Tenth People's Hospital, School of Medicine, Tongji University, Shanghai, China, [2]Nursing Department, Shanghai First Maternity and Infant Hospital, School of Medicine, Tongji University, Shanghai, China, [3]Department of Nursing, Tongji Hospital, School of Medicine, Tongji University, Shanghai, China

Background: With the development of society, nurses have an increasingly more important role in the medical team. At the same time, due to various reasons, the number of active nurses is continuously decreasing, and the shortage of nursing personnel is becoming ever more serious. The COVID-19 pandemic made these clinical problems more serious. As the department with the greatest work pressure and the most intense pace, acute and critical care nurses are already facing serious problems related to job burnout and dismission. In the context of the COVID-19 pandemic, these problems should be solved urgently. Furthermore, with the rise of positive psychology, many scholars are turning their research direction to the positive professional experience of nurses so as to get inspiration to encourage nurses to face work with an optimistic attitude and guide nursing managers to better retain nursing talents.

Objective: The purpose of this paper is to summarize and evaluate the positive emotional experience and professional benefit of acute and critical care specialist nurses in the process of work. So as to better interpret their occupational benefit perception and guide nursing managers in adopting positive measures and promoting the development of high-quality nursing.

Methods: Cinahl plus, Embase, Medline and other twelve databases were searched for relevant literature. Meta-aggregation was used to synthesize the findings of the included studies.

Results: From a total of 12 articles included in this study, 55 main results were presented, 8 new categories were integrated, and three themes were formed: professional identity, social support, and personal growth. The professional identity included: being proud of professional ability and increasing professional value; social support included: friends and family support, organizational, environmental support, peer support, and support of patients and their families; personal growth included realizing self-worth and promoting self-development.

Conclusion: Hospital managers should pay attention to the positive emotional experience of nurses in work and based on this, provide practical and beneficial protection for nurses from the aspects of salary, learning opportunities, working environment, social support and internal personality, stimulate

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work enthusiasm, guide nurses to correctly face negative emotions and occupational pressure, and improve the sense of professional benefit.

KEYWORDS

acute and critical care, nurses, qualitative review, meta-synthesis, occupational benefit perception

Introduction

With the development of society and the great advancements in medical settings, nurses represent the central and largest sector of the healthcare workforce (1). They have an important role in daily medical work but are also expected to bear the weight of unexpected medical emergencies such as the outbreak of COVID-19. Undoubtedly, nurses are patients' closest associates, commonly assuming the role of their "best friends." However, due to high work pressure, uncertain career prospects, poor salary, response fatigue to public health events, and other reasons, the high dimission rate of nursing staff has become increasingly serious (2). Following the rapid development of medical technology and the progress of the nursing process, the shortage of nurses in this context deserves more attention and the adoption of some positive measures (3). As this issue has become a global problem, some scholars argue that solving the shortage of nurses might be the basis for advancing medical cause (4). Each country has its criteria for evaluating nurse shortages. According to previous studies, American states have nearly 700 nurses for every 10,000 people, while some African countries, such as Uganda, have a nurse-to-population ratio of approximately 6:10,000. Both these countries report nurse shortages (5). In Europe, forty-three percent of nurses plan to leave their occupation within 5 years, while in China, this phenomenon is particularly serious (6). Some scholars have studied the status quo of turnover intention and turnover rate of nurses in China, reporting that the turnover intention of nurses, which is affected by multiple factors, such as age, region, and culture, is generally at a high level (7). All of these questions affect the service quality and the rehabilitation of patients, as well as the development of medical causes and the improvement of medical levels. A shortage of nurses is expected to continue until 2030, making it imperative to take active measures to deal with nurse turnover (1).

The COVID-19 pandemic broke out in Wuhan, China, in 2019 and has spread to all parts of the world. Due to the high variability and rapid spread of the virus, there is currently a lack of specific drugs, so the preventive and control measures still mainly involve preventing respiratory transmission and vaccination. In medical staff, who have undoubtedly been on the front line, facing the danger of infection and isolation, the psychological pressure is self-evident. Some hospitals in the preview triage department reassigned paramedics to screen patients as soon as possible, preventing the epidemic from spreading in the hospital, thus reducing the staff within the department and consequently increasing workload. Currently, the normalization of the epidemic is the main response measure. Under the threat of multiple pressures, medical staff inevitably accumulates negative emotions, which in turn enforces their resignation intention. Previous studies have pointed out that COVID-19 has increased the physical, psychological, and social pressure on the medical staff, and such a high-pressure working environment has also increased the turnover of nurses. During the COVID-19 outbreak, nurses, as the main force and front-line personnel, must have close contact with infected people, and each nurse may need to wear 3–4 layers of protective equipment, including clothing, masks, goggles, gloves, and shoe covers. Wearing protective clothing for a long time may lead to hypoxia, shortness of breath, and some other adverse reactions e.g., masks may cause facial pressure injuries, while gloves affect the sense of touch and operation of nurses. Nurses may also lack the support and comfort of family members and relatives due to isolation, resulting in great psychological and mental pressure. Some patients do not have adequate knowledge of their diseases or do not fully understand medical staff, which further increases the difficulty of nurses' work. In addition, the mobility of patients in acute and critical care departments is large, and nurses come into contact with many patients, which increases their risk of infection, putting them under greater physical and mental pressure (8). COVID-19 is not only an epidemiological problem but also a socio-economic and structural problem (9).

At the forefront of the hospital, acute and critical care nurses are always confronted with urgent and unknown situations and often come into contact with stressful events such as death and serious injury of patients. As the emergency department is also more likely to be the site of violence and conflict, the working pressure of nurses is particularly prominent compared with nurses in other departments (10). At present, a series of problems caused by the shortage of nurses make the working pressure on acute critical care nurses even more challenging: long waiting times, crowded spaces, and delayed treatment make patients and their families feel anxious and irritable, which may result in aggressive behavior (11). They may need to make critical nursing decisions independently in situations where adequate information is lacking. Also, an unknown number

of critically ill patients may be admitted at any given time. Furthermore, they may suffer from limited peer and social support and rest periods. Studies have suggested that acute and critical care nurses need to maintain constant vigilance and alertness (12) in order to respond to emergencies well. Long-term work pressure beyond the acceptable threshold can cause a series of psychological stress responses and job burnout; heavy workloads and hospital scheduling can lead to occupational diseases. Previous studies have shown that the dismission of nurses in acute and critical care departments is particularly serious (13), and the impact of the current epidemic has further exacerbated the nurse shortage. While the mass dismission of nurses further intensives the existing conflicts, it also causes a series of problems: the decline of medical quality, the surge of patient dissatisfaction, the regression of first-aid efficiency, and the increase of adverse clinical outcomes for patients. In addition, due to the particularity of the working environment in the acute and critical care department, nurses are required to remain calm in emergency situations and quickly and skillfully provide treatment and guidance for patients, all of which highlight the importance of work experience of nurses. However, the increasing turnover rate of nurses has led to a shortage of senior nurses, posing another problem as it takes a long time and energy to re-train new nurses (14).

Since the rise of positive psychology, more and more scholars have turned to the positive emotional experience of nurses in the professional process in order to retain nursing talents by improving nurses' professional emotions (6). Studies have pointed out that the sense of benefit and satisfaction with the nursing profession is closely related to their intention to stay on the job. According to a previous study, nurses with low levels of job satisfaction were 65 % more likely to leave than nurses with high job satisfaction (15). Therefore, the professional benefit among nurses has become a focus of attention. An in-depth understanding of nursing staff's positive emotions and job demands can provide managers with ideas for formulating more effective measures to reduce stress and the dismission rate, improve resilience and enhance professional identity, strengthen the willingness to stay on the job, awaken the enthusiasm for work, provide high-quality care to patients and ultimately lead to better clinical outcomes for patients.

In the past, a large number of studies often started from the negative factors affecting nurses' intention to stay, or used the perceived occupational benefit scale to carry out quantitative research. This paper focuses on the integration of qualitative research from the perspective of positive psychology to explore the real needs of emergency and critical care specialist nurses to make the conclusions more in-depth and applicable. This paper is aim to effectively guide nursing managers to formulate and take corresponding measures, pay attention to and meet the psychological and professional needs of nurses, retain more nursing talents, reduce the turnover rate, and promote the development of high-quality nursing.

Methods

Design

This is a systematic evaluation and meta-synthesis of qualitative research. Qualitative research is rooted in an interpretive paradigm of cognitive multiple socially constructed realities and aims to explore how people interact with and interpret the world (6). Qualitative research is gaining an increasingly important role in the medical field as it can often explore participants' emotional experiences more deeply than other research methods (16).

The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) (17) was used as a basis for reporting the review. Inspired by Sandelowski et al. (18), meta-synthesis of qualitative research is based on the premise of understanding its philosophical thoughts and methodology, repeatedly reading the included literature and extracting the themes and hidden meanings so as to conduct inductive analysis, form new categories, and finally integrate new results. By synthesizing new results, a more profound and substantial explanation can be given to specific phenomena, providing a more influential and persuasive final conclusion.

Search methods

Cinahl plus, Embase, Medline, Cochrane, Elsvier, Ovid, Pubmed, Web of Science, CNKI, VIP, Chinainfo, and Chinese Biomedical Literature databases were searched for relevant literature. Search terms "nurs*," "professional benefit," "professional benefit perception," "sense of career benefit," "Job satisfaction," "retention will," "professional identity" were included and combined using Boolean operators. These search terms were also adjusted and matched to ensure a comprehensive range of searches. The retrieval period was from database construction to April 2022.

Eligibility criteria and study selection

Study design(S)

The qualitative research and qualitative part of mixed method research is included in this study. The methodologies of qualitative research is not limited, including ethnography, grounded theory, phenomenological methods, etc.

Participant(P)

Nurses now working in the emergency and critical care department.

Interest of phenomenal(I)

Positive experience and professional benefit of emergency and critical care specialist nurses in their work.

Context(Co)

Positive experiences of nurses who are currently working in the emergency and critical care department and will continue to work in the future.

Exclusion criteria

The exclusion criteria are as follows: duplicate and unavailable full-text literature; non-Chinese and non-English literature; the subjects were other clinical medical workers; conference papers; case studies; official reports; book reviews; review articles and editorials.

Two researchers screened the retrieved literature according to inclusion and exclusion criteria. In case of disagreement, the third researcher was consulted for judgment. In this search, 2,943 studies were obtained, and 872 duplicated articles were removed. Also, 1,677 irrelevant studies were removed after reading the title and abstract, and 382 inconsistent studies were removed after reading the full text. Finally, 12 studies were obtained after literature quality evaluation. The literature screening steps are shown in Figure 1.

Quality appraisal

The included studies were independently evaluated by two researchers trained in systematic evidence-based care using the JBI Australian Centre for Evidence-based Health Care Qualitative research Quality evaluation criteria (19). This method evaluates studies from ten aspects, and the results are divided into three aspects: yes, no, and unclear. Each criterion is assigned a corresponding score (yes = 2, no = 0, unclear = 1); the overall score for each study is 20 points. These scores are eventually converted to a percentage system. Finally, a study with a score of 70% was selected and retained. The score was the result of an agreement between two researchers. In case of disagreement, the two researchers further discussed or consulted a third investigator for the verdict. The final evaluation results are shown in Table 1.

Data extraction

Data extracted in this study included author and year, source, objective, methodology, and conclusion. These results were evaluated by two investigators, and in case of disagreement, by a third investigator. The final results are shown in Table 2.

Data analysis and synthesis

Qualitative research is a broad concept that encompasses a variety of approaches. Researchers argue that qualitative research can provide rich insights and descriptions, but the lack of connections between studies limits its application and progress. Meta-synthesis of qualitative studies can solve this problem to some extent by not only summarizing the results of all qualitative studies but also by interpreting the results of qualitative studies to create new perspectives and so-called "third-level" findings (32). Meta-synthesis is a systematic evaluation method in which the results of two or more studies are classified and reclassified to form a comprehensive result (19). In the first place, the researchers read papers and then re-read them to gain a preliminary understanding. Then, the results of each study are extracted, along with the research results showing that the results of data and text and included in the study of support data consistency between levels by two independent researchers. In case of disagreement, the third researcher was consulted. Each finding was assigned its own level of confidence: both explicitly credible and unsupported (19). Results were then encoded according to their meaning and content. Researchers looked for similarities and differences between the findings and the textual data, and the meanings of the original data set were classified. Next, the categories were read over and over again, searching for similarities and forming comprehensive findings.

Results

From a total of 2,943 identified studies, 12 were included in the analysis. None of the included studies specified the values and cultural background. In addition, six articles did not indicate whether their studies were approved by ethics bodies. Out of the 12 included studies, 11 were qualitative and one was a mixture of qualitative and quantitative studies. Methodology included descriptive research (n = 2), phenomenological research (n = 8), ethnography (n = 1), and hermeneutic research (n = 1). The studies were from following countries: China (n = 6), UK (n = 1), Denmark (n = 1), Malaysia (n = 1), USA (n = 1), Sweden (n = 1), and Norway (n = 1). The study participants ranged in age from 23 to 60 from 1999 to 2021. Sample sizes ranged from 9 to 46. A total of 202 samples were included in the studies. All the included studies focused on nursing staff in critical and critical care departments, and the qualitative research subjects were mainly from operating rooms, intensive care units, emergency departments, oncology departments, nephrology departments, etc., as well as nurses who volunteered during COVID-19 (Table 2). A total of 55 results were extracted from the 12 included literature, and 8 new categories were obtained after synthesizing. Three new themes

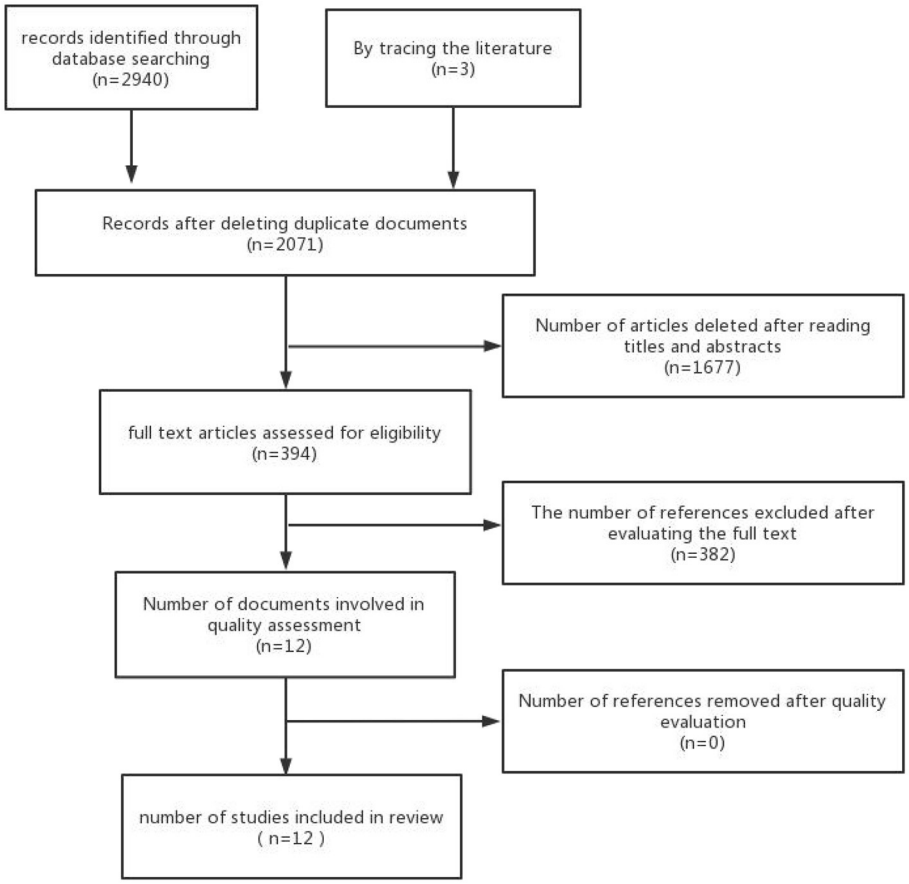

FIGURE 1
The literature screening steps.

were obtained after synthesizing 8 new categories: professional identity, social support, and personal growth (Table 3).

Theme 1: Professional identity

Proud professional ability

The situation in acute and critical care units is always urgent, and the work environment is complex and stressful. Therefore, it is very important to have good psychological quality, skilled operation technology, and teamwork ability. Having the professional ability recognized and affirmed by people can increase the professional identity of nurses, thus enhancing their sense of professional benefit. "*The most beneficial aspect of my work is the patients' recognition and praise of my work after each operation and education, which makes me more confident and motivated to persist.*" (20); "*I have a lot of knowledge about cancer prevention*" *and "I have mastered PICC tube placement technology, which is an affirmation of my professional ability*" (22). Many nurses express that they have a certain degree of autonomy in the clinical decision-making process and can use their knowledge and experience to save patients' lives in emergency situations when a life-threatening situation occurs and the doctor has not yet arrived (30). This independence greatly enhances the sense of accomplishment and career benefit and improves the quality of nursing.

Increasing professional value

Nurses in acute and critical care departments usually deal with critically ill patients, so after treatment and nursing, patients' rehabilitation and discharge may increase their professional sense of achievement, which is also a reflection of their professional value. *"He was a very critical patient, but he got better through our daily care, was transferred out of ICU and discharged. I feel a sense of accomplishment every time I see him"* (23). Many nurses said their professional value was reflected in saving lives (20). In addition, nurses said they felt their profession was valuable because their knowledge and clinical experience could help those around them, reducing the need

TABLE 1 Evaluation of methodological quality.

Included studies	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	Results (%)
Jiang et al. (20)	Y	Y	Y	Y	Y	N	N	Y	U	Y	15/20 (75%)
Xie et al. (21)	Y	Y	Y	Y	Y	N	N	Y	U	Y	15/20 (75%)
Li et al. (22)	Y	Y	Y	Y	Y	N	N	Y	U	Y	15/20 (75%)
Zhang et al. (23)	Y	Y	Y	Y	Y	N	N	Y	U	Y	15/20 (75%)
Xu et al. (24)	Y	Y	Y	Y	Y	N	N	Y	U	Y	15/20 (75%)
Atefi et al. (25)	Y	Y	Y	Y	Y	U	Y	Y	Y	Y	19/20 (95%)
McNeese-Smith (26)	Y	Y	Y	Y	Y	U	U	Y	Y	Y	18/20 (90%)
Fagerberg (27)	Y	Y	Y	Y	Y	U	Y	Y	Y	Y	19/20 (95%)
McKenzie and Addis (28)	Y	Y	Y	Y	Y	U	U	Y	Y	Y	18/20 (90%)
Kristoffersen (29)	Y	Y	Y	Y	Y	U	Y	Y	U	Y	18/20 (90%)
Aagaard et al. (30)	Y	Y	Y	Y	Y	U	Y	Y	Y	Y	19/20 (95%)
Sheng et al. (31)	Y	Y	Y	Y	Y	U	U	Y	Y	Y	18/20 (90%)

JBI Australian Centre for Evidence-based Health Care Qualitative research Quality evaluation criteria (19): ① Is there congruity between the stated philosophical perspective and the research methodology? ② Is there congruity between the research methodology and the research question or objectives? ③ Is there congruity between the research methodology and the methods used to collect data? ④ Is there congruity between the research methodology and the representation and analysis of data? ⑤ Is there congruity between the research methodology and the interpretation of results? ⑥Is there a statement locating the researcher culturally or theoretically? ⑦Is the influence of the researcher on the research, and vice-versa, addressed? ⑧Are participants, and their voices, adequately represented? ⑨Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body? ⑩Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?

for hospital visits (20) "*My relative's enterostomy was performed under my guidance, and there were no complications* (22)."

Theme 2: Social support

Friends and family support

Family and friends are important pillars of one's social support. In fact, the support of relatives and friends can provide a lot of comfort and motivation for nurses, thus strengthening their willingness to stay and enhancing the sense of professional benefit. "*My wife is a nurse. She understands me and supports me because she is in the same profession*" (23); and "*The elderly in my family respect medical care and let me do my job well. My family supports me. That's enough* (21)."

Organizational environmental support

Organizational support is also an important factor affecting the sense of career benefit. If the leaders and management of a hospital attach importance to the development and needs of employees, they will achieve certain accomplishments through teamwork as employees feel cared for (23). *"Many new hires in nephrology can feel a lot of stress when they first come in, but the education team guides you through the work, helping you to familiarize yourself with the problems you'll encounter on the job* (28)." In addition, hospital management's bonus setting and medical equipment upgrades can undoubtedly improve nurses' sense of professional benefit. "*I'm in the emergency department, benefiting from all kinds of subsidies; the salary level is basically satisfactory (23).*" In acute and critical care units, patients often need to be rescued at any time or need high-end equipment for auxiliary diagnosis and treatment, so rich medical resources are indispensable. *"We have a good nursing facility and all the equipment we need to provide safe patient care* (28)."

Peer support

Peer support is often helpful for emotional and stress support at work, and is also one of the conditions for maintaining a good working atmosphere and high work efficiency. Understanding each other and sharing life experiences among colleagues can greatly relieve occupational stress: "*I am a nurse from other places. Nurses in our department work side by side and tend to cooperate. The oncology department has a heavy workload, but we still manage to work closely. I am not from around here, but I still feel accepted* (20)." Similarly, the support of the head nurse is also of great help in improving the sense of professional benefit among nurses: "*This was my fourth year at work, and the head nurse assigned the task of instrument management to me. I felt appreciated, which encouraged me to try to do better (23).*" In addition, nurses say that approval from doctors can also motivate them (24).

Support from patients and their families

Mutual understanding and respect between nurses and patients, and mutual help and understanding between family members and nurses can make nurses feel affirmed and supported, which further enhances their professional benefit

TABLE 2 Characteristics of the included studies ($n = 12$).

Reference	Origin	Aim	Methodology	Results
Jiang et al. (20)	China	To explore the sense of professional benefit of nurses in emergency department	Using a phenomenological approach to qualitative research, face-to-face semi-structured in-depth interview. The sample size was 16, including 2 males and 14 females. Age range: 24–47	Four themes emerged: (1) Professional values (2) Organizational support (3) Family gain (4) Good working atmosphere
Xie et al. (21)	China	To explore the expectations of operating room nurses for burnout relief	Using a phenomenological approach to qualitative research, face-to-face semi-structured in-depth interview. The sample size was 10, including 1 male and 9 female. Working years 1–25 years	Four themes emerged: (1) Expect support from colleagues (2) Expect support from the head nurse (3) Expect medical coordination and cooperation (3) Expect to improve nurses' professional identity and career planning
Li et al. (22)	China	To explore the occupational benefit of oncology nurses	Using a phenomenological approach to qualitative research, face-to-face semi-structured in-depth interview. The sample size was 15, including 1 male and 14 female. Age range:24–49	Five themes emerged: (1) Specialized nursing knowledge and skills (2) Professional affirmation after helping patients (3) Scientific research ability (4) Teaching ability (5) Peer help and support
Zhang et al. (23)	China	To explore the promoting factors of occupational stability of male nurses in tertiary hospitals	Using a phenomenological approach to qualitative research, face-to-face semi-structured in-depth interview. The sample size was 9, with an age range of 26–31	Seven themes emerged: (1) Nursing makes you valuable (2) Nursing work benefits the family (3) Male nurses have different advantages Satisfactory remuneration package (4) Good working atmosphere (5) Attention and training of leaders (6) Understanding and support from relatives and friends (7) Male nurses are gradually accepted by society
Xu et al. (24)	China	To understand the professional identity of operating room nurses	Using a phenomenological approach to qualitative research, face-to-face semi-structured in-depth interview. The sample size was 9, including 3 males and 6 females. Age range: 23–40	Five themes emerged: (1) The humanistic care I get in my work. (2) In compensation (3) The first aid ability and emergency response-ability (4) Realization of personal value and family gain
Atefi et al. (25)	Malaysia	To explore the job satisfaction of registered nurses in Malaysia	Qualitative research and face-to-face semi-structured in-depth interview were used. The sample size was 46 from operating rooms, intensive care units, and internal medicine.	Three themes emerged: (1) Spiritual feeling (2) Work environment factors (3) Motivation

(Continued)

TABLE 2 (Continued)

Reference	Origin	Aim	Methodology	Results
McNeese-Smith (26)	USA	To explore the job satisfaction and dissatisfaction of nursing staff	Qualitative research and semi-structured taped interviews were used. The sample size was 30, including 28 females and 2 males, with an age range of 31–59. From ICU and internal medicine.	Four themes emerged: (1) Patient care (2) The pace and variety in an acute care environment (3) Relationships with coworkers. (4) Meeting personal and family needs
Fagerberg (27)	Sweden	To explore the work experience and professional identity of nurses	Phenomenological methods of qualitative research were used through annual interviews and student surveys. The sample size was 16. From intensive care units, psychiatric departments, operating rooms, and emergency departments.	Three themes emerged: (1) The meaning of caring for and protecting patients (2) The meaning of work organization in nurses' work (3) The implied meaning of using one's professional role.
McKenzie and Addis (28)	UK	To explore the job satisfaction of inpatient ward nurses in the nephrology department	Using phenomenological methods of qualitative research, face-to-face semi-structured interviews were conducted. The sample size was 12, from the critical ward and general ward of the department of nephrology.	Three themes emerged: (1) Self care (2) Organizational culture (3) Work environment
Kristoffersen (29)	Norway	To explore the influencing factors of nurses' intention to stay at work	The hermeneutic method of qualitative research is adopted. Sample size: 13 people, age range: 26–60, working years: 2–40 years. Mainly from emergency departments, intensive care units, psychiatry, and oncology	Two themes emerged: (1) Acting as a professional contributor (2) Realigning to maintain professional belongingness
Aagaard and Rasmussen (30)	Denmark	To explore the professional identity of anesthesiologists	Using ethnography of qualitative research. The sample size was 12, mainly for breast cancer and gastrointestinal cancer.	Two themes emerged: (1) Gliding between tasks and structures (2) Depending on independence
Sheng et al. (31)	China	To explore the professional identity of Chinese nurses participating in COVID-19 rescue missions	Using the phenomenological method of qualitative research. Through face-to-face and semi-structured interviews, the sample size was 14, all of whom participated in the support work in Wuhan, Hubei province, during the COVID-19 outbreak	Four themes emerged: (1) Impression of exhaustion and fear (2) Feeling the unfairness (3) Perceiving incompetence in the rescue task (4) Unexpected professional benefits

(26). "*I found meaning and confidence in my work with the active participation of my patients in the health promotion* (31)." Nurse-patient contradiction is an important problem in today's society. The increasingly acute nurse-patient contradiction directly affects the turnover rate of nurses. Therefore, a good nurse-patient relationship is essential for both individuals and organizations.

Theme 3: Personal growth

Promote self development

The professional ability and psychological quality accumulated by nurses in acute and critical care help them improve their professional identity to a certain extent. For example: "*I think my reflexes are faster. That's what my major gives me*" (20); other nurses reported that their calm response and treatment in the first aid processes, as well as their decisive decision-making power and strong psychological abilities instilled a sincere sense of professional pride in them. Some nurses with rich theoretical knowledge and innovative spirit took the initiative to participate in scientific research activities, paper writing, and teaching, finding new professional significance and satisfaction in the process of learning and studying, which also strengthens their professional belongingness. "I now have students of my own, and I hear they want to be like me in the future, which is comforting (26)." Some hospitals provide nurses with various opportunities for further studying and learning, to a certain extent, thus stimulating the

TABLE 3 Thematic synthesis findings.

Descriptive themes	Sub-themes
Professional identity	Proud professional ability
	Increasing professional value
Social support	Friends and family support
	Organizational environmental support
	Peer support
	Support of patients and their families
personal growth	Realize self-worth
	Promote self-development

professional confidence of nurses and their personal growth (22).

Realization of self-worth

Engaging in nursing work helps nurses to find their sense of value and mission to a certain extent, thus enhancing their sense of professional benefit. *"Because our department often needs consultation, I also get to know many doctors, which is convenient to provide medical consultation for people around me, making me feel that my work is very valuable* (21)." Many nurses say they choose to nurse and now they are stuck with it because it is stable and pays well (24). As health workers, their relatives and families can also reap the benefits. *"Sometimes friends and relatives ask me about cancer, and I can try to help them"* (22). Nurses who participated in the rescue during the epidemic believe that unexpected rewards, whether in a material form or spiritual feedback, made them realize their own value (31). In addition, due to the physical advantages of male nurses, they reported a greatly improved sense of professional benefits (23). Other nurses found nursing to be a good fit for their personality and religious beliefs. Some said they had grown up empathizing with others, eager to understand and help them, and that nursing allowed them to fulfill their dreams (27). Other nurses said they were not nursing for money or material things but for firmer beliefs, such as invigorating energy and serving God (26).

Discussion

The purpose of this study was to elucidate the problems related to occupational benefit perception of acute and critical care nurses so as to find a more suitable management method for the hospital nursing team. Moreover, these data provide more comprehensive information for hospital human resource management, which in turn could promote the improvement of medical level and the development of high-quality nursing career.

Due to the special environment of acute and critical care, nurses in the department must have higher specialized skills, theoretical knowledge, and rich clinical experience. Meanwhile, they are expected to keep up with current events, understand the cutting-edge knowledge of the development of acute and critical care medicine, and timely update themselves on various emergency guidelines. Previous studies have suggested that the specialized skills of nurses and the value they show in the process of work can greatly improve their sense of professional benefit (20). Therefore, nursing managers should provide more opportunities for nurses to learn and further their studies so as to meet their needs for self-improvement. At the same time, managers should pay attention to stress and negative emotions and successful ways to avoid or deal with them. They can try to guide nurses to correctly view pressure and deal with it. In addition, managers can also provide more psychological decompression measures, such as music therapy, meditation, group counseling, etc., so as to prevent job burnout caused by long-term pressure load and improve nurses' resilience. Nursing managers can also organize lectures related to professional interests, enhance the importance of role models, use workshops or online meetings to publicize the outstanding deeds of outstanding nursing workers, and help nurses to find a sense of honor and holiness of the profession, thus enhancing their professional identity and improving the quality of nursing.

Hospital managers should also pay more attention to the psychological needs of nurses in their future work, which might be smaller and related to salary and treatment, the satisfaction of a harmonious working atmosphere with peer support, or larger such as striving for more independent decision-making opportunities, in order to allow nurses to combine knowledge with practice to a greater extent so as to achieve their own life value. All of these have a significant influence on nurses' sense of professional benefit. If we take Maslow's hierarchy of needs (33) as an example, we can see that it has a lot of links with the sense of benefit of the nursing profession. The first thing nurses need is their physiological needs to be met, followed by a steady income that can ensure the availability of food, clothing, housing, and transportation, thus improving their quality of life. Second, they have safety needs, i.e., nurses and relatives, and friends can experience a certain degree of worry about their health and medical treatment. Next, there is the need for love and belonging; nurses can feel the sense of respect brought on by this job to a certain extent when they receive the attention and affirmation from head nurses and managers, as well as the understanding and support or even admiration from family members and patients. Management by Wandering Around (MB-WA) is an effective form of hospital comprehensive management tool used by nursing managers. The figures of this tool often appear in the field of vision of nurses, greatly increasing their work confidence and security. Also, in this process, which includes listening and guidance, the work enthusiasm of nurses is greatly improved,

including an increased professional sense of belonging among nurses (34). The support of the external environment is also a part of the attribution needs of nurses. Only when managers attach importance to the development of hospitals and nursing undertakings, actively prepare funds for this, and purchase advanced equipment can nurses feel cared for and supported. Nurses also need respect, where nurses establish spiritual links with their peers in daily work. They do not only coordinate and cooperate in terms of work but also become friends with each other. Finally, there is the top-level need, which namely includes the need for self-actualization, i.e., the realization of professional honor and self-worth mentioned above. Hospital managers should take corresponding measures to meet the needs of these levels in different degrees to improve the career satisfaction of nurses, thus reducing the dismission rate and attracting more and more excellent nursing talents to join the team.

In addition to paying attention to the psychological needs of nurses, hospital managers should also actively build a good working atmosphere for staff and recruit more excellent nursing talents to enrich and develop the nursing team. It is necessary to strengthen the guidance of public opinion, improve the promotion and personnel selection system, and make it fair, open, and just so that talented and competent people can give fully showcase their professional advantages (35). Since the shortage of nursing staff often leads to work overload and occupational pressure (21), which is also the main reason for job burnout, managers should start from multiple aspects, adjusting the ratio of nurse to patient, reducing the workload of nurses as much as possible and control it within a reasonable range. As acute critical care nurses work in a special working environment (36), with relatively large occupational pressure and complex patient situation, it is necessary to find ways to improve the work system and their job satisfaction. In today's society, the nurse-patient contradiction is more prominent (37). Managers should strengthen the guidance of public opinion, promote the deeds of outstanding nursing workers, guide nurses to take this as an example, guide senior nurses to share their experience with new nurses, and provide as many opportunities as possible for nurses to learn nurse-patient communication skills and call for the establishment of a harmonious relationship. Although autonomous decision-making is rarely mentioned in Asian cultures as part of nurses' work (25), studies in western countries mention the influence of independent clinical decision-making on nurses' sense of professional benefit and professional pride. As the first country that develop advanced practice nurses, the United States has developed a sound qualification certification system, which can be used for reference by nursing managers in other countries. Through professional training, nurses can improve their educational background by gaining expert knowledge and skills to make better clinical decisions (38). Managers can also do their best to provide opportunities for nurses and encourage them to further study, carry out research projects and solo teaching tasks to develop more nursing talents (39), and promote professional pride.

Because of the influence of the COVID-19 pandemic, nursing staff should also pay attention to protect themselves in the process of working so as not to get infected. Managers need to attach importance to the nurses' needs, provide sufficient protection material, arrange more lectures on epidemic prevention and control, and provide nurses with timely guidance on how to deal with negative emotions and pressure.

As some studies pointed out that the professional development of nurses and the realization of self-worth may also depend on childhood education related to religion, inner personality, and growth environment, managers might also pay attention to nursing workers' intrinsic personalities, and religious beliefs (27) when providing them with learning opportunities and assignments. They should also teach nurses according to their aptitude whenever possible so as to let everybody fully display their talents and better ensure team coordination. As with the progress of modern medical concepts, more and more male nurses are pursuing nursing careers. Therefore, managers should recognize their gender strengths and encourage them to continue to excel in their positions.

In a word, nursing managers should focus on the acute and critical care nurses' career benefit. They should take a series of practical and effective measures for management and reform, which will improve the nurse's resilience, increase the career identity, and encourage nurses to put more energy and attention into work, thus improving the quality of care and patients' satisfaction.

Limitations

The purpose of this study is to explore the professional benefit of nurses in acute and critical care. A total of 12 studies from 7 countries were included in the analysis. Due to language restrictions, non-Chinese and non-English literature was excluded. Despite our efforts to search for as comprehensive literature as possible, there is no doubt that some relevant documents were missed.

Conclusion

This is a synthesis of qualitative studies on the perception of professional benefits among acute and critical care nurses. We identified three new themes: professional identity, social support, and personal growth. Hospital managers should pay attention to the positive emotional experience of nurses in work and based on this, provide practical and beneficial protection for nurses from the aspects of salary, learning opportunities, working environment, social support and internal personality, stimulate work enthusiasm, guide nurses to correctly face negative emotions and occupational pressure, and improve the

sense of professional benefit. In future research, we will continue to explore the long-term positive psychological experience of acute and intensive care specialist nurses. These results can be used as a guide for nursing managers to develop more perfect management plans. When the positive experience of nurses is strengthened, the professional expectation is met, and the sense of professional benefit is improved, the turnover rate of nurses can be effectively reduced, the professional identity of nurses can be improved, so as to be more engaged in clinical work, improve the clinical outcome of patients, and promote the progress of medical level and the high-quality development of nursing career.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

Author contributions

SL: conceptualization, methodology, formal analysis, writing—original draft, and writing—review and editing. XD: conceptualization, methodology, writing—original draft, and writing—review and editing. PH and HS: conceptualization, methodology, formal analysis, and writing—review and editing. JJ and LZ: methodology, formal analysis, and writing—review and editing. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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EDITED BY
David Peters,
University of Westminster,
United Kingdom

REVIEWED BY
Charlie Falguera,
University of the Philippines
Manila, Philippines
Feifei Sun,
Shandong Mental Health Center, China

*CORRESPONDENCE
Lifen Mao
maolifen8404@163.com

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Association between horizontal violence and turnover intention in nurses: A systematic review and meta-analysis

Yue Zhang[1,2], Rulan Yin[3,4], Jing Lu[1,2], Jianzheng Cai[1], Haifang Wang[1], Xiaoqing Shi[1] and Lifen Mao[1]*

[1]Department of Nursing, The First Affiliated Hospital of Soochow University, Suzhou, China, [2]School of Nursing, Medical College of Soochow University, Suzhou, China, [3]Department of Rheumatology, The First Affiliated Hospital of Soochow University, Suzhou, China, [4]Faculty of Nursing, Chiang Mai University, Chiang Mai, Thailand

Background: Horizontal violence is common in nurses. Most published studies have focused on horizontal violence and higher turnover rates in nurses; however, it lacks systematic reviews and meta-analyses. The purpose of this review is to quantitatively assess the correlation between horizontal violence and turnover intention in nurses.

Methods: Systematic review and meta-analysis were performed in accordance with PRISMA guidelines. The relationship between horizontal violence and turnover intention in nurses was obtained by systematically searching related literature in four English databases (Cochrane, PubMed, Embase, and CINAHL) and three Chinese databases (SinoMed, CNKI, and Wanfang) (up to 6 March 2022). The relationship between horizontal violence and turnover intention was evaluated using Fisher's *z*-value, which was then converted to *r*. STATA 16.0 was used to perform statistical analysis. The random-effects model was performed to synthesize data.

Results: A total of 14 studies with 6,472 nurses were included. A low-positive correlation of horizontal violence with turnover intention was found (pooled r=0.32 [0.29–0.34]). Subgroup analysis showed that sample size and quality were not the source of heterogeneity. Measurement tool was the source of heterogeneity. Although geographic region might not be the source of heterogeneity, further subgroup analysis of the country reveals heterogeneity. The funnel plot and Egger's test showed no publication bias.

Conclusion: Horizontal violence had a low positive correlation with turnover intention in nurses. Nurses who experienced horizontal violence were more likely to leave or change careers than those who did not experience horizontal violence. This finding helps to draw attention to horizontal violence by nursing managers and implement effective interventions for nurses, so as to reduce nurses' turnover.

KEYWORDS

horizontal violence, turnover intention, nurses, occupational health, meta-analysis

Introduction

Horizontal violence (HV), which belongs to internal workplace violence, refers to inter-group conflict, manifested by sabotage, infighting, scapegoating, criticism, and other explicit and implicit non-physical hostilities (1). In the current study, other terms are also used to describe negative behaviors among peers, such as workplace violence, bullying, or workplace incivility (2–4). In recent years, some scholars have made conceptual distinctions between different terms (5). This review focused on the negative behaviors among peers of the same status, without considering the temporal and behavioral differences of negative behaviors. Therefore, horizontal violence is used in this study, and other terms are considered to be forms of horizontal violence. Horizontal violence has many negative effects on nurses. It not only causes negative emotions in nurses (6) and physical symptoms, such as headache and insomnia (7, 8), but also affects the atmosphere of nursing organizations (9, 10) and the quality of nursing work (11). Nurses who have been exposed to horizontal violence for a long time may have the leave intention (12). Currently, sufficient evidence showed that turnover intention is the direct premise of turnover behavior (13). As a high turnover rate has many adverse effects on nurses' own development, nursing quality, patient outcomes, medical organization stability, and other aspects, it has been a wide concern among scholars and nursing managers (14). In conclusion, turnover intention, as an adverse outcome of horizontal violence, is a huge obstacle in nursing career development, and it is necessary to think highly of the association between the two aspects.

Turnover intention, which refers to the tendency of employees to leave their current job and seek other job opportunities, is a key predictor of turnover although it does not necessarily lead to actual turnover (15). Frequent employee turnover reduces organizational efficiency, may cause emotional instability and slack behavior of other employees in the organization, and increases the hospital's investment in nurse training (16). In the case of a shortage of nurses, finding the factors that affect nurses' turnover intention and reducing nurses' turnover intention are the main issues that researchers need to consider.

Current research showed that the reasons for nurses' resignation include salary, negative working environment, excessive workload, and inconsistency with personal expectations (17, 18). However, it is difficult to substantially improve nurses' salaries, reduce their workload and change their social status in the short term. Scholars mostly put forward strategies to reduce nurses' turnover intention from the perspective of improving the organizational atmosphere and providing a healthy working environment (18). In the context of workplace violence, scholars pay more attention to the high prevalence of violence between nurses and patients and pay less attention to the negative behavior between colleagues. As a result, there are still some nurses who lack awareness of horizontal violence and lack the ability to effectively deal with it, so they choose negative coping methods, such as silence and compromise. When it exceeds the tolerance of nurses, they will have the intention to leave or change careers. Bambi et al. (19) showed that in 87.4% of nurses exposed to horizontal violence, as many as 75% showed physical and psychological symptoms, and about 10% showed symptoms of post-traumatic stress disorder. Some junior nurses chose to leave or even change careers due to horizontal violence. Other studies showed that inter-nurse horizontal violence is one of the most destructive problems affecting nursing career development, and nurses often deal with horizontal violence in negative ways such as resignation, retaliation, avoidance, and turnover intention (12). A study occurred in China showed that the prevalence of horizontal violence among nurses is about 56.6%, among which 21.67% are nurses with turnover intention and 33.33% are nurses with change careers intention (20). A multi-center study from the USA showed that 43–46% of participants indicated that horizontal violence did not impact their intention to leave, but 11–16% felt horizontal violence impacted their intention (21).

In conclusion, most studies indicate that horizontal violence is associated with turnover intention, but the proportion of turnover intention varies among studies, and the degree of correlation between horizontal violence and turnover intention is unclear. To date, no meta-analysis has been published on the association between horizontal violence and turnover intention. Therefore, in view of this situation, we conducted a systematic review and meta-analysis to gather the available evidence and more accurately evaluate the correlation between horizontal violence and turnover intention in nurses, so as to provide a recommendation to pay attention to horizontal violence, investigate antecedents, and implement strategies to reduce nurses' turnover intention.

Materials and methods

Search strategy

This systematic review and meta-analysis were carried out according to the Preferred Reporting Items for Systemic Review and Meta-Analyses (PRISMA 2020) guidelines (22). A systematic search was performed in the four English databases: Cochrane Library, PubMed, EMBASE, and CINAHL, and three Chinese databases: SinoMed, CNKI, and Wanfang (from inception to March 6, 2022). Keywords used for searching were "horizontal violence" (including

"lateral violence", "horizontal hostility", "bullying place", and "workplace incivility") and nurses, with the retrieval adjusted according to the database, the search strategy is shown in Supplementary File 1. In addition, the list of references in the included articles was searched to obtain additional studies.

Inclusion criteria

Inclusion criteria were: (1) The participants were nurses, and the violent behavior was from colleagues; (2) investigating the relationship between horizontal violence and turnover intention; (3) reporting data on the correlation between

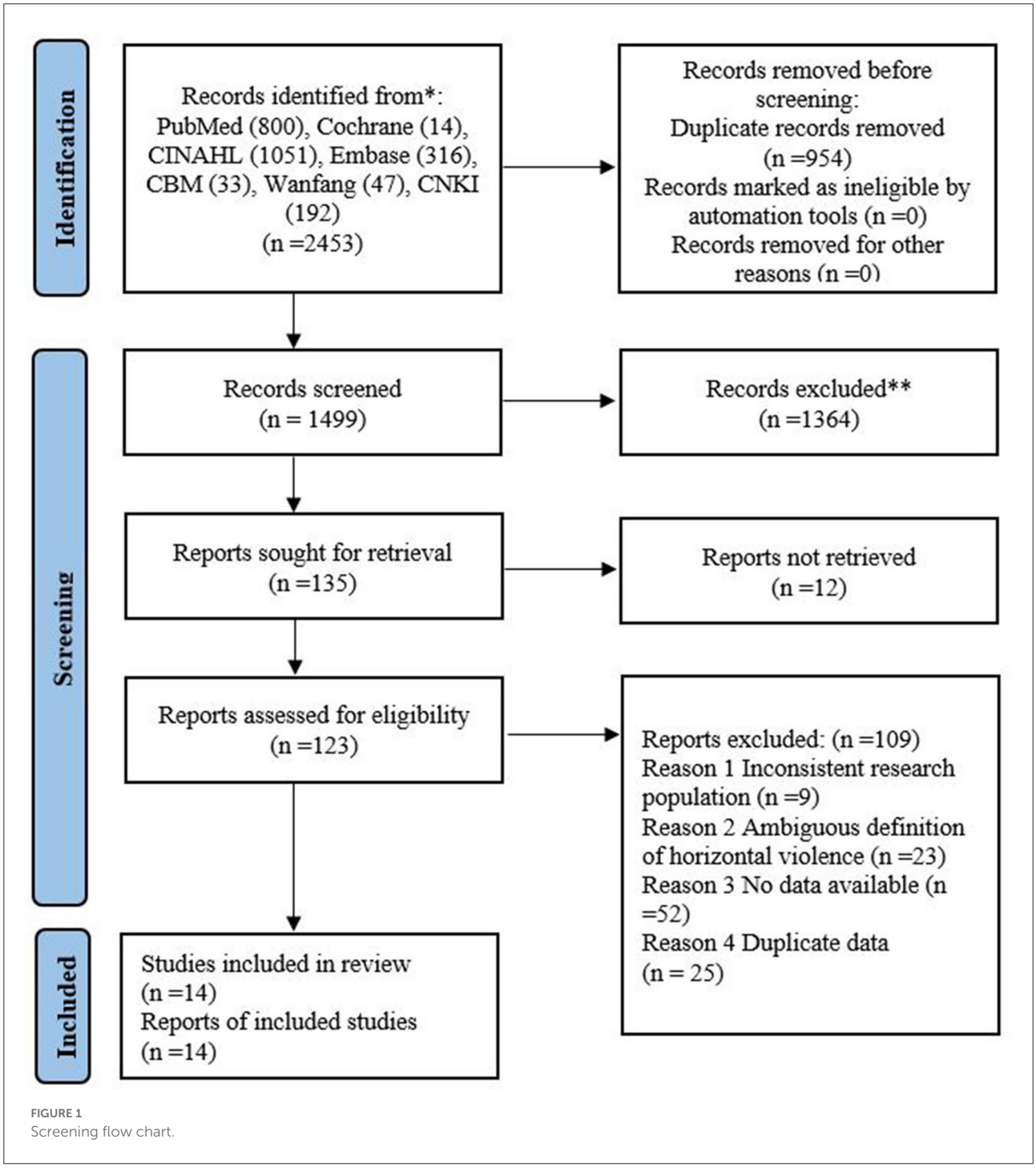

FIGURE 1
Screening flow chart.

horizontal violence and turnover intention, including Spearman's or Pearson's correlation coefficient (r); (4) research design was cross-sectional, case-control, or longitudinal design (using baseline data); and (5) published in English and Chinese.

Exclusion criteria

Exclusion criteria were: (1) meeting or conference abstracts, case reports, reviews, meta-analysis, letters, pilot studies, qualitative studies, and study protocols; (2) full-text studies not found; (3) duplicate articles and/or data (selected the most recent article); and (4) unclear descriptions of nurse populations and data.

Data extraction and quality assessment

Two reviewers screened the literature independently according to the inclusion and exclusion criteria. After confirming the included studies, the two authors independently extracted data from each paper, including the first author, year of publication, country, sample size and percent of females, age, working experience, tools of horizontal violence, and Pearson's/Spearman's correlation coefficient (r) between horizontal violence and turnover intention. The quality of the included studies was evaluated using the modified Newcastle-Ottawa Scale (M-NOS) (23). There are eight items and a maximum of 10 stars. The higher scores indicate better quality. In this study, ≥5 was defined as low-risk bias and <5 as high-risk bias. Any disagreements between two authors, which cannot be resolved through discussion, should be discussed and adjudicated by the third author.

Statistical analysis

Stata 16.0 was used for meta-analysis. The random-effects model was used as a synthesizer, as it is more desirable than the fixed-effects model and can provide a wider confidence interval (CI). For correlation coefficients (r), Spearman's r was first converted to Pearson's r (24). Then the pooled estimate of Pearson's r by Fisher's exact test r-to-z transformation was calculated (25). All values were weighted by the reciprocal of the r variance, after which the combined r of the overall value was converted back for presentation. I^2 was adopted to assess between-study heterogeneity, with thresholds of 25% (low heterogeneity), 50% (moderate heterogeneity), and 75% (high heterogeneity) (26). Subgroup and sensitivity analyses were used to search for sources of heterogeneity. Funnel plots and Egger's test were only combined to assess publication bias when ≥10 studies were included (27, 28), as the power of these tests is too low to distinguish chance from real asymmetry when there are <10 studies (29).

Results

Study selection

After having assessed the studies by selection criteria, data from 14 studies were included, which involved 6,472 nurses. A flow chart of the study selection process is shown in Figure 1.

Study characteristics

In this systematic review and meta-analysis, five studies occurred in Canada (4, 30–33), four in America (34–37), two in Korea (38, 39), and one in each of the following countries: China (40), Pakistan (41), and Turkey (42). Ten studies had large sample sizes (≥200 cases) and the others were small sample sizes (<200 cases). NAQ-R scale was most commonly used to measure horizontal violence (five studies), following the WIS scale (three studies). Measuring the quality of studies by M-NOS (0–5 scores), two studies were judged as the high risk of bias (<3 points), and the others were judged as the low risk of bias (≥3 points). Details are shown in Table 1.

Correlation between horizontal violence and turnover intention in nurses

As shown in Figure 2 14 studies reported a correlation (r) between horizontal violence and turnover intention among nurses, and the pooled Fisher z-value was 0.33 (95% CI: 0.25–0.42; $I^2 = 91.2\%$, $P < 0.001$). After the z-to-r back transformation, the pooled r was 0.32 (95% CI: 0.29–0.34; $P < 0.001$), and 95% CI (0.24–0.39) does not include the value 0, suggesting a positive relationship between the horizontal violence and turnover intention, and the correlation magnitude is lower.

Subgroup analysis

Subgroup analysis was conducted based on geographic region, sample size, measurement tools of horizontal violence, and quality. The results showed that measurement tools may be the source of heterogeneity in the meta-analysis of the correlation between horizontal violence and turnover intention. Subgroup analysis showed that the pooled Fisher z-value was 0.45 (95%CI: 0.32–0.58) for NAQ-R, which suggests a low-positive relationship. However, WIS and Others were 0.19

TABLE 1 Characteristics of the incorporated studies.

study	Country	Sample size	Female (%)	Age (year)	Working Experience (year)	Tools of HV	r	r type	Quality
Simons (34)	US	511	93.3	33.1 ± 9.0	3.7 ± 5	NAQ-R	0.51	Pearson	6
Spence et al. (30)	Canada	612	95	41.3 ± 10.6	11.23 ± 11.27	WIS	0.19	Pearson	5
Leiter et al. (31)	Canada	477	94.8	41.98 ± 10.477	13.55 ± 10.26	WIS	0.19	Pearson	5
Spence et al. (32)	Canada	342	91.5	28.10 ± 6.58	1.04 ± 0.24	NAQ-R	0.32	Pearson	4
Oyeleye et al. (35)	US	61	87	40	11 ± 9.3	the Uncivil Workplace Behaviors questionnaire and WIS	0.496	Pearson	5
Shiau-Ting et al. (40)	China	708	98.2	30.17 ± 7.15	7.17 ± 6.97	NAQ-R	0.389	Pearson	5
Dellasega et al. (36)	US	842	93.5	40.95 ± 15.01	8.32	RAAS	0.24	Spearman	5
Blackstock et al. (4)	Canada	94	85	42	11.8	the 9-item scale from Hutchinson et al.	0.32	Pearson	5
Armmer et al. (37)	US	104	96.2	38.9 ± 10.3	13.7 ± 10.3	BSSQ	0.214	Pearson	4
Munir et al. (41)	Pakistan	668	—	—	—	NAQ-R	0.561	Pearson	5
Yun et al. (38)	Korea	301	98.7	29.23 ± 6.49	6.5 ± 5.72	NAQ-R	0.28	Pearson	6
Arslan et al. (42)	Turkey	574	90.8	36.5 ± 7.6	15.3 ± 8.5	WIS	0.19	Pearson	5
Lee et al. (39)	Korea	170	94.7	28.61	4.02	the Nurses Incivility Scale developed by Guidroz et al.	0.33	Pearson	6
Favaro et al. (33)	Canada	1008	92.5	27.42 ± 6.36	1.18 ± 0.50	NAQ	0.21	Pearson	5
Armmer et al. (37)	US	104	96.2	38.9 ± 10.3	13.7 ± 10.3	BSSQ	0.214	Pearson	4
Munir et al. (41)	Pakistan	668	—	—	—	NAQ-R	0.561	Pearson	5
Yun et al. (38)	Korea	301	98.7	29.23 ± 6.49	6.5 ± 5.72	NAQ-R	0.28	Pearson	6
Arslan et al. (42)	Turkey	574	90.8	36.5 ± 7.6	15.3 ± 8.5	WIS	0.19	Pearson	5
Lee et al. (39)	Korea	170	94.7	28.61	4.02	the Nurses Incivility Scale developed by Guidroz et al.	0.33	Pearson	6
Favaro et al. (33)	Canada	1,008	92.5	27.42 ± 6.36	1.18 ± 0.50	NAQ	0.21	Pearson	5

HV, Horizontal violence; NAQ-R, Negative Acts Questionnaire-Revised; RAAS, The Relational Aggression Assessment Survey; BSSQ, the Briles' Sabotage Savvy Questionnaire; WIS, the Workplace Incivility Scale developed by Cortina et al. (43); NAQ, A shortened (3-item) version of the Negative Acts Questionnaire.

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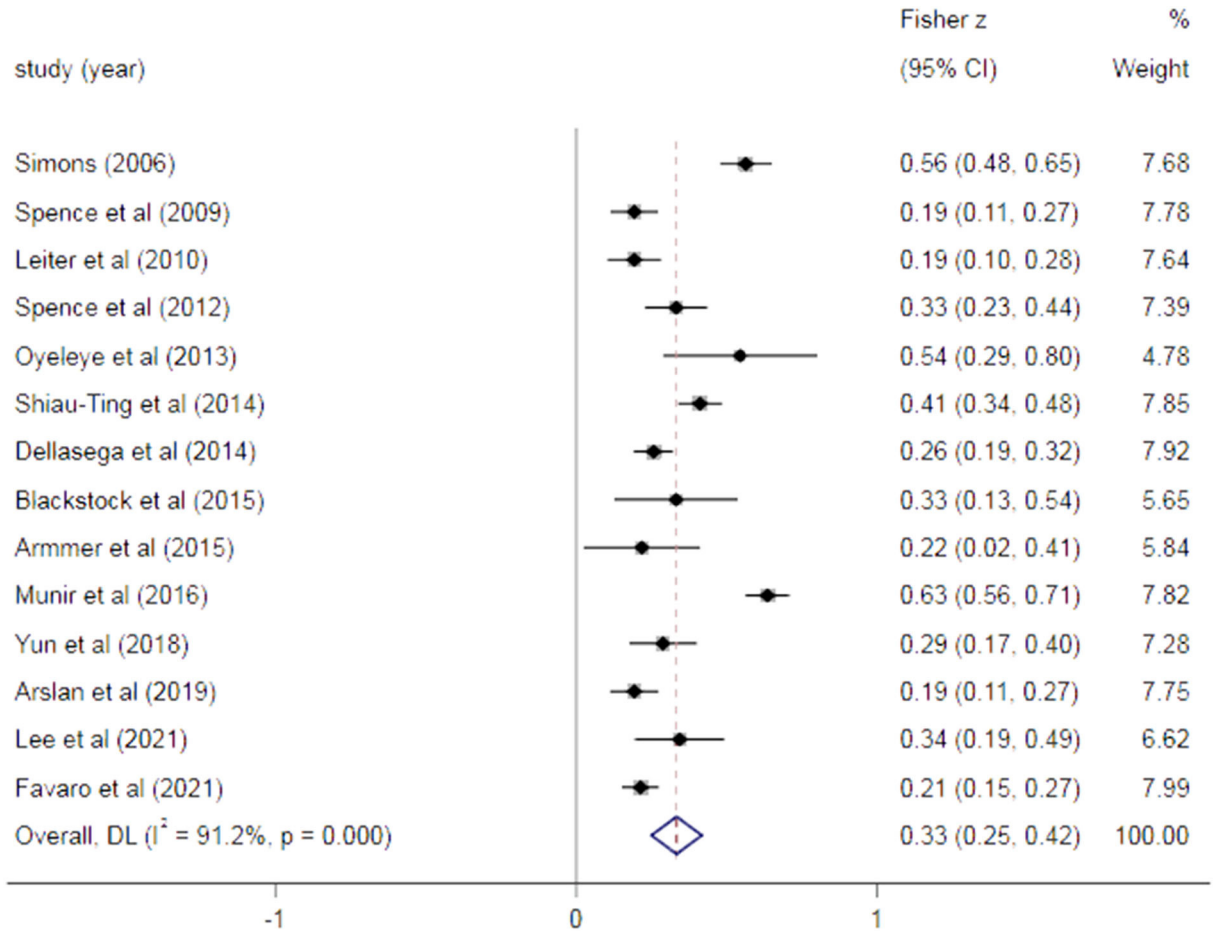

FIGURE 2
Forest plot of eligible studies.

(95%CI: 0.14–0.24) and 0.27 (95%CI: 0.21–0.34), respectively, showing that horizontal violence was not associated with turnover intentions. Geographical regions are further divided into subgroups of countries (US, Canada, and Korea), and heterogeneity is found. The results showed that the pooled Fisher *z*-value was 0.39 (0.19, 0.59) in the USA and 0.31 (0.22, 0.40) in Korea, suggesting a low correlation between horizontal violence and turnover intention. In Canada, it was 0.23 (0.18, 0.28), suggesting no correlation (Supplementary File 2).

Sensitivity analysis and publication bias

Although the quality of the two studies was assessed as high risk, both sensitivity analysis and subgroup analysis showed no significance, indicating that the risk of bias was not related to study quality, so two low-quality studies were still included in the meta-analysis. Sensitivity analysis was conducted on the included 14 studies, and it was found that the results were unchanged when each study was excluded serially (Figure 3). It indicated that the results of this meta-analysis were stable. Funnel plots and Egger's test indicated that no significant evidence of publication bias was found in the 14 studies (Egger bias = 0.82, 95% CI: (−5.09, 6.73), $P = 0.767$) (Figures 4, 5).

Discussion

This systematic review and meta-analysis quantitatively assessed the association between horizontal violence and turnover intention in nurses. As far as we know, the review included 14 studies involving 6,472 nurses and was the first quantitative assessment of the association between horizontal violence and turnover intention. The results of the random-effects meta-analysis procedure show that there is a positive

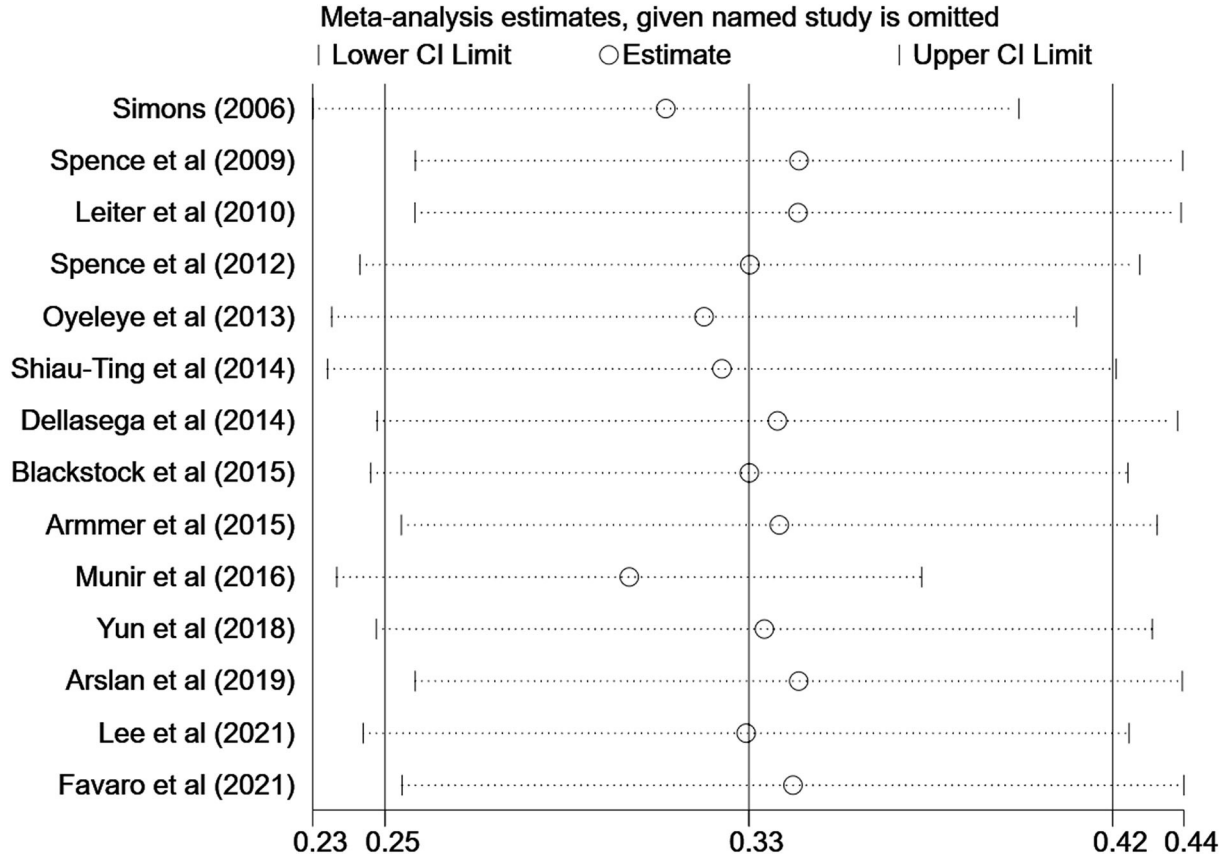

FIGURE 3
Sensitivity analysis estimating heterogeneity.

correlation between horizontal violence and turnover intention in nurses.

Subgroup analysis of the geographic region, sample size, horizontal violence measurement tools, and quality showed that only horizontal violence measurement tools might be the source of heterogeneity ($P = 0.001$). NAQ-R (Fisher $z = 0.45$; $Z = 6.901$, $P < 0.001$) showed a stronger correlation between horizontal violence and turnover intention than WIS (Fisher $z = 0.19$; $Z = 7.822$, $P < 0.001$) and Others (Fisher $z = 0.27$; $Z = 8.178$, $P < 0.001$). The results showed that horizontal violence associated with turnover intention in Asia (Fisher $z = 0.38$; $Z = 4.406$, $P < 0.001$) was stronger than that in America (Fisher $z = 0.30$; $Z = 6.510$, $P < 0.001$), but there was no statistical significance between groups ($P = 0.463$). Further divided by different countries (USA, Canada, and Korea) into subgroups, heterogeneity was found among different countries ($P < 0.001$): USA (Fisher $z = 0.39$; $Z = 3.792$, $P < 0.001$), followed by Korea (Fisher $z = 0.31$; $Z = 6.631$, $P < 0.001$). The Canada correlation was considered almost irrelevant (Fisher $z = 0.23$; $Z = 8.728$, $P < 0.001$). It suggested that the correlation between horizontal violence and turnover intention was different in countries, which might be related to the cultural environment. Influenced by cultural differences, individuals may react differently to violent acts (13). As suggested by Sorge et al. (44), the extent to which members of a specific culture can control their desires and impulses is one of the influential dimensions used to classify that culture. Workplace incivility tends to be higher in "indulgent" cultures (such as the USA), while "restrained" cultures (such as Mediterranean countries) have weaker impulse control (44). Lutgen et al. (45) noted that in individualistic cultures, such as the USA, the individual may feel more threatened by bullying and more challenged by bullying events since they may perceive bullying as an attempt to weaken their competitive strength. In the context of collectivism, for example, in Asian countries, such as China and Japan, harmony and group norms are more valuable, which may lead nurses to choose to avoid or even get used to their negative emotions after experiencing bullying and return to their previous level of well-being after a period of time (46). It should be noted that the number of studies included in this meta-analysis was insufficient, and there was insufficient

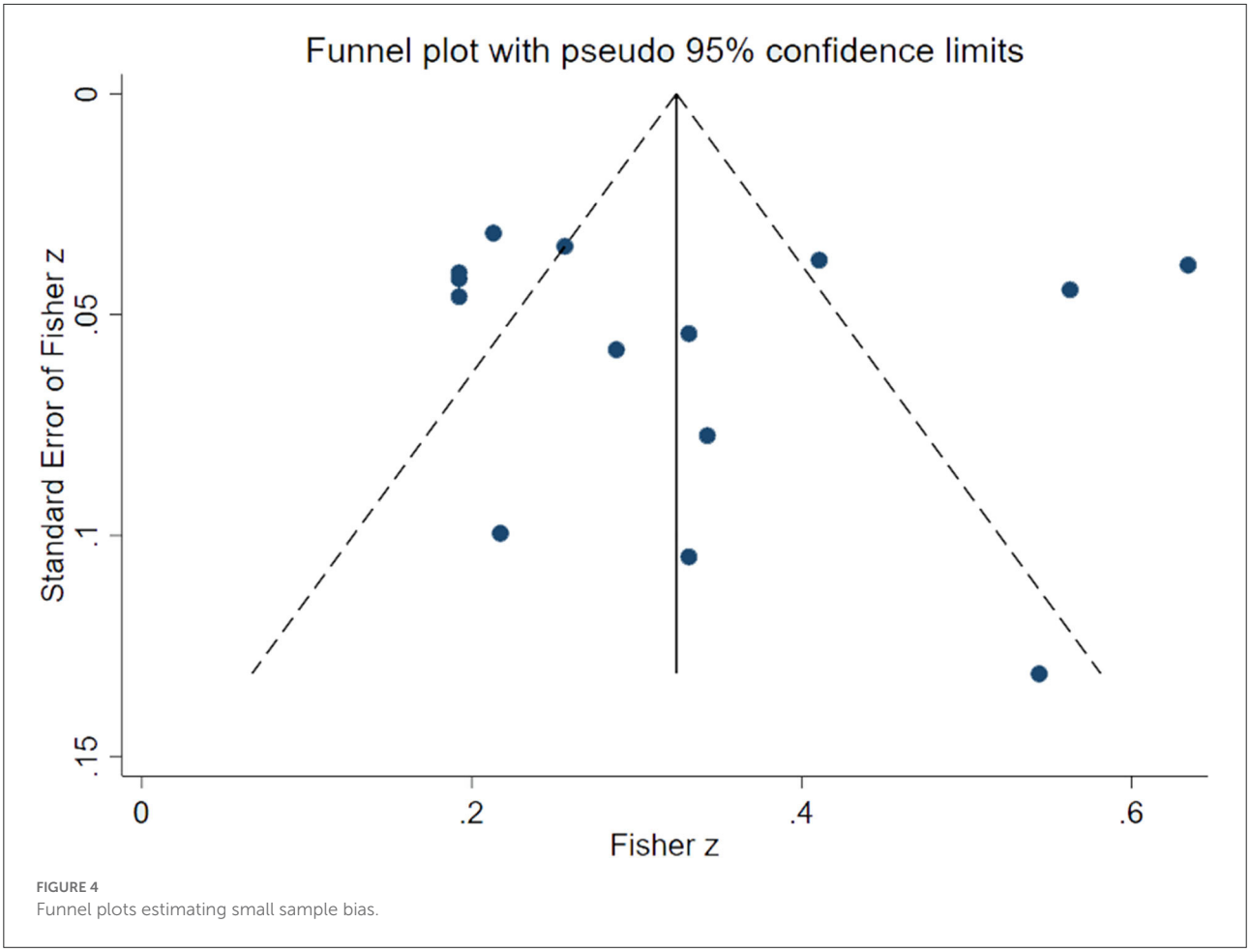

FIGURE 4
Funnel plots estimating small sample bias.

evidence for a pooled analysis when conducting subgroup analysis. Therefore, it is suggested that researchers should conduct more comparative studies on cultural differences in the future. In addition, the correlation measured by the NAQ-R measurement tool was significantly higher than that of the other two groups (Fisher $z = 0.45$; $Z = 6.901$, $P < 0.001$). WIS (Fisher $z = 0.19$; $Z = 7.822$, $P < 0.001$) and Others (Fisher $z = 0.27$; $Z = 8.178$, $P < 0.001$) showed almost no correlation between horizontal violence and turnover intention. This may be related to NAQ-R's sensitivity to horizontal violence. Currently, NAQ-R is the main measurement tool used to measure horizontal violence. Among the 14 studies included in this review, it can also be found that there are six studies (32–34, 38, 40, 41) used NAQ-R, one of which is the third edition of NAQ (33), and three of the five studies after 2015 have used this measurement tool. It is suggested that researchers conduct controlled trials to further explore the differences in horizontal violence measured with different measurement tools in the future.

The advantage of this systematic review and meta-analysis include: previous studies have inconsistent conclusions on the correlation between horizontal violence and turnover intention in nurses, while this review, including 6,472 nurses, has a large sample size and a relatively firm conclusion. Through sensitivity analysis and heterogeneity test, it was finally confirmed that the result was stable. Therefore, it can provide reference for future nursing managers to pay attention to horizontal violence, implement intervention measures and reduce the turnover intention of nurses. In addition, a meta-analysis showed a pooled *r*-value of 0.32 (95% CI: 0.29–0.34; $P < 0.001$), and there was a low-positive correlation between nurses' horizontal violence and turnover intention. Horizontal violence has been shown to be one of the reasons nurses leave their jobs. It is suggested that nurse managers should not only pay attention to the improvement of nurses' professional ability and the prevention of nurse-patient conflict, but also pay attention to the impact of negative behavior among colleagues on nurses, and explore strategies to improve horizontal violence.

This meta-analysis has the following limitations. First, the number of studies included in this meta-analysis is small, and the number of subgroup analysis studies is insufficient. For example, the studies are limited to Asia and America, there are no studies from other regions due to some reasons, which limits

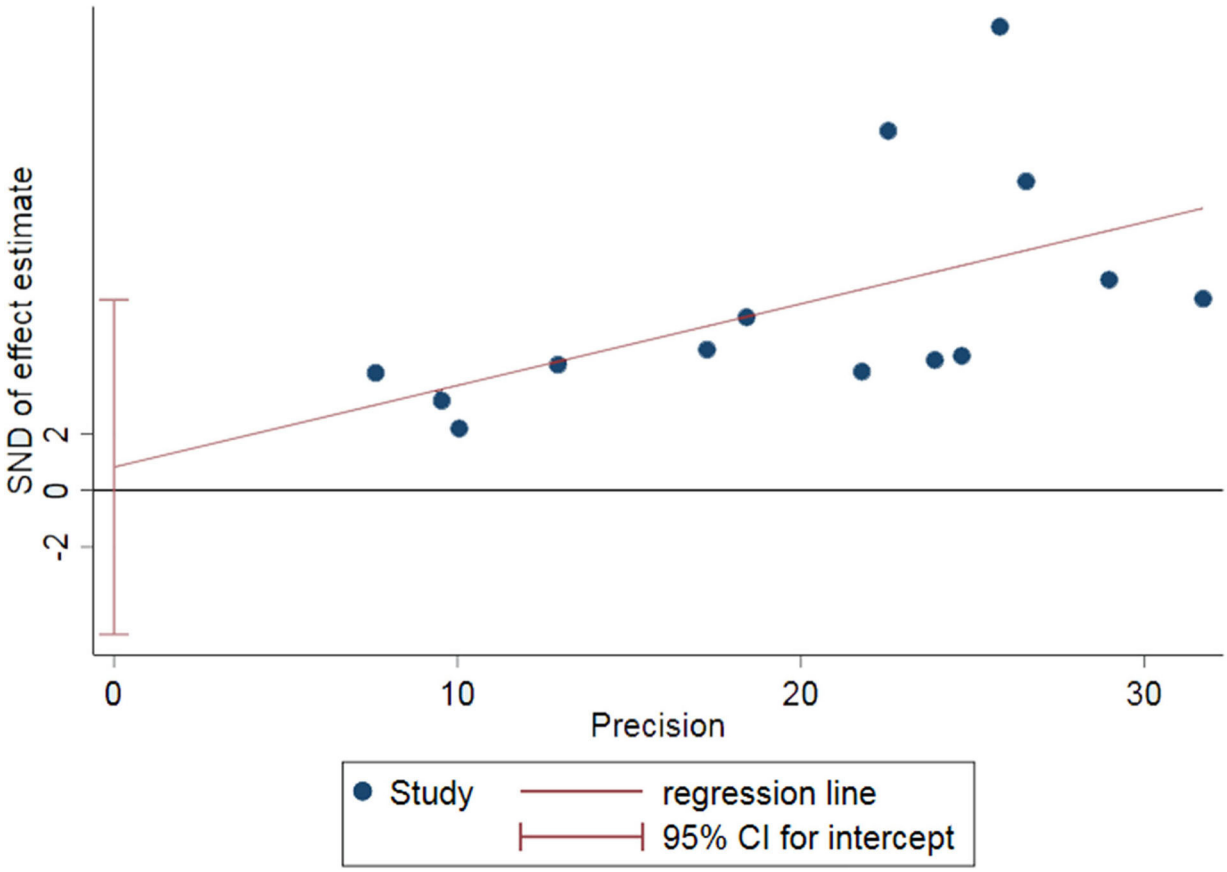

FIGURE 5
Egger's test estimating publication bias.

the representativeness of the results. So, it is recommended that studies on the correlation between horizontal violence and turnover intention be carried out in more regions and that meta-analysis results must be updated to better represent global levels. Second, the outcomes caused by horizontal violence are not limited to turnover intention. Although most studies suggest that a higher turnover rate is related to horizontal violence, this study suggests a low correlation. In recent years, with the development of structural equation modeling, more and more studies have focused on the mechanism between them. Therefore, it is suggested to explore the relationship between horizontal violence and other outcomes in the future and explore variables that may play a mediating or moderating effect between horizontal violence and turnover intention. Finally, we tried our best to have a rigorous attitude for screening and analysis of interpretation of the study, but the research mainly was a cross-sectional design. Horizontal violence and turnover intention at the same time measurement may lead to the possibility of a spurious correlation. So, there is a need for more longitudinal studies, which can further explain the correlation between horizontal violence and turnover intention.

Conclusion

This meta-analysis suggests that horizontal violence has a low-negative correlation with turnover intention in nurses. Nurses who have experienced horizontal violence tend to be more likely to leave their jobs than those who have not experienced horizontal violence. Awareness of this correlation may prompt nursing managers to pay more attention to horizontal violence, care about how nurses get along with colleagues, and strive to create a good working atmosphere, thereby reducing nurse turnover.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author/s.

Author contributions

YZ and JL searched and checked the databases according to the inclusion and exclusion criteria, extracted the data, and assessed their quality. YZ analyzed the data and wrote the draft of the paper. RY and JC gave advice on meta-analysis methodology and revised the paper. LM is the guarantor of this work and had full access to all the data in the study and takes responsibility for its integrity and the accuracy of the data analysis. All authors contributed to reviewing, read, and approved the final manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

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EDITED BY
Oriol Yuguero,
Lleida Institute for Biomedical Research (IRBLleida), Spain

REVIEWED BY
Jingjing Ji,
Southern Medical University, China
Qiubi Tang,
Guangzhou Medical University, China
Adriano Friganovic,
University Hospital Centre Zagreb, Croatia

*CORRESPONDENCE
Zhenzhen Zheng
zhengzhenzhen2018@163.com
Xianrui Zhuang
zhuangxianrui@163.com
Riken Chen
chenriken@126.com

†These authors have contributed equally to this work

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Effects of psychological intervention on empathy fatigue in nurses: A meta-analysis

Xiaojuan Chen[1,2†], Mingdi Chen[1†], Huang Zheng[1†], Chaoyu Wang[3†], Huimin Chen[1†], Qinglan Wu[4†], Huizhao Liao[5], Jinru Zhu[1], Junyan Lin[5], Xudong Ou[5], Zhihong Zou[5], Zhiwei Wang[5], Zhenzhen Zheng[1*], Xianrui Zhuang[1*] and Riken Chen[5*]

[1]The Second Affiliated Hospital of Guangdong Medical University, Zhanjiang, China, [2]Medical College of Jiaying University, Meizhou, China, [3]Taishan Hospital of Traditional Chinese Medicine, Jiangmen, China, [4]Central People's Hospital of Zhanjiang, Zhanjiang, China, [5]State Key Laboratory of Respiratory Disease, National Clinical Research Center for Respiratory Disease, Guangzhou Institute of Respiratory Health, The First Affiliated Hospital of Guangzhou Medical University, Guangzhou Medical University, Guangzhou, China

Objective: The purpose of this meta-analysis is to systematically assess the effects of psychological intervention on empathy fatigue among nursing staff.

Method: Five electronic databases are searched separately from their establishment to April 8th, 2022. The research team independently performs paper selection, quality assessment, data extraction and analysis for all included studies. PRISMA guidelines are used to report this meta-analysis.

Results: A total of seven randomized controlled trials (RCTs) covering 513 nursing staff are included. The meta-analysis results show that the empathy fatigue score (SMD = −0.22, 95% CI: −0.42∼ −0.02, $P = 0.03$) and burnout (SMD = −0.37, 95% CI: −0.56∼ −0.19, $P < 0.001$) are lower than the control group. The empathy satisfaction score of the psychological intervention group is higher than that of the control group (SMD = 0.45, 95% CI: 0.27–0.63, $P < 0.001$). The differences are statistically significant ($P < 0.05$). Subgroup analysis finds significant heterogeneity in the impact of different departments on psychological intervention at ≥6 weeks ($I^2 = 71\%$, $P = 0.01$) and <6 weeks ($I^2 = 0\%$, $P = 0.75$) ($P = 0.05$). Different departments also show significant heterogeneity in the effects of psychological intervention: ICU ($I^2 = 73\%$, $P = 0.02$), pediatric ($I^2 = 53\%$, $P = 0.14$) and other departments ($I^2 = 0\%$, $P = 0.63$). The differences are statistically significant ($P = 0.0007$). Besides, the results show that both mindfulness intervention (SMD = 0.50, 95% CI: 0.24–0.77, $P = 0.0002$) and other interventions (SMD = 0.41, 95% CI: 0.16–0.65, $P = 0.001$) are statistically significant difference in the level of empathy satisfaction between the psychological intervention group and the control group.

Conclusion: Psychological intervention has a coordinated improvement effect on empathy fatigue, empathy satisfaction and burnout, and can also improve the quality of life of nursing staff.

KEYWORDS

psychological intervention, empathy fatigue, burnout, empathy satisfaction, nursing staff, randomized controlled trial, meta-analysis

Introduction

Empathy fatigue, also known as "the cost of caring," refers to a kind of occupational hazard suffered by helping people in the process of providing assistance services to the injured population. It is a psychological problem characterized by indirect exposure to traumatic events on the premise of providing empathy to others (1). In 2005, Stamm (2) proposed a three-dimensional structural model of empathy fatigue, and measured it through the Professional Quality of Life Scale (ProQOL), which is a common tool for evaluating empathy fatigue in medical groups, which has good reliability and validity. Compassion and empathy are the cornerstones of practicing humane care, which require nurses to feel and perceive from the perspective of patients, and understand and help patients to cope with all kinds of pressure and pain. Furthermore, compassion and empathy are the basis of humanized care. Nurses are supposed to recognize and understand patients from their perspective, and help them to deal with the pain of disease and life pressure as much as possible. However, with the extension of nurses' working years, and due to long-term and repeated exposure to patients' pain, they often suffer from empathy fatigue, and have difficulty in feeling patients' suffering. If not adjusted in time, this will certainly affect their mental health, induce job burnout and even reduce the quality and safety of their work (1). Nursing staff is a high risk group for empathy fatigue, as they make contact with patients directly, continuously, closely and extensively (3). Empathy fatigue not only has a serious impact on the physical and mental health of nursing staff, but it also has a negative impact on the level of work input, patient safety and quality of medical services. It can even lead to medical error or the loss of nursing talents, which is a common phenomenon across cultures and regions (4). If the symptoms of empathy fatigue persist, nurses may decide that leaving is the only solution, leading to a shortage of nursing staff. The World Health Organization predicts that the global shortage of nursing staff is projected to reach 7.6 million by 2030. At present, nursing staff are the shortest in supply in the health care system (5, 6), Psychological intervention is a relatively preferable method to solve the symptom of empathy fatigue (7–9), which mainly includes mindfulness-based stress reduction therapy, Balint groups, high-quality nursing service systems and stress reduction management of head nurses, as well as other stress reduction methods. However, there are great differences in the effects, forms and duration of empathy fatigue among nursing staff in different areas. Therefore, we used a meta-analysis of psychological intervention to objectively evaluate the impact of empathy fatigue on nursing staff so as to provide a scientific basis and references for intervention.

Methods

Literature search strategy

We performed a preliminary scoping search of the Cochrane Library and PubMed databases to determine appropriate key words. We then performed systematic retrieval based on the key words in five electronic databases from their establishment to April 8th, 2022. The five databases were Cochrane Library, PubMed, Web of Science, CINAHL and Embase. According to the PICOS principles, the topics were divided into empathy fatigue, psychological intervention, nurses and randomized controlled trial. (1) P (Participants) - English search terms for nurses: nurses, nursing staff, nursing personnel; (2) I (Intervention) - English search terms for psychosocial intervention: psychosocial intervention, psychosocial interventions, mindfulness therapy, mindfulness, Compassion Fatigue Resiliency Program; (3) O (Outcomes) - English search terms for empathy fatigue: empathy fatigue, vicarious trauma, secondary trauma, decondary traumatization, secondary traumatic stress, vicarious traumatization, Professional Quality of Life Scale (ProQOL), empathy satisfaction, burnout; (4) S (Study Design) - English search terms for randomized controlled trial: randomized controlled trial, controlled clinical trial, random allocation, randomized, placebo, randomly. The retrieval was carried out using a combination of medical subject headings (MeSH) and free words, and adjusted according to the characteristics of each database. Each search term was connected with the word "OR," then the four sets of results were connected with the Boolean operator "AND" to search the relevant literature. And the time frame for the searches included all literature before April 8th, 2022.

Eligibility criteria

The inclusion criteria were:

(i) Study design: randomized controlled trial; (ii) participants: registered nurses; (iii) the study used the outcome indicator ProQOL; (iv) the study involved intervention measures such as mindfulness therapy, compassion fatigue resiliency programs, emotional regulation training, etc.; (v) the language of the included literature was English.

The exclusion criteria were:

(i) Study design: not randomized controlled trial; (ii) participants: non-nursing staff; (iii) systematic review articles, magazine articles, case reports, low-quality articles and so on; (iv) full articles unavailable.

Study selection

We used Note Express software to import and manage the search results. After removing duplicates, two reviewers independently assessed the studies by title and abstract, then reviewed the full texts. Any disagreement was settled through discussion with a third reviewer.

Data extraction

After the final list of articles was settled, two searchers used datasheets (Microsoft Excel) to independently extract the data from each article. The data extraction characteristics included: author, year, country, department, sample size of experimental group and control group, intervention methods of experimental group and control group, intervention time, intervention frequency, outcome indicator ProQOL, empathy fatigue, empathy satisfaction and burnout.

Statistical analysis

We used Review Manager 5.4.1 software to merge the statistics of our previously extracted data. The original data included in this study is continuous variables. The meta-analysis results were expressed by standardized mean difference (SMD) and 95% CI. The sizes of the I2 and *P*-values were used to examine heterogeneity between studies. If I2 $<$ 50%, $P > 0.1$, it indicated that there was no statistical heterogeneity among the research results, so the fixed effects model was used for meta-analysis. Instead, if I2 $\geq$ 50%, $P < 0.1$, it suggested that there was statistical heterogeneity among the research results, so the random effects model was used. The sources of heterogeneity could be analyzed by subgroup analysis or sensitivity analysis. The difference was statistically significant ($P < 0.05$).

Results

Search results

The search was performed from March to May in 2022. A total of 329 articles were retrieved, of which 56 duplicate articles were excluded. Based on the inclusion and exclusion criteria, 257 articles were excluded by screening the titles and abstracts. The reasons for exclusion were: irrelevant ($n = 247$); reviews ($n = 22$). After reading the full texts, nine articles were excluded. Finally, a total of seven articles were included in the meta-analysis (see Figure 1) (7–13).

Characteristics of included studies

In the seven articles covering 315 nurses from six different countries, most were from the ICU ($n = 3$), followed by the pediatric and other departments (Table 1).

Quality appraisal

Among the included literature, the methodological quality was moderately biased. Two searchers independently conducted a quality assessment for each of the included studies by using the Cochrane Collaboration's risk of bias tool, suggesting that the quality was Grade B. The results of the quality assessment for each study are presented in Figures 2, 3.

Results of meta-analysis of empathy fatigue, empathy satisfaction and burnout

(1) Effects of psychological intervention on empathy fatigue of nursing staff: a total of six RCTs were included (7, 8, 10–13), covering 418 nurses. The results of the heterogeneity test showed that there was no heterogeneity among the studies (I2 = 0%, $P > 0.05$), so the fixed effects model was chosen. The results showed that the scores of empathy fatigue of nursing staff who accepted psychological intervention were significantly lower than those of the control group. The difference was statistically significant (SMD = $\sim$ −0.22, 95% CI: −0.42−0.02, $P = 0.03$) (Figure 4).

(2) Effects of psychological intervention on empathy satisfaction of nursing staff: a total of seven RCTs were included (7–13), involving 513 nurses. The results of the heterogeneity test showed that there was mild heterogeneity among the studies (I2 = 30%, $P > 0.05$), so the fixed effects model was chosen. The results show that the scores of empathy satisfaction of nursing staff who accepted psychological intervention were significantly higher than those of the control group. The difference was

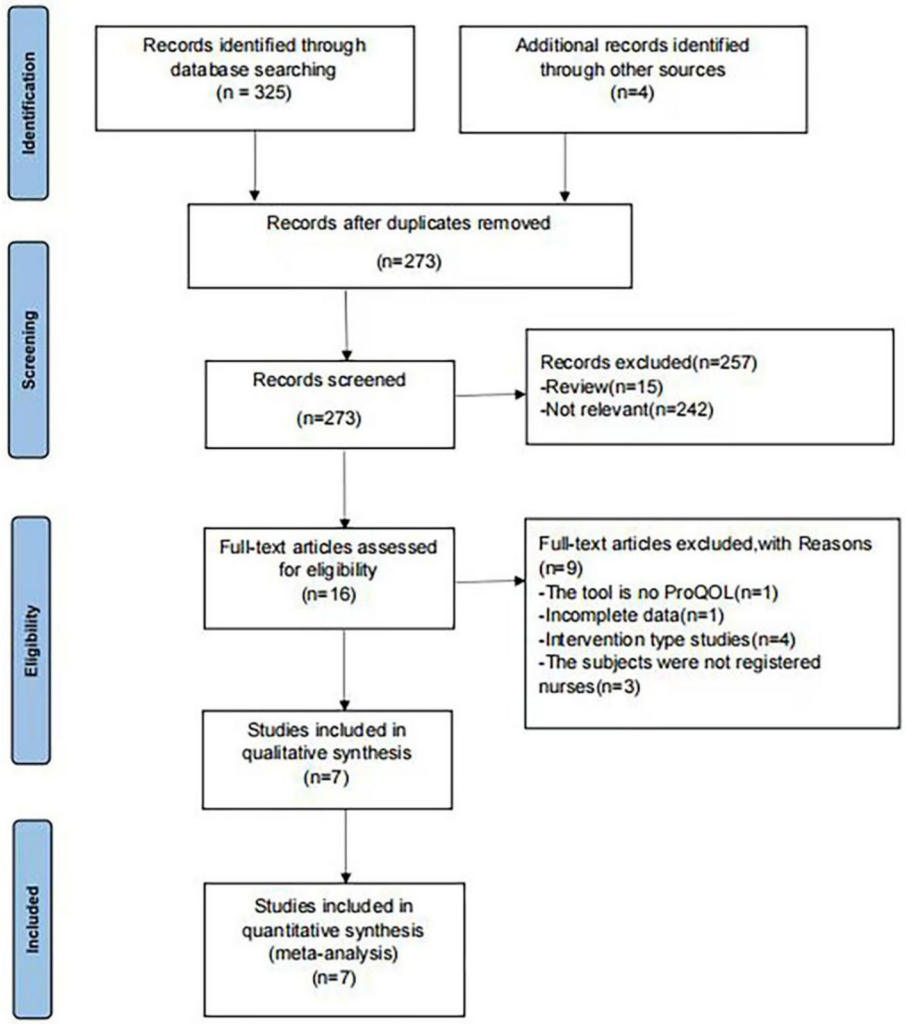

FIGURE 1
Flowchart of literature search.

statistically significant (SMD = 0.45,95% CI: 0.27∼–0.63, $P < 0.001$) (Figure 5).

(3) Effects of psychological intervention on burnout of nursing staff: a total of seven RCTs were included (7–13), covering 513 nurses. The results of the heterogeneity test showed that there was moderate heterogeneity among the studies (I2 = 53%, P = 0.003), so the random effects model was selected. The results suggest that the differences were statistically significant (SMD = −0.30, 95% CI: −0.57−0.03, $P = 0.03$) (A of Figure 6). We changed the criteria of the included studies, that was, the total sample size of each study was not <40. Among the seven included studies, Kang's study (8) had the smallest sample size, with 15 participants in the psychological intervention group and 23 in the control group. The total sample size was 38, therefore, Kang's study was excluded for sensitivity analysis. Moreover, in the sensitivity analysis, we also adopted the method of eliminating studies one by one. When Kang's study was excluded from the analysis, moderate heterogeneity (I2 = 53%, $P = 0.003$) was changed to mild statistical heterogeneity (I2 = 30%, $P = 0.21$), so the fixed effects model was used. The results showed that the burnout scores of the nurses who accepted psychological intervention were lower than those of the control group. The difference was statistically significant (SMD = −0.37, 95% CI: −0.56−0.19, $P < 0.001$), indicating robust results (B of Figure 6). As mentioned above, heterogeneity decreased after Kang's study was excluded. Tracing back to original text, we found that there was no significant difference in the changes of empathy satisfaction and empathy fatigue scores between the experimental group and the control group, indicating that subjects relied on past experience rather than

TABLE 1 The characteristics of each study.

Author, year	Country	Department	Sample (T/C)	Intervention		Time of intervention (weeks)	Frequency of intervention
				T	C		
Berger and Gelkop (10)	Israel	Pediatric	42/38	Mindfulness therapy	Blank control	12	Twice a week, 90 min per week
Kang et al. (8)	Korean	ICU	15/23	Self-reflection program	Blank control	6	Once a week, 90 min per week
Wylde et al. (9)	USA	Pediatric	46/49	Mindfulness intervention	Regular discussion education	4	Once a week, 120 min per week
Slatyer et al. (7)	Australia	Neurosurgery	60/16	Mindfulness therapy	Blank control	7	Once a week, 105 min per week
Kharatzadeh et al. (11)	Iran	ICU	26/27	ERT	Blank control	6	Once a week, 120 min per week
Pehlivan and Güner (12)	Turkey	Oncology–hematology	49/42	Compassion Fatigue Resiliency Program	Blank control	5	Once a week, 120 min per week
Emani et al. (13)	Iran	ICU	40/40	Chromotherapy-based interventions	Blank control	5	Once a week, 120 min per week

T, treatment group; C, control group; ERT, emotional regulation training.

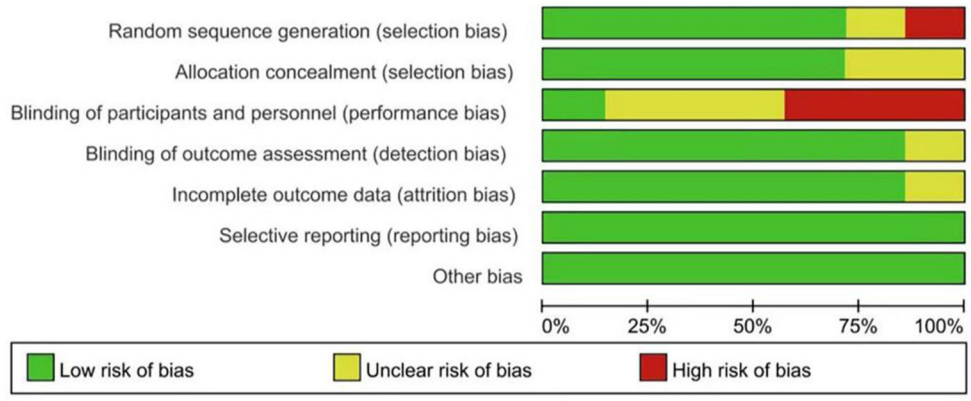

FIGURE 2
Risk of bias graph of included studies.

participating in the program immediately after experiencing a child's death. In addition, the objects participated in the project while working continuously, which may also lead to heterogeneity.

Subgroup analyses

According to intervention time and department, the subgroup analysis of seven RCTs (7–13) was carried out in the burnout dimension. First, the nursing staff were divided into two groups on the basis of intervention time. When the intervention time was ≥6 weeks, the result was I2 = 71%, $P = 0.01$; when it was <6 weeks, the result was I2 = 0%, $P = 0.75$. The heterogeneity test results showed that there was moderate heterogeneity among the studies (I2 = 44%, $P = 0.18$). The results are presented in Fig. 7. Likewise, the nursing staff were divided into three groups on the basis of department. The results showed that the ICU department was (I2 = 73%, P = 0.02), pediatric department was (I2 = 53%, P = 0.14) and other departments were (I2 = 0%, $P = 0.63$). The heterogeneity test results showed that there was mild heterogeneity among the included studies (I2 = 32.5%, $P = 0.23$), and the differences were statistically significant ($P = 0.0007$). The results are presented

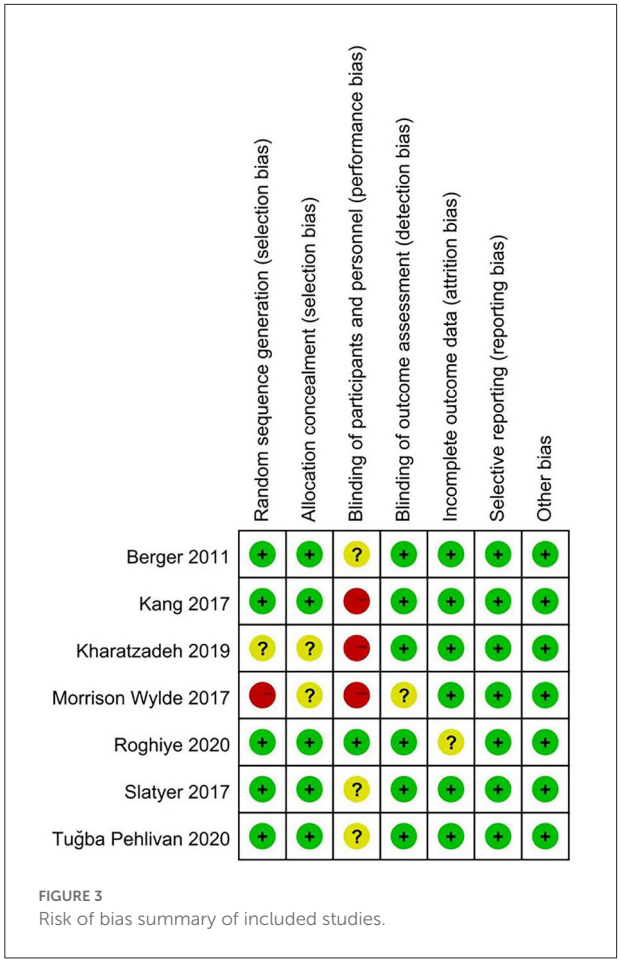

FIGURE 3
Risk of bias summary of included studies.

in Figure 8. Therefore, intervention time and department can be considered sources of heterogeneity. From subgroup analysis, the results also showed that when the intervention time was ≥6 weeks, there was statistically significant difference in the level of empathy fatigue between the psychological intervention group and the control group (SMD = −0.45, 95% CI−0.72∼ −0.18, $P = 0.001$). While <6 weeks, there was no significant difference in the level of empathy fatigue between the psychological intervention group and the control group (SMD = −0.20, 95% CI: −0.44∼ −0.04, $P = 0.10$). Moreover, for ICU department, there was no significant difference in the level of empathy fatigue between the psychological intervention group and the control group (SMD = −0.17, 95% CI: −0.48∼ 0.13, $P = 0.27$). For pediatric department, there was statistically significant difference in the level of empathy fatigue between the psychological intervention group and the control group (SMD = −0.52, 95% CI: −0.83 to ∼0.22, $P = 0.0007$). For other departments, there was statistically significant difference in the level of empathy fatigue between the psychological intervention group and the control group (SMD = −0.22, 95% CI: −0.55∼0.11, $P = 0.19$). As showed in Figures 7, 8 subgroup analysis found that the improvement benefit of psychological intervention on burnout of nursing staff has not been determined.

In addition, according to form of psychological intervention, the subgroup analysis of seven RCTs (7–13) was carried out in the empathy satisfaction dimension. From subgroup analysis, the results showed that when using mindfulness intervention, there was statistically significant difference in the level of empathy satisfaction between the psychological intervention group and the control group (SMD = 0.50, 95% CI: 0.24∼0.77, $P = 0.0002$). While using other interventions, there was statistically significant difference in the level of empathy satisfaction between the psychological intervention group and the control group (SMD = 0.41, 95% CI: 0.16∼0.65, $P = 0.001$) (Figure 9).

Publication bias

Due to only seven articles being included in the meta-analysis, funnel analysis was unnecessary.

Discussion

In different areas and departments, empathy fatigue in nurses is very common, and the incidence rate is also very high, which is having a great impact on the nursing profession (14, 15). Zhou's research (16) explored nurse stressors and mediating factors that affect nurses' stress. As for nurse stressors, they basically follow five aspects: nursing profession and work, time distribution and workload, working environment and equipment, patient care and management, and interpersonal relationships. The mediating factors that affect nurses are mainly age, educational background, personality and support system. The quality of the literature included in our study was at a medium level. The methodological quality of the seven articles was moderately biased, and the literature quality was Grade B. Since it was difficult to blind researchers and nursing staff in psychological intervention, this study only included evaluator blindness. Among them, six articles (85.7%) explained specific randomization methods and processes, six articles (85.7%) used outcome evaluator blindness and five articles (71.4%) described the method of allocation scheme hiding. Three articles (42.9%) reported the loss to follow-up of nursing staff, with the rate of loss to follow-up ranging from 0 to 16.3%, and only one explained the reasons. All seven articles all adopted intentionality analysis. All articles compared the baseline data of nursing staff such as age, male-female ratio, working years, marital status, educational background, professional title, empathy fatigue and scores of each dimension, and the results showed that the psychological intervention group and control group were comparable ($P > 0.05$). Therefore, the

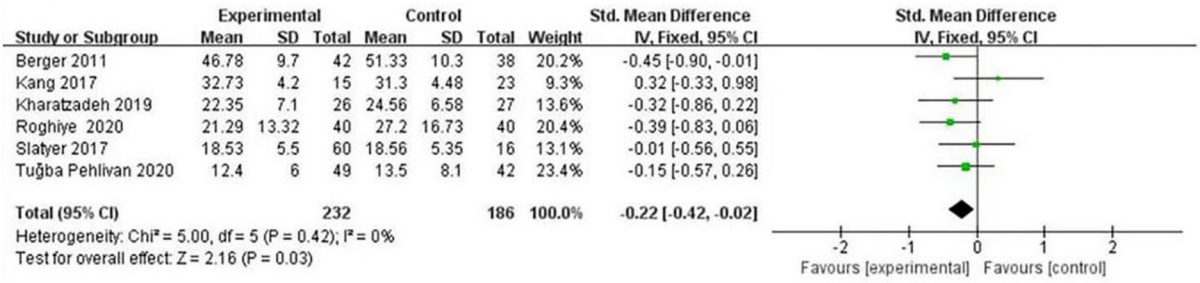

FIGURE 4
Forest graph showing analysis of empathy fatigue score of nursing staff in psychological intervention group and control group.

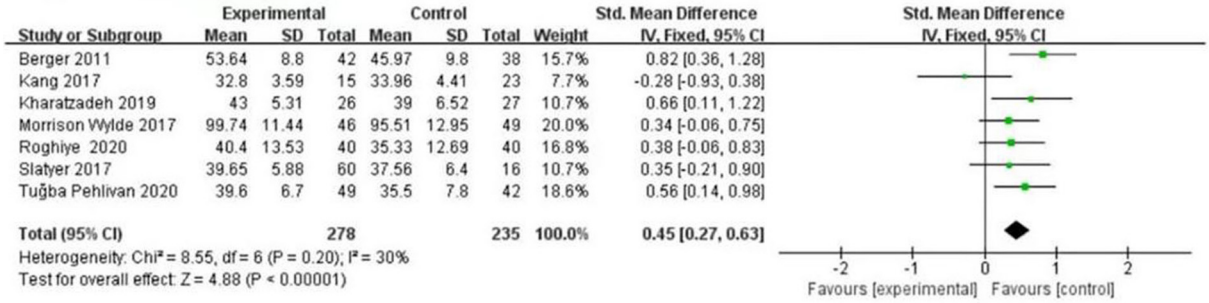

FIGURE 5
Forest graph showing analysis of empathy satisfaction score of nursing staff in psychological intervention group and control group.

quality of the literature included in this study was at a medium level, and the research results were relatively reliable. Our results show that the empathy satisfaction score of the psychological intervention group was significantly higher than that of the control group, and the burnout and empathy fatigue scores were significantly lower than that of the control group, indicating that psychological intervention can effectively improve the level of empathy satisfaction of nursing staff and improve the symptoms of burnout and empathy fatigue. The reasons may be as follows: in the course of psychological intervention, nursing staff change their awareness, attention and cognition of people and things through professional theory and technical training. They tap into their own advantages and potential, and enhance their self-regulation ability, enabling them to correctly adjust their inner emotional experience in their work, improve their level of psychological resilience and empathy ability, and effectively alleviate the symptoms of empathy fatigue (8, 9). Empathy fatigue is common among nurses, and the important factors that lead to burnout are mental overload, value conflict and a sense of being out of control (17). Therefore, In order to ensure the sustainable and healthy development of the nursing profession, it is urgent to take necessary psychological intervention measures to improve the condition of empathy fatigue and maintain the mental health of nursing staff.

We found that compared with the control group, psychological intervention can effectively improve the symptoms of empathy fatigue, and the longer the duration of psychological intervention, the better the symptoms of empathy fatigue; in other words, the positive effects of psychological intervention increase with the duration of intervention time, which is similar to the results of previous studies (18). The maximum duration of intervention was 12 weeks in all included literature, among which the immediate effects after intervention were evaluated in all seven articles, and only three followed up after intervention. Therefore, the long-term observation and evaluation of the maintenance effects of psychological intervention are still lacking. At present, there exist innumerable methods of psychological intervention, among which mindfulness therapy and Balint groups are more common for empathy fatigue intervention. The psychological intervention of the empathy fatigue of nursing staff mostly adopts mindfulness therapy, and systematic evaluation shows that this can improve the symptoms of job burnout, anxiety and stress of medical staff, and enhance empathy and concentration (19, 20). Mindfulness therapy, including mindfulness-based stress reduction and cognitive behavioral therapy, is a method to awaken the inner consciousness and observation, and be aware of self-thought, emotions and physical feeling

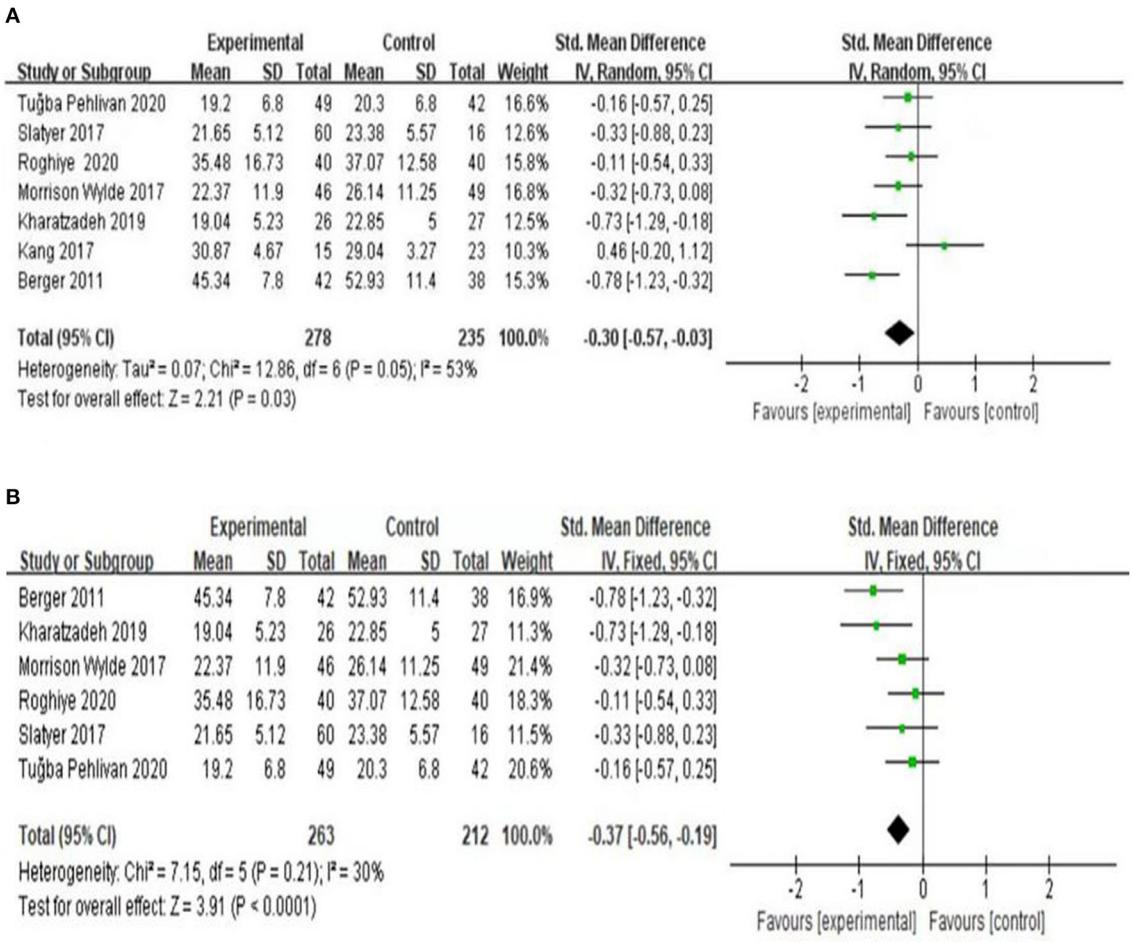

FIGURE 6
Forest graph showing analysis of burnout score of nursing staff in psychological intervention group and control group. **(A)** A total of seven RCTs were included. **(B)** After changing the criteria of the included studies, Kang's study was excluded for sensitivity analysis.

through theoretical learning and training. After more than 30 years of development in foreign countries, the theory has become relatively mature, and the empirical tests and clinical meta-analysis of relevant studies have shown obvious effects (21, 22). The Balint group is a group psychotherapy that integrates psychoanalysis, group therapy, narrative medicine concept, emotional support, self-reflection and so on, which can effectively reduce negative emotions and improve the psychological energy, empathy and mental health level of medical staff (23). The positive affective response to the stimulating situation is mainly affected by cognitive empathy, while the negative affective response is mainly affected by affective empathy (24). The higher the perspective-taking and perspective-selection ability of nurses, the lower the risk of empathy fatigue and job burnout (25). Thus, Balint groups might offer a form of learning to be patient-centered (26) and a method for keeping nurses healthy in their working and living conditions (27). In addition, in terms of other psychological interventions, although there were differences in name, the contents and methods of intervention had some common characteristics through different carriers; for example, popular knowledge manuals, information support materials and videos provided nurses with guidance on empathy fatigue, as well as group therapy, psychological stress management meditation training and so on. It is suggested that nursing managers should provide more targeted empathy fatigue intervention for nursing staff through a variety of forms of psychological intervention (16, 28, 29). According to our results and other research, we suggest regarding psychological intervention courses as a formal training for practicing nurses and new nurse training curricula, enabling more nurses to master these scientific methods of self-decompression management.

In addition, in the context of the COVID-19 global pandemic, the current review found that nurses had higher psychological distress compared to doctors, which was

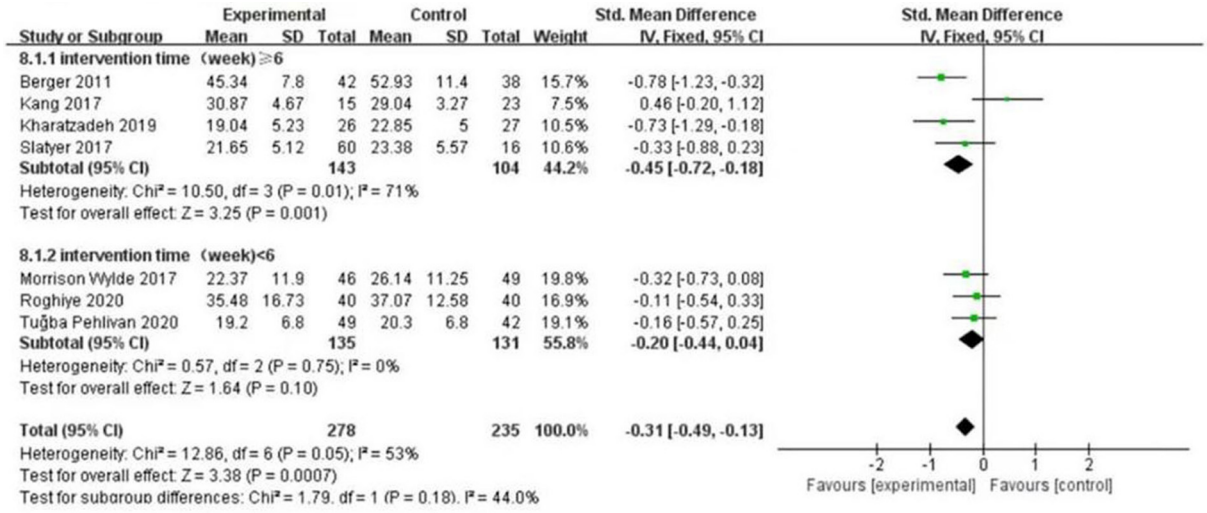

FIGURE 7
Forest graph showing subgroup analysis of different intervention times.

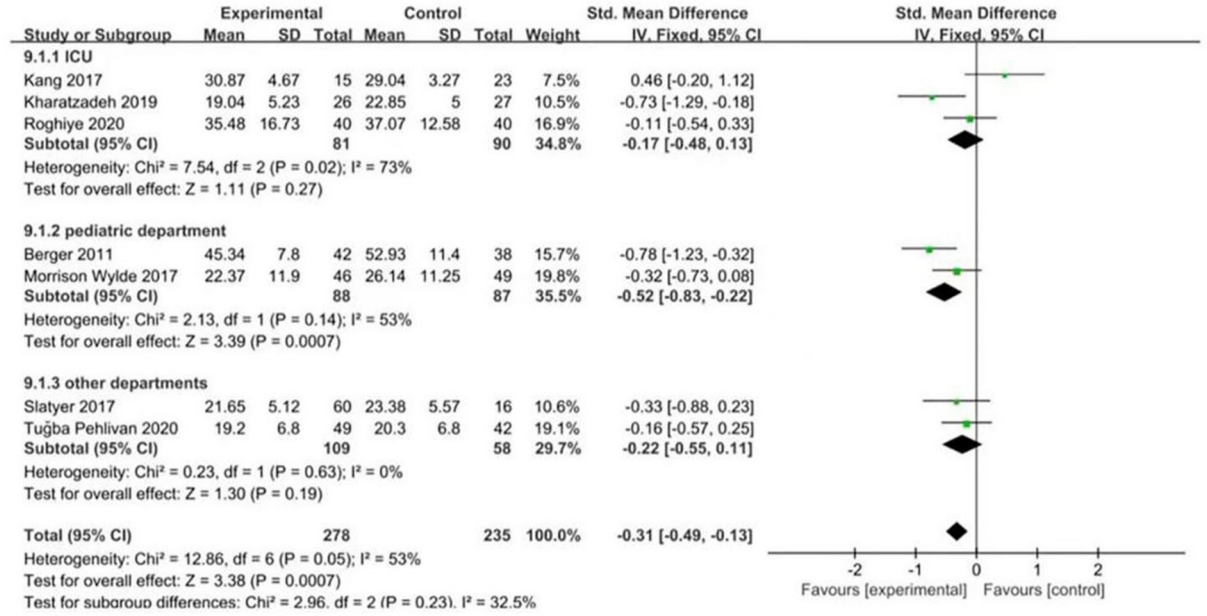

FIGURE 8
Forest graph showing subgroup analysis of different departments.

consistent with previous findings that nurses were more vulnerable to stress (30–32). Therefore, that's why we chose nursing staff rather than medical staff. As far as we're concerned, psychological factors are equally effective for medical staff outside of nursing. The COVID-19 pandemic has caused heavy psychological impact among medical workers and the general public. Since most countries around the world are currently prioritizing their medical resources for the containment of COVID-19 and the treatment of patients with COVID-19, there may be limited resources available for psychological services and interventions. Therefore, improving knowledge, awareness, and self-coping strategies are critical in the current situation (33). A prior study has found that 50.4% of study participants had accessed psychological resources through books or

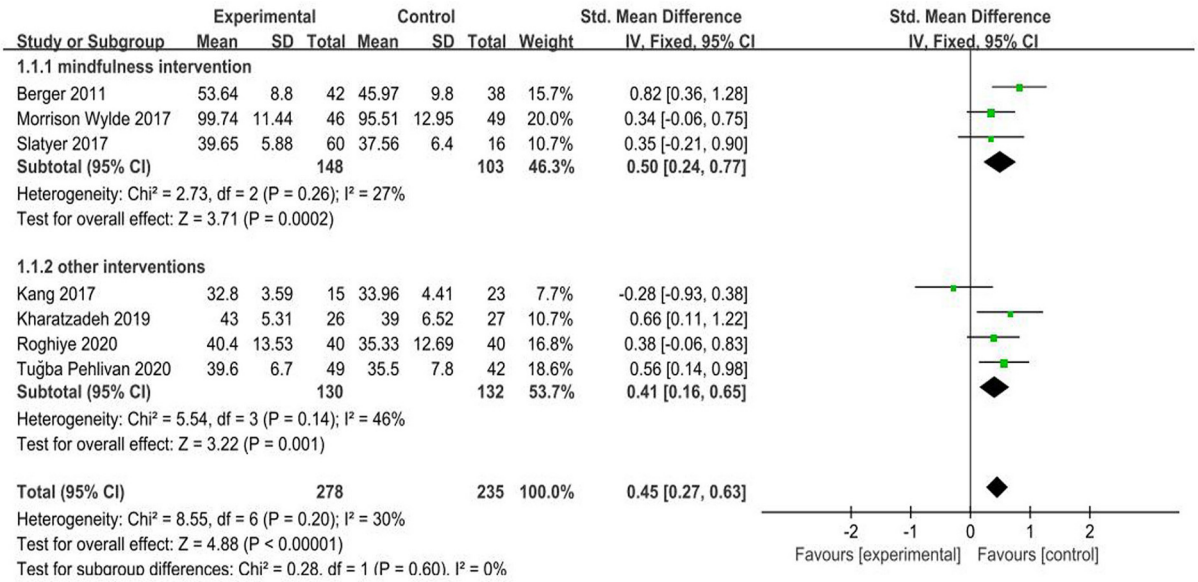

FIGURE 9
Forest graph showing subgroup analysis of different forms of psychological intervention.

media, and 17.5% had sought counseling or psychotherapy. In addition, the study also found that people with mild or lower disturbances preferred to obtain such services from media sources, while those with heavier burdens expressed their needs to seek services directly from professionals (e.g., psychologists, psychiatrists) (34). Empirical evidence suggests mindfulness-based stress reduction (MBSR) programs as an intervention to decrease stress and improve physical and mental health among individuals. Although MBSR studies have demonstrated multiple benefits, the required time commitment impacts clinician participation. Clinicians are less inclined to enroll in programs that require a significant investment of personal time (35). Even so, we do hope that follow-up researches can further explore the psychological problems of medical staff.

Limitations

(1) the included literature was limited to English, which may generate a certain selection bias; (2) there were many outcome indicators in the included literature, little could be used for combined analysis, and the generalization of the final analysis results was limited; (3) the form, degree and frequency of psychological intervention were different among the included studies, as well as the severity of empathy fatigue, which may affect the authenticity of the results; (4) there is little literature involving different psychological intervention methods, which may affect the accuracy of the results; (5) there was some heterogeneity in the included literature, and the number of studies involved in this meta-analysis was <10, so the funnel plot analysis was not carried out for the time being, and further improvement in meta-analysis methods is demanded in subsequent studies; (6) the sample size included in this study is relatively small, so it is necessary to carry out a large, multi-center, well-designed, high-quality randomized controlled trial for further verification; (7) among the included literature, only two articles performed a secondary trauma score, so this study lacked the dimension analysis of secondary trauma. It is suggested that nursing scholars should perform more studies on the score of the three dimensions of empathy fatigue. Thus, follow-up studies should make updates and additions on this basis.

Conclusion

Our findings show that psychological intervention can improve the empathy satisfaction level of nurses, improve the symptoms of empathy fatigue and have a certain preventive effect on its occurrence and development. It is suggested that related managers should pay attention to the physical and mental health of nursing staff, and take corresponding measures to improve their level of mental health and quality of nursing, thereby ensuring the sustainable and healthy development of the nursing profession.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

XC, MC, HZ, CW, HC, and ZzZ are the guarantors of the manuscript and take responsibility for the content of this manuscript. XC, ZzZ, RC, and CW contributed to the design of the study. QW, JZ, ZW, and XO were involved in the data analysis. ZhZ, XO, and RC contributed to the acquisition of primary data. XZ, XC, and RC wrote the initial draft of the manuscript and contributed significantly to the revision of the manuscript. All authors read and approved the final manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The reviewer QT declared a shared parent affiliation with the authors HL, JL, XO, ZhZ, ZW, and RC to the handling editor at the time of review.

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EDITED BY
Oriol Yuguero,
Lleida Institute for Biomedical Research (IRBLleida), Spain

REVIEWED BY
Delia Virga,
West University of Timişoara, Romania
Domenico De Berardis,
Mental Health Center (CSM) and Psychiatric Service of Diagnosis and Treatment (SPDC), Italy

*CORRESPONDENCE
Kun Tang
tangk@tsinghua.edu.cn
Muhammad Shahid
muhammadshahid.15.pk@gmail.com

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When workaholism is negatively associated with burnout: A moderated mediation

Irsa Fatima Makhdoom[1], Najma Iqbal Malik[1], Mohsin Atta[1], Nudra Malik[2], Madeeha Gohar Qureshi[3], Muhammad Shahid[4,5]* and Kun Tang[5]*

[1]Department of Psychology, University of Sargodha, Sargodha, Pakistan, [2]Department of Applied Psychology, Lahore College for Women University, Lahore, Pakistan, [3]Department of Economics, Pakistan Institute of Development Economics, Islamabad, Pakistan, [4]School of Insurance and Economics, University of International Business and Economics, Beijing, China, [5]Vanke School of Public Health, Tsinghua University, Beijing, China

Aim: Previous theory and research postulate that workaholism is one of the important factors that contribute to burnout. The present study aimed to analyze the role of psychological capital as a mediator between the two. Moreover, the study examined the moderating role in the stated mediated relationship.

Methods: The researchers approached a sample of university teachers (N = 1,008) including both male (n = 531) and female (n = 477) university teachers by using a multi-stage random sampling technique. For this purpose, DUWAS-10 Oldenburg Burnout Inventory, Challenging Job Demands Scale, and Anila PsyCap Scale were applied to measure workaholism, burnout, challenging job demands, and PsyCap, respectively. The data obtained from the sample was subjected to analysis by using Model 14 of Process Macro by Hayes.

Results: The results confirmed the mediating role of PsyCap and moderating role of time pressure and cognitive demands in the relationship of the two variables. The results concluded that workaholism is not directly related to burnout rather the negative relationship existed through psychological capital, and the mediated relationship was stronger for the university employees who were to face a higher level of challenging job demands including cognitive demands and time pressure.

Conclusion: Burnout is an occupational health problem that causes devastating effects on both the employees as well as to the organizational economy. Improving personal resources might help the negative relationship between workaholism and burnout in higher education institutions in the country.

KEYWORDS

burnout, cognitive demands, PsyCap, social load, time pressure, university teachers, workaholism, moderated mediation

Introduction

Burnout, a stress-related outcome (1–4), is one of the most serious occupational health-related problems. Every year in the United States only, 120,000 employees die out of it, and thus, it leads to 190 billion dollars being spent by employers. Further, burnout is strongly and positively related to other mental and physical health illnesses such as depression and anxiety which results in a productivity loss of one trillion dollars annually (5, 6). Similarly, a research report (7) concluded that it costs between 1 to 2 billion dollars in lost revenue in the veterinary industry. Such statistics suggest the importance of burnout in the world economy.

Although several theories have been proposed to explain the processes behind burnout, Job Demands/Resources Theory (2) is one of the most welcomed theories among burnout researchers that initially outlined that there were certain job demands which affect the employee negatively and thus is bad for employees' health and motivation. These bad things were termed job demands. Equally, there were certainly good things that could reduce the effects of job demands, brought positivity to employees' health, and added to their motivation. These were labeled as job resources. Later, researchers found that not all job demands brought negative consequences. Rather some job demands, besides being stressful and thus affecting the health of the employees, brought some positive consequences also, for example, personal growth, feeling of mastery, and competence. This difference resulted in two forms of job demands i.e., challenging job demands and hindering job demands.

The current study includes three job demands as challenging that has been outlined in the indigenous culture of Pakistan in a sample of University teachers (3). Afterward, a ratio of job demands and resources was identified which stated that an increase in ratio resulted in an increased level of health and productivity (8). On the conceptual level, later researchers found that along with organizational resources, certain individual differences performed as resources and acted in the same way as organizational resources did. Such individual differences were labeled as personal resources (9, 10). Such personal characteristics often act as third variables in the demands-outcome relationship (11). For the present study, the researchers have focused on the personal resource of psychological capital.

Along with demands and resources, the researchers explained other work-related behaviors and outcomes such as innovative behavior and personal demands through the JD-R model (12, 13). One such construct is workaholism. Workaholism is traditionally defined as an addiction to work. It is characterized by excessive working and working out of some inner compulsion, and is marked by an obsession to work without any external incentive such as financial gain or monetary rewards, etc (14). Ostensibly, it seems that the construct is positive and may result in positive outcomes for both the employee and the organization, however, the studies have found mixed results regarding its effects. The previous research concluded both positive and negative correlates of workaholism. Among the negative outcomes, there are deteriorated employees' health, increased stress, more perpetration of CWBs, increased work-family conflict, and marital dissatisfaction. Similarly, it often results in increased burnout (14–16). However, work enjoyment, organizational commitment, and job involvement are those factors that are found positively associated with workaholism. Interestingly performance is found to be uncorrelated with overall job performance (17). Hence, more roles of workaholism in the JD-R Model are yet to be explored. Therefore, the purpose of the present research includes (1) to find out if personal resources (i.e., PsyCap) link workaholism and burnout, and (2) to explore whether the relationship between workaholism and burnout through the personal resource (i.e., PsyCap) changes as a function of challenging job demands (i.e., time pressure, social load, and cognitive demands).

Workaholism and burnout

Traditionally, workaholism and burnout are supposed to positively relate to each other. Since workaholism involves excessive and compulsive thinking about work and thinking of work even when not working, it may eventually result in depleted emotional resources. This depletion of emotional resources, according to Conservation of Resources Theory (18), may result in the experience of job burnout. Moreover, workaholics spend more hours at work, they find lesser time to regain their depleted emotional resources, and thus are at greater risk of developing symptoms of burnout (19). Therefore, a positive relationship between the two is expected. Several researchers have concluded the same. For example, Cheung and colleagues (20) found that workaholism and burnout are positively related and that the relationship was very strong and was the same across different cultures and countries. Similarly, Schaufeli et al. (1) observed that workaholism resulted in more role conflicts which eventually lead to a higher level of burnout among employees.

On the other hand, workaholism may bring some positive outcomes too. For instance, it can beget promotions and managerial status (21) as well as positively relate to personal accomplishments and satisfaction with the leadership components of burnout (22). The mixed findings regarding its effects on burnout and other work-related positive and negative outcomes give room to search for certain third variables and the mechanism through which the relationship operates. Although much work has been done to explain the mechanism through which workaholism relates to burnout and other work-related outcomes, the complete mechanism is yet

to be explored. Role conflict (23) and work-family conflict (24) are often researched mediators for the workaholism-outcome relationship. However, both of them explain the positive relationship between workaholism and burnout. There is a need to explore how workaholism negatively relates to burnout or which possible third variables could relate workaholism to burnout negatively. We propose that personal resources (i.e., PsyCap) and challenging job demands (i.e., time pressure, cognitive demands, and social load) may affect this relationship.

Workaholism, psychological capital and burnout

The present study assumes that the relationship of workaholism with health-related outcomes (i.e., job burnout) is not simple; rather, the relationship is complex and may be affected by certain third variables. The researchers suggest that personal resources and challenging job demands act as third variables in the model. Among other personal resources, psychological capital (PsyCap) is often considered an important personal resource. PsyCap is defined as a strong mental state which is characterized by personal growth and is marked by hope, resilience, self-efficacy, and optimism (25, 26). Although being a workaholic does not guarantee increased performance, spending more hours at work simply may result in more work done. Similarly, it is positively associated with eustress (27) which may help employees to take work tasks as challenges, and thus they might feel grown. Therefore, as previous literature states, workaholism positively predicts PsyCap and its all four sub-scales including hope, resilience, self-efficacy, and optimism (28). The same positive relationship with workaholism has been found by previous researchers (29). Workaholism when accompanied by an external locus of control, may act as a resilience capacity or at even a higher level as learned resourcefulness (30).

On the other hand, PsyCap has often been attributed as a personal resource in the literature on JD-R Model. Since PsyCap includes feelings of mastery, hope and motivation for the future, and a feeling of personal capability in the form of self-efficacy, it may directly affect burnout. Particularly, the resilience component was a strong negative predictor of burnout in previous literature (31). Moreover, it may affect the perceptions of other demands and resources and the employee who is high at PsyCap might take these demands and resources as more positive to them (32, 33) and therefore, it is found as a negative predictor of burnout. Simply stated, the employee who expects positivity for the future, takes a brighter look at every aspect, or easily come back to routine after setbacks, and believes that s/he can complete the tasks (i.e., who is high in four components of PsyCap) will experience lesser stress and will be less affected by negative outcomes of stress. Therefore, PsyCap can act as a protective factor against developing the symptoms of burnout directly and through positive factors for example flourishing and positive coping, etc., (34–36). Therefore, we propose that workaholism will positively affect PsyCap which in turn would negatively affect burnout. Therefore, we hypothesize that.

H1: Psychological capital mediates the relationship between workaholism and burnout.

Challenging job demands as moderators in the relationship of psychological capital and burnout

Challenging job demands, according to the Job Demands/Resource Model, are those job demands or stressors which, besides being negative and stressful, also contribute to the achievement and personal growth of the employees (37). Examples of such job demands are time pressure, cognitive demands, and workload (38). Although a considerable amount of research has been carried out about the differential effects of challenging and hindering job demands on work engagement and burnout, more rigorous evidence is required to clarify the various differential roles these job demands play (39). For the present research, three challenging job demands were studied including time pressure, cognitive job demands, and social load. Time pressure was defined as the pressure that is exerted when the job tasks have to be done using lesser time than what is available. It is the stress which results from the conflict of lesser time and more responsibilities to be completed. Cognitive job demands include those job demands which need higher-order cognitive functioning to complete the task. Finally, there is the social load. The social load includes those job demands which occur with the interaction of people at work. The three are found as challenging job demands in literature (40–42).

These job demands result in many positive outcomes including increased motivation, satisfaction, performance, and overall well-being of the employees (37, 43). Apart from its direct and clearer effect, the role of challenging job demands is more complex than it seems to be. The researchers have argued that not the nature of job demands (i.e., either challenging or hindering) but the appraisals associated with these job demands actually result in either favorable or unfavorable outcomes; and even the appraisal is not solely responsible for the particular outcomes, as the degree of these demands also matters. They say that no matter how the demands are appraised, some job demands can start acting as hindrances after a certain degree and level (44).

Therefore, the job demands can act as a challenge for one group of the population and as a hindrance for another. Similarly, they can act as a challenge up to a certain level and degree. However, apart from outcomes based on their appraisal, the challenging job demands may also play a role while

interacting with other variables. For instance, time pressure works best when satisfaction with work-life balance is there or the quality of leader-member exchange is high (45). Similarly, when professionals (such as nurses) had to face time pressure along with other factors such as poor sleep, they were more likely to give false medicines and were more likely to accidentally injure their patients (46). However, little is known about the interactive effects of other challenging job demands (i.e., cognitive demands and social load). One study (47) found that cognitive demands and cognitive resources both interact with each other to result in higher professional efficacy in a sample of informatics. Even lesser data is available for the role of social demands in the stated variables. However, based on the proposition that challenging job demands act as positive agents for the employees like university teachers, they will bring positive outcomes in the relationship between PsyCap and burnout. More specifically, we propose that the negative relationship between PsyCap and burnout will be strengthened when there are highly challenging job demands. Therefore, the hypothesis of the study is:

H2: Challenging job demands moderate the strength of the indirect relationship between workaholism and burnout in university faculty *via* psychological capital as the indirect relationship is strengthened when challenging job demands in respondents are high.

H2(a): Time pressure moderates the strength of the indirect relationship between workaholism and burnout in university faculty *via* psychological capital such as the indirect relationship is strengthened when time pressure is high.

H2(b): Social load moderates the strength of the indirect relationship between workaholism and burnout in university faculty *via* psychological capital such as the indirect relationship is strengthened when a social load is high.

H3(c): Cognitive demands moderate the strength of the indirect relationship between workaholism and burnout in university faculty *via* psychological capital such as the mediated relationship is strengthened when cognitive demands are high.

The conceptual framework of the study (see Figure 1) suggests that workaholism is a predictor of burnout and that workaholism and burnout are related through psychological capital. Moreover, challenging job demands would affect this mediated relationship. Therefore, the main purpose of the research is to find out the relationship of workaholism and burnout through PsyCap and also to explain if the mediated relationship differs in terms of different levels of challenging job demands (i.e., time pressure, cognitive demands, and social load).

Methods

The present study followed a correlational research design where a survey was used as a research method.

Participants

The sample of the present study included teachers ($N = 1008$) from different public sector universities in Pakistan through multi-stage random sampling. The sample size was determined through G-Power analysis using α (0.05) and a small effect size (0.02) with five independent variables. The sample size estimated through G-Power analysis was $N = 646$. Out of eight administrative units of Pakistan (including Islamabad, Punjab, Sindh, Khyber Pakhtunkhwa, Balochistan, Gilgit Baltistan, Azad Jammu and Kashmir, and Federally Administered Tribal Areas), the equal number of university teachers ($n = 252$) from four areas including Islamabad, Punjab, Khyber Pakhtunkhwa, and Azad Jammu and Kashmir were selected on the bases of a lottery method. In the selected administrative units, 3 universities from each selected province (thus resulting in 12 universities and 84 respondents from each university) were selected on the bases of the lottery method. The lottery method is a technique used in simple random sampling that is a sampling method of probability sampling. In this method, all the population list is assigned a number and the numbers are then put in a bowl or hat, and then the numbers are selected from the hat until the desired number of sampling elements is received (48, 49). From these selected universities, four faculties were decided and out of these four faculties, respondents were conveniently approached ($n = 21$). The participants included both male ($n = 531$) and female ($n = 477$) university teachers with the age range of 26–60 years and $M = 36.22$, SD = 7.36. The sample included lecturers ($n = 596$), assistant professors ($n = 338$), and associate professors or above ($n = 74$). Only regular faculty members working in the current university for at least last 1 year were included in the sample. The employees who were not on regular bases or whose work experience in their current workplace was lesser than 1 year were not included in the sample.

Instruments

The following instruments were used for this study.

DUWAS-10 (1)

DUWAS-10 is a psychometrically sound measure of workaholism. It consists of 10 items that measure two dimensions of workaholism including Working Excessively and Working Compulsively. All the items are to be responded to on a four-point Likert Scale ranging from 1 = very unlikely to 4 = Always. For the current study, the Urdu-translated version (50) of the scale was used. The alpha reliability of the sub-scales of the Urdu version was acceptable i.e., 65 and 0.63 and 0.74 for Working Excessively, Working Compulsively, and total DUWAS-10 respectively.

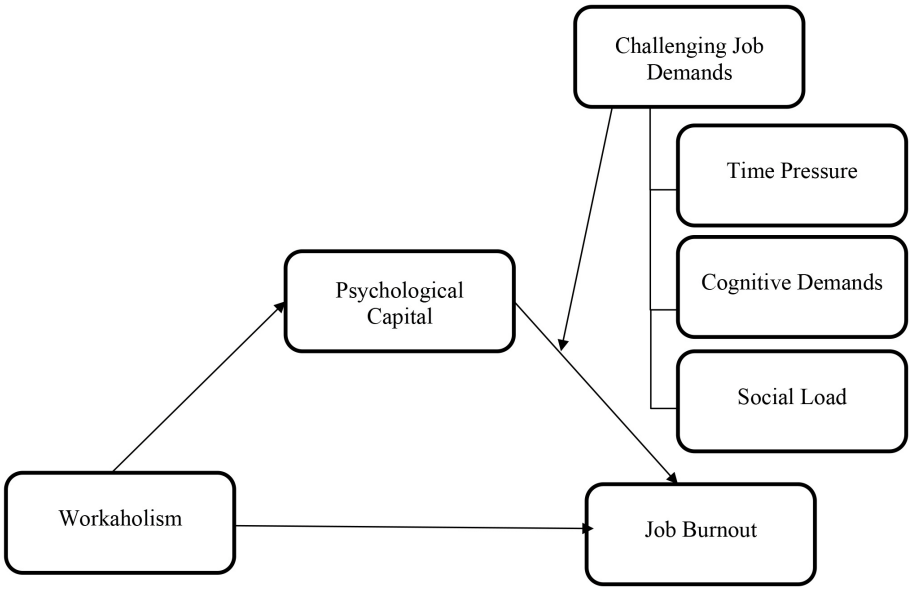

FIGURE 1
Proposed model of the study.

Oldenburg burnout inventory, OLBI (2)

To measure the level of burnout, the Urdu version (39) of OLBI (2) was used. It is a sound and reliable measure of burnout. It measures two dimensions of burnout including exhaustion and depersonalization through 16 items. All items are to be responded to on a four-point Likert scale where responses range from 1 = strongly agree to 4 = strongly disagree and half of the items are reversely coded. The scale is a reliable measure with high alpha i.e., 0.78 and 0.79 for Exhaustion and Disengagement respectively (51).

Challenging job demands scale (3)

The Challenging Job Demands Scale (3) was used. It includes 13 items that measure three of the challenging job demands including Time Pressure (4 items), Social Load (5 items), and Cognitive Demands (4 items). The scale is a sound measure of challenging job demands with good psychometrics as the reported alpha is 0.81, 0.74, and 0.79 for Time Pressure, Social Load, and Cognitive Demands respectively.

Anila PsyCap scale (4)

The level of PsyCap was measured by using Anila PsyCap Scale (4). The scale is a good measure of general psychological capital. The scale consists of 34 items categorized into 4 sub-scales i.e., Resilience, Self-Efficacy, Hope, and Optimism. The response format of the scale ranges from 1 to 4 where 1 indicates strongly disagree and 4 indicates strongly agree. The score is obtained by reverse coding item numbers 29 and 33 (which are reverse items) and then adding up the scores of all items. The scale is in the Urdu language and yields good psychometrics ranging from 0.67 (for the Hope sub-scale) to 0.87 for the total scale (4).

Procedure

The present study was carried out from 2017 to 2019 and the data collection was completed by 2018. A research team was hired for data collection. Afterward, formal permissions of selected institutes were obtained. The sample was personally contacted by the researcher and their team who contacted the teachers in their offices and briefed them about the nature of the research. The study followed the ethical research protocol and key principles, for example, de-briefing about study objectives, voluntary participation informed consent (verbal and written), and confidentiality assurance. It was made clear to them that the research was non-funded and thus they would be given no incentive for participation in the research. They were further informed about their right to withdraw from the study at any point without facing any negative consequences for making such a decision before data collection. After having consent from the teachers, the questionnaires along with the demographic sheets were distributed among them. Some of them responded

TABLE 1 Correlation matrix, psychometric properties and descriptive statistics of the scales used in the study.

Variables	Workaholism	Job burnout	Time pressure	Cognitive demands	Social load	PsyCap	*M*	SD	α
Workaholism	–	−0.17**	0.29***	0.12*	0.12*	0.28***	26.92	4.54	0.76
Job burnout	–	–	0.06	−0.14*	0.01	−0.41***	34.68	4.85	0.71
Time pressure	–	–	–	0.28***	0.23***	0.10	13.99	3.38	0.88
Cognitive demands	–	–	–	–	0.46***	0.20***	18.14	4.00	0.87
Social load	–	–	–	–	–	0.15*	13.43	3.15	0.70
PsyCap	–	–	–	–	–	–	106.71	10.43	0.91

*p < 0.05, ***p < 0.01, and ***p < 0.001.

TABLE 2 Mediating role of PsyCap in the relationship of workaholism and burnout.

Paths	Outcome variable	Predictor variable	*B*	*P*	95% CI	
					LL	UL
A	PsyCap	Workaholism	0.76	0.000	0.62	0.90
B	Burnout	PsyCap	−0.20	0.000	−0.22	−0.17
C (Total effect)	Burnout	Workaholism	−0.08	0.019	−0.14	−0.01
C' (Direct effect)	Burnout	Workaholism	−0.15	0.000	−0.19	−0.11

in the same meeting while some others gave time on another day. The researchers and the team contacted them at their promised time and collected the completed response. When the proposed number of the data was achieved, the data was thoroughly reviewed for missing items and face validity. 30 forms were having incomplete responses or random responses from 2 universes. These 30 forms were discarded and again 30 individuals from these universities were contacted thus, a total of 1,008 numbers were completed and were subjected to further statistical analyses.

Statistical analysis plan

The frequency of all the variables was computed to identify the erroneous entry, missing values, and other initial information. After initial screening, Harman's Single Factor Test was applied to the data in which the researchers performed an EFA where all the items of the four scales were loaded on a single factor without rotation. The EFA revealed that only 15% variance of the single factor could explain which was quite acceptable to move further for the analysis assuming that the common method bias is not affecting the data (52). Afterward, Cronbach alpha reliability, mean and standard deviation, and correlations were computed by using SPSS as preliminary analyses so that the data may proceed to main analyses for hypothesis testing. The reliability analyses indicated that the data obtained was internally consistent enough to proceed with further analyses. The correlational analysis highlighted the initial pattern of relationship among study variables. Further, simple mediation was computed using Model 4 of Process Macro. Model 4 of Process Macro indicates the direct effect of an independent variable on an outcome variable with one or more mediators. In the present study workaholism was a predictor, job burnout was the outcome variable and the PsyCap was studied as a mediator. Further, the moderated mediation was carried out by using Model 14 of Process Macro. For the present study, the mediated relationship between workaholism and job burnout through PsyCap was studied at different levels of challenging job demands including time pressure, cognitive demands, and social load through this model.

Ethical consideration

The Institutional Research Board, and Department of Psychology at the University of Sargodha, Pakistan (SU/PSY/786-3) initially approved the study. Afterward, the researcher hired a team for data collection who were initially trained about the ethical protocol suggested by the "Declaration of Helsinki" (respecting the dignity and autonomy of the participants; maintaining the confidentiality and all other rights of the participants including the right to refuse taking part in the study or withdraw their given information at any time).

Results

To achieve the study objectives, the data obtained were subjected to analysis by using SPSS. Initially, Cronbach alpha reliability, mean and standard deviation, and correlations were computed by using SPSS. Further, simple mediation

TABLE 3 Relationship of workaholism and job burnout mediated by PsyCap and moderated by time pressure, cognitive demands and social load ($N = 1,008$).

Relationship of workaholism and job burnout mediated by PsyCap and moderated by time pressure					Relationship of workaholism and job burnout mediated by PsyCap and moderated by cognitive demands					Relationship of workaholism and job burnout mediated by PsyCap and moderated by social load				
	95% CI					95% CI					95% CI			
Paths	***B***	***LL***	***UL***	***P***	**Paths**	***B***	***LL***	***UL***	***p***	**Paths**	***B***	***LL***	***UL***	***P***
Workaholism⟶ PsyCap	0.76	0.62	0.90	0.000	Workaholism⟶ PsyCap	0.76	0.62	0.90	0.000	Workaholism⟶ PsyCap	0.76	0.62	0.90	0.000
PsyCap⟶	0.02	−0.10	0.15	0.71	PsyCap ⟶JB	0.11	−0.02	0.25	0.092	PsyCap ⟶ JB	−0.08	−0.21	0.06	0.069
TP ⟶JB	1.63	0.73	2.53	0.000	CD⟶ JB	1.44	0.81	2.06	0.000	SL ⟶JB	0.74	0.024	1.46	0.042
WKh⟶ JB (Direct effect)	−0.10	−0.16	−0.03	0.006	WKh⟶ JB (Direct effect)	−0.05	−0.16	0.06	0.394	WKh ⟶JB (Direct effect)	−0.09	−0.15	−0.02	0.010
Workaholism⟶ PsyCap⟶ JB[a]	−0.12	−0.17	−0.07	0.000	Workaholism⟶ PsyCap⟶ JB[a]	−0.10	−0.15	−0.07	0.000	Workaholism⟶ PsyCap⟶ JB[a]	−0.17	−0.21	−0.12	0.000
Workaholism⟶ PsyCap⟶ JB[b]	−0.19	−0.22	−0.17	0.000	Workaholism⟶ PsyCap⟶ JB[b]	−0.19	−0.22	−0.17	0.000	Workaholism⟶ PsyCap⟶ JB[b]	−0.20	−0.22	−0.17	0.000
Workaholism ⟶ PsyCap ⟶JB[c]	−0.22	−0.26	−0.19	0.000	Workaholism⟶ PsyCap⟶ JB[c]	−0.24	−0.27	−0.20	0.000	Workaholism⟶ PsyCap⟶ JB[c]	−0.22	−0.26	−0.19	0.000
PsyCap × TP	−0.01	−0.02	−0.01	0.000	PsyCap × CD	−0.01	−02	−0.01	0.000	PsyCap × SL	−0.01	−0.03	0.01	0.369

JB, Job Burnout; TP, time pressure; PsyCap, Psychological capital; CD, cognitive demands; SL, social load. The relationship of WKH and JB through PsyCap at [a]low level of moderator; [b]moderate level of moderator; [c]at high level of moderator.

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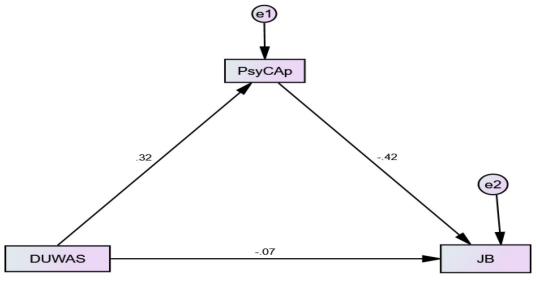


FIGURE 2
Mediated Relationship of Workaholism and Job Burnout through PsyCap.

was computed using AMOS separately whereas, moderated mediation was computed using Model 14 of Process Macro. The results obtained are summarized below.

Table 1 summarizes the results of correlation among all the study variables. The results show that workaholism is negatively associated with burnout while it is positively associated with the three challenging job demands as well as with psychological capital. Psychological capital is negatively associated with burnout whereas, among job demands, only cognitive demands are negatively associated with burnout.

Table 2 summarizes the results of the mediated relationship between workaholism and burnout through PsyCap. The results reveal that workaholism is a positive predictor of PsyCap ($B = 0.64$, $t = 5.28$, $p < 0.001$). Further, PsyCap ($B = -0.18$, $t = -7.46$, $p < 0.001$) negatively predicts burnout. The Path C describes total effect of workaholism on burnout which is ($B = -0.16$, $p < 0.001$) and the direct effects of burnout on workaholism is significant ($B = -0.08$, $p < 0.05$). Finally, the indirect effect of workaholism on burnout through PsyCap is significant i.e., ($B = -0.15$, $p < 0.001$; BootCILL $= -0.19$, BootCIUL $= -0.11$).

Table 3 summarizes the results of moderated mediation analysis where PsyCap is studied as a mediator between the relationship between workaholism and job burnout. Moreover, the mediated relationship is moderated by time pressure, social load, and cognitive demands which moderate the relationship between PsyCap and job burnout. The index of moderated mediation states that the moderated mediation analysis for the moderating effects of time pressure (i.e., Index $= -0.01$, BootCILL $= -0.02$, BootCIUL $= -0.004$) and cognitive demands (Index $= -0.01$, BootCILL $= -0.03$, BootCIUL $= -0.01$) are significant (Index $= -0.01$, BootCILL $= -0.02$, BootCIUL $= -0.004$). Whereas, the social load is not a significant moderator for the mediated relationship of workaholism and burnout through PsyCap. Figure 2 gives a graphical representation of the results.

The Table 3 states that workaholism significantly and positively predicts PsyCap ($B = 0.65$, $t = 5.22$, $p < 0.0001$); however, in this model, PsyCap doesn't predict job burnout. Moreover, time pressure predicts burnout positively ($B = 2.01$, $t = 2.42$, $p < 0.05$). The interaction term suggests that PsyCap and time pressure interact with each other and produce a significant effect on the outcome variable ($B = -0.02$, $t = -2.21$, $p < 0.05$). Further, the direct path indicates that workaholism does not predict job burnout directly whereas, the indirect effects on the low, moderate, and high levels of time pressure are significant. Further, when the moderating role of the social load is observed, the table indicates that all the direct paths to burnout are non-significant except the direct and indirect effects of workaholism suggesting that workaholism is a significant predictor of burnout and PsyCap. Whereas, PsyCap, social load, and workaholism do not predict job burnout. However, the mediated relationship of workaholism and burnout through PsyCap on a low, moderate, and high level of moderators is significant (with negligible difference in the value of B for all the three levels of the moderator) suggesting that mediation is significant but the moderated mediation is non-significant.

Finally, when role of cognitive demands is observed, it is turned out that workaholism significantly predicts PsyCap ($B = 0.72$, $t = 5.72$, $p < 0.0001$) and cognitive demands significantly predict burnout ($B = 1.94$, $t = 2.765$, $p < 0.05$); whereas, workaholism and PsyCap are non-significant predictors of the burnout. Further, the results revealed that the interaction of PsyCap and cognitive demands produce significant effects on job burnout with $\Delta F_{(1,323)} = 8.56$, $p < 0.01$ and contributes to a 2.09% variance in the outcome variable ($\Delta R2 = 0.0209$). The pictorial representation of the significantly mediated moderations is given in the figures.

The Figure 3 gives a clearer look at the moderated relationship between PsyCap and burnout where challenging job demands are supposed to be moderators.

Figure 4 illustrates the moderated relationship between PsyCap and burnout at different levels of challenging job demands. The figure states that time pressure and cognitive demands both act as challenging in the relationship of independent and criterion variables such that the higher the level of challenging job demand (i.e., time pressure and cognitive demands) the stronger the relationship of PsyCap and job burnout. However, the social load does not moderate the relationship between the two.

Discussion

The study was aimed at examining the mediated relationship between workaholism and burnout through PsyCap at different levels of challenging job demands including time pressure, social load, and cognitive demands. The results revealed that workaholism significantly and positively predicted PsyCap which negatively predicted burnout. The total direct and indirect

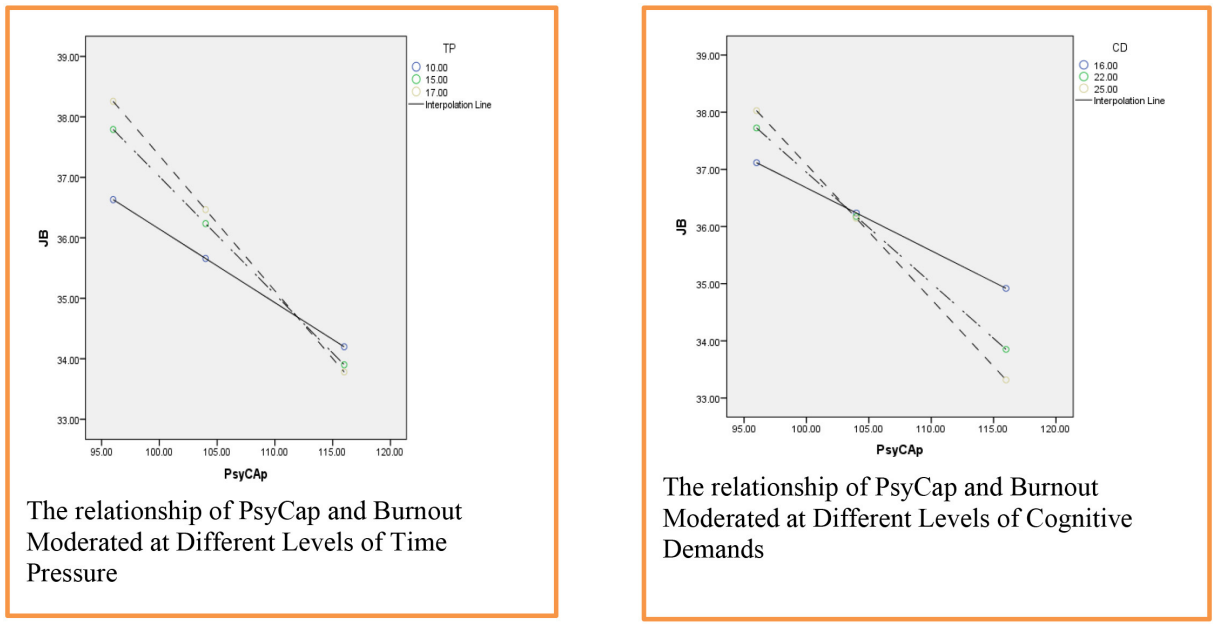
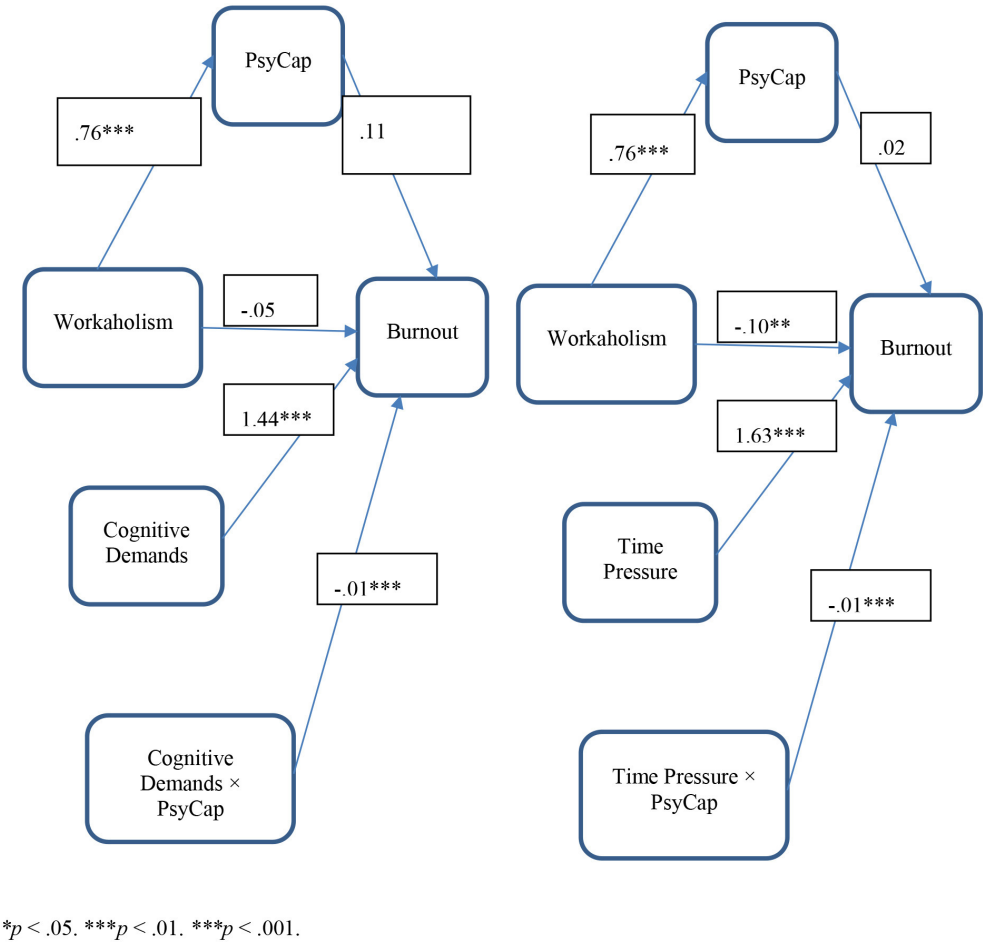


FIGURE 3
The relationship of PsyCap and burnout moderated at different levels of time pressure, cognitive demands and social load (1,008).

effects of workaholism on job burnout were found significant suggesting a mediation effect.

The present study is an endeavor to find out the status of workaholism in the JD-R Model. Within JD-R Model, the status of workaholism is controversial to some researchers (53). Traditionally, workaholism is found a negative predictor of work-related outcomes more specifically that of occupational health and burnout. However, there is more to know about the exact role of workaholism in the JD-R Model (54). Not only is it related to burnout, but also has a strong negative relationship with quality of life (39). Similarly, an increase in excessive working (a dimension of workaholism) is associated with an increase in sick leave as well as burnout (55). However, it may produce positive effects too. For instance, simply giving more time to work and thinking more about work may bring more work done. Similarly, it may yield more positive ratings by the supervisors as compared to those for non-workaholics. Moreover, they want to avoid negative emotions which arise for them when not working, and thus gain more satisfaction from work (56). Therefore, their work may bring more positive experiences for them such as hope, resilience, efficacy, and optimism, i.e., the higher PsyCap. This enhanced PsyCap eventually results in decreased burnout. Previous research has established this relationship (57) by stating that PsyCap results in enhanced well-being as those with high PsyCap are more able to experience flourishing as well as are more engaged, which, in turn, reduces their burnout. Previous studies (58, 59) also asserted PsyCap as a mediator between the relationship between workaholism and burnout and other constructs in JD-R Model.

Further, two of the challenging job demands (i.e., time pressure and social load) moderated the mediated relationship in the sense that mediated relationship was stronger with the higher level of challenging job demands (H2) however, the social load did not moderate the relationship. Traditionally, psychological capital had been observed as a strong negative predictor of burnout (35, 60, 61) and as the present study concluded, the negative relationship was stronger for those who experience challenging job demands at work. This stance of challenging job demands is not new to JD-R Model as challenging job demands have previously been observed as moderators in the literature of the JD-R Model (62, 63). Since challenging job demands may foster psychological need satisfaction and thus may bring important health-related and occupational benefits (64), it may eventually result in reduced burnout. Moreover, those high on PsyCap when facing challenging job demands may take more benefits from their demands and thus ultimately may experience lesser burnout. Therefore, the moderating relationship of challenging job demands seems justified. However, the social load did not moderate the stated relationship. One possible factor behind this may lie in the multi-dimensional nature of social relationships at work, particularly at universities. Some social interactions need cognitive efforts while others may end up only in fatigue. Hence, a piecemeal treatment of social load is further required.



*$p < .05$. ***$p < .01$. ***$p < .001$.

FIGURE 4
Relationship of workaholism and job burnout mediated by PsyCap and moderated by time pressure and cognitive demands ($N = 1,008$).

Earlier theories and research are controversial regarding the effects of time pressure on burnout. For instance, some researchers (65, 66) found a moderate to a strong positive relationship between time pressure with the dimensions of burnout. However, some others (67) found that time pressure resulted in different types of creative behaviors and outcomes based on positive and negative affective states. The results of these studies suggest that the effects of time pressure on different attitudes and behaviors are not simple but the result of the interaction of other variables.

As in the present case, the results revealed that time pressure itself produces a significant (although weak) positive effect on job burnout. However, the negative effects on burnout are observed when the employees possess more PsyCap and face high time pressure. In other words, workaholics who possess a high level of self-efficacy, hope, optimism, and self-efficacy experience a lesser level of burnout in situations where they face high time pressure. Stating simply, being a workaholic alone does not affect burnout. Rather, it is a matter of personal resources as well as the demands from the side of the organization (in this case time pressure) which lead the workaholic toward the experience of lesser or more symptoms of burnout.

The results supported cognitive demands as a moderator in the mediated relationship between workaholism and burnout. Stating otherwise, workaholics who had more psychological strength in terms of resilience, hope, self-efficacy, and optimism were less likely to experience burnout when they found that their jobs were offering them a means of personal development and grooming (i.e., high cognitive demands). Moreover, cognitive demands serve as a means to fulfill the need for competence. This need satisfaction might have also resulted in decreased burnout. The previous research (68) noted that PsyCap helps in need fulfillment (including the need for autonomy, competence, and relatedness) which in turn leads to better psychological well–being and enhanced performance.

The next challenging job demand was a social load which did not moderate the stated mediated relationship (see Table 3). The social load includes the number of contact with others at work for work-related tasks. This interaction results in both positive and negative consequences for the employees (3, 40). Besides being a source of broader exposure to problem-solving, a means to satisfy relatedness needs, and a source of personal recognition at work, the social load may result in potentially negative consequences. For instance, it gives room to high emotional demands and emotional labor.

Emotional labor and emotional demands are required in professions where positive or negative emotions are required in order to complete the task successfully. More specifically, emotional labor is the requirement for service professionals who have to show (no matter what their inner emotional state is) positive emotions at work (69). Therefore, in service-oriented professions, contact with others at work demands emotional labor from them as the employees have to display the required and not the original emotions. Consequently, the professionals might experience negative outcomes. Keeping both positive and negative outcomes together, the social load might have worked both as a challenge and hindrance stressor as well. A piecemeal analysis of social load might produce different results.

To conclude, the relationship between workaholism and burnout was mediated through PsyCap and the challenging job demands (including time pressure and cognitive demands but not social load) moderated the relationship. The study yields important implications for organizational researchers who can replicate the findings as well as can study the role of more personal resources and other challenging job demands. Further, it is important for the organizational leaders and managers, who can foster the health conditions of the employees by offering more challenging job demands at work and by organizing workshops based on PsyCap to employees specifically those who are high on workaholism to prevent them from burnout and other health-related issues.

Limitations of the present study

The study has some limitations. For example, the sample included more lecturers and assistant professors and a lesser number of higher-level university teachers. Although this is because of the actual trend of teachers in Pakistani universities where teachers of higher positions are lesser in numbers, this may act as confounding. Besides, workaholism, burnout, and social load are all multi-dimensional variables but the research did not assess the relationships on a finer-grained level due to time constraints. Therefore, future studies may replicate the findings by searching for and/or using the sub-scales of the constructs. Finally, the study has focused only on the health impairment process, however, the same positive effects of personal resources and challenging job demands can be explored in the process of work engagement.

Theoretical and practical strengths of the study

At the theoretical level, the study adds to the literature on JD-R Model in the following ways:

The study adds to the positive side of workaholism, hence it does not attribute "goodness" or "badness" inherent to workaholism itself; rather it offers the underlying mechanisms that make workaholism "good" or "bad." Although personal resources such as psychological capital have traditionally been studied as predictors or moderating factors; the study adds to the literature on the JD-R Model by suggesting PsyCap as a mediator. It also contributes to the validation of the JD-R Model by confirming the interactive role of challenging job demands, which had been established by previous theorists and researchers working with this theory of occupational health and well–being.

The study offers important implications to the administration of the universities as well as to the occupational health counselors. It suggests that the administrators can specifically target the workaholics and foster their psychological capital through different faculty development workshops. Afterward, challenging job demands may be assigned to them which will even bring more positive outcomes regarding the level of burnout. Further, the study offers the same to the workaholics themselves who can work on their personal resources to beget more benefits from their workaholism.

Conclusions

Burnout is an occupational health problem that not only affects the employees' health but also harms the productivity and performance of the organization. This results in devastating effects on the economy of the organization. In the present world, workaholism, or the addiction to work is also a serious health concern. However, working on personal resources may affect the relationship between workaholism and burnout in higher education institutes.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

Ethics statement

The studies involving human participants were reviewed and approved by the Institutional Research Board, and Department of Psychology at the University of Sargodha, Pakistan (SU/PSY/786-3) initially approved the study. The

patients/participants provided their written informed consent to participate in this study.

Author contributions

The study is designed by IM, NIM, and MA. While MS, NM, MQ, and KT gave the creative contribution to the finalization of this manuscript. All the authors have equally contributed to the write-up, critical review, and finalization of the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Oriol Yuguero,
Lleida Institute for Biomedical Research (IRBLleida), Spain

REVIEWED BY
Fatih Sekercioglu,
Ryerson University, Canada
Bushra Elhusein,
London Health Sciences Centre, Canada

*CORRESPONDENCE
Joseph U. Almazan
Joalmazan030@gmail.com;
joseph.almazan@nu.edu.kz

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The relationship between nurses' risk assessment and management, fear perception, and mental wellbeing during the COVID-19 pandemic in Saudi Arabia

Reem N. Al-Dossary[1], Sana AlMahmoud[1], Maram Ahmed Banakhar[2], Majed Alamri[3], Hamdan Albaqawi[4], Khaled Al Hosis[5], Mohammed S. Aljohani[6], Bader Alrasheadi[7], Rawaih Falatah[8], Noura Almadani[9], Khalid Aljohani[10], Jalal Alharbi[11] and Joseph U. Almazan[12]*

[1]Nursing Education Department, Nursing College, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia, [2]Public Health Nursing Department, Faculty of Nursing, King Abdul-Aziz University, Jeddah, Saudi Arabia, [3]Nursing Department, College of Applied Medical Sciences, University of Hafr Al Batin, Hafar Al Batin, Saudi Arabia, [4]College of Nursing, University of Hail, Hail, Saudi Arabia, [5]Department of Nursing Education, Nursing College, Qassim University, Buraydah, Saudi Arabia, [6]Medical and Surgical Department, Nursing College, Taibah University, Medina, Saudi Arabia, [7]Nursing Department, College of Applied Medical Sciences, Majmaah University, Al Majma'ah, Saudi Arabia, [8]Nursing Administration and Education Department, College of Nursing, King Saud University, Riyadh, Saudi Arabia, [9]Community Health Nursing Department, College of Nursing, Princess Nourah Bint Abdulrahman University, Riyadh, Saudi Arabia, [10]Community Health Nursing Department, Nursing College, Taibah University, Medina, Saudi Arabia, [11]Nursing Department, College of Applied Medical Sciences, University of Hafr Albatin, Hafar Al Batin, Saudi Arabia, [12]Medicine Department, Nazarbayev University School of Medicine, Nazarbayev University, Astana, Kazakhstan

During this pandemic, it is crucial to implement early interventions to help nurses manage their mental wellbeing by providing them with information regarding coping skills, preventive risk assessment approaches (such as hospital preparedness and rapid risk assessment), and the ability to respond. This study evaluated the effect of fear and risk assessment management on nurses' mental wellbeing during the COVID-19 pandemic in Saudi Arabia. A total of 507 nurses who worked in tertiary public hospitals were asked to take a descriptive design survey. Three survey scales were used to assess the survey: the Risk Assessment Scale, the Fear of COVID-19 Scale, and the Warwick-Edinburgh Mental Wellbeing Scale. Independent *t*-tests and a one-way ANOVA were used to examine the association between fear of COVID-19 and nurses' demographic characteristics on their mental wellbeing. A multiple regression analysis was performed to examine the predictors associated with mental wellbeing. Findings revealed that almost half of the participants showed moderate positive mental wellbeing, 49.7%, while only 14% had low levels of fear on the Warwick-Edinburgh Mental *Well* being Scale. Most of the respondents had low levels of fear on the Fear of COVID-19 Scale, 45%, while only 15% had high levels of fear on the scale. Then, some demographic variables, such

as "age," "nationality," "total years of experience in the current hospital," and "region you work at" had statistically significant differences with $p < 0.5$. Meanwhile, risk assessment is also associated with mental wellbeing scores. All items on the Fear of COVID-19 Scale showed no significant difference with a $P > 0.05$. In conclusion, most nurses providing direct patient care to a patient with COVID-19 emphasized the importance of wearing PPE and performing hand hygiene before and after any clean or aseptic procedure. Meanwhile, although almost all nurses were vaccinated, they were still afraid of a COVID-19 infection. Additionally, the results reported that the older the nurses are, the better their mental wellbeing scores. Non-Saudi nurses had higher perceived mental wellbeing scores than Saudi nurses, and different working environments corresponded to different mental wellbeing scores. Finally, nurses' risk assessment was associated with mental wellbeing scores.

KEYWORDS

COVID-19, fear perception, risk assessment and management, mental wellbeing, pandemic

Introduction

The coronavirus disease 2019 (COVID-19) pandemic has unsympathetically put the health of healthcare professionals (HCPs) and the public at unprecedented health risks. This has prompted immediate action from medical facilities around the world. Two years after the COVID-19 outbreak, as of 2 May 2022, data showed that 66.2% of the world population has already received the vaccine, which is more than 5.08 billion people around the world (1). According to the World Health Organization's (1) epidemiological update regarding COVID-19, there was a 16% decline in newly reported cases from 28 March 2022 to 3 April 2022, and both new weekly cases and deaths have been declining globally (1). However, although the data speak positively on a macro-level scale, individuals are nevertheless confronted with challenges at the micro level. For instance, in some countries, HCPs were assigned as one of the priority healthcare groups for vaccination (2, 3). A recent Centers for Disease Control and Prevention study published in 2021 (4) reported that vaccination has a greater protection rate than those previously infected with COVID-19. There was high anticipation from the HCPs for these vaccines. Nurses make up one of the largest groups of HCPs and have the most direct patient contact, so vaccination is crucial for them because it reduces their risk of infection (5).

By the end of 2021, over 50% of healthcare professionals (including nurses) worldwide were neither fully vaccinated nor had no plans to do so (6). For instance, vaccination hesitancy has been one of the determinants of under-vaccination in some nurses (7). According to Reses et al. (3), the reason for the high hesitancy status of getting vaccinated can be attributed to people's political views and a lack of confidence and trust in vaccine manufacturers. Moreover, people were hesitant to get the COVID-19 vaccination due to their concerns regarding its side effects, which stemmed from the vaccine's quick development and the conspiracy theory that it is employed for population control (8–10). The rapid pace of vaccine development and rollout may have caused doubts regarding vaccine safety. Meanwhile, another study found the cause of greater reluctance to vaccination to be the vaccine development process and a lack of knowledge about the vaccine's long-term effects (11).

Similar to vaccination reluctance, the physical and mental wellbeing of HCPs, particularly frontline nurses, is becoming a significant concern over the pandemic's larger impact due to the unknown number of COVID-19-related excess deaths among HCPs (12). COVID-19 also impacted the workforce in the healthcare sector. Undoubtedly, nurses were most severely affected by the pandemic, as they faced multiple hazards that affected their physical as well as mental wellbeing (13). In addition, Al-Dossary et al. (14) explained that nurses experienced moderate to severe symptoms of burnout, distress, anxiety, fear, and trauma during the COVID-19 pandemic. Another study from Bangladesh about the challenges faced by HCPs reported that nurses experienced greater workloads, scarce incentives, psychological distress, personal protective equipment (PPE) shortages, and social exclusion/stigmatization (15).

In addition, the disproportionate impact of the COVID-19 pandemic on hospitals has resulted in nursing staff shortages and increased workload (16), which could lead to stress and exhaustion for nurses. This heavy workload negatively affects patient safety, causes greater stress, reduces job satisfaction, and increases occupational burnout. Increased demands on nurses'

time and energy lead to a decline in their quality of life (17) and can have negative consequences for patient care in the form of staffing shortages and high turnover rates.

When the pandemic hit Saudi Arabia, it exacerbated an already problematic situation for nursing professionals. A recent study revealed that nurses dreaded the disease for a variety of reasons, including the abrupt increase in COVID-19-related morbidity and mortality in the country (18, 19). Moreover, nurses reported being directly involved in the treatment of patients diagnosed positive for COVID-19. Thus, they were apprehensive about contracting the infection and passing it on to their families. Furthermore, nurses, like any human being, fear the unknown. During the first few months of the pandemic, the lack of adequate disease knowledge and no specific treatment caused the nurses to be exposed to transmission risk and emotional distress (14, 20). Nurses' anxiety about COVID-19 may have been influenced by any number of factors, many of which have been the subject of prior research. As reported by recent studies, assessing the nurses' fear and mental wellbeing during the outbreak of COVID-19 has been seen as a crucial matter. For example, the investigation by Albaqawi et al. (21) regarding the nurses' risk for COVID-19 infection revealed that nurses who do not practice proper hand hygiene after physical contact with patients with COVID-19 and who do not replace PPE are at a higher risk of contracting the infection. Additionally, nurses' inadequate understanding of COVID-19, inadequate PPE, lack of access to tests, and the presence of psychological stress were the major factors for infection among healthcare professionals (22, 23), thus highlighting the importance of COVID-19 preparedness in managing its risks to HCPs. A study conducted in the Najran Region, KSA, revealed that nurses are well-versed in preventive measures and reported attending orientation about the COVID-19 guidelines (24). This is probably why early interventions help the nurses manage their mental wellbeing by providing them with information regarding coping skills and, at the same time, the preventive risk assessment approach (e.g., hospital preparedness and rapid risk assessment) and the ability to respond during this pandemic is greatly important (25).

Previous studies examined how they manage the emotional distress brought on by the pandemic, and it was revealed that nurses' use of COVID-19 protective measures such as PPE, psychological and management support, avoidance strategies, faith-based practices, and social support from their families during the COVID-19 outbreak improved nurses' coping response (26, 27).

A study identified informational support, such as training and clear preventative programs, as one of the factors that may treat mental health issues. It has been demonstrated that instrumental support is particularly effective in providing adequate PPE and other protection protocols. Emotional and psychological support, such as counseling and therapy for nurses experiencing emotional distress, and organizational support, such as manpower allocation and redistribution of workloads and working hours, were themes that were revealed to be helpful not only to nurses but also to policymakers in each healthcare institution (28). The strain on mental health can cause dysfunction at work and other disorders that could be more serious if left untreated. Actions such as risk management and risk reduction for all staff can be taken to mitigate this risk.

The interventions, such as spreading awareness through public health education, helped the HCPs manage their fear and psychological wellbeing throughout the pandemic. A study has shown that public health education decreased the fear of an individual toward COVID-19 since the awareness of the disease helped nursing professionals understand that preventive measures can work effectively (29). Time management training for the nurses was also found to be helpful for their mental health during the COVID-19 pandemic. Sun (30) conducted a 16-week intervention for the nurses, and the results suggested that the training significantly increased the mental health level of the nurses. Mental health interventions, such as emotional management, were given to the HCPs and could enhance the ability of the nurses to regulate their emotions and help them prevent mental disorders (31). Previous studies proved that interventions had positive effects on nurses. Ali et al. (22) discussed that the number of HCPs getting infected with COVID-19 is increasing and that one of the major risk factors is the lack of understanding of the disease. Thus, they suggested that governing bodies should focus on providing education and training to increase the readiness of their staff. The same suggestion was also made in the study by d'Ettorre et al. (32), where they advised a need for interventions to protect against the mental health effects brought by the pandemic and management strategies for posttraumatic stress symptoms. A risk assessment strategy can successfully decrease the occurrence of risk events in nursing practice (33).

Therefore, it is also safe to presume that the risk assessment and management of the HCPs could also influence their undue fear and mental wellbeing during the COVID-19 pandemic. While there are studies investigating the risk assessment of the HCPs, particularly the nurses, to the best of the researchers' ability, there has been no study conducted in Saudi Arabia exploring the direct relationship of risk assessment management to the fear and mental wellbeing of nurses. Mental wellbeing is an integral and essential component of nurses' health, impacting patient safety and the quality of care provided. Evaluating the effect of risk assessment management on nurses' mental wellbeing and fear is significant, particularly in the nursing profession, since it helps healthcare institution policymakers better combat nurses' fear and mental wellbeing. In this study, the information on how healthcare professionals fear COVID-19, which, in turn, will support further designing of appropriate programs to take care of their fear and mental wellbeing, could also ensure that they deliver quality care, thereby maintaining the safety of the patients. Maintaining the good mental health

conditions of the HCWs would mean that they are fit to perform the task at their optimum level. When the nurses work at their best, they become efficient. In addition, better mental health increases HCP satisfaction and decreases voluntary turnover, which is a cost-saving move for hospital administration due to the reduction or elimination of a number of charges and losses that would otherwise be incurred (34).

Finally, the result could provide baseline information on risk assessment on reducing the transmission rate of COVID-19 and promoting positive mental wellbeing. Having established the impact of COVID-19 on the fear and mental health of nurses providing direct patient care in Saudi Arabia, this study is crucial for advancement not only in nursing research but also for the nursing profession in Saudi Arabia. This study evaluated the effect of risk assessment management on nurses' mental wellbeing and fear during the COVID-19 pandemic in Saudi Arabia. It is currently relevant that a new study will be conducted, especially since the COVID-19 pandemic is ongoing. The mere presence of the pandemic simply means that the challenges for nurses remain. Thus, the study seeks to determine how HCPs manage the risks posed by the pandemic, as well as its effect on nurses' fear and mental health.

Materials and methods

This study is cross-sectional in design. We used online survey questionnaires to gather data from the selected tertiary public hospitals in Saudi Arabia. The nurses were eligible to become participants in the study if they had a license and had at least 1 year of hospital experience. We are presently working in a Saudi Arabian public or private hospital that has provided care to patients with COVID-19 and gave consent to participate in the study.

Data collection

This study was approved by the Ministry of Health Ethical Review Board (Institutional Review Board–Hafr Albatin committee (KACST No. H-05-FT-083). Each survey questionnaire was accompanied by a cover letter describing the study's goal, the participant's right to decline participation, and the fact that participation implies consent. Confidentiality was ascertained as the survey questionnaire did not ask for any data that could expose the identity of the participants. After ethical approval was obtained, the researcher sent a copy of the survey questionnaire to each department in the selected tertiary hospitals for approval. Permission to use the tools was sent to each author of the tool, and approval letters from the authors were received. After the participants were identified, the questionnaires were distributed. Participants were asked to complete the questionnaire during their respective free time to avoid disturbing their work. Data were collected from February to May 2022.

Sample size

The sample size was decided using the online Sample Size Calculator (https://www.calculator.net/sample-size-calculator.html). This means 385 or more surveys were needed to have a 95% confidence level in which the real value was within ±5% of the surveyed value. In this study, a total of 507 nurses answered the survey, which is above the minimum sample requirements.

Survey questionnaire

The tool is a four-part questionnaire:

Demographic data

This section describes respondents' demographic and work-related characteristics.

Risk assessment scale

This scale is a modified version of the WHO's COVID-19 Virus Exposure Risk Assessment Form for HCPs. This tool contains three subparts that assess the risk category of nurses after exposure to a patient with COVID-19 (25). The first part contains the five items on nurses' intervention conducted on patients with COVID-19 in clinical settings. The second part contains the 7-item adherence to IPC procedures during healthcare interactions. Finally, the third part contains 5-item questions regarding the COVID-19 vaccine. In this study, this tool's reliability was 0.91 (Cronbach's alpha).

Warwick–Edinburgh mental wellbeing scale

The tool was composed of 14 items that assessed the mental state of the nurses during the COVID-19 outbreak (35). The participants' responses were measured on a 5-point scale (1 = none of the time to 5 = all of the time), with higher mean scores meaning greater positive mental wellbeing. The minimum score on the scale is 14, while the maximum score that can be attained is 70. A higher score means improved mental wellbeing. Several studies performed in various countries on the psychometric properties of the tools found that they have acceptable reliability and validity for assessing an individual's mental wellbeing (13, 36, 37). This study has a reliability of 0.95 (Cronbach's alpha).

Fear of COVID-19 scale

The tool measures anxiety and fear of COVID-19 (38). This tool comprises a 7-item self-administered questionnaire and has been psychometrically validated in several countries (39–42). Nurses indicated their level of agreement with the statements using a five-item Likert-type scale. Answers included "strongly disagree," "disagree," "neutral," "agree," and "strongly agree." The minimum score possible for each question was 1, and the maximum was 5. A total score could be calculated by adding up each item's score (ranging from 7 to 35). A higher overall score attained indicated severe fear of COVID-19. This study's computed Cronbach's alpha was 0.92, indicating high reliability.

Data analysis

Demographic variables, risk assessment, fear of COVID-19, and mental wellbeing were frequently counted, and percentages, mean scores, and standard deviations were calculated. The Shapiro–Wilk test was applied to check the normality or distribution of data. It found that if the value of the Shapiro–Wilk and Kolmogorov-Smirnova tests is >0.05, the data are normal. Pairwise deletion of cases was used with missing data. Independent *t*-tests and one-way ANOVA were used to examine the association between fear of COVID-19 and nurses' demographic characteristics on their mental wellbeing. Multiple regression analysis examined the predictors associated with mental wellbeing. The dependent variable used is the Warwick–Edinburgh Mental Well-Being Scale, and the independent variables are the nurses' demographic characteristics and fear of COVID-19. A *p*-value of 0.05 is considered significant.

Results

Table 1 shows that the total number of participants was equal to 507. Most of the participants were women (86.2%), and the age of most participants ranged between 31 and 40 years (47.3%), while the participants aged 61 years and above had the lowest percentage (0.2%). More than half of the participants were married, with a percentage of 66.1%, while only 3.4% of them were separated. The participants' education level had 66.7% bachelor's degrees, while only 0.2% had doctorate degrees. The participants with non-Saudi nationality represented 57.8%, while those with Saudi nationality represented 42.2% of the participants. One-third of the participants (32.3%) had an experience of 1–5 years, and only 6.5% had an experience of 21 years or more. The central region (Riyadh, Qassim) represented the majority region where 46.7% of participants worked, followed by the Eastern Region (39.6%), the Northern Region (3.2%), the Southern Region (4.7%), and the Western Region (5.7%). Most of the participants were assigned to ICUs (15.4%), emergency departments (15.2%), and obstetric departments (15.6%), comprising almost half of the participants.

The perceived risk assessment of the respondents is shown in Table 2. The first part of the risk assessment tool consists of five questions reflecting the following: 52.3% of the participants lived with their families at the pandemic's peak. In contrast, the remaining lived in an isolated room, where 83.2% of participants provided direct care to a confirmed COVID-19 patient, 81.5% had face-to-face contact within 1 m with a patient confirmed with COVID-19 in a health care facility, 72.2% were present when any aerosol-generating procedures were performed on the patient, and 78.1% had direct contact with the environment where the patient was confirmed for COVID-19. The second part of the risk assessment tool consisted of seven questions, which reflects the following: 94.28% of the participants wore PPE (62.13% medical masks, 32.94% face shields or goggles, and 4.93% single gloves), 86.19% followed the protocols by removing and replacing their PPE, 88.17% "always practice hand hygiene before and after touching the COVID-19 patient," 89.3% "always practice hand hygiene before and after any clean or aseptic procedure was performed," 92.70% "always practice hand hygiene after exposure to body fluid, 84.62% perform hand hygiene after touching the patient's surroundings," and 65.09% of them "always have high touch surfaces decontaminated frequently." The third part of the risk assessment tool consisted of five questions, which reflects the following: 98.42% of the participant were vaccinated, 79.09% of them had experienced side effects related to the vaccine, 53.65% had negative PCR test, 75.54% had adequate personal protective equipment (PPE) when working with patients infected with COVID-19, and 63.12% of the participants were afraid of becoming infected while working with patients tested positive for COVID-19 (Table 2).

Table 3 shows the respondent's perceived mental wellbeing using the WEMWBS.

Items 1, 3, 4, 5, 6, 9, and 14 had a moderate mean ranging between 3.09 and 3.36, while items 2, 7, 8, 10, 11, 12, 13, and 14 had a high mean ranging between 3.4–3.51. The WEMWBS was converted into three categories, which are low, moderate, and high. Most of the participants had moderate levels, with a percentage of 49.7%, while only 14% had low levels of mental scale. This result implies a perceived moderate positive mental wellbeing among nurses.

The association between respondents' demographic profile and perceived risk assessment about their mental wellbeing scores is shown in Table 4. Items 1, 2, 4, and 5 have results of "neutral" with a mean range between 2.76–2.95, while items 3, 6, and 7 have results of "disagree" with a mean range between 2.26–2.32. The Fear of the COVID-19 Scale was converted into three categories, which are low, moderate, and high levels. Most of the respondents had a low level of fear, 45%, while only 15% had high levels of fear on the scale. This implies that respondents had a low fear of COVID-19.

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TABLE 1 Respondents' demographic data ($N = 507$).

Demographic data		Frequency	Percent
Age	20–30 years old	145	28.6
	31–40 years old	240	47.3
	41–50 years old	83	16.4
	51–60 years old	38	7.5
	61 years old and above	1	0.2
Gender	Male	70	13.8
	Female	437	86.2
Marital status	Married	335	66.1
	Separated	17	3.4
	Signal	149	29.4
	Widow	6	1.2
Educational attainment	Diploma	119	23.5
	Bachelor	338	66.7
	Master	49	9.7
	PhD	1	0.2
Nationality (Saudi and Non-Saudi only)	Saudi	214	42.2
	Non-Saudi	293	57.8
Total years of experience in the current hospital	1–5 years	164	32.3
	6–10 years	131	25.8
	11–15 years	105	20.7
	16–20 years	74	14.6
	21 years and more	33	6.5
Region	Central region (Riyadh, Qassim)	237	46.7
	Eastern region (Dammam, Jubail, Hassa, & others)	201	39.6
	Northern region (Hail, Aljouf, Tabouk, & Arar)	16	3.2
	Southern region (Assir, Jazan, Najran, Baha)	24	4.7
	Western region (Makkah, Jeddah, Taif, & Madinah)	29	5.7
Area of practice	Artificial kidney unit	31	6.1
	Emergency department	77	15.2
	Medical department	45	8.9
	Intensive care unit	78	15.4
	Nursing administration	49	9.7
	Operating room	24	4.7
	Outpatient department	42	8.3
	Pediatric department	57	11.2
	Surgical department	25	4.9
	Obstetric department	79	15.6

Table 5 shows the relationship between respondents' demographic profile and their perceived risk assessment of their mental wellbeing scores. As shown in the Table 5, "age," "nationality," "total years of experience in the current hospital," and "region you work at" had statistically significant differences with P-values less than 0.5 as follows 0.048, 0.008, 0.036, and 0.004, respectively. In contrast, "gender," "marital status," "educational attainment," and "area of practice" had no significant difference with a $P > 0.05$. Meanwhile, risk assessment is also associated with mental wellbeing scores with a statistical significance difference with a $P < 0.5$.

Table 6 depicts the relationship between fear of COVID-19 and nurses' mental wellbeing scores. An ANOVA test was applied according to the data type. As shown in the table, all items on the Fear of COVID-19 Scale had a non-significant difference with a *P*-value of more than 0.05.

10.3389/fpubh.2022.992466

TABLE 2 Perceived risk assessment of the respondents ($N = 507$).

Risk assessment		Parameters	Frequency	Percent
Part 1	1. At the peak of the pandemic where were you living?	Isolated from family	242	47.7
		Living with family	265	52.3
	2. Did you provide direct care to a confirmed COVID-19 patient?	No	85	16.8
		Yes	422	83.2
	3. Did you have face to face contact within 1 m with a confirmed COVID-19 patient in a health care facility	No	94	18.5
		Yes	413	81.5
	4. Were you present when any aerosol-generating procedures were performed on the patient?	No	141	27.8
		Yes	366	72.2
	5. Did you have direct contact with the environment where the confirmed COVID-19 patient was cared for? E.g., bed, linen, medical equipment, bathroom etc	No	111	21.9
		Yes	396	78.1
Part 2	6. During a health care interaction with a COVID-19 patient, did you wear personal protective equipment (PPE)?	No	29	5.72
		Yes	478	94.28
	What PPE?	Single gloves	25	4.93
		Medical mask	315	62.13
		Face shields or goggles	167	32.94
	7. During a health care interaction with the COVID-19 patient, did you remove and replace your PPE according to protocol (e.g., when medical mask became wet, disposed the wet PPE in the waste bin, performed hand hygiene, etc)	Most of the time (50% or more but not 100%)	70	13.81
		Always, as recommended	437	86.19
	8. During a health care interaction with the COVID-19 patient, did you perform hand hygiene before and after touching the COVID-19 patient (whether or not you were wearing gloves)?	Never	2	0.39
		Sometimes	5	0.99
		Most of the time	53	10.45
		Always	447	88.17
	9. During a health care interaction with the COVID-19 patient, did you perform hand hygiene before and after any clean or aseptic procedure was performed (e.g., while inserting a peripheral vascular catheter, urinary catheter, intubation, etc)?	Never	5	1.0
		Rarely	2	0.4
		Sometimes	7	1.4
		Most of the time	40	7.9
		Always	453	89.3
	10. During a health care interaction with the COVID-19 patient, did you perform hand hygiene after exposure to body fluid?	Never	4	0.79
		Sometimes	5	0.99
		Most of the time	28	5.52
		Always	470	92.70
	11. During a health care interaction with the COVID-19 patient, did you perform hand hygiene after touching the patient's surroundings (bed, door handle, etc.), regardless of whether you were wearing gloves?	Never	5	0.99
		Rarely	2	0.39
		Sometimes	9	1.78
		Most of the time	62	12.23
		Always	429	84.62
	12. During a health care interaction with the COVID-19 patient, were high touch surfaces decontaminated frequently (at least three times daily)?	Never	8	1.58
		Rarely	10	1.97
		Sometimes	32	6.31
		Most of the time	127	25.05
		Always	330	65.09
Part 3	13. Are you vaccinated?	No	8	1.58
		Yes	499	98.42

(Continued)

10.3389/fpubh.2022.992466

TABLE 2 (Continued)

Risk assessment	Parameters	Frequency	Percent
14. Did you experience any side effect related to the vaccine:	No	106	20.91
	Yes	401	79.09
15. Have you been confirmed to have a positive (PCR) test of (COVID-19)?	No	272	53.65
	Yes	235	46.35
16. At the peak of pandemic, were there adequate personal protective equipment PPE during working with infected patients of (COVID-19)?	No	124	24.46
	Yes	383	75.54
17. Were you afraid of being infected with (COVID-19) while working with a positive patient?	No	187	36.88
	Yes	320	63.12

TABLE 3 Respondent's perceived mental wellbeing using the WEMWBS.

No	Statement	*N* %	None	Rarely	Sometimes	Often	All the time	Mean ± SD
1	I've been feeling optimistic about the future	*N*	43	71	189	108	96	3.28 ± 1.17
		%	8.5	14	37.3	21.3	18.9	
2	I've been feeling useful	*N*	27	67.0	160	125	128	3.51 ± 1.16
		%	5.3	13.2	31.6	24.7	25.2	
3	I've been feeling relaxed	*N*	57	128	203.0	82.0	37	2.83 ± 1.06
		%	11.2	25.2	40	16.2	7.3	
4	I've been feeling interested in other people	*N*	33	100	216	104.	54	3.09 ± 1.04
		%	6.5	19.7	42.6	20.5	10.7	
5	I've had energy to spare	*N*	27	105	206.0	114.0	55	3.13 ± 1.03
		%	5.3	20.7	40.6	22.5	10.8	
6	I've been dealing with problems well	*N*	17.0	73	200.0	147.0	70.0	3.36 ± 1
		%	3.4	14.4	39.4	29.0	13.8	
7	I've been thinking clearly	*N*	13	71	177.0	148.0	98	3.49 ± 1.04
		%	2.6	14	34.9	29.2	19.3	
8	I've been feeling good about myself	*N*	23	73	161.0	138.0	112.0	3.48 ± 1.12
		%	4.5	14.4	31.8	27.2	22.1	
9	I've been feeling close to other people	*N*	26	97	174.0	143.0	67	3.25 ± 1.07
		%	5.1	19.1	34.3	28.2	13.2	
10	I've been feeling confident	*N*	27	64	164.0	148.0	104	3.47 ± 1.11
		%	5.3	12.6	32.3	29.2	20.5	
11	I've been able to make up my own mind about things	*N*	23	73.0	170.0	138	103	3.44 ± 1.1
		%	4.5	14.4	33.5	27.2	20.3	
12	I've been feeling loved	*N*	24	77	172	134	100	3.44 ± 1.1
		%	4.7	15.2	33.9	26.4	19.7	
13	I've been interested in new things	*N*	29	76	174.0	120.0	108	3.4 ± 1.15
		%	5.7	15	34.3	23.7	21.3	
14	I've been feeling cheerful	*N*	27	86	175	129	90	3.33 ± 1.11
		%	5.3	17	34.5	25.4	17.8	

Discussion

This study assessed the relationship between nurses' risk assessment and management, fear perception, and mental wellbeing during the COVID-19 pandemic in Saudi Arabia.

Findings in the risk assessment part 1 reported that most nurses (83.2%) provide direct patient care to patients infected with COVID-19. Previous literature showed that frontline workers, such as the HCPs who provide direct care to patients with COVID-19, are at risk of getting infected, as was the case

10.3389/fpubh.2022.992466

TABLE 4 Respondents scores in fear of COVID-19.

No	Question	*N* %	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean ± SD
1	I am most afraid of Corona	*N*	84.00	88	164.00	112	59	2.95 ± 1.23
		%	16.57	17.36	32.35	22.09	11.64	
2	It makes me uncomfortable to think about Corona	*N*	71	127	141	129	39	2.88 ± 1.17
		%	14	25.05	27.81	25.44	7.69	
3	My hands become clammy when I think about Corona	*N*	137	166	128	55	21	2.32 ± 1.11
		%	27.02	32.74	25.25	10.85	4.14	
4	I am afraid of losing my life because of Corona	*N*	100	119	129	100	59	2.8 ± 1.28
		%	19.72	23.47	25.44	19.72	11.64	
5	When I watch news and stories about Corona on social media. I become nervous or anxious	*N*	88	129	146	106	38	2.76 ± 1.18
		%	17.36	25.44	28.80	20.91	7.50	
6	I cannot sleep because I'm worrying about getting Corona	*N*	164	153	105	64	21	2.26 ± 1.16
		%	32.35	30.18	20.71	12.62	4.14	
7	My heart races or palpitates when I think about getting Corona	*N*	166	146	114	58	23	2.26 ± 1.16
		%	32.74	28.80	22.49	11.44	4.54	

in the study conducted in Saudi Arabia (43, 44). The results are congruent with other recent research on the high-risk perception among nurses during Saudi Arabia's COVID-19 pandemic (45).

Nurses are particularly at risk for contracting COVID-19 because they have to come in direct contact with suspected COVID-19 patients and treat multiple infections simultaneously (45). The nurses' work during this pandemic made them more vulnerable to risks such as infection. In fact, this is confirmed in the results of a phenomenological study in which the participants expressed that they were at a high risk of COVID-19 infection and that this type of vulnerability is unavoidable (46). As of November 30, 2020, the number of nurses infected with COVID-19 in the Kingdom of Saudi Arabia was already 57,159 HCPs (47). This is most likely because COVID-19 infection is higher among HCWs than in the general community, with 2747 cases per 100,000 frontline HCWs compared to 242 cases per 100,000 people in the general population (48, 49). Given the fact that nurses provide direct contact with the patient, it is indeed logical that they commonly contract the infection. This possibility could explain the increased risk of COVID-19 among the HCP, particularly the nurses.

In the Part 2 risk assessment, most of the respondents wear PPE and practice hand hygiene before and after any clean or aseptic procedure. The occurrence of pandemic affected the usage of PPE and its perceived importance by the HCPs. In a previous study, HCWs reported that PPE was frequently used and perceived as more important than the reports before the pandemic (50). Medical-ward nurses, in particular, are quite conscientious about following standard precautions like wearing masks and washing their hands before and after handling PPE (1). This might be because the HCPs recognize the additional protection in wearing PPE and practicing hand hygiene throughout this pandemic, especially for those directly caring for COVID-19 patients. The infection modes of COVID-19 were airborne, droplets, and close contact with an infected individual. Thus, wearing appropriate PPE can protect against infectious microorganisms that help in the transmission of COVID-19 infection (12). This could be why most of the nurses in this study reported wearing PPE and practicing hand hygiene before and after procedures. Despite the benefit and the additional protection, it can pose problems such as the low adherence of nurses to using PPE and not practicing hand hygiene; these problems remain a challenge for healthcare institutions. A study by Keleb et al. (51) revealed that the Northeastern Ethiopian HCP's compliance with PPE, equipment utilization, and hand hygiene was low. HCPs in the UK also reported suboptimal adherence to personal protective measures (52). The discrepancy in the results may be attributed to the difference in the setting where the nurses reportedly work. Smith et al. (54) discussed in their study that the nurses' adherence to PPE was associated with the training received by the HCWs regarding safety and health in the workplace. In Saudi Arabia, nurses reported receiving sufficient training on the preventive measures for COVID-19 (24). This could be why nurses frequently use the gear because they are aware of the protection they can get against COVID-19.

In Part 3, risk assessment, although almost all nurses are vaccinated, they are still afraid of being infected while working with a positive patient. These findings are supported by the study by Zhang et al. (53); they revealed that nurses did not change their protective behavior even after getting vaccinated. While COVID-19 vaccines are effective for immunizing people, they do not guarantee 100% complete protection (12). Even if a person is fully vaccinated, there is still a possibility that they will contract

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TABLE 5 Association between respondents' demographic profile and perceived risk assessment in relation to their mental wellbeing scores.

Demographic characteristics		Warwick Edinburgh mental wellbeing scale				Statistical test	*P*-Value
		Low level	Moderate level	High level	Mean ± SD		
Gender	Male	9 (13%)	37 (53%)	24 (34%)	3.34 ± 1.01	$t = 0.254$	0.799
	Female	62 (14%)	215 (49%)	160 (37%)	3.32 ± 0.87		
Age	20–30 years old	17 (12%)	82 (57%)	46 (32%)	3.28 ± 0.85	$F = 3.045$	0.048*
	31–40 years old	38 (16%)	117 (49%)	85 (35%)	3.3 ± 0.9		
	41–50 years old	11 (13%)	39 (47%)	33 (40%)	3.38 ± 0.91		
	51–60 years old	4 (11%)	14 (37%)	20 (53%)	3.54 ± 0.95		
	61 years old and above	1 (100%)	0 (0%)	0 (0%)	–		
Marital status	Married	44 (13%)	166 (50%)	125 (37%)	3.34 ± 0.89	$F = 0.377$	0.686
	Separated	4 (24%)	7 (41%)	6 (35%)	3.13 ± 0.99		
	Single	21 (14%)	77 (52%)	51 (34%)	3.31 ± 0.88		
	Widow	2 (33%)	2 (33%)	2 (33%)	3 ± 0.96		
Educational attainment	Diploma	25 (21%)	58 (49%)	36 (30%)	3.1 ± 1.05	$F = 1.042$	0.354
	Bachelor	36 (11%)	172 (51%)	130 (38%)	3.4 ± 0.81		
	Master	10 (20%)	21 (43%)	18 (37%)	3.28 ± 0.97		
	PhD	0 (0%)	1 (100%)	0 (0%)	–		
Nationality	Saudi	47 (22%)	109 (51%)	58 (27%)	3.12 ± 0.97	$F = 4.868$	0.008*
	Non-Saudi	40 (7.89)	223 (57.59)	175 (34.52)	4.17 ± 0.93		
Total years of experience in the current hospital	1–5 years	18 (11%)	91 (55%)	55 (34%)	3.31 ± 0.79	$F = 3.340$	0.036*
	6–10 years	17 (13%)	68 (52%)	46 (35%)	3.32 ± 0.93		
	11–15 years	18 (17%)	48 (46%)	39 (37%)	3.32 ± 0.9		
	16–20 years	13 (18%)	34 (46%)	27 (36%)	3.22 ± 0.96		
	21 years and more	5 (15%)	11 (33%)	17 (52%)	3.54 ± 1.07		
Region, you work at	Central region (Riyadh, Qassim)	26 (11%)	111 (47%)	100 (42%)	3.43 ± 0.85	$F = 5.465$	0.004*
	Eastern region (Dammam, Jubail, Hassa, & others)	27 (13%)	112 (56%)	62 (31%)	3.24 ± 0.88		
	Northern region (Hail, Aljouf, Tabouk, & Arar)	3 (19%)	10 (63%)	3 (19%)	3.18 ± 0.75		
	Southern region (Assir, Jazan, Najran, Baha)	7 (29%)	6 (25%)	11 (46%)	3.3 ± 1.13		
	Western region (Makkah, Jeddah, Taif, & Madinah)	8 (28%)	13 (45%)	8 (28%)	3 ± 1.03		
Area of practice	Artificial kidney unit	4 (13%)	14 (45%)	13 (42%)	3.51 ± 0.91	$F = 0.073$	0.929
	Emergency department	13 (17%)	37 (48%)	27 (35%)	3.33 ± 0.95		
	Medical department	8 (18%)	25 (56%)	12 (27%)	3.08 ± 0.8		
	ICUs	7 (9%)	45 (58%)	26 (33%)	3.38 ± 0.78		
	Nursing administration	8 (16%)	19 (39%)	22 (45%)	3.38 ± 0.95		
	Operating room	3 (13%)	9 (38%)	12 (50%)	3.36 ± 0.93		
	Outpatient department	9 (21%)	20 (48%)	13 (31%)	3.15 ± 1		
	Pediatric department	3 (5%)	32 (56%)	22 (39%)	3.44 ± 0.79		
	Surgical department	4 (16%)	16 (64%)	5 (20%)	3.16 ± 1.02		
	Obstetric department	12 (15%)	35 (44%)	32 (41%)	3.31 ± 0.9		

(Continued)

10.3389/fpubh.2022.992466

TABLE 5 (Continued)

Demographic characteristics		Warwick Edinburgh mental wellbeing scale				Statistical test	*P*-Value
		Low level	Moderate level	High level	Mean ± SD		
Risk assessment scale							
Did you provide direct care to a confirmed COVID-19 patient?	No	10 (12%)	37 (44%)	38 (45%)	3.28 ± 0.89	$t = 1.139$	0.255
	Yes	61 (14%)	215 (51%)	146 (35%)	3.3 ± 0.89		
Did you have face to face contact within 1 m with a confirmed COVID-19 patient in a health care facility	No	13 (3%)	38 (9%)	43 (46%)	3.47 ± 0.94	$t = 1.866$	0.063
	Yes	58 (14%)	214 (51%)	141 (34%)	3.28 ± 0.88		
Were you present when any aerosol-generating procedures were performed on the patient?	No	16 (4%)	65 (15%)	60 (43%)	3.43 ± 0.9	$t = 1.73$	0.084
	Yes	55 (13%)	187 (44%)	124 (34%)	3.28 ± 0.89		
Did you have direct contact with the environment where the confirmed COVID-19 patient was cared for? E.g., bed, linen, medical equipment, bathroom etc	No	21 (5%)	45 (11%)	45 (41%)	3.36 ± 1.01	$t = 0.518$	0.605
	Yes	50 (12%)	207 (49%)	139 (35%)	3.31 ± 0.86		
During a health care interaction with the COVID-19 patient, did you remove and replace your PPE according to protocol (e.g., when medical mask became wet, disposed the wet PPE in the waste bin, performed hand hygiene, etc)	Most of the time (50% or more but not 100%)	14 (3%)	40 (9%)	16 (23%)	3.08 ± 0.89	$t = 2.369$	0.017*
	Always, as recommended	57 (14%)	212 (50%)	168 (38%)	3.36 ± 0.89		
During a health care interaction with the COVID-19 patient, did you perform hand hygiene before and after touching the COVID-19 patient (whether or not you were wearing gloves)?	Never	2 (0%)	0 (0%)	0 (0%)	1.5 ± 0.71	$F = 2.764$	0.064
	Sometimes	1 (0%)	3 (1%)	1 (20%)	2.83 ± 1.27		
	Most of the time	7 (2%)	30 (7%)	16 (30%)	3.24 ± 0.82		
	Always	61 (14%)	219 (52%)	167 (37%)	3.34 ± 0.89		
During a health care interaction with the COVID-19 patient, did you perform hand hygiene before and after any clean or aseptic procedure was performed (e.g., while inserting a peripheral vascular catheter, urinary catheter, intubation, etc)?	Never	4 (1%)	1 (0%)	0 (0%)	2.07 ± 0.93	$F = 4.209$	0.015*
	Rarely	0 (0%)	1 (0%)	1 (50%)	3.25 ± 1.06		
	Sometimes	1 (0%)	4 (1%)	2 (29%)	3.29 ± 1.01		
	Most of the time	5 (1%)	23 (5%)	12 (30%)	3.26 ± 0.79		
	Always	61 (14%)	223 (53%)	169 (37%)	3.34 ± 0.89		

(Continued)

10.3389/fpubh.2022.992466

TABLE 5 (Continued)

Demographic characteristics		Warwick Edinburgh mental wellbeing scale				Statistical test	*P*-Value
		Low level	Moderate level	High level	Mean ± SD		
During a health care interaction with the COVID-19 patient, did you perform hand hygiene after exposure to body fluid?	Never	4 (1%)	0 (0%)	1 (20%)	2.24 ± 1.09	$F = 2.174$	0.115
	Rarely	1 (0%)	0 (0%)	1 (50%)	3.32 ± 2.37		
	Sometimes	1 (0%)	7 (2%)	1 (11%)	3.1 ± 0.62		
	Most of the time	7 (2%)	34 (8%)	21 (34%)	3.27 ± 0.77		
	Always	58 (14%)	211 (50%)	160 (37%)	3.34 ± 0.9		
During a health care interaction with the COVID-19 patient, did you perform hand hygiene after exposure to body fluid?	Never	4 (1%)	0 (0%)	1 (20%)	2.24 ± 1.09	$F = 4.297$	0.014*
	Rarely	1 (0%)	0 (0%)	1 (50%)	3.32 ± 2.37		
	Sometimes	1 (0%)	7 (2%)	1 (11%)	3.1 ± 0.62		
	Most of the time	7 (2%)	34 (8%)	21 (34%)	3.27 ± 0.77		
	Always	58 (14%)	211 (50%)	160 (37%)	3.34 ± 0.9		
During a health care interaction with the COVID-19 patient, were high touch surfaces decontaminated frequently (at least three times daily)?	Never	5 (1%)	1 (0%)	2 (25%)	2.48 ± 1.15	$F = 2.106$	0.123
	Rarely	4 (1%)	3 (1%)	3 (30%)	2.94 ± 1.12		
	Sometimes	2 (0%)	19 (5%)	11 (34%)	3.3 ± 0.77		
	Most of the time	12 (3%)	73 (17%)	42 (33%)	3.32 ± 0.73		
	Always	48 (11%)	156 (37%)	126 (38%)	3.35 ± 0.94		
Are you vaccinated?	No	5 (1%)	2 (0%)	1 (13%)	2.32 ± 0.93	$t = 3.22$	0.001*
	Yes	66 (16%)	250 (59%)	183 (37%)	3.34 ± 0.88		
Have you been confirmed to have a positive (PCR) test of (COVID-19)?	No	22 (5%)	144 (34%)	106 (39%)	3.44 ± 0.82	$t = 3.181$	0.002*
	Yes	49 (12%)	108 (26%)	78 (33%)	3.18 ± 0.95		
Were you afraid of being infected with (COVID-19) while working with a positive patient?	No	21 (5%)	92 (22%)	74 (40%)	3.38 ± 0.89	$t = 1.161$	0.244
	Yes	50 (12%)	160 (38%)	110 (34%)	3.28 ± 0.89		

*Significant at 0.05 level.

the virus. This could be why the respondents still feared being infected even after vaccination. Although this might be the case for the nurses, additional protection against COVID-19, such as getting vaccinated and adhering to protective behavior, is much better than working with no protection against the virus. Thus, it is essential to address the vaccine hesitancy of HCPs and the general population for an additional layer of protection.

Other findings of the study reported that nurses have moderate positive mental wellbeing, indicating good mental health during the pandemic. The result is congruent with the study by Abo-Ali et al. (54), in which the majority of the HCPs in Saudi Arabia had positive mental wellbeing scores during the COVID-19 pandemic. One of the probable reasons nurses felt positive mental wellbeing despite the COVID-19 pandemic is that the situation as of 2022, when this study was conducted, is under control. As of June 2022, over 71.5% of people in Saudi Arabia are vaccinated, and the newly reported cases of COVID-19 in the last seven days were only 3,830, which is lower than at the onset of the pandemic (55). This indicates that COVID-19 cases relatively decreased, which made the nurses' work more relaxed. Furthermore, nurses might have already been used to the protocol and the procedures that are necessary to perform for COVID patients, which allowed them to work more smoothly. Therefore, regular drills and training for disaster management are suggested to help HCWs adjust and use the routine.

The current study found that nurses reported a low fear of COVID-19 scores. This level of fear is lower compared to the study of Mohsin et al. (56), which revealed that Saudi nurses have an overall low or moderate level of fear of COVID-19. The low fear of nurses toward COVID-19 may be attributed to the policies that were clearly established to mitigate the negative situation brought on by the pandemic. For instance, aside from the vaccine rollouts in Saudi Arabia, the Ministry of Health developed COVID-19 guidelines based on recent COVID-19 research to help HCPs deal with COVID-19

10.3389/fpubh.2022.992466

TABLE 6 Association between fear of COVID-19 to their mental wellbeing scores.

Fear of COVID-19		Warwick Edinburgh mental wellbeing scale				Statistical test	*P*-Value
		Low level	Moderate level	High level	Mean ± SD		
I am most afraid of Corona	Strongly disagree	17 (20%)	40 (48%)	27 (32%)	3.16 ± 1.08	$F = 1.109$	0.331
	Disagree	14 (16%)	42 (48%)	32 (36%)	3.27 ± 0.89		
	Neutral	17 (10%)	86 (52%)	61 (37%)	3.33 ± 0.78		
	Agree	16 (14%)	51 (46%)	45 (40%)	3.43 ± 0.89		
	Strongly agree	7 (12%)	33 (56%)	19 (32%)	3.38 ± 0.9		
It makes me uncomfortable to think about Corona	Strongly disagree	16 (23%)	33 (46%)	22 (31%)	3.13 ± 1.14	$F = 0.776$	0.461
	Disagree	14 (11%)	58 (46%)	55 (43%)	3.4 ± 0.81		
	Neutral	18 (13%)	78 (55%)	45 (32%)	3.27 ± 0.85		
	Agree	20 (16%)	65 (50%)	44 (34%)	3.33 ± 0.82		
	Strongly agree	3 (8%)	18 (46%)	18 (46%)	3.53 ± 0.97		
My hands become clammy when I think about Corona	Strongly disagree	24 (18%)	65 (47%)	48 (35%)	3.27 ± 1.03	$F = 0.565$	0.568
	Disagree	17 (10%)	76 (46%)	73 (44%)	3.45 ± 0.8		
	Neutral	15 (12%)	75 (59%)	38 (30%)	3.22 ± 0.79		
	Agree	12 (22%)	25 (45%)	18 (33%)	3.26 ± 0.92		
	Strongly agree	3 (14%)	11 (52%)	7 (33%)	3.35 ± 1.1		
I am afraid of losing my life because of Corona	Strongly disagree	18 (18%)	44 (44%)	38 (38%)	3.32 ± 1.07	$F = 1.096$	0.335
	Disagree	18 (15%)	60 (50%)	41 (34%)	3.25 ± 0.84		
	Neutral	15 (12%)	72 (56%)	42 (33%)	3.27 ± 0.79		
	Agree	15 (15%)	46 (46%)	39 (39%)	3.35 ± 0.87		
	Strongly agree	5 (8%)	30 (51%)	24 (41%)	3.53 ± 0.9		
When I watch news and stories about Corona on social media. I become nervous or anxious	Strongly disagree	16 (18%)	34 (39%)	38 (43%)	3.37 ± 1.12	$F = 1.604$	0.202
	Disagree	15 (12%)	65 (50%)	49 (38%)	3.32 ± 0.85		
	Neutral	19 (13%)	78 (53%)	49 (34%)	3.3 ± 0.81		
	Agree	15 (14%)	55 (52%)	36 (34%)	3.32 ± 0.82		
	Strongly agree	6 (16%)	20 (53%)	12 (32%)	3.27 ± 1.01		
I cannot sleep because I'm worrying about getting Corona	Strongly disagree	21 (13%)	79 (48%)	64 (39%)	3.39 ± 0.98	$F = 2.226$	0.109
	Disagree	19 (12%)	67 (44%)	67 (44%)	3.4 ± 0.82		
	Neutral	14 (13%)	65 (62%)	26 (25%)	3.15 ± 0.79		
	Agree	14 (22%)	30 (47%)	20 (31%)	3.21 ± 0.89		
	Strongly agree	3 (14%)	11 (52%)	7 (33%)	3.32 ± 1.1		
My heart races or palpitates when I think about getting Corona	Strongly disagree	20 (12%)	84 (51%)	62 (37%)	3.37 ± 0.97	$F = 0.929$	0.396
	Disagree	20 (14%)	63 (43%)	63 (43%)	3.38 ± 0.81		
	Neutral	15 (13%)	69 (61%)	30 (26%)	3.17 ± 0.81		
	Agree	13 (22%)	27 (47%)	18 (31%)	3.23 ± 0.89		
	Strongly agree	3 (13%)	9 (39%)	11 (48%)	3.55 ± 1.11		

patients. The MOH protocol for patients who tested or were thought to be positive for COVID-19, airway management, and mechanical ventilation protocols was detailed in instruction manuals (57). Nurses, as human beings, fear the unknown. However, due to the continuous publication of guidelines and materials to guide the HCPs, the facts and other important information became known, which might be why they are no longer afraid of dealing with it. Considering this, healthcare institutions may review their COVID-19 policies and protocols to clarify implementation.

There is a significant association between some demographic profile variables and perceived risk assessment of nurses' mental wellbeing scores. Specifically, nurses' age is significantly associated with mental wellbeing. It implies that the older the nurses are, the better their mental wellbeing. This result agrees with the results in a study by Cheung and Yip (58), which revealed that age and years of experience negatively correlate with poor mental health. Specifically, younger nurses with less experience had lower mental health. This is worth noting since older nurses might have acquired more extensive

experience in nursing practice, which allowed them to adjust well to the situation and become well-versed with the routine and procedures. Although some studies identified specific age brackets of nurses with better mental wellbeing, there is no consensus among the researchers regarding the specific age of nurses with better mental wellbeing. The only common denominator in their findings was that they all agreed on the result that older nurses have better mental wellbeing. Healthcare institutions may help younger nurses to achieve stable and better mental wellbeing by providing opportunities for them to acquire more experience through various training programs and life coaching to support their journey and help them to manage their time while balancing their career and family life.

The nationality of nurses is associated with mental wellbeing scores. Specifically, non-Saudi nurses have higher perceived mental-wellbeing scores than Saudi nurses. This finding is backed by recent research (7), which revealed that nationality was a significant predictor of nurses' psychological burden. In their study, Filipino and Indian nurses achieved lower mean scores for depression, anxiety, and stress than Saudi nurses. This may be attributed to the support system that non-Saudi nurses received from their families and friends. As expatriate nurses in Saudi Arabia, Filipino nurses were known to have close familial ties (59). Consistent and close communication with families might be one of the reasons why non-Saudi nurses are provided with adequate social support. Having social support from friends had an indirect effect on the resilience of the nurses (59). This might be the reason why better mental wellbeing is observed among expatriates. With this in mind, it is recommended that healthcare institutions provide a good support system for all the HCPs to rely on amidst the pandemic.

Next, the region where nurses currently work has been significantly associated with mental wellbeing. This is worth noting since different regions might have different hospital policies, human resource management policies, providing care policies, administrative policies, and a diversity of healthcare professionals' compliance with several policies and procedures of each organization. Considering the complex nature of the healthcare industry's structure, this may affect their mental wellbeing. According to WHO (1), workplace environments also have different health and safety issues, communication, management practices, employee support, and organizational tasks and objectives, all affecting their mental health. Although the current study included the area of practice, findings have shown that it has no significant association with the perceived risk in relation to their mental wellbeing. Nonetheless, it negates the study by Cruz et al. (17), in which they discussed that emergency nurses have a higher infection risk, higher workload, fatigue, and helplessness, which could be associated with a high depression level in ED nurses. A recent study in China conducted by Chen et al. (60) revealed that ICU nurses and those assigned to COVID-19-designated hospitals and departments have a higher developing symptoms risk, the same with posttraumatic stress disorder (PSTD). This could indicate that the workplace where nurses are assigned might have brought risks that could affect their mental wellbeing. However, the method did not include risk factors for mental health that may be present in the working environment. Thus, further research determining risk factors for mental health and relationships between work environments is warranted.

Finally, nurses' risk assessment is associated with mental wellbeing scores. This result agrees with the results of the previous studies that the risks encountered by the nurses as frontline workers during the COVID-19 pandemic increase their mental health issues (13, 14). This is worth noting since nurses, as health care professionals, render direct care to patients with COVID-19, which indicates that they are more exposed to the risks affecting their mental wellbeing. A study showed that HCPs working in direct contact with patients who tested positive for COVID-19 experienced two times the risk of depression and anxiety compared to HCWs with less exposure to COVID-19 (61). Since the newly reported cases are constantly decreasing, the possibility of the risks that nurses might experience decreases as well, thereby maintaining their mental health. Continuous support on vaccine rollouts, adherence to wearing protective gear, and hand hygiene behaviors among frontline workers may enable them to fully control adverse events that currently occur during the pandemic.

Conclusion

The findings indicate that the risks posed by the COVID-19 pandemic affect nurses' mental wellbeing. Due to their frequent and close interaction with patients with COVID-19, nurses are at an increased risk for mental health issues. The results revealed that most nurses provide direct patient care to patients with COVID-19, state the importance of wearing PPE, and perform hand hygiene before and after any clean or aseptic procedure. Meanwhile, although almost all nurses are vaccinated, they are still afraid of being infected with COVID-19 while working with a patient tested positive for COVID-19 and reported low fear of COVID-19 scores. Additionally, the results reported that the older the nurses, the better their mental wellbeing scores; non-Saudi nurses have higher perceived mental wellbeing scores than Saudi nurses, and different working environments correspond to different mental wellbeing scores. Finally, nurses' risk assessment is associated with mental wellbeing scores. Therefore, the study's findings proved that despite getting vaccinated and the nurses' adherence to hand hygiene behaviors, they are still susceptible to fear of COVID-19, which will impact their mental wellbeing.

Limitations of the study

Some limitations should be considered in the findings. This study used a cross-sectional design with online survey questionnaires. Hence, causality cannot be conclusively inferred. Also, convenient sampling was used, which led to an inability to generalize the findings. The study was conducted after the COVID-19 vaccine was introduced and after 2 years of pandemic experience. Further interventional studies' management assessment of nurses' mental wellbeing and various coping mechanisms for nurses' mental health during and after the pandemic are warranted.

Implications

These findings may help us understand the implications of healthcare institutions' policies, which are relevant to improving healthcare workers' mental health during the COVID-19 pandemic. The result of the study could provide information as a benchmark for promoting positive mental health while reducing the risk and fear perception of COVID-19. The results improved our understanding of the links between the described variables and nurses' mental wellbeing, contributing to effective prevention programs and therapeutic intervention development methods. At a nursing practice level, the results may be useful for nursing management in identifying and supporting nurses' COVID-19 anxiety levels and risk perception to mitigate risks. Interventions focused on improving mental wellbeing coping strategies might increase nurses' confidence and resilience in the face of unpredictable adverse events on psychological wellbeing that seek to reduce the anxiety and fear induced by the pandemic to promote both the implementation of preventive behaviors against COVID-19 and wellbeing in the evaluated Latin American and Caribbean countries. The authorities in the healthcare sector must first recognize that nurses are most susceptible to poor mental health during the COVID-19 pandemic. Creating an awareness program and life coaching may help nursing professionals to be mindful of their mental health during the pandemic. A comprehensive review of the local COVID-19 policies and protocol may be essential to ensure it is implemented. Enabling support systems for nursing professionals is also important to address adequate support for the protective measures against COVID-19. They must be physically and mentally supported to maintain healthy mental wellbeing during the COVID-19 pandemic.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Institutional Review Board—Hafr Albatin committee (KACST No. H-05-FT-083). The patients/participants provided their written informed consent to participate in this study.

Author contributions

RA-D, SA, MB, MA, HA, KA, MSA, BA, RF, NA, KA, JA, and JUA contributed from the data collection, data analysis and interpretation, drafting of the article, and critical revision of the article. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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EDITED BY
Oriol Yuguero,
Lleida Institute for Biomedical Research (IRBLleida), Spain

REVIEWED BY
Vera Martins,
University of Porto, Portugal
Irem Akova,
Cumhuriyet University, Turkey
Rikinkumar S. Patel,
Duke University Medical Center, United States

*CORRESPONDENCE
Gene Chibuchim Otuonye
Gene.otuonye@bcm.edu

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"I have nothing more to give": Disparities in burnout and the protective role of immigrant status during the COVID-19 pandemic

Gene Chibuchim Otuonye[1]*, Nancy Shenoi[2], Tianshi David Wu[1], Kalpalatha Guntupalli[1] and Nidal Moukaddam[2]

[1]Department of Critical Care, Baylor College of Medicine, Houston, TX, United States, [2]Department of Psychiatry, Baylor College of Medicine, Houston, TX, United States

Burnout is an epidemic, with deleterious effects on individuals, patient care, and healthcare systems. The Coronavirus Disease 2019 (COVID-19) pandemic may be exacerbating this problem. We aimed to explore socio-cultural and gender norms that modulate burnout development in physicians during the pandemic and analyze any disparities associated with gender, marital and immigration status and work-life balance. We conducted an online cross-sectional survey of physicians (August–November, 2021): The Maslach Burnout Inventory-Human Services Survey (MBI-HSS) was used to measure burnout, combined with a validated survey assessing work-life balance. Demographic data was obtained for each participant. MBI-HSS subscales were measured, along with work and home related changes due to COVID-19. The association between life changes due to COVID-19 and odds of burnout was estimated by logistic regression. Complementary analysis was performed to determine factors most associated with burnout. 352 respondents were analyzed. There was a high prevalence of burnout. Over half of individuals reported a high degree of emotional exhaustion (EE) (56%). 83% of individuals reported at least one life factor changed due to COVID-19. Home-related life changes due to COVID-19 were associated with 143% higher odds of emotional burnout [adjusted odds ratio (aOR) 2.43; 95% confidence interval (CI) 1.49, 3.98] after covariate adjusted analysis. High EE was most evident when there were three or more life changes, suggesting a cumulative effect. First-generation immigrants, older physicians, and trainees were identified as protective factors. Although female gender was identified as a factor related to EE through forward selection, this was not statistically significant (aOR 1.34; 95% CI 0.80, 2.24). Burnout remains pervasive among physicians. We highlight new risk factors for EE (home-life changes due to COVID-19), and protective factors (first-generation immigrants) not previously explored. Understanding burnout and its disparities allows for improved mitigation strategies, decreasing its deleterious effects.

KEYWORDS

burnout, COVID-19, immigrants, gender, women

Introduction and background

Burnout among health care workers (HCW) is a public health crisis that has reached epidemic proportions (1). Originally described by Freudenberger in 1974 as emotional exhaustion associated with psychological and psychosomatic symptoms, the 11th Revision of the International Classification of Diseases (ICD-11) has since defined it *as an occupational phenomenon resulting from chronic stress in the workplace* that has not been successfully managed (2). It encompasses emotional exhaustion and energy depletion, depersonalization, and reduced professional efficacy (2–4).

Burnout not only has a negative impact on one's self but pervades many aspects of patient care. It has been associated with higher rates of patient morbidity and mortality, hospital length of stay, medical errors, employee attrition, and up to $6.3 billion dollars yearly in US healthcare costs (5, 6). Although efforts to evaluate and mitigate burnout are ongoing (7), HCW burnout rates at best appear to be stagnant (8) and at worst are increasing (4).

The current pandemic has only served to exacerbate the problem globally. A recent publication by The Washington Post/Kaiser Family Foundation Survey Project reported HCW burnout rates as high as 55% in the USA (9). Maunder et al. reported burnout in up to 62% in Canadian HCW (10), and Denning et al. reported burnout symptoms in 67% of HCW in the UK, Poland and Singapore (11). This is likely multifactorial. Increased work hours, fear of personal infection and transmission to family, high patient mortality, unpredictable infection surges, emergence of more virulent and transmissible viral strains, vaccine hesitancy and medical misinformation may be pushing the emotional and psychological wellbeing of HCW to a breaking point.

The pandemic has also brought to the forefront challenges specific to women in medicine. Although women in healthcare have consistently reported higher rates of burnout compared to men over the last few decades, a 2022 national report showed a greater disparity compared to normal: 56% of women reported burnout compared to 41% of men (8). Pre-existing gender-bias and pay inequality in the workplace likely continue to play a role, but factors specific to the pandemic such as increased household responsibilities and coordinating care for "at home children" may exacerbate work-life conflict. In fact, burnout may disproportionately affect HCW not only based on their gender, but also marital and immigration status and family dynamics (4, 8, 12). We hypothesized that immigration status and female gender are protective factors for burnout and sought to identify and analyze these and other possible disparities.

Methods

After obtaining IRB approval, an anonymous online cross-sectional survey consisting of two main components: the MBI-HSS and a gender-focused questionnaire developed and validated by Raffi et al. (13, 14) was administered through the Qualtrics survey platform to HCW who had worked during the COVID-19 pandemic, including but not limited to those who had direct contact with patients diagnosed with COVID-19.

The MBI-HSS is a psychological assessment tool consisting of 22 items and is the most commonly used method to assess burnout in HCW. Its psychometric properties have been examined and well validated among numerous populations and professions (15, 16). It assesses the 3 main components of burnout scored on a seven-point scale, ranging from 0 (never) to 6 (every day). EE is evaluated over nine questions with a score range of 0–54 (>26 reflected high burnout, 17–26 reflected moderate burnout, and <17 reflected low burnout). Depersonalization is assessed over five questions with a score range of 0–30 points (>12 indicated high burnout, 7–12 reflected moderate burnout, and <7 reflected low burnout). Personal accomplishment is evaluated with eight items with a score range of 0–48 points (<32 reflected high burnout, 32–38 indicated moderate burnout and >38 reflected low burnout).

An established questionnaire by Rafii et al. was also used to characterize aspects of home and work life which have been previously associated with burnout. Evaluated attributes included clinical responsibilities such as time spent seeing patients, household responsibilities such as childcare, and sleep habits, as well as finances, substance/alcohol use and overall sense of wellbeing (14). For each individual attribute, participants reported if there was any change due to COVID-19.

Based on these answers, we determined if a participant had any life attribute, any home life attribute, and any work life attribute changed due to COVID-19. The total number of attributes changed due to COVID-19 was also calculated. The questionnaire also included other variables of interest including: age, female gender, trainee status, immigrant status (first- or second-generation immigrants) and specialty.

Various social media platforms restricted to HCW were used for global recruitment and questionnaire dissemination including: Worldwide Facebook groups: (Physicians Moms Group, Physicians for Patient Protection, The Physician Collective PMG COVID 19 subgroup, COVID-19 Texas Health care Professionals, Novel Coronavirus and COVID-19; Houston Women Physicians, Physician Women in Leadership) and WhatsApp (Pulmonary and Critical Care Fellows and Intensivists at Baylor College of Medicine, Houston, TX, Internal Medicine Residents in various programs in New Jersey,

TABLE 1 Demographics and MBI-HSS scales ($n = 352$).

Factor	
Age, mean (standard deviation)	40.6 (10.2)
Female gender	234 (66.5%)
Trainee	92 (26.1%)
Immigrant status	
Not immigrant	178 (50.6%)
First generation	110 (31.3%)
Second generation	64 (18.2%)
Specialty	
Primary care	96 (27.3%)
Critical care	61 (17.3%)
Medical subspecialty	56 (15.9%)
Psychiatry/psychiatry sub	97 (27.6%)
Surgical	42 (11.9%)
Number children, median (interquartile range)	1 (0, 2)
Household responsibility	
0–25%	51 (14.5%)
25–50%	106 (30.1%)
50–75%	96 (27.3%)
75–100%	99 (28.1%)
Hours spent seeing patients	
<8	16 (4.5%)
9–16	22 (6.3%)
17–24	36 (10.2%)
25–32	48 (13.6%)
33–40	76 (21.6%)
>40	154 (43.8%)
MBI-HSS emotional exhaustion	
Low	67 (19.0%)
Moderate	88 (25.0%)
High	197 (56.0%)
MBI-HSS depersonalization	
Low	129 (36.6%)
Moderate	105 (29.8%)
High	118 (33.5%)
MBI-HSS professional accomplishment	
Low	107 (30.4%)
Moderate	162 (46.0%)
High	83 (23.6%)

MBI-HSS, Maslach Burnout Inventory-Human Services Survey.

New York, Texas, Jamaica, India). The questionnaire was also sent *via* email (Baylor College of Medicine Alumni group, American University of Beirut and Andhra Medical College, Andhra Pradesh Medical graduates association, American association of Physicians of Indian Origin, Dow Medical school in Pakistan). The survey was only available in English and hence only sent to HCW with English proficiency. There was no randomization, group assignments or follow-up.

TABLE 2 Work and home life changes due to COVID-19.

Factor	Value*
Hours spent seeing patients*	154 (43.8%)
Obtaining subspecialty education*	126 (35.8%)
Obtaining CME*	141 (40.1%)
Caregiver for children	56 (15.9%)
Pick up children from school	31 (8.8%)
Care for children if sick	34 (9.7%)
Feeding family	66 (18.8%)
Obtaining groceries	95 (27.0%)
Household responsibility	41 (11.6%)
Employing household help	42 (11.9%)
Use of errand simplifiers	25 (7.1%)
Sleep time	81 (23.0%)
Personal downtime	138 (39.2%)
Any change	291 (82.7%)
Any change at work	243 (69%)
Any change at home	226 (64.2%)
Total changes, median (interquartile range)	2 (1, 4.5)

*Classified as a work change; CME, continuing medical education.
*Value, Respondents who responded in the affirmative.

Statistical analysis

The analytic population were all physician respondents who provided complete data, including responses necessary to calculate scores on the MBI-HSS. Life changes due to COVID-19 which were not answered or not applicable for all respondents (such as who cared for children at home) were singly imputed as "no" and were categorized into work-related or home-related changes. Summary statistics were generated.

The association between life changes due to COVID-19 and odds of burnout in each MBI-HSS subscale was estimated by logistic regression. Unadjusted and adjusted estimates were performed. We conducted four separate analyses, parameterizing life changes due to COVID-19 as any life change, any work-related life change, any home-related life change, and a count variable of the total number of life changes. We adjusted *a priori* for age, gender, training status, and medical specialization, presuming these to be important covariates which may confound the relationship between life changes due to COVID-19 and burnout. A two-sided $p < 0.05$ was taken to infer statistical significance.

We next performed a complementary analysis to determine which factors most explained burnout, without forcing life changes due to COVID-19 into the model. Because of the exploratory objectives of the study, we relied on data agnostic techniques to identify these factors and no pre-specified power analysis was conducted. We did backward and forward stepwise techniques with the threshold p-value for variable removal or

TABLE 3 Adjusted odds ratios (aOR) of burnout associated with life changes due to COVID-19*.

MBI scale	Type of life change		
	Any life change, aOR (95% CI)	Any work-related life change, aOR (95% CI)	Any home-related life change, aOR (95% CI)
High emotional exhaustion	1.57 (0.87, 2.84)	1.24 (0.76, 2.02)	2.43 (1.49, 3.98)
High depersonalization	1.46 (0.77, 2.78)	1.28 (0.76, 2.14)	1.43 (0.85, 2.42)
Low professional achievement	1.09 (0.54, 2.18)	1.34 (0.74, 2.41)	0.83 (0.48, 1.44)

*Adjusted for age, gender, trainee status, and specialty.

insertion, respectively, of $p < 0.1$, and best subset selection based on the model which produced the lowest Akiake Information Criterion (32148735).

All analyses were performed in Stata 15 (StataCorp; College Station, TX).

Results

A total of 352 respondents were included in the analysis (Table 1). Mean age was 41 years, and approximately two-thirds were of female gender. Ninety-two (26%) of respondents self-identified as trainees. There was a high prevalence of burnout, with over half of individuals reporting a high degree of EE.

Table 2 summarizes the distribution of life changes that occurred due to COVID-19. Overall, most individuals (83%) reported at least one life factor changed due to COVID-19, with approximately equal proportions of these changes being in factors related to home or work.

Table 3 reports the adjusted relationship between any life change, any work-related life change, and any home-related life change due to COVID-19 with odds of burnout in each of the three MBI-HSS subscales. Unadjusted analysis is available in Table 4. In adjusted analysis, we did not find a statistically significant relationship between any life change due to COVID-19 with burnout in all scales. However, when examining home vs. work-related changes, we found that any home-related life change due to COVID-19 was associated with 143% higher odds of emotional burnout [adjusted odds ratio (aOR) 2.43; 95% confidence interval (CI) 1.49, 3.98]. There were no relationships between work-related life change due to COVID-19 and burnout. When the total number of COVID-19-related life changes were separated into equal sextiles, we found that high EE was most evident when there were three or more life changes, suggesting that the effect is cumulative (Figure 1).

Because we found that life changes due to COVID-19 most impacted the EE dimension of the MBI-HSS, we next investigated if such life changes remained predictive of EE when taken together with all other factors assessed by the survey. All three variable selection methods found that home-related life changes due to COVID-19 retained a substantial relationship with high emotional burnout but work-related life changes did not.

In addition, high emotional burnout was also more likely with a greater number of hours spent seeing patients and greater household responsibility. Conversely, being a first-generation immigrant, being older, and being a trainee were identified as protective factors (Table 5). Both backward selection and best subset selection identified the same factors. Forward selection identified that female gender was related to emotional burnout, but this comparison was not statistically significant (aOR 1.34; 95% CI 0.80, 2.24).

Discussion

Burnout as an entity remains pervasive among HCW. 81% of respondents in this present study self-reported at minimum moderate EE among respondents, with 56% reporting high EE. This correlates with previously published reports examining burnout (1, 9). While burnout is still a subjectively defined phenomenon, the effects of developing burnout can manifest as interpersonal difficulties, increased medical errors, patient morbidity and mortality and ultimately job burnout and attrition (5, 6). Burnout effects are cumulative. Repeated and prolonged EE may precipitate the movement of HCW to different institutions, or to leave medicine altogether. Indeed, The Washington Post/Kaiser Family Foundation Survey Project reports that 29% of HCW have considered leaving the medical field, in part due to burnout (9). Moreover, a recent AAMC report projects a shortfall of up to 124,000 physicians by 2034, with burnout contributing to accelerated rather than delayed retirement (17). There is scant research exploring the socio-cultural and gender norms that may modulate burnout development. In this study we sought to understand the effects, if any, gender and immigrant status had on self-reported burnout in our selected sample, as well the effects of the COVID-19 pandemic on work-life balance and its association with burnout.

In this study, 66.5% of our respondents identified as female. Women have historically reported and continue to report higher

TABLE 4 Unadjusted odds ratios (OR) of burnout associated with life changes due to COVID-19.

MBI-HSS scale	Type of life change		
	Any life change, OR (95% CI)	Any work-related life change, OR (95% CI)	Any home-related life change, OR (95% CI)
High emotional exhaustion	1.77 (1.01, 3.09)	1.31 (0.83, 2.06)	2.55 (1.63, 3.98)
High depersonalization	1.25 (0.69, 2.28)	1.10 (0.68, 1.78)	1.27 (0.80, 2.03)
Low professional achievement	1.04 (0.54, 2.01)	1.33 (0.77, 2.30)	0.75 (0.45, 1.24)

rates of burnout than men, and the reasons are not fully understood. A recent 2022 survey of over 13,000 physicians reported burnout rates of 56% in women vs. 41% in men (8). Although not statistically significant, forward selection in this present study also identifies a trend toward increased emotional burnout in women (aOR 1.34; 95% CI 0.80, 2.24). Although women may be more likely to report burnout than men, traditionally gender specific roles of childrearing and household responsibilities may be a contributing factor in working women who had increased home responsibilities due to COVID-19, or who had arranged for help and support prior to the pandemic, but lost it with virus-related restrictions. In fact, in both genders, life changes due to COVID-19 most impacted self-reported EE. Specifically, home changes were associated with 143% higher odds of emotional burnout, with apparent cumulative effects, with increasing likelihood of burnout per additional reported home change. This is particularly significant as the prevailing culture of medicine stigmatizes and discourages help-seeking. Many physicians do not seek care when depressed or anxious and are often expected to function impeccably at work despite personal life changes. The COVID-19 pandemic continues to highlight needed systemic changes in supporting faculty and trainees through personal difficulties as a way to counter the development/worsening of burnout.

To our knowledge, this is the first study of its kind to examine the effect of first and second-generation immigrant status on trainee and non-trainee physician burnout. Immigrant status appears to be protective from EE in our survey. Compared to non-immigrants, first generation immigrants were 49% less likely to report burnout symptoms, and there was a non-statistically significant trend toward less exhaustion among second generation immigrants. The reasons for this are unknown. Although there is a paucity of data regarding burnout among immigrant physicians, West et al. attempted to explore differences in burnout between U.S. and international medical graduates (IMGs) in Internal Medicine residency. They hypothesized that IMGs trainees in US residency programs may be less prone to burnout due to their successful navigation through the complex and highly competitive residency selection process (18). Onge et al. suggested that differences in medical school curricula and emphasis on USMLE scores may play a role

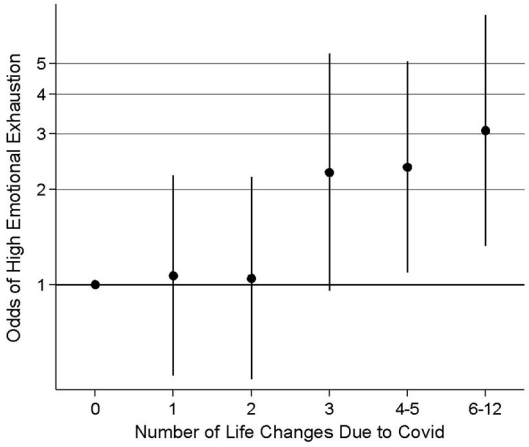

FIGURE 1
Odds ratios and 95% confidence intervals for emotional burnout associated with number of life changes due to COVID.

(19). We further theorize this may be due to cultural differences as it relates to moral value systems and increased emphasis on labor in many developing countries and under resourced settings. Nevertheless, this finding is in line with the perspective that burnout development is a fairly personal experience with intricate socio-cultural effects that need further investigation. Burnout in immigrant physicians, who constitute 28% of the United States physician workforce, and who train and work in the U.S., appears to be poorly understood, and further study is needed in this population.

Of the three subdivisions of burnout, 81% of respondents reported moderate to high EE compared to 63.3% reporting depersonalization and 30.4% reporting low personal achievement. EE is likely the first manifestation of burnout. We hypothesize that repeated and prolonged EE has a direct temporal relationship to eventual depersonalization and low professional achievement. Future study is needed on this.

We do recognize limitations in this study. Recruitment strategies involved use of various social media platforms for questionnaire dissemination and may have targeted particular groups including but not limited to physicians in Lebanon,

TABLE 5 Factors most associated with emotional burnout*.

Factor	Burnout, aOR (95% CI)
Age (per 1-year increase)	0.96 (0.93, 0.99)
Trainee status	0.33 (0.17, 0.64)
Immigrant status	
Not immigrant	Referent
First generation	0.51 (0.30, 0.87)
Second generation	0.91 (0.49, 1.69)
Hours spent seeing patients (per 1-category increase)[a]	1.26 (1.06, 1.49)
Percentage of household responsibility (per 25% increase)	1.31 (1.04, 1.64)
Any home change due to COVID-19	2.61 (1.61, 4.23)

*Identified based on best subset and backward selection methods.
[a]Categories of hours per week were <8, 9–16, 17–24, 25–32, 33–40, >40.

India, and Pakistan, acknowledging that various cultures may have alternate views on the responsibilities of men and women at home and at work. Survey completion was also limited to English-speaking participants meaning the sample was not globally representative. Moreover, there was no randomization within the study of participants which potentially affects the generalizability of results.

The survey design also inquired less about work-related changes than home-related changes, taking into account only hours spent working and time spent obtaining CME and subspecialty education. Future assessments of burnout may need to assess other work-related aspects of work-life balance in order to have a more comprehensive understanding of physician burnout. Most studies about physician burnout identify key workplace factors such as dealing with patient death and illness, a loss of autonomy at work, decreased sense of control over work due to administrative requirements, clerical stressors related to utilization of electronic health record usage, and frequent call duties (5). It is possible that such factors may compromise the delivery of health care services and lead to increased rates of medical errors and decreased job satisfaction. The implications of work-related changes could be far-reaching and should be a topic of future study.

Another consideration in this study was that a significant sector of the study population was excluded due to incomplete survey answers, particularly to questions about gender expectation, a core area our group was interested in studying.

Conclusion

Burnout remains a global epidemic affecting the healthcare sector with significant impact on medical workers' individual lives and on patient care. The COVID-19 pandemic, still ongoing after 2 years and with no clear signs of remitting, has had unprecedented implications for HCW work-life balance. This worldwide cross-sectional survey brings to light unique risk factors for emotional exhaustion and burnout during the pandemic as well as unique protective factors. First and second-generation immigrant status, a factor not known to be previously explored in this manner, appears to be protective from EE in our survey. Only by understanding high risk workers who may develop high levels of EE, depersonalization and decreased personal accomplishment, can we enact effective mitigation strategies to prevent end-stage burnout and subsequent exodus from the field of medicine.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the Institutional Review Board for Human Subject Research for Baylor College of Medicine and Affiliated Hospitals (BCM IRB). The patients/participants provided their written informed consent to participate in this study.

Author contributions

GO: literature review, chart review, data and results analysis, and grammatical composition. NS: data review, discussion, and conclusion drafts. TW: statistical analysis. NM and KG: hypothesis and methods outline, questionnaire formulation, IRB applications, overall guidance, and review of project including suggestions for discussion. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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EDITED BY
Oriol Yuguero,
Lleida Institute for Biomedical Research (IRBLleida), Spain

REVIEWED BY
Jan Christopher Cwik,
University of Cologne, Germany
Tobias Weigl,
Hochschule Fresenius - University of Applied Sciences, Germany
Dolors Liria,
University of Barcelona, Spain

*CORRESPONDENCE
Katharina Gossmann
katharina.gossmann@ku.de

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How does burnout relate to daily work-related rumination and well-being of psychotherapists? A daily diary study among psychotherapeutic practitioners

Katharina Gossmann [1]*, Regina Franziska Schmid [1], Carina Loos[1], Alessandra Barbara Anneliese Orthmann[1], Rita Rosner [1] and Antonia Barke [2]

[1]Department of Psychology, Catholic University of Eichstätt-Ingolstadt, Eichstätt, Germany, [2]Division of Clinical Psychology and Psychological Intervention, Institute for Psychology, University of Duisburg-Essen, Essen, Germany

Objective: This is the first study to use a daily diary design to investigate the relationship between daily work-related rumination (WRR), daily well-being, and burnout symptoms among psychotherapeutic practitioners.

Method: In total, *N* = 58 psychotherapeutic practitioners participated in the study. For 4 weeks, the participants received a daily evening prompt on weekdays asking about their WRR and well-being. The burnout level of the psychotherapists was assessed using Maslach Burnout Inventory (MBI) prior to the daily diary period and afterward. The MBI measures the level of work-related distress on three subscales: emotional exhaustion (EE), depersonalization (DP), and personal achievement (PA). Two main analyses were performed: Based on the hierarchical structure of the data we performed random intercept and slopes models. These models examined the association between daily WRR and daily well-being, and the relationship between pre-burnout and daily WRR and daily mood. Secondly, linear regressions with the post-MBI subscales as criterion and the daily diary variables as predictors were calculated to assess their contribution to post-burnout.

Results: The compliance rate in our study was 76.8%. Daily WRR and pre-assessment EE were associated with all aspects of reduced daily well-being: bad mood, increased nervousness, and tiredness after work. Daily tiredness and nervousness played a differential role in predicting post-burnout.

Conclusion: Our results indicated that daily rumination and pre-EE were associated with reduced daily well-being. As we are the first to present a daily diary study among psychotherapists, we examined the feasibility of the

daily diary design in particular and ecological momentary assessment (EMA) in general in this population. Compliance rates compared well with other EMA studies, indicating that EMAs were a feasible assessment option for psychotherapeutic practitioners.

KEYWORDS

work-related rumination, ecological momentary assessment, psychotherapists, mental health, psychological well-being, burnout, daily diary

Introduction

Psychotherapists are at an elevated risk of burnout due to the specific emotional demands resulting from their work with patients with mental disorders (1–3). Burnout is defined by the three dimensions of emotional exhaustion (EE), depersonalization (DP), and personal achievement (PA) (4). EE—the most frequently reported symptom of burnout—describes the stress resulting from a lack of emotional and cognitive distance from work. DP constitutes an attempt to establish distance from patients by developing an indifferent and cynical attitude toward their uniqueness. PA stands for effectiveness and a low level of PA is indicative of burnout. PA can be impaired by EE, DP, and a lack of resources. Taken together, the dimensions describe a reaction to interpersonal or chronic emotional stressors like work overload or social conflicts. The burnout level is high when EE and DP are high and PA low (4).

Systematic reviews show prevalence rates of up to 55% for moderate to high burnout symptoms among psychotherapists and mental health professionals. According to the systematic review of Simionato and Simpson (1) 18.3–39.9% of psychotherapists and clinical psychologists reported high levels of EE and 11–26.3% low or moderate levels of DP. Psychotherapists also reported moderately to strongly reduced experience of PA with 15–29.6% being in the low range (1). When comparing the burnout level between psychotherapists and other professions, general practitioners described similar levels of EE (34.1%) and DP (29.0%), and low PA (21.5%) (5). Among general health care workers during the COVID-19 pandemic, EE was high in 37% and moderate in 45% of participants, DP was high in 18% and moderate among 49%, and PA moderate among 38% and high among 51% (6).

Burnout among psychotherapists is associated with poorer mental and physical health conditions such as increased depression, anxiety, sleep issues, alcohol consumption, and physical pain as well as reduced effectiveness in their therapeutic work (7, 8). Young age, limited work experience, being in training, high workload, little support, difficulties in one's own work-life-balance, limited role clarity, lack of regular clinical supervision, and a reduced perception of self-efficacy have all been identified as risk factors for burnout (1, 9–11). In a meta-analysis the number of working hours and interaction with patients showing aggressive or threatening behavior during therapy emerged as the main factors associated with more EE and DP and reduced performance (12). So far, it is unclear how burnout relates to daily well-being and mood. Well-being can be understood in different facets like in the Multidimensional Mood Questionnaire as bad vs. good mood, tired vs. awake, or nervous vs. calm (13–15) or like in the Positive and Negative Affectivity Scale as work-related affective well-being with aspects like bored vs. enthusiastic, tiredness vs. vigor, anxiety vs. comfort, depression vs. pleasure, or angry vs. placid [PANAS (16)]. The advantages of the MDMQ in comparision to the PANAS is, e.g., the multidimensional conceptualization covering mood and activity level or the economical shortness of the questionnaire (17). Based on these different conceptualizations, well-being is comparable to moods and affective states which affect our behaving, thinking, and experiencing of everything we do (15). Affective well-being as conceived here is a dynamic state, susceptible to short-term changes of its facets; burnout as assessed with the MBI describes a state, that endures in a medium timeframe.

Another factor influencing burnout among psychotherapeutic practitioners is affective work-related rumination (WRR) (18, 19). WRR is characterized by repetitive and non-constructive, negative thinking patterns regarding work-related topics out of working time (18). Mohr et al. (20) describe cognitive irritation which is related to rumination as the inability to cognitively "switch off" from a topic. However, some researchers argue that rumination may also include positive problem-solving aspects (21–23). The inability to "switch off" during leisure time and rumination after work seem to be affected by high cognitive and emotional job demands, heavy work load and time pressure, low spatial work-home boundaries, limited support, and a low degree of control at work (24–27). Allwood et al. (18) found gender differences for rumination with women reporting more pondering and affective work-related rumination than men. In the case of a person prone to rumination, WRR is associated with low well-being and vigor, high emotional exhaustion and need for recovery, as well as sleep impairment (25, 28–33). Affective

rumination, except its facet of problem-solving pondering, can further mediate the relationship between burnout and higher psychological morbidity (34), and the relationship between boredom or overload at work, and emotional exhaustion and disengagement 2 weeks later (35). This negative facet of rumination appears related to different emotional problems and may become psychopathologically relevant by increasing symptoms of depression, anxiety, or gambling (22, 36–38). For this reason, rumination is also focused on in the treatment of depression (39). The positive counterpart of negative affective rumination, psychological detachment, is closely linked to a higher degree of life satisfaction, less burnout, and greater personal flourishing and functionality (23). Since our study focusses on stress and well-being in psychotherapists, we investigate the negative aspects of rumination that are related to burnout and depression. Thus, we define rumination in the sense of negative, repetitive thinking comparable to worries which also describe repetitive, negative thoughts without a current solution (40, 41). Previous studies used trait-based measures of rumination tendency, which focus on the person's self-appraisal of their general cognitive style. However, this may miss periods of increased rumination due to high job demand in persons would not normally describe their cognitive style as ruminative. We investigated the state distress caused by WRR on a within-person level.

Cognitive styles such as rumination about work-related topics seem to be associated with burnout. However, since most studies were based on correlative retrospective assessments of rumination and burnout, they were unable to establish whether persons with a high level of burnout overestimated their WRR retrospectively. Additionally, these studies focused on a between-person level using trait measures of rumination. Therefore, a longitudinal approach with a day-to-day perspective was needed that also took off-work recovery into account (42). A methodological approach that is particularly suited for such research is ecological momentary assessment (EMA) including also daily diary designs. In EMAs, participants report symptoms *in situ*. This immediate assessment resolves the biases of retrospective study designs such as memory effects or duration neglect. Additionally, EMAs often use repeated measurement which helps to cater for intrapersonal processes, to show symptom dynamics, and to allow context sensibility (43–45).

Considering these advantages of EMA, several studies with EMA designs already examined WRR and its potential correlates (46). However, there are no studies that examine WRR itself or the effect of WRR and burnout on daily psychological well-being among the population of psychotherapists. Psychotherapists work in a close interpersonal context with patients and might ruminate not about their work in general but about patients and the therapy sessions in specific. EMA studies in other health-related professions showed that chronic stress assessed in a baseline questionnaire went hand in hand with a daily assessed negative after-shift-mood among nurses (47). An EMA study using heart rate and skin conductance among forensic nurses demonstrated that the daily reported burnout symptoms after work were associated with daily assessed job stress and aggressive behavior of patients (48). Furthermore, another EMA study with 43 university students showed that daily assessed mind wandering was prospectively related to daily mood. Accordingly, daily mood was affected as negative emotions decreased and positive emotions increased when the reported mind wandering was experienced as mainly pleasant. The results also suggested that a dispositional trait for ruminative negative pondering exacerbates bad mood in daily life (49). Ruminative patterns assessed *via* daily EMA seem to indicate persisting symptoms of depression (50) and are related to negative affect (51). Additionally, increased negative and decreased positive affect seems to predict rumination at a later measurement point (52). Daily assessed work-related rumination was related to sleep impairment as it mediated the relationship between work-related tasks that remained unfinished before the beginning of a weekend and sleeping impairment (31). Additionally, the positive facet of rumination—problem-solving pondering—revealed to be associated with less sleeping impairment. Another EMA study on ruminative self-focus (two-item-scale), potential mindfulness interventions, and burnout among young adults demonstrated that although mindfulness instruction interventions were not related to changes in mood, they fostered calmness. Additionally, this study revealed that burnout was positively associated with ruminative self-focus among the sample (53). Furthermore, EMA studies using a cross-lagged design demonstrated that work stress increases ruminative thinking in the evening as well as sleep impairment. However, work stress was not associated with rumination at the weekends (32).

Thus, rumination has already been examined in several EMA studies with a within-person focus showing that a daily assessment is feasible (31, 54), able to distinguish between worrying and ruminating (55), and reliable regarding its relationship with biochemical measurements of cortisol (56, 57). These studies also demonstrate for certain samples (e.g., teachers) that not only actually present stressful events but even the rumination about these events increase physiological arousal (57). However, most studies cited focus on rumination in general and not work-related rumination in particular and above all not to the specific demands of work-related thought in a mental health orientated profession with daily patient interaction.

Despite the particularly high demands placed on psychotherapists and the increased burnout risk for them, little is known about contributing factors. Especially factors that may be targets for intervention, such as rumination about one's therapies and patients, and the relationship of such rumination with daily well-being and burnout have never been examined in psychotherapists' daily life, despite their potential of informing

preventive measures. The present study aimed to increase knowledge about rumination, daily well-being, and burnout in a sample of psychotherapeutic practitioners. In order to overcome the well-known biases of retrospective self-reports, we used a daily diary design with daily reports of work-related rumination and psychological well-being. The series of within-person data will be used to elucidate the relationship of psychotherapists' daily rumination and well-being with burnout. Therefore, the overall aim of our study is to demonstrate the dysfunctional circle between burnout, daily WRR and daily well-being among mental health professionals. Thus, we consider within-person effects for daily WRR and well-being as well as the effects of the pre-assessed burnout level on daily measures and the effects of the daily measures on post-burnout. We aim to reveal dysfunctional circles maintaining and fostering burnout and point out implications which may help to interrupt such cycles. Since this is the first daily diary study among psychotherapists, we also focused on the feasibility of the use of daily diaries among this population by examining the compliance rates for the daily prompts.

Materials and methods

The study was conducted according to the Declaration of Helsinki (58) and approved by the University's Internal Review Board in January 2021 (ethics approval number: 039-2020). All participants received information about the aims, procedure, and the General Data Protection Regulation before they gave their informed consent to participate.

Procedure

We conducted this study as an ecological momentary assessment over the course of 4 weeks with pre- and post-assessments framing the daily diary period. The pre- and post-assessment was presented *via* the Qualtrics software (59). The daily diary schedule involved time-based monitoring with fixed-time sampling using the Android application movisensXS, version 1.4.8 (movisens GmbH, Karlsruhe, Germany, 2022). The data assessment was carried out from January to April 2021. We followed the reporting guidelines for EMA studies outlined by Trull and Ebner-Priemer when drafting this manuscript (44, 45).

Data were collected using pseudonyms. All participants generated an individual ID in the pre-assessment, which they entered at the beginning of the daily diary part and at the post-assessment. The daily assessment was conducted as a fixed-time sampling and took place on weekdays (Monday to Friday) at 8 p.m. over the course of 4 weeks. The daily diary period ended with the post-assessment. At the end of the post-assessment, the participants could request individualized feedback on their personal results regarding the different constructs such as burnout, daily mood, and rumination. Prior to receiving this individualized feedback, the participants were given additional information on data protection and privacy, and had to give their informed consent. All study parts were presented in German.

Recruitment and participant flow

The participants were recruited through a nationwide online survey that took place in 2020 (60). At the end of this anonymous survey, participants were presented with an advertisement for the daily diary study and were linked to an independent survey and invited to provide contact information if they were interested in participating in the future diary study. In response to this advertisement, $n = 40$ psychotherapeutic practitioners indicated their interest in the daily diary study. Additionally, we contacted national and regional associations for psychotherapists in training (PiTs) and licensed psychotherapists (LPTs) in Germany who sent out our study information in their newsletters or by mail.

These recruitment strategies resulted in a list of $n = 265$ PiTs and LPTs interested in the study. All potential participants were sent detailed study information and the pre-assessment questionnaire by email. The inclusion criteria were working as a psychotherapist and performing psychotherapy on at least 4 days/week.

A total of $n = 178$ therapists completed the pre-assessment. Of these, $n = 58$ did not provide contact information or a pseudonymous participant code and thus did not receive an access code the second part of the study—the ambulatory daily assessment. From the $n = 120$ therapists who were invited to the daily diary assessment, $n = 66$ participated in the daily diary study part. Of these, $n = 42$ participated using their own mobile device and $n = 24$ participated using programmed devices from the university because their own devices were incompatible with the assessment app. After 4 weeks of daily assessments, all participants received the post-assessment which was completed by $n = 45$ participants. After excluding participants with incomplete datasets or less than two daily assessments, the final sample consisted of $N = 58$ participants for the analyses involving the pre-burnout and the daily measures and $N = 44$ participants who additionally participated in the post-assessment and thus, reported a post-burnout level. Almost all participants of the post-assessment for burnout ($n = 43$) requested individualized feedback.

To investigate whether therapists who—after the initial questionnaire—agreed to participate in the daily diary part and those did not, we compared the groups with independent t-tests. The groups did not differ with regard to the MBI (4, 61) facets of EE [$t(178) = -0.74$, $p = 0.46$], DP [$t(176) = -0.67$, $p = 0.51$], or PA [$t(178) = -0.90$, $p = 0.37$]. The level of burnout did not seem

to play a systematic role in the therapists' decision to participate in the daily diary or not.

Measures

Pre- and post-assessment questionnaires

In the pre-assessment, participants reported demographical data like gender (female vs. male vs. diverse), age, training level (Psychotherapists in Training [PiTs] vs. Licensed Psychotherapists [LPTs]), time since start of licensed practice (LPTs)/beginning of training (PiTs), type of licensure (children and adolescents vs. adults), type of training institute (university vs. private), and the number of therapy sessions per week.

The burnout level of the participants was examined in the pre- and post-assessment using Maslach Burnout Inventory (4, 61). The MBI consists of three different scales: emotional exhaustion (EE—9 items), depersonalization (DP—5 items), and personal achievement (PA—8 items). In detail, the MBI scale for EE describes the exhaustion and frustration caused by a person's own job requirements with items such as "I feel emotionally exhausted because of my work." DP stands for the tendency to treat one's patients like objects and to become emotionally numb (e.g., "I get the feeling that I treat some patients impersonally, as if they were objects."). If a therapist feels successful and empathic while performing therapy, the level of PA is high (e.g., "I find it easy to build a relaxed atmosphere with my patients."). Higher ratings for EE and DP in combination with lower ratings for PA indicated a higher degree of burnout (62). Participants rated their agreement with all items on a 7-point Likert scale ranging from "never" to "daily." The levels of EE, DP, and PA can be classified to estimate the level of burnout: EE (scale range 0–54) with the level < 17 regarded as low, 18–29 as medium, and >30 as high; DP (scale range 0–30) with <5 regarded as low, 6–11 as medium, and >12 as high, and PA (scale range 0–48) with level < 33 regarded as low, 34–39 as medium, and >40 as high. In our assessment, item 24 of the DP subscale reduced the internal consistency of the subscale and thus was excluded from further analyses. The internal consistency (Cronbach's Alpha and McDonald's Omega) of the MBI scales in our sample was $\alpha = 0.92$ ($\omega = 0.93$) for EE, $\alpha = 0.70$ ($\omega = 0.79$) for DP, and $\alpha = 0.78$ ($\omega = 0.78$) for PA.

Daily diary

The daily diary part of the study consisted of items that assessed multiple aspects of daily perceptions about a person's own therapeutic work, rumination, and well-being. Although, there are trait and state scales for rumination (21, 23, 31), these do not account for the specific work-related rumination related to ruminative thinking about one's patients. Therefore, we established a one-item-EMA-scale assessing the distress caused be ruminative thoughts about one's patients ("At this moment these thoughts about my patients and therapies are distressing for me"). The item was rated on visual analogue scales from 0 (not at all) to 10 (very much).

For daily well-being, we used a modified version of the Multidimensional Mood Questionnaire [MDMQ (13, 14)]—the standard measurement instrument in EMA studies with a good validity, sensitivity to change, and reliability (15). This questionnaire contained six adjective pairs (two on each of three scales: bad mood vs. good mood, tired vs. awake, nervous vs. calm). Each adjective pair is introduced with the statement "At this moment I feel..." and assessed using bipolar visual analogue scales (coded from 0 to 10): tired-awake, content-discontent, agitated-calm, full of energy-without energy, unwell-well, and relaxed-tense. For the analysis, all scales are coded in such a way that higher scores indicate the positive end of the scale (i.e., good mood, wakefulness, and calmness). Between-person and within-person reliabilities of the three MDMQ scales in our study were analyzed by applying generalizability theory (63). They were very high with $R_{KF} = 0.99$ (between) and $R_C = 0.86$ (within) for bad mood vs. good mood, $R_{KF} = 0.98$ (between) and $R_C = 0.84$ (within) for tired vs. awake, and $R_{KF} = 1.00$ (between) and $R_C = 0.99$ (within) for nervous vs. calm.

Statistical analyses

Data were analyzed using SPSS statistics, version 28. First, the daily diary along with the demographical and pre- and post-assessment data were descriptively analyzed. In the next step, all person-related predictors (level 2) were grand-mean centered, and all daily diary predictors (level 1) were person-mean centered as recommended by Ohly et al. (64). Based on the hierarchical structure of the data—daily mood and rumination were nested in-person—we performed random intercept and slopes models. These models examined the association between daily rumination and daily mood (level 1), as well as the relationship between burnout (level 2) and daily rumination and daily mood. In addition, they looked at the interactions between burnout and rumination for daily mood. The three scales for daily mood (bad mood vs. good mood, tired vs. awake, nervous vs. calm), and burnout (EE, DP, PA) were analyzed separately. To examine potential interactions exploratively, we also included cross-level interactions between WRR and the MBI scales as predictors. All predictors and potential interactions were included simultaneously. These analyses were conducted using the burnout level in our pre-assessment.

Based on null models, we calculated the intraclass correlations (ICC) for all daily variables to estimate the variance between the intra-person (level 1) and inter-person (level 2) levels. To examine the model fit, we used chi-square tests to compare the differences in the log likelihood ratios and degrees of freedom between our null models and the final models.

TABLE 1 Demographic information of participants.

Variable	N = 58					
	n	*M*	*SD*	*Mdn*	*Min*	*Max*
Age (years)	58	40.6	11.6	40	26	68
Time since licensure (years)—only LPTs	34	10.2	6.6	10	1	23
Time since beginning of training (years)—only PiTs	23	3.5	3.9	3	1	20
Therapy sessions per week	58	17.7	7.8	17.5	5	36

LPT, licensed psychotherapist; PiT, psychotherapist in training.

TABLE 2 Demographic information about the participants.

Variable	N = 58		Variable	N = 58	
	n	%		*n*	%
Level of training			PiTs—Type of training institute (*n* = 23)		
LPT	34	58.6	Private	19	82.6
PiT (+ *n* = 1 psychologist not yet in training)	24	41.4	University	4	17.4
LPTs and PiTs—Type of license			Gender		
Psychological psychotherapist (in training) for adults	45	77.6	Female	50	86.2
Psychotherapist (in training) for children and adolescents	10	17.2	Male	8	13.8
No specification	3	5.2			

LPT, licensed psychotherapist; PiT, psychotherapist in training.

To further investigate the potential influence of daily WRR and well-being on post-burnout, we performed additional multiple regression analyses with the three burnout facets (EE, DP, PA) as dependent variables with a subsample and the mean daily WRR and well-being as predictors.

Results

Descriptive statistics

Demographical sample characteristics

The final sample (N = 58) consisted of n = 34 LPTs (58.6%) and n = 24 PiTs (41.4%; including one psychologist working in psychotherapy not yet in training). Most participants were female (n = 50; 86.2%). In terms of type of licensure or training, the majority of the sample worked with adults (n = 45, 77.6%), and performed on average 17.7 therapy sessions per week (SD = 7.8). The mean age of the sample was 40.6 years (SD = 11.6), and the group of LPTs was significantly older than the PiTs [$t(56) = 8.91$, $p < 0.001$]. The LPTs had received their licensure an average 10.2 years previously (SD = 6.6) and the PiTs had been in training for an average of 3.5 years (SD = 3.9). Most of the PiTs were enrolled in private training institutes

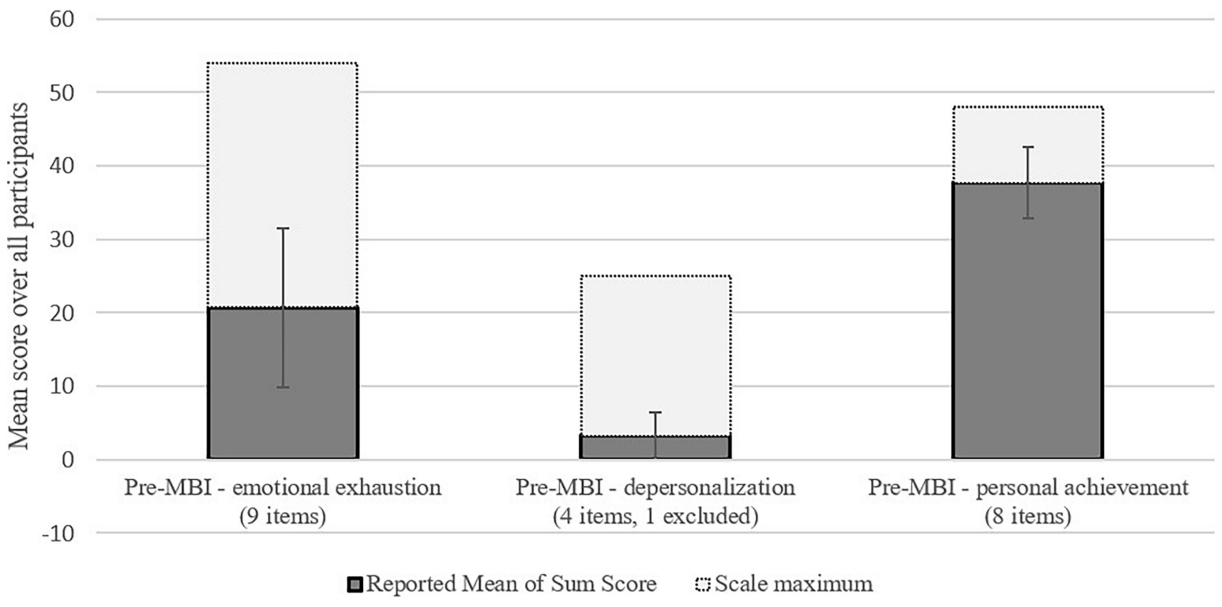

FIGURE 1
Mean scores of the component scales of the MBI. Error bars show standard deviations.

TABLE 3 Descriptive statistics of all (component) scales.

Variable	*N* = 58				
	M	*SD*	*Mdn*	*Min*	*Max*
Level-2—Pre-assessment					
MBI—emotional exhaustion (9 items, range 0–54)	20.7	10.8	17	6	49
MBI—depersonalization (4 items, 1 excluded, range 0–24)	3.2	3.3	3	0	16
MBI—personal achievement (8 items, range 0–48)	37.7	4.8	38	19	48
Level-1—Daily assessment					
MDMQ—bad mood vs. good mood (range 0–10)	7.1	1.9	7.5	1	10
MDMQ—tired vs. awake (range 0–10)	5.1	2.2	5.0	0	10
MDMQ—nervous vs. calm (range 0–10)	6.4	2.0	7.0	1	10
Work-related rumination (range 0–10)	2.2	2.1	2.0	0	10
	N = 44				
Level-2—post-assessment					
MBI—emotional exhaustion (9 items, range 0–54)	20.4	9.8	18	2	44
MBI—depersonalization (4 items, 1 excluded, range 0–24)	2.8	2.8	2	0	10
MBI—personal achievement (8 items, range 0–48)	38.4	5.4	39	19	48

MBI, Maslach burnout inventory; MDMQ, multidimensional mood questionnaire.

(n = 19, 82.6% of all PiTs), and just a small number (n = 4, 17.4% of all PiTs) in university-related training institutes. Tables 1, 2 give detailed information on the sample characteristics.

Descriptive statistics for burnout and daily diary data

The burnout level at the pre-assessment of the sample based on the three MBI scales for EE was on average 20.7 ± 10.8 indicating a medium level, for DP on average 3.2 ± 3.3 indicating a very low level, and for PA on average 37.7 ± 4.8 in the medium range regarding the cut-offs (62). Figure 1 gives detailed information on the MBI subscales in our sample in comparison with the whole range of the scales.

Table 3 gives descriptive information about the daily assessed ratings. Daily well-being was rated in the dimensions bad vs. good mood (7.1 ± 1.9), tired vs. awake (5.1 ± 2.2), and nervous vs. calm (6.4 ± 2.0). For the one-item-scale for rumination after work (WRR), the sample reported a mean of 2.2 (±2.1).

Overall, each participant received 20 daily diary prompts over the course of the 4 weeks, resulting in 1,160 prompts across all included participants for the duration of the study. In the data analysis, we included all the participants who completed the daily questionnaire in response to at least two prompts. However, the lowest number of responded-to prompts was

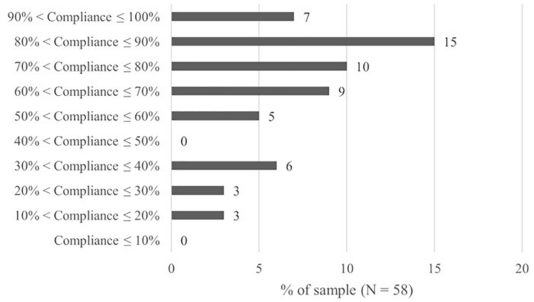

FIGURE 2
Distribution of compliance rates for the daily diary assessment.

four and occurred three times; four participants completed all 20 notification forms (M = 15.8 ± 3.8, range 4–20). In total, the participating therapists responded to 810 prompts. Nine out of the 810 responses to prompts were incomplete. The response rate of the participants resulted in an overall compliance of 76.8% and ranged from 20% up to 100% with a high number of frequent responders (Figure 2). Individual compliance rates were significantly (but with a very small effect size) associated with the pre-assessed MBI scale for emotional exhaustion (r = −0.09, p = 0.007) indicating that participants who reported a higher level of EE responded to marginally fewer prompts. The individual response rate was not associated with demographic characteristics such as age, time since licensure or beginning of training, number of therapy sessions per week, gender, or level of training.

Relationship between burnout, daily work-related rumination, and daily psychological well-being

The *ICCs* for all daily variables indicated that a considerable proportion of variance could be traced back to the within-person level: ρ = 0.44 for bad mood vs. good mood; ρ = 0.44 for tired vs. awake; ρ = 0.44 for nervous vs. calm; and ρ = 0.45 for rumination after work (WRR).

Our results indicated that there was a significant link between daily WRR and the psychological well-being of the therapists on the MDMQ-scales for *bad mood* vs. *good mood* [γ = −0.29, $t(33)$ = −5.89, p < 0.001], *nervous vs. calm* [γ = −0.30, $t(27)$ = −7.15, p < 0.001], and *tired* vs. *awake* [γ = −0.23, $t(27)$ = −3.99, p < 0.001]. This indicated that a higher level of work-related rumination at the assessment time in the evening went hand in hand with lower mood, more nervousness and tiredness (Table 4).

In terms of the burnout symptoms assessed prior to the daily diary, the MBI scale for EE was related to the daily psychological well-being on all three MDMQ component scales. Accordingly, higher scores for EE were associated with daily bad mood

TABLE 4 Multilevel models predicting daily level-1 variables for work-related rumination and the MDMQ scales.

	Bad mood vs. good mood		Tired vs. awake		Nervous vs. calm		Work-related rumination	
Fixed effects	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*
Intercept	7.00 (0.15)	<0.001***	5.00 (0.18)	<0.001***	6.34 (0.15)	<0.001***	2.08 (0.19)	<0.001***
Pre-MBI—emotional exhaustion (EE)	−0.05 (0.02)	0.006**	−0.05 (0.02)	0.041*	−0.06 (0.02)	<0.001***	0.03 (0.02)	0.225
Pre-MBI—depersonalization (DP)	−0.02 (0.06)	0.717	0.02 (0.07)	0.735	−0.00 (0.06)	0.959	0.00 (0.03)	0.897
Pre-MBI—personal achievement (PA)	0.02 (0.03)	0.564	−0.01 (0.04)	0.797	0.00 (0.03)	0.905	0.05 (0.08)	0.543
Work-related rumination (WRR)	−0.29 (0.05)	<0.001***	−0.23 (0.06)	<0.001***	−0.30 (0.04)	<0.001***	–	–
Pre-MBI-EE × WRR	−0.01 (0.01)	0.344	−0.00 (0.01)	0.564	−0.00 (0.01)	0.557	–	–
Pre-MBI-DP × WRR	0.01 (0.02)	0.816	0.01 (0.03)	0.816	0.03 (0.02)	0.157	–	–
Pre-MBI-PA × WRR	0.01 (0.01)	0.377	0.01 (0.01)	0.307	0.01 (0.01)	0.524	–	–
Random effect variances	Estimate (*SE*)		Estimate (*SE*)		Estimate (*SE*)		Estimate (*SE*)	
Intercept	1.00 (0.24)***		1.45 (0.34)***		1.12 (0.26)***		1.31 (0.36)***	
Work-related rumination (WRR)	0.04 (0.02)		0.04 (0.03)		0.02 (0.02)		–	
Model comparison	Null model	Main effects and interaction model	Null model	Main effects and interaction model	Null model	Main effects and interaction model	Null model	Main effects and interaction model
−2* Log likelihood	3110.19	2434.13	3398.94	2698.31	3117.25	2403.60	2608.70	2132.96
χ^2		676.06***		700.63***		713.65***		471.74***
df		8		8		8		3

N_1 (persons) = 58, N_2 (assessments) = 810.
***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.
MBI, Maslach burnout inventory; MBI-EE, MBI-scale for emotional exhaustion; MBI-DP, MBI-scale for depersonalization; MBI-PA, MBI-scale personal achievement; WRR, work-related rumination after work (level 1); MDMQ, multidimensional mood questionnaire (level 1).

[$\gamma = -0.05$, $t(58) = -2.83$, $p = 0.006$], more tiredness [$\gamma = -0.05$, $t(60) = -2.09$, $p = 0.041$], and more nervousness [$\gamma = -0.06$, $t(57) = -3.35$, $p < 0.001$] in the therapists' daily life. However, none of the pre-MBI scales was associated with daily WRR. We did not observe any interaction effects in our explorative interaction analyses.

To account not only for the influence of pre-assessed burnout on WRR and daily well-being but also for the influence of rumination and daily well-being on the burnout that was measured after the daily diary period, we conducted multiple regression analyses for all burnout scales in the post-assessment. For EE, the overall model [$F_{(4,704)} = 67.27$, $p < 0.001$] explained 27% of variance ($R^2_{Adjusted} = 0.27$) and showed a high effect size of Cohen's $f^2 = 0.38$. The detailed analysis revealed two significant predictors: daily tiredness ($\beta = -0.18$, $p < 0.001$) and nervousness ($\beta = -0.41$, $p < 0.001$). For DP, neither total model nor the predictors proved significant [$F_{(4,704)} = 1.40$, $p = 0.252$]. The final regression with the criterion PA also did not yielded a significant model and no predictors proved significant [$F_{(4,704)} = 1.56$, $p = 0.185$] (**Table 5**).

Discussion

We conducted the first daily diary study among psychotherapeutic practitioners and reported results on the relationships between work-related rumination, daily well-being, and burnout. In general, the participating psychotherapists reported a medium level of EE, a low level of DP and high levels of PA, suggesting they were somewhat less burdened than previous research observed (1, 10, 61, 65).

Our study results showed that overall WRR was low in our sample regarding the scale maximum. Still, rumination was related to bad mood, more tiredness, and more nervousness after work. Pre-assessed emotional exhaustion—as an aspect of burnout among psychotherapists—was significantly associated

TABLE 5 Regression models for burnout (emotional exhaustion, depersonalization, personal achievement) based on daily rumination and well-being (good vs. bad mood, tired vs. awake, nervous vs. calm).

	Estimate (*SE*)	Standardized beta	*p*
MBI—Emotional exhaustion (EE)			
Intercept	47.70 (2.88)		<0.001
MDMQ—bad vs. good mood	−0.06 (0.50)	−0.01	0.906
MDMQ—tired vs. awake	−1.37 (0.32)	−0.18	<0.001
MDMQ—nervous vs. calm	−3.04 (0.37)	−0.41	<0.001
Work-related rumination (WRR)	−0.20 (0.31)	−0.03	0.516
MBI—Depersonalization (DP)			
Intercept	7.68 (3.76)		0.048
MDMQ—bad vs. good mood	−0.66 (0.64)	−0.27	0.307
MDMQ—tired vs. awake	−0.22 (0.43)	−0.10	0.613
MDMQ—nervous vs. calm	0.10 (0.50)	0.05	0.846
Work-related rumination (WRR)	0.13 (0.40)	0.06	0.747
MBI—Personal Achievement (PA)			
Intercept	35.14 (1.87)		<0.001
MDMQ—bad vs. good mood	0.20 (0.32)	0.04	0.533
MDMQ—tired vs. awake	0.35 (0.21)	0.08	0.094
MDMQ—nervous vs. calm	−0.05 (0.24)	−0.01	0.840
Work-related rumination (WRR)	0.17 (0.20)	0.04	0.397

Model: *MBI-EE*—$F_{(4,704)} = 67.27$, $p < 0.001$, adjusted $R^2 = 0.27$. *MBI-DP*—$F_{(4,704)} = 1.40$, $p = 0.252$, adjusted $R^2 = 0.03$. *MBI-PA*—$F_{(4,704)} = 1.56$, $p = 0.185$, adjusted $R^2 = 0.00$. MBI, Maslach burnout inventory; MBI-EE, MBI-scale for emotional exhaustion; MBI-DP, MBI-scale for depersonalization; MBI-PA, MBI-scale personal achievement; WRR, daily work-related rumination after work; MDMQ, multidimensional mood questionnaire (assessed daily).

with bad daily mood, tiredness, and nervousness. However, pre-assessed burnout symptoms were not directly associated with daily work-related rumination. To take time effects into account, we also tested whether daily well-being and WRR related to burnout in our post-assessment. The MDMQ-scales for tiredness and nervousness were associated differentially with EE at the post-assessment. The compliance rate (76.8%) among the participating psychotherapists demonstrated that daily diary and EMA research designs were a feasible option for psychotherapeutic practitioners.

Relationship between daily work-related rumination, well-being, and burnout

In cross-sectional studies, psychotherapeutic practitioners showed a high risk of burnout (1–4, 10, 65). Burnout was associated with different risk factors and, among other things, with affective work-related rumination (18, 19, 53). WRR relates to different health outcomes like decreased well-being and high EE (25, 28–31, 33). First EMA studies demonstrated that daily well-being was associated not only with WRR but also with burnout (47–49, 51, 52), and burnout is positively associated with a ruminative self-focus (53).

In our study, daily WRR after work was associated with bad mood, tiredness and nervousness. EE at pre-assessment was related to better daily well-being, such as good mood, feeling more wakeful and calmer. The other burnout scales showed no effects. Based on our results, we concluded that daily rumination after work was linked to the reduced well-being of psychotherapists. Therefore, our study did not only consider within-person differences by analyzing the effects of daily WRR on daily well-being, but also included cross-level analyses by considering the potential effects of burnout and the interaction between burnout and daily WRR on daily well-being.

The main effect of WRR on daily well-being observed in the current daily diary study was in line with previous cross-sectional research indicating that negative rumination patterns after work and difficulty switching-off from work could negatively affect well-being and impair mental health (47–49). Our results for WRR also go along with previous EMA research showing that rumination in general goes along with negative affect (51). We demonstrated that this effect of daily rumination also became clear in the case of psychotherapists in a longitudinal study. Furthermore, we concluded that well-being assessed in a daily setting was associated with burnout and, more particularly, with EE. This expanded our knowledge about these relationships since, in contrast to retrospective cross-sectional designs, we were able to rule out retrospective reporting bias as the reason for the correlation. However, we did not find a direct association between pre-assessed burnout and WRR, indicating that pre-existing EE as well as other MBI facets did not appear to lead to more daily WRR *per se*. Thus, our study does not support previous results regarding the positive relationship between burnout and rumination (53). Although, it needs to be considered that the study of Huffziger et al. (53) did not assess work-related rumination and examined another sample—young university students. In our study daily rumination was associated with daily well-being, and, as the regression with the assessment at the end of the daily diary showed, with future burnout facets (see below for a detailed discussion). Prevention strategies for burnout and daily well-being among psychotherapists may need to focus on daily WRR, too. To decrease daily WRR and potentially increase daily well-being, detachment strategies for psychotherapists could be addressed in prevention programs or during psychotherapist training. Previous studies already demonstrated that mindfulness-based interventions among recurrently depressed patients were able to reduce negative rumination (50) and thus could also be a promising approach for the prevention of rumination

among psychotherapists. Cognitive control plays seem also reduce negative emotion regulation including rumination in the daily life (66). Therefore, decreasing rumination in general, could be one piece in prevention and intervention strategies to prevent or reduce job-related emotional problems among psychotherapists, as a high level of rumination can become problematic and is related to psychopathologically relevant symptoms, such as anxiety and depressive symptoms (36, 37). Additionally, future research should include also daily measures of well-being and WRR at the weekends to enable cross-lagged analyses like in the study of Vahle-Hinz et al. (32). These studies could reveal time effects of rumination and therapeutic experiences on daily well-being.

As we were also interested in how the WRR and well-being during the EMA period was related with the burnout level after the end of the assessment, we conducted additional regression analyses. More daily tiredness and nervousness was associated with more EE at the end of the assessment. These results indicate that daily well-being may contribute to the development of burnout in general and EE in particular.

However, as our sample in the regression analyses consisted of only 44 participants, further research should examine whether these results prove robust and investigate the influence of daily WRR on burnout considering different positive and negative facets of work-related thinking by in further and larger samples.

Feasibility of daily diary designs for studies with psychotherapeutic practitioners

Our study achieved a compliance rate of 76.8% among psychotherapists, and very few participants had to be excluded because they responded to fewer than two prompts. According to the meta-analysis of Wrzus and Neubauer (67), the compliance rate of 76.8% was on a high level comparable to other EMA in a range of research field, that showed an average compliance rate of 79.2%. Daily diary and EMA designs in general seemed to be a feasible option for psychotherapeutic practitioners. However, the daily diary requirements may have deterred a few potential participants from the outset: although 178 therapists participated in the pre-questionnaire, only 66 agreed to participate in the second study part by completing the daily questionnaires. This meant that only around one third of all pre-questionnaire participants were willing to provide daily reports, with a further third of this smaller group dropping out before the post questionnaire. Informal feedback received by mail indicated that this may not be solely attributable to the demands of the daily diary, but rather that many motivated PiTs would not reach the number of 4 days with therapies stipulated as inclusion criterion.

For the interpretation of the current study results, it should be borne in mind that we found no significant difference regarding the burnout level between participants of the daily diary study and those who answered only the pre-assessment. Also, demographical characteristics were not associated with the participation in the daily diary study part or the individual compliance rates during the daily diary assessment. Nevertheless, we found differences regarding the compliance rates in relation to the pre-assessed burnout level. These findings indicate that participants with higher EE answered fewer daily prompts. When interpreting this correlation, it should be taken into account that a correlation coefficient of $r = -0.09$ is very small.

Limitations

The recruitment strategy addressed interested psychotherapeutic practitioners in Germany. As the inclusion criteria required that the participants were in contact with patients at least 4 days per week, it is possible that psychotherapists working part-time or psychotherapists in training with a lower number of working hours were systematically excluded from the study. This again constituted a potential recruiting bias. Another restriction concerning our sample was that the daily diary design included fixed-time sampling. This explains why participants who knew that they were not available at the specific daily assessment time, might have decided against participating. As the inclusion criteria, along with the assessment time and period, were provided in the study information, it is probable that self-selection took place.

Due to the nature of the study, we were not able to include all potentially relevant covariates for burnout, daily well-being, and rumination. Relevant covariates may have been, e.g., the therapeutic orientation—which we asked for, but could not include in the analyses due to the small group sizes of the orientations—, the number or therapy sessions per week, case supervision, personal analyses, or specific populations predominantly treated such as patients with complex needs. These covariates could potentially also influence the daily well-being, and the level of WRR or burnout among psychotherapists. As we were only interested in work-related rumination directly on days when therapy was performed, our daily assessments only took place on weekdays. Consequently, we cannot provide information on general rumination tendencies or rumination on weekends. Thus, we also did not conduct cross-lagged analyses as our study was not designed for time lagged processes. Further studies should therefore include assessment on weekends like Vahle-Hinz et al. (32) to enable analyses over time considering cross-lagged effects also on weekends.

For the assessment of daily well-being, we used a well-established and validated measure (15). To assess WRR

in our daily diary design, we established a new one-item scale for WRR related to one's patients. However, in the meantime Hoebeke et al. (68) developed a five-item general rumination questionnaire with good psychometric properties for EMA studies. This questionnaire could be adapted to work-related rumination, validated among different professions, and adjusted to professions in the health sector with patient interaction. Additionally, further EMA-research on rumination should consider more extensive scales for WRR like Syrek et al. (31) did and adapt these for patient-related professions. These scales also should cover different positive and negative facets of rumination as previous research demonstrated the interdependence of positive, negative, and neutral rumination as well as different correlates with these facets (21, 23, 46).

Further limitations refer to the sample characteristics: Our sample consists of mainly female psychotherapeutic practitioners. Although this distribution of gender reflects the demographical epidemiological distribution of gender among psychotherapists in Germany (69), the generalizability of our results to male psychotherapist in general may be limited.

Conclusion

Daily diary studies and consequently EMA designs are a feasible option for psychotherapists and should be used more frequently to assess the factors that influence work-related rumination on well-being among psychotherapeutic practitioners. This study built on the knowledge regarding the mechanisms that may contribute to diminished well-being and burnout in psychotherapists. Work-related rumination and pre-assessed burnout, especially emotional exhaustion, appeared to be potential risk factors for reduced daily well-being. Additionally, different aspects of daily well-being are related to the burnout level at the post-assessment. These findings have implications for future prevention and intervention efforts, which should focus on the ability of psychotherapists to switch-off from work, and foster strategies to achieve detachment from patient and therapy-related issues during psychotherapists' leisure time.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the Institutional Review Board (IRB) of the Catholic University of Eichstaett-Ingolstadt in January 2021 (ethics approval number: 039-2020). The patients/participants provided their written informed consent to participate in this study.

Author contributions

KG designed the study, recruited the participants, gathered the data, drafted the manuscript, and carried out the statistical analysis. AO and CL were involved in gathering the data. AB and RR supervised the study and revised the manuscript. AB and RS were involved in designing the study, analyzing the data, and in drafting the manuscript. All authors read and approved the manuscript and its final version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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EDITED BY
Wulf Rössler,
Charité – Universitätsmedizin Berlin, Germany

REVIEWED BY
Mahlagha Dehghan,
Kerman University of Medical Sciences, Iran
Ari Saptono,
Jakarta State University, Indonesia
Marcin Wnuk,
Adam Mickiewicz University, Poland

*CORRESPONDENCE
Yan Liu
✉ cwx0609@sina.com

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The mediating role of job satisfaction between psychological capital and work engagement among Chinese nurses during COVID-19 outbreak: A comparative study between nurse specialists and general nurses

Minyi Zhang[1], Hongyu Chen[1], Ning Wang[1], Yao Li[1], Xiaofei Li[2] and Yan Liu[1]*

[1]Department of Neurosurgery, The First Hospital of China Medical University, Shenyang, China, [2]Department of Transplantation/Hepatobiliary Surgery, The First Hospital of China Medical University, Shenyang, China

Background: The outbreak of COVID-19 has become a global public health emergency, causing great psychological distress to nurses. It is unknown whether the pandemic will affect the work engagement of nurses, the relationship between psychological capital, job satisfaction, and work engagement among nurses, and whether there are differences between nurse specialists and general nurses during the pandemic.

Objectives: The purpose of this study was to compare psychological capital, job satisfaction, and work engagement among nurse specialists and general nurses during the pandemic, as well as to test the role of job satisfaction as a mediator in the association between psychological capital and work engagement among nurses, and to examine whether the underlying mechanism of the relationship between psychological capital and job satisfaction differs between nurse specialists and general nurses.

Materials and methods: A convenience sampling was used to assess a sample of 372 nurse specialists and 318 general nurses from nine provincial general hospitals in China to participate in the online survey. Data were collected using self-report questionnaires, including the following tools: self-designed socio-demographic questionnaire, psychological capital scale, job satisfaction scale, and work engagement scale.

Results: Compared with general nurses, the nurse specialists had higher psychological capital, job satisfaction, and work engagement. Job satisfaction partially mediated the positive association between psychological capital and

work engagement and the indirect effect was stronger in nurse specialists in comparison to general nurses during the COVID-19 pandemic.

Conclusion: The findings provide important practical implications for future intervention programs aimed at enhancing nurses' work engagement, which may be realized through strengthening psychological capital and job satisfaction during the pandemic. Moreover, considering the cost-effectiveness of limited health care spending, nursing managers should pay more attention to the continuing professional development of young general nurses.

KEYWORDS

nurses, COVID-19, psychological capital, job satisfaction, work engagement

Introduction

With the rapid development of health care and the aging of the population, the demand for quality care continues to increase, which brings great challenges to nursing work. However, the World Health Organization estimates that a shortfall of 5.7 million nurses has been predicted by 2030 across the world (1). In China, the number of registered nurses per 1,000 people is 2.73, which is significantly lower than in developed countries (2). The acute shortage and high turnover of nurses have become a global problem. COVID-19 has caused over 513 million confirmed cases and 6.24 million deaths worldwide, according to the World Health Organization as of May 7, 2022 (3). COVID-19 could exist for a long time, especially as the virus evolves, posing new challenges for nursing staff and potentially exacerbating the shortage of nurses in hospitals. At the same time, the pandemic had a significant negative impact on nurses' physical and mental health, as well as their quality of life (4). Nurses who are under high pressure for a long time are prone to job burnout, which also affects the health outcomes of patients (5). Previous study showed that higher engagement results in lower intention to leave the organization and profession (6). Work engagement is a positive emotion and cognitive state related to work (7), which has been shown to help professionals cope with work-related psychological distress and contribute to their well-being and health (8), and boost job performance (9). Moreover, Bargagliotti (10) argued that in the twenty-first century, positive nurses' work engagement is essential for nurses' personal initiative, and for health organizations' profitability and efficiency. Given the important role of nurses' work engagement in nursing, investigating the level of nurses' work engagement, which may benefit nursing managers to help nurses be more productive in responding to the ongoing pandemic.

Work engagement is a positive state of mind associated with work that is characterized by vigor, dedication, and absorption (7). Vigor refers to the willingness to invest effort in one's work, dedication is related to participation, and absorption is related to concentration and being absorbed in one's work (11). Work engagement keeps employees energized, passionate about solving customer problems and fully committed to their work (12). According to the Job Demands-Resources (JD-R) model of work engagement (13), work engagement is determined by two factors: job resources and personal resources. Job resources include all physical, social, psychological and organizational characteristics of a job that help people achieve goals, whereas personal resources come from individual psychological states (13). A positive psychological state manifested by an individual in the process of growth and development is known as psychological capital, which contains four dimensions of self-efficacy, optimism, hope and resilience (14). People with high self-efficacy, hope, and resilient believe that they have specific skills and resources to quickly recover from stressful situations (15–17). In addition, optimists can effectively buffer the negative effects of the pandemic (15). A previous study showed that psychological capital can maintain employee work motivation and effectively alleviate psychological stress and negative emotions, as well as job burnout (18). Employees with higher psychological capital will actively connect with other resources, and promote job satisfaction (19), and work engagement (20). However, Martin et al. (21) investigated the intention of nurses to work during the H1N1 pandemic. They found that nurses were less likely to work during pandemics if they were afraid of transmitting the infection to their family members. Therefore, psychological capital may be a useful personal resource for increasing work engagement during the pandemic. Given the positive impact of psychological capital on work, we hypothesized that psychological capital may positively affect work engagement with nurses.

Aside from psychological capital, job satisfaction has become a supportive factor in work engagement (5). Job satisfaction is usually defined as a positive and pleasant emotional reaction generated by an individual's overall assessment (22). Previous studies have shown that job

satisfaction has a positive impact on organizational commitment (23), career identity (24), job performance (19), and negative impact on turnover intention (22). At the same time, job satisfaction was a significant predictor of physical and mental health, as well as subjective well-being (25). However, the COVID-19 pandemic has increased pressure on Chinese health professionals, who have been under pressure in recent years due to the large population and increasing health awareness (26). High levels of stress and burnout are linked to lower satisfaction among nurses (27). Across health care professions and settings, job satisfaction is important because low job satisfaction of nurses has contributed to their high turnover rate and decreased quality and safety of patient care (23). The conservation of resources (COR) theory (28) states that people strive to acquire and protect resources that they find useful. Those who lack resources are not only more vulnerable to resource loss, but the initial loss also leads to future losses. Those with resources, on the other hand, are more capable of gaining, and the initial resource gain leads to additional gains. Previous researches have shown that psychological capital as an internal personal resource that helps employees respond to various work requirements with a positive psychological state, effectively prevents and improves job burnout, and finally improves their job satisfaction (19). In addition, job satisfaction as an individual's subjective emotional state, produces a pleasant emotional response due to the realization of the individual's work value, and the individual may be more actively engaged in work (29). That is, when individuals' psychological and emotional needs are met and they are satisfied with their work, they may devote themselves to that work in a more active and fuller state of mind and are able to realize their work value. However, little is known about the relationship between psychological capital, job satisfaction and work engagement among nurses during the pandemic. Given the above discussion, we hypothesized that job satisfaction has a mediating effect on the relationship between psychological capital and work engagement in nurses.

In light of a potential nursing shortage, the growing burden of diseases in the aging population and scarcity of health resources sharpen the need for a sustainable nursing health human resources strategy to satisfy the rising demand for care and maximize nursing efficiency (30, 31). The development of nurse specialists has been recognized as one of the solutions to these challenges (32). A nurse specialist is described as "a nurse prepared beyond the level of a general nurse and authorized to practice as a specialist with advanced expertise in a branch of the nursing industry" by the International Council of Nurses. Clinical, educational, administration, research, and consultant roles are all part of specialized practice (33), and preventive care, chronic disease management, practice operations, nursing management, and transition care are key areas of general nurses' practice (34). Previous researches have shown that nurse specialists' engagement in patient care shortens hospital stays, readmissions, and emergency visits, as well as medical costs (35–37). However, it has been widely reported that nurses are facing numerous challenges during the COVID-19 pandemic, which includes an increase in workload, physical exhaustion, the need for personal protective equipment, fear of infection and infection of family members, disruption of work-life balance, and ignoring the needs of individuals and families, has put a significant deal of stress on nurses (38). It can be argued that the work engagement of nurses may be affected by occupational stress and changes in the work environment caused by the pandemic. While evaluations of nurse specialist roles have shown multiple positive outcomes in previous studies, little is known about whether nurse specialists also still have a positive impact during a pandemic.

Therefore, it is necessary to focus on the impact of the pandemic on nurses' work engagement. And because specialist nurses and general nurses have different scopes of practice, it is important to explore whether there are differences in psychological capital, job satisfaction and work engagement between them, which may benefit in promoting the continuing professional development of nursing staff. In addition, little is known about the relationship between psychological capital, job satisfaction and work engagement among nurses during the pandemic. As a result, the purpose of our study is to compare psychological capital, job satisfaction, and work engagement among nurse specialists and general nurses during the pandemic, as well as propose the hypotheses that the relationship of psychological capital on work engagement is mediated by job satisfaction, and to test whether the underlying mechanism of the relationship between psychological capital and job satisfaction differs between nurse specialists and general nurses during the COVID-19 pandemic. A moderated mediation model (**Figure 1**) was constructed to address the hypotheses that the effect of psychological capital on work engagement was mediated by job satisfaction and moderated by specialization. Considering the positive assessment of the nurse specialist roles in previous studies (35–37), we hypothesized that the association between psychological capital and job satisfaction would be strengthened for nurse specialists during COVID-19 pandemic. Specifically, the relationship between psychological capital and job satisfaction might be more powerful in nurse specialists than general nurses.

Materials and methods

Design, setting, and participants

A multi-center cross-sectional survey was carried out from May to October of 2021 from 9 provinces in China. The researchers created an electronic questionnaire on the questionnaire star platform and sent it to nursing administrators in nine provincial general hospitals of China through WeChat,

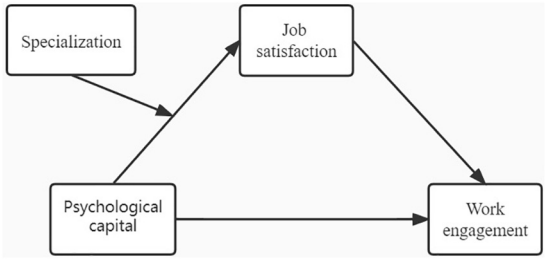

FIGURE 1
Conceptual model.

mainly including Liaoning, Jilin, Heilongjiang, Sichuan, Guangdong, Anhui, Henan, Anhui, Guangxi Province. They were asked to deliver the survey to the nurse through We Chat. Participants could scan the QR to read and submit the informed consent agreement and questionnaires. Each participant was only allowed to submit once in order to avoid double submission.

The following were the eligibility criteria for nurse specialist enrollment: (a) hold a Chinese nursing specialist certificate after completing at least 6 months of training; (b) hold a Chinese registered nurse license; (c) work full-time; (d) have submitted a declaration of consent.

The following eligibility criteria for general nurse were: (a) hold a Chinese registered nurse license; (b) work full-time; (c) have submitted a declaration of consent.

The exclusion criteria for two group nurses were nursing staff who were not directly involved in patient care, such as absent due to sick leave, personal leave, study, or further training.

The sample size calculator G*Power (3.0.10) was used (39). To identify a mean difference (two-tail) with a 50% effect size, 5% estimated error and 95% power (1–β), 210 participants were required. To account for 20% attrition, a total of 252 participants were required (126 in each group). The study recruited 690 nurses from nine provincial general hospitals in China, which included 372 nurse specialists and 318 general nurses.

Variables and measurements

Social-demographic questionnaire

According to the purpose of our study, we designed the general socio-demographic data, which mainly includes gender, age, health status, physical condition, marital status, family status, years of working, education, job title, department position, total night shifts per month and monthly income.

Psychological capital scale

The Chinese version of the Psychological Capital Scale was used to assess the psychological capital of nurses. Luthans et al. (40) developed the scale and the Chinese scholar Luo (41) revised it based on the characteristics of nursing work. It contains 20 items and four dimensions, which include self-efficacy (6 items), hope (6 items), resilience (5 items), and optimism (3 items). The scale used the six-point Likert, with a total score of 20 to 120 points, ranging from "strongly disagree" (1 point) to "strongly agree" (6 points). The greater the psychological capital, the higher the score. The total Cronbach's alpha was 0.92 and each subscale of Cronbach's alpha ranged from 0.88 to 0.95 (41). In our study, the scale's Cronbach's alpha was 0.91, and the Cronbach's alpha of each subscale was 0.89, 0.93, 0.92, and 0.88.

Job satisfaction scale

The job satisfaction scale of medical staff developed by Chinese scholar Wang et al. (42) was used to assess job satisfaction among nurses in our study. It primarily consists of 20 entries and six dimensions: work itself (2 items), work pressure (2 items), interpersonal relationship (4 items), working condition (4 items), work return (4 items), and organizational management (4 items). All items were rated on a five-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). This scale has revealed good reliability and validity. The total score on the scale ranges from 20 to 100, with a higher total score indicating a higher level of job satisfaction. The total Cronbach's alpha was 0.91 and each subscale of Cronbach's alpha ranged from 0.74 to 0.89 (42). In this study, the total Cronbach's alpha was 0.90, and the Cronbach's alpha of each domain was 0.74, 0.80, 0.85, 0.88, 0.89, and 0.83.

Utrecht work engagement scale (UWES-9)

The Chinese version of the Utrecht Work Engagement Scale was used to assess work engagement of nurses. It was developed by Schaufeli et al. (7) with nine items. It consists of three subscales: vigor (3 items), dedication (3 items), and absorption (3 items). Each item is given a seven-point Likert scale from 0 (never) to 6 (always), with a total score of 0 to 54. A higher score indicates a higher level of work engagement. The total Cronbach's alpha was 0.93 and each subscale of Cronbach's alpha ranged from 0.81 to 0.90 (7). The scale has good reliability and validity. In this study, the total Cronbach's alpha was 0.94, and the Cronbach's alpha of each domain was 0.82, 0.93, and 0.83.

Data collection

To ensure accuracy, two researchers who did not know the study design entered the data after all surveys were completed. They received training on how to check, input and code the data into IBM SPSS v23.0 before analyzing the data. Only if they pass the training exam can they participate in data entry.

Data analysis

The IBM SPSS v23.0 software was used to analyze the data. First, continuous data were represented by mean and standard deviation, and categorical data or rank data were represented by frequency or percentage. The Chi-square test was used to compare differences in general demographic characteristics between groups. Confirmatory factor analysis was used to check for common method variance (43). Second, the *t*-test was used to analyze and compare the psychological capital, job satisfaction, and work engagement of the nurse specialist group and the non-nurse specialist group. Third, Pearson's or Spearman's correlation analysis was used to analyze the correlation between social-demographic variables, psychological capital, job satisfaction and work engagement among nurses. To check for collinearity among the independent variables, both bivariate Pearson's correlations and variance inflation factors were performed, with significant correlations less than 0.8 among these variables and variance inflation factors (VIFs) were < 10, indicating that multicollinearity was not a problem. Then, a simple mediation analysis of job satisfaction mediating the relationship between psychological capital and work engagement was tested using Hayes's PROCESS macro for SPSS (Model 4) (44). The indirect effect of mediation was tested using a bootstrapping method with 5,000 samples as recommended, with a significant effect indicated by a 95% confidence interval not including zero. Finally, PROCESS macro (Model 7) (44) was utilized to examine the moderated mediation model, followed by a simple slope test (45).

According to the previous studies (46), age, sex, years of nursing experience, night shift, professional practice environment and professional status were found to predict work engagement of registered nurse. This mediation analysis was controlled for relevant social-demographics of nurses. In the current study, *P*-value was two-tailed and we inferred statistical significance if α was < 0.05.

Results

Common method variance (CMV) test

The data for this study were collected through self-report, which may have been influenced by common method bias, reducing the validity of the results. In this study, we followed strict confidentiality and voluntarism principles and asked participants to be honest in their answers to each question. Data collectors are used to collect and enter data. These methods effectively control the bias of the common method. In addition, following the method suggested by Podsakoff et al. (43), common method variance was tested by controlling for the effects of an unmeasured latent factor. Confirmatory factor analysis was used to test the common method bias of all self-assessment items. The results showed that the model fit was poor, $\chi^2 = 2686.43$, degrees of freedom (df) = 170, $\chi^2/DF = 15.803$, comparative fit index (CFI) = 0.849, goodness of fit (GFI) = 0.676, normed fit index (NFI) = 0.841, root mean square error of approximation (RMSEA) = 0.147, which indicating that there is no significant common method variance problem in this study.

Demographic characteristics of the participants

A total of 700 nurses took part in the study. After excluding 10 invalid questionnaires, a total of 690 valid questionnaires remained for an completion rate of 98.6%, which included 372 nurse specialists and 318 general nurses. Females predominated in both groups. In terms of age, 206 (55.4%) of nurse specialists were over 35 years old, while only 59 (18.56%) of general nurses were, indicating that most numbers of general nurses were younger than nurse specialists. The age difference between the two groups was significant ($p < 0.001$). In nurse specialists, 80.11% had children compared to 49.37% in general nurses, respectively (**Table 1**, $p < 0.001$). 138 (37.1%) of nurse specialists had worked between 11 and 15 years, 104 (27.96%) had worked more than 21 years, and 86.48% of general nurses had worked fewer than 15 years. In terms of working years, there was a considerable difference between the two groups ($p < 0.001$). Among nurse specialists, 2.69% were junior nurses, 26.61% were senior nurses, 52.15% were nurses-in-charge and 18.55% were vice-director nurses and above, however, 18.90% were junior nurses, 51.90% were senior nurses, 23.90% were nurses-in-charge and 5.30% were Vice-director nurse and above in general nurses. There was a significant difference in the job title between the two groups ($p < 0.001$). Among the department position of nurse specialists and general nurses, there were 155 (41.67%) and 246 (77.36%) of general nurses, 55 (14.78%) and 27 (8.49%) of team teachers, 49 (13.17%) and 17 (5.35%) of nursing team leaders, 99 (26.61%) and 25 (7.86%) of head nurses, and 14 (3.76%) and 3 (0.94%) head nurses and above. There was a significant difference in department position, marital status and the number of night shifts per month between the two groups ($p < 0.001$), but no difference in educational level, health status and monthly income ($p = 0.227$).

As shown in **Table 2**, the nurse specialists had a higher psychological capital score (95.52 ± 15.83) than general nurses (92.12 ± 17.70). The nurse specialists scored higher than general nurses on the four dimensions of self-efficacy, hope, resilience and optimism ($p < 0.05$). The nurse specialists' job satisfaction score (76.59 ± 12.20) was significantly higher than general nurses (74.44 ± 12.57). In terms of work itself, interpersonal relationship, and work return, the nurse specialists scored significantly higher than general nurses ($p < 0.05$). However, there was no significant difference in work pressure, working

TABLE 1 Differences in general characteristics between nurse specialists and general nurses.

Demographic characteristics	Nurse specialist (*n* = 372)	General nurses (*n* = 318)	Total (*n* = 690)	χ^2	*P*
Gender				7.432	0.006**
Male	15 (4.03%)	29 (9.12%)	44 (6.38%)		
Female	357 (95.97)	289 (90.88%)	646 (93.62%)		
Age				187.325	<0.001***
≤25	3 (0.80%)	42 (13.20%)	45 (6.52%)		
26~30	32 (8.60%)	134 (42.14%)	166 (24.06%)		
31~35	131 (35.22%)	83 (26.10%)	214 (31.01%)		
36~40	92 (24.73%)	33 (10.38%)	125 (18.12%)		
≥41	114 (30.65%)	26 (8.18%)	140 (20.29%)		
Physical condition				2.354	0.502
Poor	6 (1.60%)	5 (1.57%)	11 (1.59%)		
General	120 (32.30%)	115 (36.16%)	235 (34.06%)		
Better	175 (47.00%)	150 (47.17%)	325 (47.10%)		
Very good	71 (19.10%)	48 (15.09%)	119 (17.25%)		
Marital status				47.735	<0.001***
Single	50 (13.44%)	114 (35.85%)	164 (23.77%)		
Married	310 (83.33%)	198 (62.26%)	508 (73.62%)		
Divorced	12 (3.23%)	6 (1.89%)	18 (2.61%)		
Family status				78.701	<0.001***
Do not have children	74 (19.89%)	161 (50.63%)	235 (34.06%)		
Has children	298 (80.11%)	157 (49.37%)	455 (65.94%)		
Yeas of working				197.035	<0.001***
≤1 year	0 (0%)	16 (5.03%)	16 (2.32%)		
2~5 years	13 (3.49%)	111 (34.91%)	124 (17.97%)		
6~10 years	52 (13.98%)	82 (25.79%)	134 (19.42%)		
11~15 years	138 (37.1%)	66 (20.75%)	204 (29.57%)		
16~20 years	65 (17.47%)	15 (4.72%)	80 (11.59%)		
≥21 years	104 (27.96%)	28 (8.81%)	132 (19.13%)		
Education				6.835	0.077
Below university	6 (1.61%)	3 (0.94%)	9 (1.30%)		
College	28 (7.53%)	41 (12.89%)	69 (10.00%)		
Undergraduate	332 (89.25%)	266 (83.65%)	598 (86.67%)		
Master's degree and above	6 (1.61%)	8 (2.52%)	14 (2.03%)		
Job title				131.808	<0.001***
Junior nurse	10 (2.69%)	60 (18.90%)	70 (10.15%)		
Senior nurse	99 (26.61%)	165 (51.90%)	264 (38.26%)		
Nurse-in-charge	194 (52.15%)	76 (23.90%)	270 (39.13%)		
Vice-director nurse and above	69 (18.55%)	17 (5.30%)	86 (12.46%)		
Department position				93.352	<0.001***
Ordinary nurse	155 (41.67%)	246 (77.36%)	401 (58.12%)		
Team teacher	55 (14.78%)	27 (8.49%)	82 (11.88%)		

(Continued)

TABLE 1 (Continued)

Demographic characteristics	Nurse specialist (*n* = 372)	General nurses (*n* = 318)	Total (*n* = 690)	χ^2	*P*
Team leader	49 (13.17%)	17 (5.35%)	66 (9.57%)		
Head nurse	99 (26.61%)	25 (7.86%)	124 (17.97%)		
Head nurse and above	14 (3.76%)	3 (0.94%)	17 (2.46%)		
Total night shifts per month				69.983	<0.001***
0	166 (44.62%)	76 (23.90%)	242 (35.07%)		
1~2	73 (19.62%)	28 (8.81%)	101 (14.64%)		
3~4	16 (4.30%)	34 (10.69%)	50 (7.25%)		
5~6	50 (13.44%)	70 (22.01%)	120 (17.39%)		
>6	67 (18.01%)	110 (34.59%)	177 (25.65%)		
Monthly income (RMB)				6.220	0.101
<2,000	1 (0.27%)	4 (1.26%)	5 (0.73%)		
2,000~5,000	109 (29.30%)	86 (27.04%)	195 (28.26%)		
5,000~10,000	195 (52.42%)	152 (47.80%)	347 (50.29%)		
>10,000	67 (18.01%)	76 (23.90%)	143 (20.73%)		

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

condition, and organizational management between the two groups ($p > 0.05$). The nurse specialists' work engagement scores (39.22 ± 12.35) and vigor scores (13.20 ± 4.15) were significantly higher than general nurses (37.16 ± 12.65) and (12.21 ± 4.44). However, we found no statistically significant differences in dedication and absorption scores between the two groups ($p > 0.05$).

Table 3 shows the correlations, mean and standard deviations of the three variables in the study (n = 690). The score for work engagement was 38.27 (SD = 12.52). The scores for psychological capital and job satisfaction were 94.17 (SD = 16.82) and 75.60 (SD = 12.41), respectively. As shown in Table 3, the result of Pearson's correlation analysis revealed that psychological capital and job satisfaction were positively associated with work engagement ($r = 0.776$, $p < 0.001$; $r = 0.629$, $p < 0.001$). Moreover, psychological capital was found to be positively related to job satisfaction ($r = 0.704$, $p < 0.001$). The absolute values of the correlation coefficients between the three variables were less than 0.8, indicating a weak to moderate correlation between the variables and no multicollinearity problem (47).

Table 4 shows the correlation analysis of the variables between nurse specialists and general nurses. The results revealed that age, physical condition, years of working, job title, and department position were all positively associated with psychological capital, job satisfaction and work engagement, while total night shifts per month was negatively associated with all three variables among nurse specialists ($p < 0.05$). Moreover, gender, years of working were all positively related to psychological capital, job satisfaction and work engagement, while total night shifts per month were negatively related to all three variables among general nurses ($p < 0.05$). In addition, the findings also showed positive correlations between psychological capital, job satisfaction, and work engagement in both groups ($p < 0.001$).

Testing for mediating effects among nurses (n = 690)

According to the Hypothesis, we investigated if the relationship between psychological capital and work engagement would be mediated by job satisfaction (Table 5). Before considering the mediating role of job satisfaction, we initially investigated the main effect of psychological capital on work engagement and discovered that psychological capital was positively associated with work engagement (β = 0.771, $p < 0.001$). The mediating effect was then investigated using model 4 in the PROCESS macro. After accounting for nurses' socio-demographic, psychological capital was found to be positively associated with job satisfaction (β = 0.715, $p < 0.001$), which in turn predicted work engagement (β = 0.177, $p < 0.001$). Job satisfaction also had a significant indirect effect [indirect effect = 0.126, SE = 0.025, 95% CI = (0.080, 0.176)], according to bootstrapping analyses. Furthermore, there was a significant direct relationship between psychological capital and work engagement (β = 0.645, $p < 0.001$). Therefore, job satisfaction partially mediated the relationship between psychological capital and work engagement. The mediating effect accounted for 16.34% of the total effect.

TABLE 2 Comparison of psychological capital, job satisfaction, and work engagement scores between nurse specialists and general nurses.

Variables	Nurse specialists (n = 372) M ± SD	General nurses (n = 318) M ± SD	t	P
Psychological capital	95.52 ± 15.83	92.12 ± 17.70	−2.974	0.003**
Self-efficacy	28.99 ± 4.93	27.65 ± 5.69	−3.325	0.001**
Hope	28.23 ± 5.00	27.19 ± 5.71	−2.572	0.010*
Resilience	24.06 ± 4.22	23.23 ± 4.48	−2.484	0.013*
Optimism	14.63 ± 2.70	14.05 ± 2.91	−2.719	0.007**
Job satisfaction	76.59 ± 12.20	74.44 ± 12.57	−2.276	0.023*
Work itself	7.65 ± 1.68	7.30 ± 1.76	−2.649	0.008**
Work pressure	7.12 ± 1.61	7.09 ± 1.73	−0.284	0.777
Interpersonal relationship	16.49 ± 2.52	15.79 ± 2.72	−3.495	0.001**
Working condition	15.15 ± 3.22	14.93 ± 3.20	−0.895	0.371
Work return	14.72 ± 3.18	14.23 ± 3.11	−2.035	0.042*
Organizational management	15.47 ± 3.25	15.11 ± 3.25	−1.464	0.144
Work engagement	39.22 ± 12.35	37.16 ± 12.65	−2.154	0.032*
Vigor	13.20 ± 4.15	12.21 ± 4.44	−3.001	0.003**
Dedication	12.86 ± 4.53	12.20 ± 4.73	−1.886	0.063
Absorption	13.16 ± 4.37	12.75 ± 4.30	−1.248	0.213

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Testing for moderated mediation

The study hypothesized that specialization would moderate the effect of psychological capital on job satisfaction. As shown in Table 6, the interaction between psychological capital and job satisfaction had a significant effect on work engagement (β = 0.301, $p < 0.05$), indicating that the effect of psychological capital on job satisfaction was moderated by specialization. Thus, the moderated mediation model was established as the first stage of the mediation effect was moderated by specialization.

The results of the simple slope analysis revealed that psychological capital was significantly positively associated with job satisfaction for nurse specialists (β_{simple} = 0.866, $p < 0.001$), whereas for general nurses, the association between psychological capital and job satisfaction was still significant, but much smaller (β_{simple} = 0.566, $p < 0.001$). The study plotted the association of psychological capital with job satisfaction separately for nurse specialists and general nurses to interpret interactions with moderating variables (Figure 2). As shown in Figure 2, psychological capital had less impact on job satisfaction when specialization was low, and the relationship was strengthened when specialization was high. Thus, our hypothesis was supported.

Table 6 also showed the conditional indirect effect of psychological capital on work engagement. The result indicated that the index of moderated mediation is significant [β = 0.029, 95% CI = (0.020, 0.045)]. Specifically, the indirect effect of psychological capital on work engagement *via* job satisfaction was stronger for nurse specialists [β = 0.202, 95% CI = (0.086, 0.192)] than for general nurses [β = 0.173, 95% CI = (0.072, 0.167)].

TABLE 3 Correlations, means, standard deviations of variables among nurses (n = 690).

Variables	M ± SD	1	2	3
1. Psychological capital	94.17 ± 16.82	1		
2. Job satisfaction	75.60 ± 12.41	0.704***	1	
3. Work engagement	38.27 ± 12.52	0.776***	0.629***	1

***$p < 0.001$.

Discussion

This study compared the work engagement, psychological capital, and job satisfaction of nurse specialists and general nurses and to investigate the relationship between psychological capital and work engagement of nurses, as well as the role of job satisfaction in mediating the relationship between psychological capital and work engagement in China during the pandemic. We found that compared with general nurses, nurse specialists had higher work engagement, psychological capital and job satisfaction, psychological capital was positively correlated with work engagement. Job satisfaction partially mediated the positive association between psychological capital and work engagement. Specifically, the association

TABLE 4 Correlation analysis of variables between nurse specialists and general nurses.

Variables	Nurse specialists (n = 372)			General nurses (n = 318)		
	Psychologic-al capital	Job satisfaction	Work engagement	Psychologi-cal capital	Job satisfaction	Work engagement
1. Gender	0.049	0.079	0.079	0.135**	0.121**	0.114**
2. Age	0.170***	0.140**	0.110**	0.095	0.277***	0.088
3. Physical condition	0.175***	0.128**	0.255***	0.217***	0.05	0.183***
4. Marital status	0.064	0.033	0.102**	0.102	0.048	0.112**
5. Family status	0.006	−0.009	0.051	0.098	−0.019	0.113**
6. Yeas of working	0.120**	0.188***	0.209***	0.121**	0.125**	0.121**
7. Education	0.007	0.023	0.034	0.082	0.041	0.095
8. Job title	0.110**	0.160***	0.215***	0.123**	0.065	0.169***
9. Department position	0.038	0.175***	0.196***	0.129**	0.003	0.134**
10. Total night shifts per month	−0.112**	−0.331***	−0.136***	−0.212***	−0.146***	−0.25**
11. Monthly income	0.079	0.169***	0.048	0.037	0.005	0.119**
12. Psychological capital	1	–	–	1	–	–
13. Job satisfaction	0.711***	1	–	0.683***	1	–
14. Work engagement	0.751***	0.644***	1	0.780***	0.648***	1

***$p < 0.001$, **$p < 0.05$.

between psychological capital and job satisfaction was stronger for nurse specialists compared to general nurses during the COVID-19 pandemic. Overall, the results explain the hypotheses proposed in this study.

The study found that nurses showed a higher level of work engagement during the COVID-19 pandemic than Wan et al. (48) were before the pandemic. This may be due to the fact that the Chinese government established very specific national rules and regulations to prevent the spread of the virus and enforced them from the central to local government strictly and consistently (49), with proactive strategies like enhancing the public health system, securing the supply of pandemic prevention and control equipment, and conducting pandemic prevention training (50). In addition, the Chinese government in a collective way has encouraged citizens to form a shared sense of responsibility, emphasized group interests, and advocated actions for the common good (51). As a result, nurses are more confident in dealing with pandemic, addressing their fears and demonstrating a strong sense of moral obligation, vocation and values associated with the professions (52). Individuals with a strong vocation are more likely to commit to their profession because they perceive their personal mission more clearly, are more focused on their goals, and have a clear sense of meaning and identity, which may promote the development of work engagement (53).

The study found that nurse specialists had a higher level of work engagement than general nurses. This could be because the two groups of nurses differed in age, years of working, night shift, professional practice environment, and professional status (such as job title or department position), which was consistent with the previous study (46). Vigor received the highest score among nurse specialists. It could be explained the fact that most nurse specialists have senior professional titles, extensive clinical and management experience, and a stronger feeling of responsibility and mission in the field of nursing work, which leads to higher work engagement. People with a sense of mission are willing to face challenges and difficulties, and even make sacrifices for them, even in a stressful work environment (54). Moreover, when employees believe that their work can create value and make sense to themselves, they have a higher sense of career identity, more engagement and satisfaction with their work (24). However, the highest score in general nurses was absorption, possibly due to most nurses with a low job title and young, and a lack of relevant clinical experience to combat the pandemic, which were more likely to experience more fatigue (55), so that they need to spend more time and energy dealing with work. The previous research on avian influenza A/H7N9 has shown that medical personnel with less than 5 years of experience or without relevant training and experience are more likely to experience psychological problems (56). Therefore, nursing managers must provide more protective psychological intervention to recover their mental health and help them improve professional knowledge and skills, strengthen their career identity and sense of responsibility, and thus improve their work engagement.

We found that the psychological capital of nurse specialists was significantly higher than that of general nurses. On the four

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dimensions of self-efficacy, hope, resilience and optimism, the nurse specialists outperformed the general nurses. It could be due to the fact that self-efficacy is one's belief in their ability to achieve their goals (14), which can control personal emotions and their management, and improve individuals' psychological well-being and mental health (16). In our study, higher level of self-efficacy among nurse specialists suggest that they may have adequate abilities to cope with the negative impact of the pandemic, maintaining relatively stable emotions even under pressure, confirming the important role of self-efficacy in adaptive confrontation styles during the pandemic. This result is consistent with previous studies that self-efficacious individuals have positive attitudes toward life and are psycho-emotionally able to cope with difficult situations, changes, and stress (16). Second, hope is a positive motivation state based on the inner sense of success, that is, the way and plan to achieve the goal (57). According to prior research (24), a high level of hope may enable nurses to effectively deal with psychological distress and cope with difficulties at work more positively, and drive them to pursue professional development. Our findings support previous research that hope play an important role in the face of the uncertainty that characterizes the current work and career environment during the pandemic (58). Third, optimism was highest among the two groups, which shows that nurses are coping positively with the negative effects of the pandemic. This result is consistent with previous studies that optimism seems to moderate the effect of stressful life events on depression and anxiety symptoms (59). Furthermore, resilience is defined as an individual's ability to successfully cope with adversity, resist illness, and adapt to new situations in order to maintain psychological health (60). Highly resilient healthcare workers may have adequate coping resources and positive emotions, can effectively address

TABLE 5 Testing the mediation effect of psychological capital on work engagement *via* job satisfaction ($N = 690$).

Predictors	Model 1 (work engagement)		Model 2 (job satisfaction)		Model 3 (work engagement)		Indirect effect of job satisfaction			
	β	t	β	t	β	t	Indirect effect	SE	LLCI	ULCI
Psychological capital	0.771***	31.118	0.715***	25.729	0.645***	18.883	0.176	0.025	−0.080	0.176
Job satisfaction					0.177***	5.267				
R^2_{adj}	0.607		0.507		0.623					
F	116.800***		77.574***		112.027***					

Each column represents a regression on the model, which predicts the criterion at the top of the column. All models are adjusted for gender, age, marital status, family status, yeas of working, job title, department position, and total night shifts per month.
***$p < 0.001$.

TABLE 6 Testing for moderated mediation effect ($N = 690$).

	β	SE	LLCI	ULCI
Mediator variable model (Outcome: Job satisfaction)				
Psychological capital	0.716***	0.028	0.663	0.772
Specialization	0.268	0.031	0.000	0.123
Psychological capital × Specialization	0.301**	0.027	0.002	0.108
Dependent variable model (Outcome: Work engagement)				
Psychological capital	0.645***	0.034	0.578	0.712
Job satisfaction	0.177***	0.034	0.111	0.243
Conditional indirect effect analysis				
Nurse specialists	0.202	0.027	0.086	0.192
General nurses	0.173	0.024	0.072	0.167
Index of moderated mediation	0.029	0.011	0.020	0.045

Each column represents a regression on the model, which predicts the criterion at the top of the column. All models are adjusted for gender, age, marital status, family status, yeas of working, job title, department position, and total night shifts per month.
***$p < 0.001$, **$p < 0.05$.

COVID-19-related stress and withstand the pandemic-related psychological burden, thereby reducing the negative outcomes related to the job (61, 62). These findings are consistent with those of previous studies (15), confirming that nurse specialists high in psychological capital may be more likely to overcome adversity and deal effectively with potential stressors during the pandemic. Therefore, nursing managers should pay attention to the psychological capital of general nurses. This is cost-effective, since training nurses is costly and resources can be directed from being wasted efforts to productive activities (63). Nurse managers can provide effective interventions by holding mindful activities that stimulate positive emotions (64), deliver psychological counseling lectures (65), and conduct resilience training (17) to reduce nurses' psychological pressures and negative emotions during the pandemic.

The study found that the job satisfaction of nurse specialists was higher than general nurses. This could be due to the fact that general nurses are mostly young nurses who had to shoulder the responsibility for coping with the pandemic in addition to their regular nursing duties. A previous study reported that of the 28,600 nurses recruited from across China to provide care to patients with COVID-19 in Hubei, 40% were younger than 30 years, which indicated young health-care providers were the backbone of the COVID-19 crisis in China (66). Therefore, their work is likely to be more intensive and stressful, which may lead to lower job satisfaction. Previous studies have shown that heavy workloads have a negative impact on job satisfaction (22). Moreover, most of them are new nurses who lack a definite career path, frequently work night shifts, and have lower stress resistance and coping strategies, all of which may reduce job satisfaction. On the contrary, as working years and experience accumulate, nurse specialists gradually gain decision-making power in their work, and it is easier to gain a sense of accomplishment and career identity (67). Scanlan et al. (68) demonstrated that career identity facilitates employees to effectively obtain the required work resources, assists to create a comfortable working atmosphere, so as to enhance employees' job satisfaction and reduce employees' turnover intention. Therefore, nursing managers can improve the job satisfaction of general nurses by providing skills training, enhancing career identity and nursing values to guide their career path, and rationalizing shift work during the pandemic.

A previous study noted that experienced nurses were appreciated by students and young nurses for the knowledge and skills that helped ease their transition to the workplace, allowing them to better realize their roles within the healthcare team and their respective scopes of practice (69). However, one of the most frequently identified challenges in the nurse specialist profession is a lack of recognition by position and title (70). One way to recognize the importance of these nurse specialists is to actively engage them in the professional development of students and young nurses. This will be of great benefit to health care organizations by ensuring sufficient training and mentorship for novice nurses while helping to establish a cohesive health care team during the pandemic. In addition, nursing managers can take advantage of clinical ladder plans to provide a training framework for nurses to promote their continued professional development (71).

One of the key findings of the study was that psychological capital was positively associated with work engagement, which could be explained by the JD-R model theory (13) stated that work engagement would persist if an individual had enough job and personal resources to complete the demanding tasks. This finding was consistent with those of previous studies (18, 20). Therefore, nurses with higher psychological resource can effectively deal with stressful events, thereby promote their work engagement during the pandemic. Moreover, job satisfaction partially mediated the positive association between psychological capital and work engagement during the pandemic. The mediating effect accounted for 16.34% of the total effect (**Figure 1**). This result suggests that the underlying mechanism between psychological capital and work engagement can be explained by job satisfaction, which supports the COR theory's (28) predictions that persons with more psychological capital also have more positive psychological resources, which helps them stay motivated and prevent burnout at work, and these positive psychological traits promote their job satisfaction and may stimulate them to strive and focus on their work. The results of this study underscore the importance of job satisfaction in increasing nurses' work engagement during ongoing pandemics. A previous studies reported (72), in a large UK study conducted in April 2020, 60% of nurses reported being professionally dissatisfied and demoralized. Therefore, in the context of the COVID-19 pandemic, nursing managers should focus on cultivating nurses' positive psychological capital (73), leading nurses to actively respond to work pressure and enhancing nurses' work engagement to work by creating a positive and supportive working environment. In addition, the results of the moderated mediation model also revealed that the specialization moderated the indirect impact of psychological capital on work engagement through job satisfaction among nurses during the pandemic. Specifically, the association between psychological capital and job satisfaction was stronger for nurse specialists in comparison to general nurses during the COVID-19 pandemic. This could be explained by the fact that the COVID-19 crisis has challenged existing roles and shifted organizational priorities and staff responsibilities (74). Most nurse specialists with high psychological capital and years of experience played an important role in the planning, training, and evaluation of crisis preparation, which adapted to the needs of the organization and expanded their responsibilities to provide crisis leadership that instilled calmness, confidence, trust, and resiliency in the staff during the COVID-19 pandemic (74), making it easier to gain a sense of career identity and improve job satisfaction (67, 68),which may boost their work engagement. Therefore, more attention should be paid to the

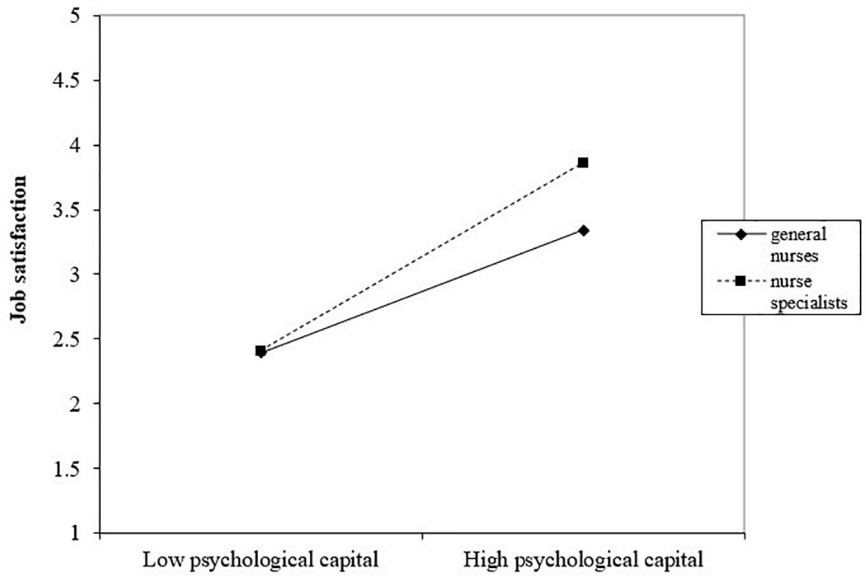

FIGURE 2
Specialization as a moderator of the association between psychological capital and job satisfaction.

continuing professional development of young general nurses to equip them with the necessary professional knowledge and ability (75). It could also develop relevant reward systems and provide promotion opportunities for outstanding performance during the pandemic (51), promote a sense of safety, and support a shared learning to meet nurses' needs for self-realization, improve their job satisfaction, thereby improving their work engagement.

Limitations and recommendations for future studies

Although the present study compared the work engagement between two groups of nurses and furthers our understanding of the mediating mechanism underlying the association between psychological capital and work engagement among Chinese nurses, several limitations need to be acknowledged. First, because this is a cross-sectional study, the causality of the associations between psychological capital, job satisfaction and work engagement cannot be inferred. However, we believe that our findings still provide useful and important information on the mediation model between psychological capital and work engagement. Future longitudinal study designs are needed to more robustly validate the causal relationship in this model. Second, the study data were derived from self-reports, which could lead to potential subjective and recall bias that could affect the accuracy of the assessment. Moreover, social expectations bias among participants should be considered. In this study conducted in the same hospitals setting, nurses may likely report similar work engagement results, as they felt it might make others feel that they had high levels of work engagement, particularly during the pandemic. To reduce this bias, researchers reassured all participants that there were no right or wrong answers and were informed to answer all questions based on their first instinct to minimize the impact of elucidating socially desirable responses. In addition, all participants were recruited from nine provinces in China. Therefore, the results may not apply to all nurses. Long-term studies that require random sampling in other organizational and cultural contexts should be considered to improve the generalizability of the results in the future.

As evidence has shown that mental health support is urgently needed to help nurses be more productive all over the world in combating the COVID-19 pandemic to relieve their psychological distress (76). Our studies suggest that increasing psychological capital and job satisfaction among nurses may be an effective and useful way to improve their work engagement under the COVID-19 pandemic.

Conclusion

Our results suggest that compared with general nurses, nurse specialists had higher work engagement, psychological capital, and job satisfaction. More importantly, this study is primarily based on the JD-R model and considers the COR theory to explore that job satisfaction partially mediated the positive association between psychological capital and work engagement, and the indirect effect was stronger in

nurse specialists in comparison to general nurses during the COVID-19 pandemic. Our study provides nursing managers with suggestions for team building and management that have theoretical and practical significance. Consider the cost-effectiveness of limited healthcare expenditures during the pandemic, nursing managers should pay more attention to the continuing professional development of young general nurses, ensuring sufficient training and mentorship for them in combating the pandemic by experienced nurse specialists, which helps to create a cohesive health care team during the pandemic. Second, our finding can help nursing managers correctly understand the mechanism of the relationship among psychological capital, job satisfaction and work engagement and adopt effective intervention strategies to promote nurses' work engagement.

Data availability statement

The original contributions presented in this study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by the First Affiliated Hospital of China Medical University (approval number: [2020]194). The patients/participants provided their written informed consent to participate in this study.

Author contributions

MZ and YLiu conceptualized and designed the project. MZ, HC, NW, and YLi acquired and managed the data and performed statistical and data analysis. MZ and HC drafted the manuscript. YLiu and XL revised the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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EDITED BY
Oriol Yuguero,
Lleida Institute for Biomedical Research (IRBLleida), Spain

REVIEWED BY
Zhaoqiang Jiang,
Hangzhou Medical College, China
Ah Yusuf,
Airlangga University, Indonesia

*CORRESPONDENCE
Yun-Xia Hong
✉ chbyhjyb@zju.edu.cn
Jian-Hua Mao
✉ maojh88@zju.edu.cn

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Association between social supports and negative emotions among pediatric residents in China: The chain-mediating role of psychological resilience and burnout

Chao Song[1], Xiao-Tian Du[2], Yun-Xia Hong[1]*, Jian-Hua Mao[1]* and Wen Zhang[3]

[1]The Children's Hospital, Zhejiang University School of Medicine, National Clinical Research Centre for Child Health, Hangzhou, China, [2]School of Public Health, Shanghai Medical College, Fudan University, Shanghai, China, [3]Department of Philosophy, Beijing Normal University, Beijing, China

Background: Chinese pediatricians are facing challenges, and there is a need to examine the issue of negative emotions, namely, stress, anxiety and depression, among front-line pediatric residents in clinical settings. Understanding the current situation and influencing factors of negative emotions among pediatric residents in China and exploring the formation mechanism can lay a foundation for psychological interventions.

Methods: A total of 138 pediatric residents in the Children's Hospital, Zhejiang University School of Medicine, China, were surveyed using the Depression Anxiety Stress Scale-21 (DASS-21), Social Support Rating Scale (SSRS), Connor-Davidson Resilience Scale (CD-RISC), and Maslach Burnout Inventory-General Survey (MBI-GS).

Results: (1) The incidence of abnormal stress, anxiety, and depression among pediatric residents was 18.8%, 47.8%, and 47.8% respectively. (2) Negative emotions were significantly negatively correlated with social supports and psychological resilience, and positively correlated with burnout. (3) The chain-mediating effect of resilience and burnout between social supports and negative emotions was significant.

Conclusion: Psychological resilience and burnout played a chain-mediating role between social supports and negative emotions. Measures should be taken to improve the mental health of Chinese pediatric residents.

KEYWORDS

social support, psychological resilience, stress, anxiety, depression, burnout, chain-mediating effect, pediatrician

1. Introduction

In recent years, pediatricians in China have been confronted with a crisis with regards to long working hours, the frequency of medical disputes, and a shortage of pediatricians, which has caused widespread concern among the public. Despite intense workloads and high levels of risk, they earn less income than other senior healthcare providers (1, 2). The turnover rate of pediatricians in China is as high as 12.6%, and largely includes young doctors (3).

In China, the standardized training system for residents has been established in recent years. All clinicians, including pediatricians, should undergo a 3-year residency training after graduating from medical school. During these 3 years, residents will study in different departments of the training base in turn. Pediatric residents work on the front line in healthcare settings, have direct interaction with children and their families, and are close to graduating from medical school and embarking on their careers in clinical practice. It is necessary to pay attention to their negative emotions caused by above crisis, because addressing negative emotions is not only the key to improving quality of life (4), but also patient safety (5). Anxiety and depression are the most common negative emotions in the general population (6). Anxiety and depression are usually external manifestations of stress (7). Therefore, we proposed the following hypotheses and verified the mechanisms.

Social supports describe the actual or perceived material, emotional and spiritual supports that an individual can access in their external world (8). The social support buffering hypothesis holds that social supports can mitigate the negative impact of stress on mental health (9). Lower levels of social support have been found to be associated with more mental health issues (10, 11), and individuals with less social support are about five times more likely to experience symptoms of anxiety and depression than those that have greater social supports (12). People with low levels of social support are at a higher risk of psychological stress, while higher levels of social support can help to alleviate anxiety and depression (13–15). Accordingly, the first hypothesis (H1) is proposed: social support can predict negative emotions among pediatric residents.

Psychological resilience is the ability to flexibly deal with challenges and overcome adversity, and it is accompanied by personal growth and transformation (16, 17). Some studies have pointed out that there is a significant positive correlation between social support and psychological resilience (18, 19), and people who receive more social support tend to have a higher level of psychological resilience. Psychological resilience can negatively predict anxiety (20) and alleviate depressive symptoms (21). High levels of resilience are associated with optimism and tenacity (22). Thus, the second hypothesis (H2) is proposed: among pediatric residents, social support could influence negative emotions through the mediating effect of psychological resilience.

Burnout is a psychological condition or a response to chronic emotional and interpersonal stressors on the job (23), and burnout among pediatricians may pose a danger to both doctors and patients (24). Negative emotions are closely related to job burnout (25, 26). Previous study has shown that social support has a negative predictive effect on job burnout among nurses (27). Support from leaders and colleagues could alleviate burnout and contribute to lower turnover intentions (28). Studies in different environments (29) and in different populations (30) seem to have found that social support may have a positive effect on burnout. Accordingly, the third hypothesis (H3) is proposed: among pediatric residents, social support can influence negative emotions through the mediating effect of burnout.

High psychological resilience often enables individuals to cope more effectively with their work environment, improve their work involvement and alleviate symptoms of burnout (31). Resilience can be regarded as the other side of the burnout coin (32) and could protect people from workplace stress (33). Researchers who have examined the relationship between resilience and burnout among nurses (34, 35) have shown that these two factors are negatively correlated, suggesting that higher levels of resilience might protect nurses from emotional exhaustion and contribute to personal accomplishment. Combining the relationship between resilience and social support, and the relationship between burnout and negative emotions, the fourth hypothesis (H4) is put forward: among pediatric residents, social support can affect negative emotions through the chain-mediating effect of resilience and burnout.

By verifying the above hypotheses, it would help exploring the psychological intervention for Chinese pediatric residents to improve their mental health, and reduce the turnover rate of pediatric professionals.

2. Methods

2.1. Investigation site and participants

The study was conducted at the Children's Hospital, Zhejiang University School of Medicine, Zhejiang Province, Eastern China in January 2022. A total of 138 pediatric residents participated in the investigation. This study was approved by the Ethics Committee of the children's hospital, Zhejiang University school of medicine (No. 2022-IRB-107).

2.2. Questionnaire tool

2.2.1. Socio-demographic information

The socio-demographic information questionnaire covered information related to gender, age, working years, education level, annual income, category, qualification, and clinical practice area.

2.2.2. Depression Anxiety Stress Scale-21

The Depression Anxiety Stress Scale-21 (DASS-21) is used to measure an individual's negative mood and the severity of symptoms in the previous week (36). The scale includes three subscales of anxiety, depression, and stress. Each subscale contains seven items, and a total of 21 items. Four grades ranging from 0 to 3 were used: "completely inconsistent," "partially consistent," "mostly consistent," and "completely consistent." Higher scores indicated more intense negative emotions. Each subscale is divided into *asymptomatic*, *mild*, *moderate*, *severe*, and *extremely severe* according to the score. In this study, the overall Cronbach's (37) alpha value was 0.956, and the Cronbach's alpha coefficients of each subscale were 0.880, 0.879, and 0.892, respectively.

2.2.3. Social Support Rating Scale

The Social Support Rating Scale (SSRS) (38) compiled by Chinese scholar Shuiyuan Xiao consists of ten items and three dimensions: objective social support (four items), subjective social support (four items), and utilization of social support (three items). Items 1–5 and 8–10 were scored on a four-point Likert scale, ranging from 1 ("not at all") to 4 ("very much"). For items 6 and 7, the response "no source" was assigned 0 points and the response "have a source" was assigned

1 point for each source. Overall, higher scores indicated higher levels of personal social support. A total score of <20 signifies less social support, a total score of 20–30 signifies general social support, and a total score of more than 30 signifies satisfactory social support. In this study, the scale's Cronbach's alpha value was 0.940.

2.2.4. Connor-Davidson Resilience Scale

The Connor-Davidson Resilience Scale (CD-RISC), developed by Connor and Davidson (17), consists of 25 items that were assessed using a five-point Likert scale ranging from 0 to 4: incorrect, rarely correct, sometimes correct, usually correct, and correct. Higher scores indicated higher levels of resilience (39). The questionnaire was divided into three dimensions: tenacity, strength and optimism (40). In this study, the CD-RISC overall Cronbach's alpha value was 0.962.

2.2.5. Maslach Burnout Inventory-General Survey

We adopt the revised Chinese version of Maslach Burnout Inventory-General Survey (MBI-GS) (41, 42). The MBI-GS (Chinese version) consists of three subscales: emotional exhaustion (five items), cynicism (four items) and reduced personal accomplishment (six items). The scale was evaluated using a seven-point Likert scoring method, with scores from 0 to 6 indicating the frequency of their own feelings. For emotional exhaustion and cynicism, higher scores were associated with high levels of burnout. In the case of reduced personal accomplishment, higher scores indicated lower levels of burnout. The total Cronbach's alpha value of the burnout scale was 0.846, and the Cronbach's alpha values of the three subscales were 0.949, 0.945, and 0.937, respectively.

2.3. Statistical analysis

SPSS version 26.0 (IBM SPSS Statistics, USA) was used for data sorting and analysis. The measurement data are expressed as means ± standard deviations. For the basic situation of the data, a chi-square test was performed to assess the balance of grouping. If the data of both groups were normally distributed, a t-test was carried out for inter-group comparison; otherwise, the Mann-Whitney test was applied. For more than two groups, if the data satisfied a normal distribution and the variance was homogeneous, a one-way analysis of variance (ANOVA) was performed for inter-group comparison, and the least significant difference procedure was carried out for *post-hoc* comparison; otherwise, the data were analyzed by the Kruskal-Wallis test. The Spearman rank correlation method was used to analyze the correlation between social support, psychological resilience, burnout, stress, anxiety and depression. SPSS 26.0 (IBM SPSS Statistics, USA) software and its process program were used to analyze the intermediary effect, and the bootstrap method with deviation correction was used to test the regression coefficient to obtain the 95% deviation-corrected confidence interval. The confidence interval did not contain zero, indicating that the effect was statistically significant. For the homogeneity of variance test, the test level was 0.10, whereas the test level of the others were set at 0.05; that is, $p < 0.05$ indicated a statistically significant difference.

3. Results

3.1. Common method bias test

Exploratory factor analysis was performed on all items of the four scales using Harman's one-factor test for common method bias (43). The results showed that the explanation rate of the first principal component variation extracted by unrotated factors was 28.20%, which was less than the critical value standard of 40% (44), and there were 16 factors with eigenvalues >1. It was inferred that homologous variance was not the main reason for the co-variation among the variables. The synthetic reliability, the Omega coefficient, was also calculated (45, 46). The Omega coefficient used in this questionnaire was above 0.834, which performed well, and further data analysis was carried out.

3.2. General characteristics of the study sample

A total of 138 pediatric residents were included in the data analysis, of which the oldest was 36 years old and the youngest 22 years old. The average age was (26.25 ± 2.61) years old. See Table 1 for socio-demographic characteristics.

3.3. The status of negative emotions, social supports, psychological resilience, and burnout among pediatric residents

Analysis of the DASS-21 showed that the average scores of the subscales of stress, anxiety and depression were (9.83 ± 7.93), (8.26 ± 7.37), and (8.17 ± 7.77), respectively. The abnormal rate of stress was 18.8% (26/138), of which very severe stress, severe stress, moderate stress and mild stress accounted for 0.7% (1/138), 5.1% (7/138), 5.1% (7/138), and 7.9% (11/138), respectively. The incidence of anxiety was 47.8% (66/138), of which very severe anxiety, severe anxiety, moderate anxiety, and mild anxiety accounted for 7.9% (11/138), 7.9% (11/138), 22.9% (30/138), and 10.1% (14/138), respectively. The incidence of depression was 47.8% (67/138), of which very severe depression, severe depression, moderate depression, and mild depression accounted for 3.6% (5/138), 2.2% (3/138), 18.8% (26/138), and 20.3% (28/138), respectively. See Table 2 for details.

The lowest SSRS score was 17, the highest was 57, and the average score was (32.21 ± 6.83). Among them, two respondents (1.4%) reported that they had received little social support, 53 (38.5%) had general social support and 83 (60.1%) had satisfactory social support. The objective support score was (5.92 ± 2.63), the subjective support score was (19.03 ± 4.282), and the support utilization score was (7.26 ± 1.86). The average score of the CD-RISC was (58.26 ± 15.66), including tenacity (42.56 ± 8.74), strength (28.54 ± 5.32) and optimism (13.16 ± 2.47). The overall average score of MBI-GS was (50.87 ± 20.59), of which emotional exhaustion accounted for (15.88 ± 7.11), cynicism (7.89 ± 5.50), and reduced personal accomplishment (20.62 ± 7.53). The incidence of burnout among

TABLE 1 Socio-demographic characteristics of the respondents.

		Frequency	Percentage
Total		138	
Gender	Male	39	28.3%
	Female	99	71.7%
Education level	PhD or MD	12	8.7%
	Master	38	37.5%
	Bachelor and others	88	63.8%
Working years	1 year	52	37.7%
	2 years	35	25.3%
	3 years	51	37.0%
Annual income	<¥50,000	53	38.4%
	¥50,000 – ¥100,000	55	39.9%
	>¥100,000	30	21.7%
Category	Formal staff	22	16.0%
	Professional master student	42	30.4%
	Others	74	53.6%
Hometown	Urban	52	37.7%
	Rural	86	62.3%
Qualification	No physician qualification certificate	57	41.3%
	Have physician qualification certificate	81	58.7%
Clinical practice area	Pediatric internal medicine	118	85.5%
	Pediatric surgery	13	9.4%
	Others	7	5.1%

pediatric residents was 51.4% (71/138), of which the incidences of severe burnout, moderate burnout, and mild burnout were 2.2% (3/138), 9.4% (13/138), and 39.8% (55/138), respectively.

3.4. Correlation analysis and mediating effect analysis

Stress among pediatric residents was negatively correlated with social support ($r = -0.260$, $p < 0.01$) as well as psychological resilience ($r = -0.542$, $p < 0.01$), but positively correlated with burnout ($r = 0.488$, $p < 0.01$); their anxiety was negatively correlated with social support ($r = -0.265$, $p < 0.01$) and psychological resilience ($r = -0.566$, $p < 0.01$), whereas positively correlated with burnout ($r = 0.502$, $p < 0.01$); depression, similarly, was negatively correlated with social support ($r = -0.316$, $p < 0.01$) and psychological resilience ($r = -0.574$, $p < 0.01$), but positively correlated with burnout ($r = 0.528$, $p < 0.01$). The correlation analysis of social support, psychological resilience, burnout, stress, anxiety and depression is shown in Table 3, indicating that H1 was verified.

Taking the levels of stress, anxiety, and depression as dependent variables; social supports as independent variables, and psychological resilience and burnout as mediating independent variables; a chain-mediating effect analysis was carried out. The beta values obtained from the analysis are shown in Figure 1. Social support positively predicted resilience ($\beta = 1.062$, $p < 0.001$); psychological resilience negatively predicted burnout ($\beta = 0.752$, $p < 0.001$), stress ($\beta = -0.1684$, $p < 0.001$), anxiety ($\beta = -0.1872$, $p < 0.001$) and depression ($\beta = -0.1783$, $p < 0.001$); while burnout positively predicted stress ($\beta = 0.1128$, $p < 0.05$), anxiety ($\beta = 0.0836$, $p < 0.05$) and depression ($\beta = 0.1003$, $p < 0.05$).

It can be seen from Table 4 that the mediating effect of resilience between social supports and negative emotions was significant, indicating that H2 was verified; the mediating effect of burnout was not significantly associated with social supports and negative emotions, indicating that H3 was not verified; the chain-mediating effect of resilience and burnout was significantly associated with social supports and negative emotions, and it was a complete mediating role, which verified H4.

4. Discussion

The abnormal rate of stress among the 138 pediatric residents in this study was 18.8%, and nearly half developed anxiety and depression. The residency period is the initial stage at which medical professionals embark on their formal career path, and stress may be related to excessive medical disputes and patients' high expectations (25). Tense doctor-patient relationships have a significant effect on mental health, job satisfaction, burnout and rates of drop-out among physicians (47, 48). In addition to intense clinical work, the income of residents is generally lower, more than 70% of pediatric residents in this study earning < ¥100,000 per year. Residency trainees also include many highly educated medical graduates. Some of these doctors may be over 30 years old when they start their training and may also be responsible for supporting their parents and other family expenses. Therefore, their financial pressure cannot be ignored, and improving the treatment of residents is still something that needs to be addressed at this time.

At present, it is believed that longer working hours are associated with greater work pressures, which may contribute to negative emotions (49). Some scholars constructed an effort-reward-imbalance model of occupational stress (50), which can be used to explain the occurrence of negative emotions. Negative emotions are not only detrimental to the mental health of physicians, but may also increase the incidence of medical errors (51). Screening out physicians with psychological abnormalities and encouraging them to seek help and treatment through educational actions may be a feasible way to help medical staff to reduce negative emotions (52). Psychological interventions had a positive and significant effect on negative emotions (53). The Vila Sana Program, which was established by the Norwegian Medical Association to provide free individual and group counseling services for all doctors in the country, improved the mental health of clinicians (54). There is also an urgent need in China to establish a psychological support service system for pediatric residents and for all physicians, to improve their mental health.

TABLE 2 Negative emotions of respondents.

		Stress			Anxiety			Depression		
		Scores	Z	*p*	Scores	Z	*p*	Scores	Z	*p*
Total		9.83 ± 7.93			8.26 ± 7.37			8.17 ± 7.77		
Gender	Male ($n = 39$)	11.79 ± 7.70	−2.065	0.039*	9.54 ± 7.01	−1.590	0.112	10.05 ± 7.68	−2.110	0.035*
	Female ($n = 99$)	9.05 ± 7.93			7.76 ± 7.48			7.43 ± 7.71		
Age	≤25 years old ($n = 61$)	9.70 ± 7.72	−0.028	0.978	8.26 ± 7.32	−0.026	0.979	7.87 ± 7.23	−0.082	0.934
	>25 years old ($n = 77$)	9.92 ± 8.15			8.26 ± 7.46			8.42 ± 8.21		
Education level	PhD or MD ($n = 12$)	8.00 ± 6.98	0.652	0.722	4.67 ± 4.70	3.835	0.147	5.17 ± 5.08	2.658	0.265
	Master ($n = 38$)	9.58 ± 8.80			8.42 ± 8.68			7.84 ± 8.77		
	Bachelor and others ($n = 88$)	10.18 ± 7.71			8.68 ± 6.98			8.73 ± 7.58		
Working years	1 year ($n = 52$)	9.69 ± 7.90	2.839	0.242	7.35 ± 7.08	2.971	0.226	7.50 ± 7.31	2.345	0.310
	2 years ($n = 35$)	11.14 ± 7.03			9.60 ± 6.54			9.60 ± 7.59		
	3 years ($n = 51$)	9.06 ± 8.56			8.27 ± 8.15			7.88 ± 8.35		
Annual income	<¥50,000 ($n = 53$)	11.74 ± 9.46	3.049	0.218	9.81 ± 8.76	2.273	0.321	9.70 ± 9.50	1.458	0.482
	¥50,000–¥100,000 ($n = 55$)	8.58 ± 6.49			7.49 ± 7.47			7.31 ± 5.99		
	>¥100,000 ($n = 30$)	8.73 ± 6.90			6.93 ± 5.80			7.07 ± 7.04		
Category	Formal staff ($n = 22$)	7.64 ± 5.91	4.975	0.083	4.64 ± 4.42	8.851	0.012*	4.91 ± 4.85	5.049	0.080
	Professional master student ($n = 42$)	12.52 ± 9.53			10.86 ± 9.17			10.24 ± 9.64		
	Others ($n = 74$)	8.95 ± 7.12			7.86 ± 6.41			7.97 ± 6.97		
Hometown	Urban ($n = 52$)	9.12 ± 7.46	−0.652	0.514	7.23 ± 6.46	−1.137	0.256	7.42 ± 7.10	−0.685	0.493
	Rural ($n = 86$)	10.26 ± 8.22			8.88 ± 7.84			8.63 ± 8.15		
Qualification	No physician qualification certificate ($n = 57$)	10.00 ± 7.92	−0.165	0.869	7.79 ± 7.02	−0.579	0.563	7.82 ± 7.53	−0.412	0.680
	Have physician qualification certificate ($n = 81$)	9.70 ± 7.99			8.59 ± 7.63			8.42 ± 7.97		
Clinical practice area	Pediatric internal medicine ($n = 118$)	10.19 ± 7.91	3.304	0.192	8.56 ± 7.40	1.984	0.371	8.56 ± 7.80	2.926	0.232
	Pediatric surgery ($n = 13$)	9.23 ± 8.43			6.77 ± 7.90			6.46 ± 7.97		
	Others ($n = 7$)	4.86 ± 6.41			6.00 ± 6.00			4.86 ± 6.41		

*$p < 0.05$.

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TABLE 3 Correlation analysis.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Social support	1														
2. Objective support	0.705**	1													
3. Subjective support	0.881**	0.426**	1												
4. Utilization of support	0.575**	0.313**	0.285**	1											
5. Psychological resilience	0.430**	0.164	0.420**	0.386**	1										
6. Optimism	0.427**	0.221**	0.410**	0.309**	0.803**	1									
7. Strength	0.398**	0.142	0.400**	0.348**	0.971**	0.704**	1								
8. Tenacity	0.409**	0.160	0.390**	0.402**	0.954**	0.737**	0.885**	1							
9. Burnout	−0.341**	−0.211*	−0.280**	−0.356**	−0.584**	−0.377**	−0.565**	−0.619**	1						
10. Emotional exhaustion	−0.227**	−0.162	−0.233**	−0.075	−0.358**	−0.163	−0.374**	−0.356**	0.756**	1					
11. Cynicism	−0.267**	−0.170*	−0.193*	−0.286**	−0.417**	−0.218*	−0.405**	−0.463**	0.846**	0.736**	1				
12. Reduced personal accomplishment	−0.285**	−0.131	−0.218*	−0.460**	−0.581**	−0.502**	−0.535**	−0.608**	0.640**	0.093	0.314**	1			
13. Stress	−0.260**	−0.116	−0.184*	−0.282**	−0.524**	−0.341**	−0.542**	−0.486**	0.488**	0.464**	0.495**	0.255**	1		
14. Anxiety	−0.265**	−0.134	−0.176*	−0.333**	−0.566**	−0.395**	−0.564**	−0.540**	0.502**	0.444**	0.434**	0.320**	0.857**	1	
15. Depression	−0.316**	−0.178*	−0.233**	−0.358**	−0.574**	−0.407**	−0.576**	−0.544**	0.528**	0.423**	0.504**	0.355**	0.847**	0.858**	1

*$p < 0.05$; **$p < 0.01$.

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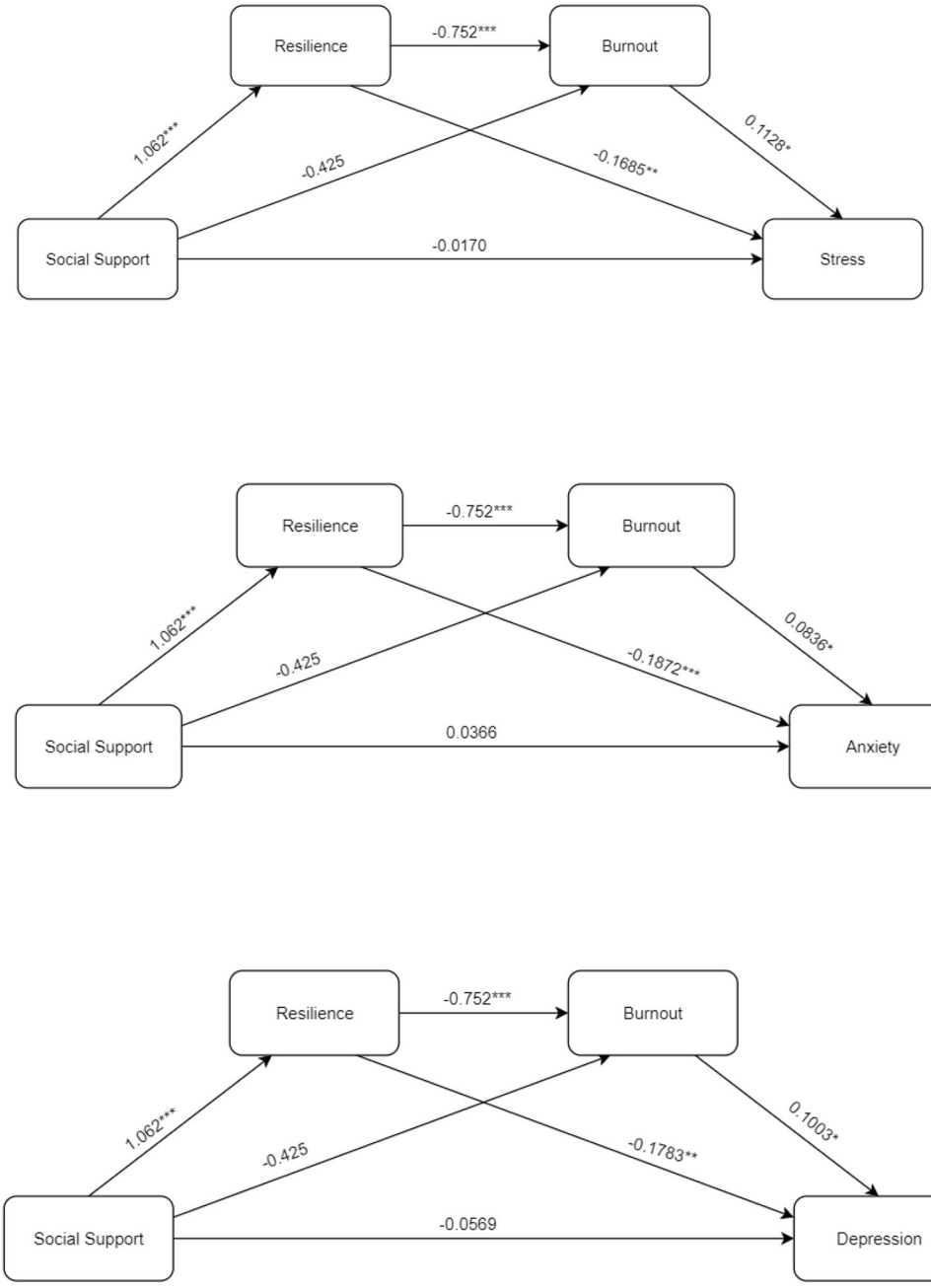

FIGURE 1
Beta values from the mediating effect analysis (***$p < 0.001$; **$p < 0.01$; *$p < 0.05$).

The results of this study showed that negative emotions among pediatric residents were significantly inversely associated with social support. Previous studies suggested that social support had preventive and regulatory effects on stress and depressive symptoms (55, 56), and social support can help residents to deal with stressors more effectively (57), which may be attributed to the way in which social support can shape brain activity (58). As seen in Table 3, male residents exhibited higher levels of stress and were more likely to suffer from depression. This suggested that the mental health of male pediatric residents should not be neglected. In China, female pediatricians far outnumber male pediatricians, which was also confirmed in this study. It was observed on a daily basis that female pediatricians are more likely to form partnerships and support each other, whereas Chinese men were less good at expressing emotions in traditional culture, which results in emotional problems. We also found that professional master's students are a relatively special group of residents, and anxiety is more obvious in this group, which might also be related to the current professional master's training model in China. Unlike other residents who only need clinical rotations to improve clinical theory and practice, professional master's students are required to engage in scientific research in addition to clinical work, which increases the risk of negative emotions. Considering the points outlined above, government authorities should reform the training of professional master's students.

TABLE 4 Bootstrap analysis of mediating effect test between social supports and negative emotions.

	Effect size	Boot SE	95% Bootstrap CI
Stress			
Total effect	−0.3339	0.0954	(−0.5225, −0.1452)
Direct effect	−0.0170	0.0940	(−0.2029, 0.1690)
Total indirect effect	−0.3169	0.0690	(−0.4603, −0.1886)
Social support → Resilience → Stress	−0.1788	0.0586	(−0.3069, −0.0756)
Social support → Burnout → Stress	−0.0480	0.0281	(−0.1089, 0.0000)
Social support → Resilience → Burnout → Stress	−0.0901	0.0332	(−0.1597, −0.0309)
Anxiety			
Total effect	−0.2645	0.0897	(−0.4418, −0.0871)
Direct effect	0.0366	0.0883	(−0.1381, 0.2112)
Total indirect effect	−0.3010	0.0649	(−0.4329, −0.1839)
Social support → Resilience → Anxiety	−0.1987	0.0564	(−0.3204, −0.0987)
Social support → Burnout → Anxiety	−0.0355	0.0233	(−0.0869, 0.0017)
Social support → Resilience → Burnout → Anxiety	−0.0668	0.0298	(−0.1304, −0.0136)
Depression			
Total effect	−0.3689	0.0923	(−0.5514, −0.1864)
Direct effect	−0.0569	0.0905	(−0.2359, 0.1220)
Total indirect effect	−0.3120	0.0696	(−0.4579, −0.1856)
Social support → Resilience → Depression	−0.1892	0.0565	(−0.3146, −0.0918)
Social support → Burnout → Depression	−0.0426	0.0290	(−0.1102, 0.0007)
Social support→ Resilience→ Burnout→ Depression	−0.0801	0.0339	(−0.1522, −0.0199)

Our study found that psychological resilience was one of the most important factors that mediated the relationship between social support and negative emotions, and that negative emotions among pediatric residents were significantly and negatively correlated with psychological resilience, similar to previous findings in other populations (35). Individuals with higher levels of psychological resilience were highly adaptable when confronted with adversities and work-related pressures, and they also demonstrated an ability to make decisions that were most favorable in the current situation, which enhances subjective wellbeing and quality of life (22). We also found that burnout was also an important factor in mediating the relationship between resilience and negative emotions. This is consistent with the conservation of resources theory (59) which holds that burnout arises from an imbalance between an employee's perceived levels of job investment and job reward. Moreover, burnout can cause employees to negatively evaluate themselves and others, and can also cause negative reactions. Therefore, in addition to increasing social supports for pediatric residents, it is also necessary to strengthen psychological resilience and reduce burnout, thereby alleviating negative emotions.

Some studies have explored how psychological resilience can be enhanced among doctors, and the most mainstream method involves providing mindfulness training (60–62). Before and after the implementation of some intervention measures, an improvement has been observed in resilience test scores (63, 64), although not all physicians showed a significant improvement, and some even exhibited decreased levels of resilience. However, these physicians nonetheless felt that similar interventions could encourage better peer relationships and play a positive role in strengthening resilience (61). Mindfulness-based interventions tend to focus on building resilience at the individual level, which is now believed to be determined by a combination of internal and external factors rather than a single intrinsic factor (33, 65), as confirmed by this study, and social support, as an external factor, can directly affect psychological resilience. Therefore, the results of the current study indicate that external supports, such as family support and peer support, play an equally important role in promoting psychological resilience. Some scholars have started to examine how external environments, such as organizations, affects individual resilience, proposing that it is possible to improve an individual's levels of resilience within an organization by addressing organizational-level issues (66). In China, literature that focuses on improving the psychological resilience of medical staff is scarce. As such, we need to learn from relevant foreign studies and develop psychological resilience intervention programs targeted at Chinese pediatric residents.

This paper presented a preliminary study on the current situation and multiple mediating paths of negative emotions among pediatric residents in China, and highlighted the role of social supports, psychological resilience and burnout in generating negative emotions. We call on the Chinese society to pay attention to the negative emotions of Chinese pediatric residents. Three ways to reduce negative emotions by strengthening social support, improving resilience, and alleviating burnout could be considered, which provides a basis for governmental policies on pediatric residents'

occupational health. In the future, we can continue to study the factors affecting the negative emotions at different levels, such as individual, organization and society. The clinical intervention trial will be designed to explore the psychological intervention to improve the mental health of Chinese pediatricians.

This study had some limitations. The bootstrap analysis of the mediating effect of social supports and anxiety revealed that the total beta effect was smaller than the total indirect beta effect, although there may have been a masking effect. Therefore, future studies should increase the sample size to further examine the relationship between social supports and anxiety. Some of the conclusions presented in this paper were largely consistent with existing studies involving other populations, but further intervention studies should be carried out among the Chinese pediatric resident population to verify the findings. Self-report scales were used, and the results may have been impacted by social desirability bias.

5. Conclusion

Psychological resilience and burnout played a chain-mediating role between social supports and negative emotions. The whole society and government departments should pay attention to the emotional problems of pediatric residents, especially professional master's students and male residents. Strengthening social support, increasing psychological resilience, and relieving burnout may be the ways to reduce negative emotions. There is an urgent need to establish a psychological support service system to improve the mental health of pediatric residents. In conclusion, measures should be taken to improve the mental health of Chinese pediatric residents.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

Ethics statement

This study was approved by the Ethics Committee of the children's hospital, Zhejiang University school of medicine (No. 2022-IRB-107). Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

CS recruited participants, collected questionnaires, and wrote the draft. X-TD and J-HM performed the statistical analysis. Y-XH conceived the study and revised the draft. J-HM contributed to recruiting the participants and collecting the questionnaires. J-HM and WZ participated in the revision of the paper. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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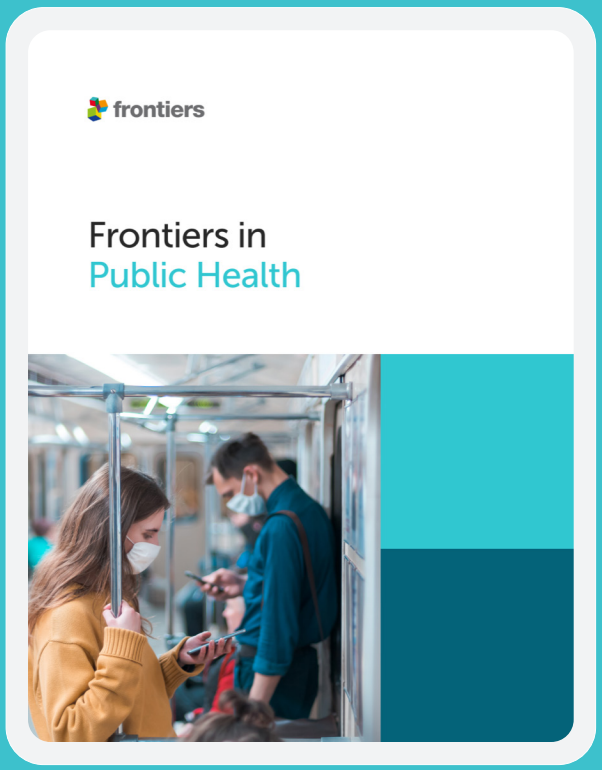

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