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How workplace behaviors impact mental health: does diversity matter?

Edited by
Vasiliki Eirini Chatzea, Dimitra Sifaki-Pistolla and Enkeleint A. Mechili

Published in
Frontiers in Public Health
Frontiers in Psychiatry

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ISSN 1664-8714
ISBN 978-2-8325-6344-1
DOI 10.3389/978-2-8325-6344-1

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How workplace behaviors impact mental health: does diversity matter?

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Citation
Chatzea, V. E., Sifaki-Pistolla, D., Mechili, E. A., eds. (2025). *How workplace behaviors impact mental health: does diversity matter?* Lausanne: Frontiers Media SA.
doi: 10.3389/978-2-8325-6344-1

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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 20 October 2023
DOI 10.3389/fpubh.2023.1220301

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RECEIVED 10 May 2023
ACCEPTED 18 September 2023
PUBLISHED 20 October 2023

CITATION
Makina-Zimalirana N, Bisnauth M, Shangase N, Davies N, Jiyane A, Buthelezi F and Rees K (2023) Workplace wellbeing among health care workers providing HIV services in primary care in Johannesburg: a mixed methods study.
Front. Public Health 11:1220301.
doi: 10.3389/fpubh.2023.1220301

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Workplace wellbeing among health care workers providing HIV services in primary care in Johannesburg: a mixed methods study

Ndinda Makina-Zimalirana[1]*, Melanie Bisnauth[1], Nosipho Shangase[1], Natasha Davies[1], Anele Jiyane[1], Fezile Buthelezi[1] and Kate Rees[1,2]

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Background: Burnout among Health Care workers (HCWs) impacts on provider-patient relations and quality of care. Anova Health Institute (Anova) is a large South African non-profit organization and PEPFAR/USAID implementing partner. We conducted a study among HCWs providing HIV-related services in primary care settings in Johannesburg, South Africa, to examine levels of burnout, understand factors affecting workplace wellbeing, and explore strategies to prevent burnout.

Methods: We used a sequential mixed-method approach. Data were collected between February and April 2022. The first phase consisted of a survey using the Maslach Burnout Inventory Human Services Survey (MBI-HSS) to measure levels of burnout. We then interviewed a subset of survey participants to understand the experiences that may affect wellbeing. We used descriptive statistics to quantify burnout rates for each MBI dimension (emotional exhaustion, personal accomplishment, and depersonalization). Qualitative data analysis was guided by the Job Demands-Resources Framework that explores the interactions between demands and resources in the workplace.

Results: Survey findings (n = 194) revealed that although depersonalization rates were low at 6%, 21% of participants had high emotional exhaustion and 24% reported low professional accomplishment. Less than half (41%, n = 80) had scores in the high category for any one of the three MBI-HSS dimensions. The MBI-HSS dimensions differed significantly by type of work and job title. Roving positions (HCW working in more than one health facility) were more likely to experience higher emotional exhaustion and lower professional accomplishment. Qualitative findings (n = 25) indicate that a number of job demands, including high workload, inadequate mental health support, and challenging relationships with stakeholders, had a negative effect on HCWs' wellbeing. However, finding meaningfulness in their work, working as a team, and practicing autonomy were experienced as resources that reduced the negative effect of these demands.

Conclusion: While measured burnout syndrome rates were low, various experiences negatively impacted at least one in five HCW. We identified key resources that provided buffering against workplace stressors. We recommend that as well as addressing key drivers of burnout, access to these resources should be fostered, for example by strengthening interventions that offer recognition, and promoting team interactions through social activities and support groups.

KEYWORDS
burnout, healthcare, primary health care, wellbeing, healthcare worker (HCW)

Introduction

Burnout has become an important challenge for public health and is recognized as a prevalent occupational hazard among healthcare workers (HCWs) globally (1). Burnout is characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment (2). Research in high-income countries has revealed that as many as 50% of primary care providers report high levels of emotional exhaustion, depersonalization, and diminished personal accomplishment (3, 4). Although limited information on burnout from low- and middle-income countries (LMICs) has been reported (5), research reveals burnout rates of 50.1% among primary HCWs in China (6) and 51% in Brazil (7). Within Sub-Saharan Africa, burnout prevalence varies from 40 to 80% among HCWs, and had been attributed to adverse work conditions, high job demands, and low job satisfaction (8).

The consequences of burnout pose significant concerns for HCWs, clients, and the health system (9–12). HCWs' motivation, retention, and compassionate care can be impacted, influencing patient interactions and the provision of quality healthcare (11, 12).

The COVID-19 pandemic exacerbated the mental health burden on HCWs (13–16), impacting their psychological wellbeing (14, 17). In South Africa, scarce resources, combined with the added strain of the pandemic on an already vulnerable healthcare system, seem to have significantly heightened the stress encountered by HCWs during this period (18). Furthermore, intensified health needs for patients with tuberculosis (TB) and HIV, and strict lockdowns have further amplified socio-economic challenges, adding pressure to an already strained healthcare system, particularly affecting the public sector (19).

HCWs employed by non-profit organisations (NPO) play a crucial role (20, 21), especially in under-resourced settings where there is a shortage of HCWs employed by the Department of Health. While South Africa has relatively higher HCW densities than other SSA countries, the demand remains unmet, particularly within the Johannesburg Metropolitan area, which houses 10% of the country's population (22). The country's high burden of people living with HIV (PLHIV) places added strain on public primary healthcare services, necessitating the involvement of NPO-employed HCWs (23). Promoting the wellbeing of NPO-employed HCWs presents unique challenges due to the unpredictable nature of funding and competing priorities (24).

However, there is a research gap on burnout in primary health care settings in LMICs, particularly in the HIV/TB-funded NPO sector, and there is limited mixed methods research on HCWs' burnout (15, 25). To bridge this gap, the Anova Health Institute, a South African NPO, conducted a mixed methods study aiming to measure burnout, understand factors affecting workplace wellbeing, and explore strategies to mitigate burnout among HCWs employed by Anova, thereby contributing to a better understanding of HCWs' wellbeing in the context of NPOs and primary care settings.

Materials and methods

The study was conducted amongst Anova employed HCWs providing or supporting services in Johannesburg Metropolitan area in 127 primary healthcare clinics. According to data from the District Health Information System spanning April 2021 to March 2022, clinics had an average quarterly PHC headcount ranging from 1,600 to 20,300 people, inclusive of those on antiretroviral therapy and utilizing HIV services.

Study design

This study used sequential mixed methods design, combining quantitative and qualitative approaches. The quantitative approach allowed the authors to measure levels of burnout using a validated tool. The qualitative data from interviews added depth to the initial quantitative findings from questionnaires (26), by explaining what is causing burnout, what is protecting people from burnout, and how their experience of the workplace either leads to burnout or does not. This integration harnesses the complementary nature of both approaches, addressing the limitations and enhancing the strengths of each (27). Qualitative methodologies strengthen quantitative findings by allowing researchers to explore associations identified in quantitative data (26). The first phase consisted of a survey to measure burnout. A survey was chosen as it allows large populations to be assessed with relative ease (28). A validated survey instrument, the Maslach Burnout Inventory Human Services Survey (MBI-HSS) (2) was used. The MBI-HSS was previously validated in South Africa among emergency medical service (29) and in a multi country study among nurses that included countries from Africa (30). MBI-HSS consists of three component scales: emotional exhaustion (9 items), depersonalization (5 items) and personal accomplishment (8 items), each measuring a dimension of burnout. All MBI-HSS items were scored using 7 level frequency ratings from "never" to "daily" (2, 31).

The second phase was a qualitative approach. We conducted in-depth interviews with a sub-set of survey participants. This phase sought to explain key survey findings and explore factors affecting workplace wellbeing, to inform activities for preventing burnout in the future.

Abbreviations: DoH, Department of Health; HCW, health care worker; LMIC, low and middle-income country; MBI, Maslach Burnout Inventory; MBI-HSS, Maslach Burnout Inventory Human Services Survey; NPO, Non-Profit Organization; PEPFAR, President's Emergency Plan for AIDS Relief; PHC, Primary Health Care; PLHIV, People Living with HIV; SSA, Sub-Saharan Africa; USAID, United States Agency for International Development; WHO, World Health Organization.

Study population and sampling

All HCWs working in Anova Johannesburg program teams in the organization were eligible, including those in primary contact with patients such as clinicians, lay counselors, and administrative staff, and those whose tasks do not involve primary contact with patients, such as monitoring and evaluation and support staff. Approximately 973 staff members including facility based and support staff in Johannesburg were invited to participate in the voluntary electronic survey.

Following analysis of the MBI-HSS survey data, a sub-set of respondents were selected for a follow up in-depth interview, from those who agreed to be contacted during the survey. Interviews were conducted purposively to ensure individuals from different facilities as well as clinical (e.g., nurse) and non-clinical (e.g., data capturer) HCWs were included. Participants were interviewed until "theoretical saturation" was achieved, and no new themes or issues appeared in the data collected (32).

Data collection

Quantitative: surveys

A survey was distributed to 973 Anova HCWs between February and March,2022. Table 1 below shows the characteristics of HCWs who submitted survey responses.

An invitation to complete the survey and follow-up reminder (within a 4-week period) was sent out through work email addresses. Team managers were also asked to communicate to teams verbally about the survey in case the emails were not accessed. Survey data was collected and managed using a secure, web-based Research Electronic Data Capture (REDCap) (33), program. A paper-based option was made available. Participation in this study was voluntary and confidential. All the participants were > 18 years and were able to provide informed consent and were assured that the information would remain confidential (that no one other than the research team would know their identity) and that only anonymous quotes would be included in any resultant reports. HCWs were invited to participate in the study, giving participants an opportunity to decline without feeling pressured and assured no repercussions as a consequence of their response. Additionally, participants were given information on where they can seek help regarding their mental wellbeing.

Both electronic and paper-based surveys asked participants if they would like to participate in a follow-up interview. If they agreed to take part and provided contact details, and purposively selected by the study team to be interviewed, an appointment would be set to conduct the interview.

Qualitative: semi-structured interviews

We used existing literature on factors in the work environment known to affect burnout (34, 35) to develop the interview guide (Supplementary File S1). The guide discussed how participants experience and perceive burnout-related factors, e.g., autonomy, team dynamics, workload, support, feedback and their coping mechanisms. The interview guide was piloted, and only minor changes were made, focusing on improving the order of questions. The interviews were between 30 and 90 min. Interviews were conducted in person in isiZulu, SeSotho, TshiVenda, and English, audio recorded, translated to English, and transcribed. Transcripts were not returned to participants for comment.

Data management and analysis

Surveys

Survey data was analyzed using Stata 14 (StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP, TX, USA). Descriptive statistics were calculated, and multivariable logistic regression analysis was used to investigate the relationship between high scores for each dimension and possible explanatory factors. Explanatory factors were gender, place of work [Community Health Centre (CHC), Primary Health Care (PHC), community work, hospital, or office], roving (HCW supporting more than one health facility), clinical (e.g., professional nurse, enrolled nurse) vs. non-clinical staff, and level of job role [1 = frontline staff; 2 = frontline staff

TABLE 1 Health care workers characteristics.

	Population (all Anova Johannesburg employees)		Survey respondents		Qualitative interviews participants	
Characteristics	*N*	%	*N*	%	*N*	%
Gender						
Female	711	73%	152	78%	18	72%
Male	262	27%	40	21%	7	18%
Prefer not to say			2	1		
Job title						
Counsellor (HIV testing and adherence)	330	34%	79	41%	11	44%
Data (Data Capturer and M&E Officer)	195	20%	38	20%	3	12%
Professional or enrolled nurse	128	13%	36	19%	4	16%
Decanting	57	6%	11	6%	3	12%
Other	263	27%	30	16%	4	16%

managers (e.g., sub-district level manager); 3 = management level above sub-district level 2 (e.g., district team level manager); 4 = senior program management].

Burnout measures

The dimensions were categorized into 3 levels (low, moderate or high) based on the reference ranges provided with the MBI-HSS: emotional exhaustion scores were categorized as low (0–16), moderate (17–26) and high (≥27), professional accomplishment scores were categorized as low (0–31), moderate (32–38) and high (≥39), and depersonalization scores were categorized as low (0–6), moderate (7–12) and high (≥13) (2). Low scores are preferred for emotional exhaustion and depersonalization, while high scores are ideal for professional accomplishment.

Semi-structured interviews

Theoretical framework

We used a framework that tackles the interactions between demands and resources in the workplace context: the Job Demands-Resources (JD-R) model (35, 36). The JD-R model is one of the most applied models of burnout and work stress, specifically applicable when seeking to better understand the dynamics of wellbeing and motivational engagement processes in a demanding work environment (37–39). According to the model, an accumulation of demands (e.g., time pressure, unfavorable environmental conditions, interpersonal conflict, abusive supervision) places a strain on mental health, leading to negative outcomes such as exhaustion or burnout (34). On the other hand, resources (e.g., autonomy, support, feedback) have a positive impact and result in higher engagement and better performance at work through a motivational process (37). Demands and resources also interact with one another, meaning that available resources can soften the negative impact of demands (*ibid.*). The model assumes that high demands require workers to make more effort, resulting in diverse coping behaviors (34).

Analysis

Audio recordings were transcribed, with simultaneous translation. Transcripts were imported into NVivo 12 (NVivo qualitative data analysis software; QSR International Pty Ltd. Version 12, 2018). This software was used to organize and classify the data. Data were analyzed inductively using thematic analysis (40). The coding took place in two steps: the first team generated initial codes, and categories in an exploratory manner, while the second team independently reviewed and validated these codes and categories. During step 1, NMZ and KR, conducted open coding, during which the authors examined the text line by line and assigned codes to different parts of the data by marking and comparing meaning units and sorted them into codes. These codes were preliminary, and the coding process was iterative. NMZ conducted the second phase which involved categorization, where the codes were grouped into sub-categories and these sub-categories were then organized into broader categories. Each sub-category consisted of codes that were related in terms of topic or concept. Throughout this process, categories and codes were continually reviewed, leading to adjustments in naming, combining, and re-categorizing. Through this reanalysis, patterns and themes in the data were developed. To enhance the reliability of the findings, AJ and FB reviewed the coding process to ensure consensus on the identified codes, categories, and themes. Finally, themes were mapped to the JD-R model components: job demands. Job resources, and coping strategies.

Results

Survey results

A total of 194 HCWs participated in the survey, representing a response rate of 20% (194/973) and a good representation of our population was achieved (Table 1). There were more female than male HCW in the organization (73% vs. 27%), and in the participants who completed the survey (78% vs. 22%). Similarly, within the job category, the proportion within each category mirrored the organization distribution. Among the participants, most were female (78%, $n = 152$), and were non-roving, i.e., based at a single facility (79%) (Table 2). Highly represented job titles were counselors [HIV testing and (antiretroviral therapy) ART adherence counselors] (41%), data capturers (20%) and professional or enrolled nurses (19%).

MBI-HSS survey analysis revealed a low overall burnout rate of 0.5% across the 194 respondents but 40% of HCWs reported moderate/high levels of emotional exhaustion (Supplementary File S2). The scores for the three dimensions are represented in Figure 1. The median score for emotional exhaustion was 14.5 (low) with a range of 0–53.0. For professional accomplishment, participants had a median of 41.0 (high), which ranged from 0 to 48.0 and for depersonalization was 1 (low) with a range of 0–21.0.

In total 41% of the participants were categorized as either high emotional exhaustion or reduced personal accomplishment or high depersonalization. The characteristics of those who scored negatively for each MBI-HSS dimension among the participants is presented in Table 2. The comparison among different dimensions of burnout indicated that the proportion of reduced personal accomplishment (24% = 47/194) and emotional exhaustion (21% = 41/194) is relatively higher than depersonalization (6% = 12/194) among the participants.

The results revealed that the emotional exhaustion, professional accomplishment, and depersonalization of participants were not significantly different by gender. A significantly higher proportion of roving positions (HCW supporting more than one health facility) than non-roving reported high emotional exhaustion (67.5% vs. 32.5%, $p = 0.02$) and lower professional accomplishment (70.2% vs. 29.8%, $p = 0.01$). Depersonalization scores of participants were not significantly different by their roving status. The results revealed that the feeling of reduced personal accomplishment and depersonalization significantly differed by job titles. In depersonalization, nurses and counselors had higher scores than other job categories ($p = 0.01$%), while counselors and data capturers had reduced personal accomplishment ($p = 0.01$%).

TABLE 2 Characteristics of health care workers who scored EE = high, D = High, PA = Low.

	All participants		EE = high or D = high or PA = Low			EE = high			PA = Low			D = high		
Characteristics	*n*	%	*n*	%	*p*	*N*	%	*p*	*n*	%	*p*	*n*	%	*p*
Total	192		80	41		41	21		47	24		12	6	
Gender														
Female	152	78	66	43	0.28	33	22	0.67	38	25	0.68	9	6	0.72
Male	40	21	13	33		7	18		8	20		3	8	
Prefer not to say	2	1	1	50		1	50		1	50				
Roving														
No	153	79	56	37	0.02	27	18	0.05	33	11	0.10	10	7	0.99
Yes	40	20	23	58		13	33		14	35		2	5	
Job title														
Counselors	79	41	21	27	0.01	10	13	0.01	9	11	0.01	6	8	0.01
Data team	38	20	26	68		12	32		22	58		1	3	
Professional/enrolled nurse	36	19	10	28		5	14		5	14		3	8	
Decanting Mentor/Coordinator	11	6	6	55		1	9		5	45			0	
Other	30	16	16	53		12	40		6	20		2	7	

EE, emotional exhaustion; PA, professional accomplishment; D, depersonalization. *p*-values: Fishers exact test.

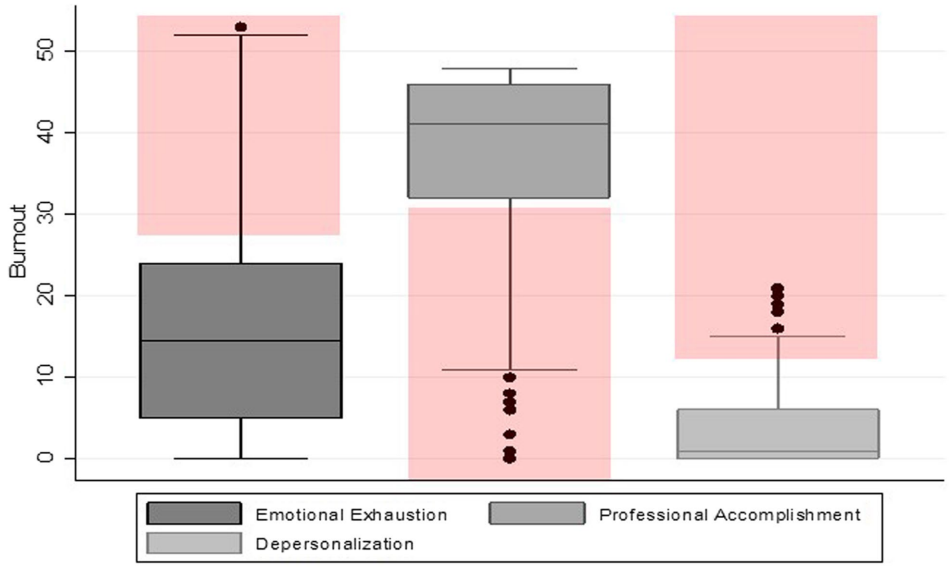

FIGURE 1
Distribution of burnout dimension scores. Red shading indicates high risk in each dimension.

Qualitative results

Twenty-five HCWs were interviewed. Table 1 describes the interviewees' characteristics.

Overall burnout syndrome levels among the participants were low. Given this, we centered our qualitative analysis on understanding the interaction between job demands and workplace wellbeing, to identify potential methods for promoting wellbeing in healthcare settings. Additionally, given the relatively higher likelihood of emotional exhaustion and low professional accomplishment among roving staff, our qualitative analysis looked for a possible explanation. However, we did not find any substantial differences in responses between roving HCWs and non-roving.

We developed five themes that contributed (positively or negatively) to work wellbeing: work conditions, management practices, work relationships, meaningfulness of work, and personal factors. Table 3 presents the themes and subthemes representing key job demands and resources.

TABLE 3 Summary of themes identified in the analysis, organized into job demands and resources.

Themes and subthemes	Job demand – description	Job resource -description
Theme – working conditions		
Mental health support	Lack of activities to support employees' mental wellbeing	
Workload	High workload has a negative impact on HCW wellbeing	
Work life balance	Inability to balance and separate work and private life	
Emotional effect of interacting with patients	Coping with distressing clients especially those connected to children, violent crimes, and sexual violence	
Nature of funding	Unpredictable funding in the sector affecting job security	
Theme: work relationships		
Colleague or peer relationship	Negative dynamics in the teams causing stress.	Supportive team relationships were important for managing stress at work
Line manager relationship	Line managers relationships were not perceived as supportive for some participants and contributed to stress	Line managers were reported as creating a better supportive climate for work wellbeing for others
Theme: management practices		
Autonomy		Most felt able and motivated to make constructive suggestions related to how they run their tasks
Recognition and career advancement	Lack of praise and recognition from management as a source of stress	Opportunities for career development were cited as a resource
Communication	Lack of platform to discuss and air out grievances	
Theme: meaningfulness of work		
Making a difference in clients' lives		Most were passionate about, and felt rewarded by, differences they make in their clients' lives.
Support service delivery		Non patient facing participants discussed how they feel their services enhance other's jobs which motivated them
Theme: family/personal issues	Stresses relating to relationships, including family, negatively affected workplace wellbeing.	

Working conditions

Participants referred to working conditions as a source of stress.

Workload- Participants described feeling overwhelmed by the high demands of work, pressure to meet targets, and the lack of time to meet those demands. Participants were concerned that they were not able to provide quality services.

> *When the line is too long, I feel overwhelmed, because the patients also start complaining that they have been here for this long. Female linkage officer.*

There were, however, some participants who described their workload in a positive way, pointing out that the amount of work was generally reasonable.

Work-Life Balance – Furthermore participants described the heavy workload to compromise private life; some participants mentioned lack of leisure time and strained family relationships.

Difficulties taking leave due to staff shortages contributed to this.

> *If I take 3 weeks my work will suffer and my work will wait for me and when I come back, it would have piled up and make me suffer work burnout because of the pressure. Female Decanting Officer.*

Emotional effect of interacting with patients - Participants described feeling very confident in their work and capable of effectively dealing with problems, however some reported being vulnerable or emotionally affected by patients' situations. One participant shared their experiences:

> *When I see someone who is struggling it makes me feel sad and I keep thinking about that person and it makes me stressed. I cannot even sleep at home because I keep thinking about that person. Female Retention Counselor.*

Some participants reported that they fail to separate themselves easily from emotions and difficult cases especially those involving children and sexual abuse.

Mental Health Support- Most participants felt there is a lack of consideration for employees' mental wellbeing. Some participants were not aware of systems for debriefing or support, while others felt that support was inadequate. All participants reported needing additional debriefing and mental health support. Many participants bemoaned that they do not have a platform to share their burdens with colleagues.

> *There is nothing much to be done about it because they do not even offer us debriefing….. So, I continue as if nothing has happened – Female Enrolled nurse.*

Nature of funding - Participants reported that they were constantly concerned about losing their jobs and were concerned about losing income due to funding uncertainties.

Regarding salary, many participants reported that the remuneration received for their work is not commensurate with the effort they put into their roles or skill set possessed. There was a general appreciation of having an income, but regardless of this, they felt that the workload did not match their salary.

> *My stress level is aggravated by the salary. My skill level does not match my salary. Male Data Capturer.*

Work relationships

This theme relates to relationships that participants have with colleagues within their organization, partner organizations and with their line managers, and the influence that such relationships can have on work wellbeing.

Relationship with colleagues within their organization – All participants described a great experience of support from their team and were positive about their relationships with their peers. This relationship appeared to be one of the key sources of support and encouragement for many interviewed. Most participants valued teamwork with their colleagues, finding it motivating. Participants also described informal peer support, discussing cases, and supporting and guiding each other.

> *I think that [relationship with other team members] is what keeps me going. I think with that I must applaud them. Even when I am feeling down or feel like quitting, they always support you. Female Enrolled Nurse.*

Relationship with line manager: There was a mix of positive and negative relationships with managers. Some participants described their managers as supportive in both work-related and personal factors:

> *My manager is cool, he sits down with me and if there is a problem, he calls me and tries to find out what is wrong, and we try and find a solution to that problem. Male Monitoring and Evaluation officer.*

Those who felt negatively toward their line manager described them as unavailable:

> *Sometimes you just have burnout, and we need to speak to her, but they do not allow us. Female Linkage officer.*

Relationship with Colleagues from host DOH- The relationship with the host was reported as difficult by most respondents, with only a few considering them to be positive. Respondents reported being undervalued and unfairly treated by colleagues from the host DOH. One particpant mentioned:

> *They sideline us and sometimes they will have the meetings and do not include us, and in those meetings, they will change things without including us and that is not okay because we work together. Female enrolled nurse.*

Management practices

The management practices theme relates to autonomy, communication, recognition and career advancement.

Autonomy- Another source of wellbeing was the perception of autonomy. Most felt able and motivated to present constructive suggestions related to how they run their tasks to their line managers. Participants indicated that they found their work satisfying as they are involved and free to express their opinion and have control when it came to managing their work.

> *The good thing about where I am right now is that I am given the opportunity to think out of the box and be independent to try and to find ways to interpret the data. It is because I get to liaise with different people, and I am trusted a lot with my work. Male Monitoring and Evaluation Officer.*

Communication- some participants stated that management lacks an open-door policy that would allow for consultation and staff involvement. Participants shared a desire for a platform where they can discuss critical issues and receive communication regarding changes in the organization.

> *There will not be any communication that addresses you as an individual but instead hear it from the grapevine or passages- Female Linkage officer.*

Recognition and career advancement - Participants' discussions on this theme were varied with both praise and criticism of their organization. Participants described promotions as well as career development through gaining on-the-job experience as motivating. While others reported feeling unappreciated by management, expressed a lack of support and understanding and shared that management did not give them sufficient recognition, implying a sense that some roles were unimportant and not respected as part of the team.

Meaningfulness of work

The rewarding nature of their roles was an important source of job satisfaction among participants. All participants described this as an important aspect of their job. Participants indicated that they found purpose and meaning in their work through making a positive difference in the lives of patients. One participant shared:

> *You know that young people are scared to come to the clinic so I work with young people who can relate, and I am a bridge to the clinic…. It makes me happy because it means that I can change someone's life. Female Youth Ambassador.*

This theme applied to all roles, and those employees who are not patient facing also found meaning in their work. Data related and supervisory role participants accounted for meaningful work in terms of offering services for the betterment of other providers in their workspace.

> *The impact that I have on the counselors, the support that I provide to them, I see the changes in their work, if I was not there for them, they will be lost. Male HIV Testing Services Coordinator.*

Personal factors

Participants acknowledged exposure to social stresses relating to relationships and family. Such experiences affect participants' work

wellbeing negatively and can affect the colleagues they work with. Conversely, when participants were asked about mechanisms for managing stress, family and social support were commonly mentioned as important factors.

> *I face situations, especially with kids' cases, and I talk to my husband at home, and I become well after those conversations. Female Linkage officer.*

Other mechanisms mentioned by participants included prayer, meditation, exercise, breaks, alcohol, and counseling. Some simply accepted the stressful situation and endured the work with no stress-reduction strategy.

Participants suggested interventions

Participants were asked to suggest interventions for building resilience or coping with stress or burnout. Their suggestions included:

Peer-based HCW support or debriefing sessions through group meetings or sessions- Participants highlighted that when held on a regular basis, these sessions offer HCWs mental support.

Acknowledgments and financial incentives were also suggested as important factors for uplifting HCWs morale and thus supporting their wellbeing.

Other participants suggested more involvement by management to better support team work especially with external partners.

Discussion

Our findings reveal that the prevalence of burnout syndrome among HCW in this setting is low, and we identified job resources that buffer against workplace stressors, mitigating risk of burnout. Although we report low rates of overall burnout, 40% of HCWs reported moderate/high levels of emotional exhaustion. Emotional exhaustion is the first stage leading to burnout (41), so this is a warning sign that burnout could follow. Our study highlights a need for the organization to address key drivers of burnout and foster the identified resources to promote HCW wellbeing and prevent vulnerable staff from progressing to a state of burnout. Burnout that would impact their own mental health and their ability to provide quality care to service users.

The low levels of overall burnout from our survey are inconsistent with previous studies conducted on different groups of HCWs (physicians, nurses, community health workers, midwives, and pharmacists) in LMIC using the MBI-HSS scale, which reported a prevalence ranging from 11.3 to 86.2% (25). Our findings are closer to those of studies from Ethiopia (42) and China (43) conducted among mixed primary health care workers with 3.3 –3.8% levels of burnout. The difference in findings could be attributed to the inclusion of non-patient facing HCWs in our study. Previous studies have cautioned that response profiles on the MBI-HSS are dependent on occupational contexts with regard to the nature of client-service work conducted by respondents (44). The scores in each MBI-HSS dimension [moderate to high emotional exhaustion (42.78%), high to moderate depersonalization (15.98%), and low to moderate personal accomplishment (39.69%)] are comparable to rates observed in frontline PHC service delivery providers including physicians, nurses, pharmacists, and community health workers in various outpatient health care settings including HIV care clinics in a number of LMICs (5). These studies, which include South African studies, found similar rates of moderate to high emotional exhaustion (range 27.4–99.6%), moderate to high depersonalization (13.3–98.0%), and low to moderate personal accomplishment (20.3–47.9%).

We found that roving positions were more likely to experience high emotional exhaustion and low professional accomplishment similar to a previous study on travel nurses (45). Job positions that require traveling or roving could contribute to burnout due to work-life imbalance (45) and stress (47). According to (48), consistently working side by side with familiar teammates builds a sense of belonging that may protect wellbeing, and lack of team identification is emotionally demanding and distressing (48). Roving positions may not foster team identification as easily as fixed positions.

Our qualitative findings suggest that job rewards and demands in our setting have a collective positive balance on most participants. Participants had high job demands characterized by high workload. The health sector in general is understaffed and lacks skills, creating a high workload (49). Because of the present economy, many organizations are finding themselves trying to accomplish more with fewer employees, subsequently affecting workload, employee–employer relationships, motivation, and job security (50). Furthermore, participants revealed that there was inadequate support for mental health promotion, consistent with findings from studies conducted in similar settings (51).

Relational issues with host department of health staff were reported as emotionally demanding and distressing. The effect of social undermining within healthcare teams (52), along with communication problems, absence of trust and unclear roles, increases the risk of burnout (53). NPO-government collaboration is a complicated process as it involves multiple organizations, each with their own priorities and characteristics (54). It is important that leadership teams of all stakeholders acknowledge this and actively support their frontline staff to be effectively incorporated into facility-based teams with greater efforts to build positive relationships across organizations.

While there were still many challenges to overcome, the study found participants to have high job resources. The majority of the respondents found great meaning in their roles, consistent with other studies of HCWs in primary care settings (51, 55) and linked to their job satisfaction. People working in data teams were most likely to have low professional accomplishment scores, suggesting they may need additional support in this area. Similar to previous literature, our participants indicated autonomy, support of supervisors, and positive relationships with colleagues to improve their job satisfaction (56). Moreover, the participants reported adopting strategies to bolster wellbeing including meditation, counseling, and getting support from friends and family. These job resources and strategies act together to promote HCW wellbeing at work, even in settings with high job demands. Our findings are similar to other studies, (40, 57) that have highlighted that there are factors (resources) which can act as buffers to stress at work and may reduce the effect of demands placed on the individual.

Finally, an objective of this study was to make recommendations to guide interventions to improve wellbeing and decrease burnout. Teamwork should be promoted through encouraging communication, promoting interaction (for example, through team meetings), providing opportunities for social activities and peer support groups, and training in good team dynamics. Acts of acknowledgment and appreciation through employee reward and recognition programs should be implemented, reflecting the respect and dignity that HCWs associate with their profession (58).

Limitations

The survey response rate was low (20%), although in line with other survey-based studies (59), as the response rate to online surveys is often low depending on the content and length of the questionnaire, especially among health professionals (60). People who are particularly struggling at work may be less likely to respond to survey request. The use of self-report measures in the survey is prone to biases arising from participants providing socially desirable responses and cultural factors. Concerns have been raised about how the MBI-HSS operationalizes burnout and there may be different cultural interpretations of questions related to the construct of burnout (8). However, the mixed method approach made it possible for in-depth analysis to complement survey findings. For example, despite the survey revealing low rates of burnout syndrome, the qualitative approach revealed the existence of high job demands, such as work overload, challenges with management, difficult workplace relationships, and the need for workplace mental health support.

Another limitation of this study is the absence of a comprehensive psychometric evaluation conducted to support the findings of the MBI-HSS. While the study focused on assessing burnout levels, the lack of accompanying psychometric analyses may undermine the robustness of our findings. This limitation should be considered when interpreting the study's findings and implications. We recommend that further investigations are undertaken to establish the validity of the burnout measures employed in this setting.

Conclusion

We found low rates of burnout syndrome, but fairly high rates of emotional exhaustion, and lack of personal accomplishment, as well as working conditions that negatively impacted wellbeing. Participants were exposed to high job demands, such as work overload, challenges with management, and difficult workplace relationships. However, most participants found value in their health care roles and the difference they made in people's lives. This meaning and teamwork within the organization promoted resilience and coping skills to protect against burnout. This NPO and other health sector employers should strengthen workplace interventions that promote resilience and help to prevent burnout, including by fostering these job resources, recongnizing, and, where possible, seeking to minimize job demands. Structured employee interventions should be designed to build and maintain resilience in a challenging environment.[1]

Data availability statement

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

1 A distress protocol was followed for participants should they become distressed and confidential counseling services were provided free of charge from the Employee Assistance Program (EAP).

Ethics statement

The studies involving humans were approved by Faculty of Health Sciences Research Ethics Committee at the University of Witwatersrand (WITS HREC Medical: M210417) and Provincial Health Research Committee (NHRD REF. NO.: GP_202110_050). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

KR, NM-Z, and MB developed the protocol. AJ and FB conducted the qualitative data collection. NS and NM-Z led the quantitative and qualitative data analysis, respectively, with input from AJ, FB, KR, MB, and ND. NM-Z wrote the first draft of the manuscript. AJ, FB, KR, and ND reviewed and revised the draft manuscript. All authors reviewed and approved the final manuscript as submitted.

Funding

This study forms part of Anova Health Institute's technical support funded by the US President's Emergency Plan for AIDS Relief (PEPFAR) through the United States Agency for International Development (USAID) under Cooperative Agreement number 72067418CA00023.

Acknowledgments

The authors would like to thank the following for their invaluable contribution: study participants and their supervisors.

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

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2023.1220301/full#supplementary-material

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Glossary of titles

Group	Job title	Description
Clinicians	Enrolled Nurse	Provide support to health facilities with the implementation of HIV Testing Service, Tuberculosis screening, promotion of family planning and provision of sexual reproductive health services, enhanced adherence counseling and facilitation of adherence clubs and other Central Chronic Medicines Dispensing and Distribution (CCMDD) modalities
	Professional Nurse	Support initiation of HIV infected clients on ART, PrEP, STI treatment and ensure full implementation of the 95 95 95 activities.
Counselors	Linkage Officer	Responsible for HIV Testing Services and ensure that proper linkage to care of all HIV infected patients is done according to DoH guidelines
	Retention Officer	Responsible to enhance retention in care with specific focus on patients (re)initiating ART, patients that are virally unsuppressed despite effective ART and patients at high risk of disengaging from care
Data Team	Monitoring and Evaluation (M&E) Officer	Lead and coordinate the implementation of M&E systems focused on data collection, analysis, and reporting of results within Anova APACE supported facilities
	Data Capturer	Carry out data-related admin work, capture patient's files, generate defaulter reports and compile monthly statistics
Decanting	Decanting	Implementing repeat prescription collection strategies (RPCS) – adherence clubs, spaced fast lane appointments and decentralized medicine options for patients on chronic treatment, targeting those that are stable
Other	Youth Ambassador	Promote healthy behaviors and prevent risk behaviors in adolescents through; the implementation of targeted interventions at individual, facility, and community level to enhance uptake of HIV-testing and linkage to and retention to treatment and uptake of prevention services such as PrEP and sexual reproductive health and services.
	HIV Testing Services Coordinator	Provide leadership and oversight to Anova Counselors and HIV Testing Services Testers allocated to work at primary health care facilities, hospital, and community
	Clinical Technical Advisor	Provide technical and operational support regarding diagnosis, clinical management and treatment of HIV and TB programs

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TYPE Brief Research Report
PUBLISHED 17 November 2023
DOI 10.3389/fpubh.2023.1287756

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RECEIVED 02 September 2023
ACCEPTED 30 October 2023
PUBLISHED 17 November 2023

CITATION
Nenadovic A, Radovanovic S, Joksimovic S, Gavrilovic J, Sorak M, Spasic M, Djonovic N, Vasiljevic D, Stajic D, Djordjevic G, Djordjevic O, Vuckovic-Filipovic J, Zivkovic Zaric R and Sekulic M (2023) Burnout syndrome among medical nurse-technicians in intensive care units in cardiovascular surgery.
Front. Public Health 11:1287756.
doi: 10.3389/fpubh.2023.1287756

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Burnout syndrome among medical nurse-technicians in intensive care units in cardiovascular surgery

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Background: Healthcare workers in intensive care units work under specifically hard conditions compared to healthcare workers who work under regular clinical conditions. In this sense, the research aims at assessing the level of burnout symptomatology among nurse technicians working in intensive care units for cardiovascular surgery and to compare those burnout levels with those recorded for medical technicians working under regular clinical conditions.

Method: The research was designed as a cross-sectional study. The sample consisted of nurse technicians working in intensive care units specializing in cardiovascular surgery (70 participants) and nurse technicians working under regular clinical conditions (70 participants) at the Institute for Cardiovascular Diseases "Dedinje," Belgrade, Serbia. To evaluate the manifestation of burnout syndrome at work, the analysis uses the Serbian version of the Maslach Burnout Inventory-Human Services Survey (MBI-HSS).

Results: To examine the variances in the average sub-scores for burnout within two groups of medical technicians, the study used Two Independent Samples *T*-test. The statistically noteworthy differentiation was ascertained for emotional exhaustion and personal accomplishment, but this does not hold true for depersonalization. However, the mean score values across the different burnout levels (low, moderate, high) are similar in two cohorts of respondents ($p > 0.05$).

Conclusion: This study will serve as an impetus for a policy reform focused on ameliorating working conditions and improving healthcare workers' satisfaction and overall healthcare quality.

KEYWORDS

burnout syndrome, medical nurse-technicians, intensive care units, cardiovascular surgery, Serbia

Introduction

The work-related burnout syndrome is a condition characterized by a state of protracted involvement in emotionally demanding circumstances, which results in a tripartite manifestation of physical, emotional, and cognitive exhaustion. The operational characterization stratifies burnout into three primary domains: emotional fatigue, depersonalization, and personal accomplishment. Freudenberger and Maslach are forbearers in elucidating the intricacies of occupational burnout (1, 2). The World Health Organization (WHO) has formally recognized burnout as a "professional phenomenon" within the ambit of the International Classification of Diseases 11th Revision, thus acknowledging its gravity as a pertinent health concern (3). The chronicity of burnout syndrome can lead to deep emotional reactions that, without intervention or guidance aimed at its prevention, can cause damage to the physical and psychological integrity of professionals (4). The evidence suggests that burnout symptoms among healthcare workers are elevated across all specialties and in all countries. However, significant disparities have been observed among geographic regions, specialties, and burnout measurement methodologies. It has been ascertained that registered nurses experience a higher level of burnout compared to other healthcare professionals due to the nature of their profession (5). Nursing is considered to be a high-risk profession due to daily exposure to difficult situations such as death and pain care. In other words, intensive care units (ICU) can be stressful due to high levels of mortality, critical medical conditions, and ethical dilemmas (6). Intensive care units (ICU) constitute a hurried, stressful, intricate environment wherein healthcare professionals routinely provide an array of advanced life support and life-sustaining measures to a diverse spectrum of critically ill patients (7). Healthcare workers in intensive care units work under specifically hard conditions compared to healthcare workers who work under regular clinical conditions. Frontline experts in the ICU are directly engaged in patient care and can be subjected to significant psychosocial stressors, moral distress, and burnout. Burnout can also cause deterioration in the quality of care, increasing the risk of morbidity and mortality in patients due to poor performance and increased possibility of making errors (8).

In this sense, it is interesting to carry out a study on burnout levels in ICUs. So far, no extensive research has been conducted on this topic in Serbia. The aim of this research is to assess the level of burnout symptomatology among nurse technicians working in intensive care units for cardiovascular surgery because they are expected to have higher burnout levels compared to those working in regular clinical settings. Additionally, the study seeks to determine possible correlations between the demographic and socio-economic characteristics of the participants and the degree of burnout experienced in both groups under investigation because it has been reported that the susceptibility to burnout syndrome in ICU nurses is influenced by socio-demographic determinants (youth, unmarried status and limited professional experience within intensive care) and employment-related circumstances (excessive workload and prolonged work duration) (9–12).

Materials and methods

Study design

The cross-sectional survey was conducted during March and April 2023.

Study population

The medical technicians in intensive care units and medical technicians in regular clinical institutions at the cardiovascular surgery department of the Institute for Cardiovascular Diseases "Dedinje," Belgrade, Serbia who met the inclusion criteria were considered eligible to participate in the study.

Sampling process

The precise number of respondents within each group was calculated based on the data from the studies with similar study design (7) using the statistical program G* Power 3.1 software for random samples. With an effect size of 0.3, an alpha error of 0.05, and a study power of 0.95, the software computed that a sample size of at least 68 participants would be adequate. The sample size was approximated to 70 respondents, adhering to the study's design involving two cohorts of participants. The 140 subjects were randomly drawn from the total pool of nurses. Anonymous self-reported questionnaires were distributed by department heads to 140 nurse technicians (70 nurse technicians working in intensive care units and 70 nurse technicians working in regular clinical settings).

The inclusion criteria were as follows: the age of 19 years and above, nurse technicians employed on fixed-term or indefinite contracts during the research period.

The exclusion criteria were: younger than 19 years, interns/volunteers, employees on sick leave or annual leave, employees with work discontinuity exceeding 1 year (due to absences for professional development in other institutions, extended absence from the workplace due to illness), employees exposed to significant psychophysical trauma in the preceding 6 months (independent of the professional environment).

All respondents were informed in writing that their participation was voluntary and that the information they provided would be treated as confidential. Participants signed written informed consent to participate in this study.

The research protocol gained ethical approval from the Institutional Ethics Committee. The research adhered rigorously to the guidelines delineated in the Helsinki Declaration and the principles of Good Clinical Practice.

Research instruments

For assessing socio-demographic variables, a distinct questionnaire was devised for the purposes of this study.

The questionnaire comprised inquiries pertaining to socio-demographic information, including gender, age, educational attainment, marital status, household size, number of children, cigarette and alcohol consumption, physical activity, dietary habits, and participants' socioeconomic status. Within the context of work conditions, the questionnaire covered the type of occupation (nurse technician, senior nurse technician), years of work experience, current employment status (permanent, fixed-term), work environment (intensive care or regular clinical conditions, shift work, contact with COVID-19 positive patients, duration of work in the COVID-19 system, contact with contaminated materials during work, availability of protective equipment, and sufficient number of healthcare workers).

To evaluate the manifestation of burnout syndrome at work, we used the translated and culturally-adapted Serbian version of Maslach Burnout Inventory-Human Services Survey (MBI-HSS), (Cronbach's $\alpha = 0.72$) (13). This instrument assesses three dimensions: (1) emotional exhaustion (2) depersonalization of persons and (3) personal accomplishment. Each item is scored based on respondents' evaluations, ranging from "never" experiencing particular feelings to "feeling a few times a week." Accordingly, the score range for emotional exhaustion is 0–54 (a score <19 indicates low burnout, 19–26 signifies moderate burnout, and >26 reflects high burnout). The depersonalization score range is 0–30 (<6 signifies low burnout, 6–9 represents moderate burnout, and >9 indicates high burnout). The personal accomplishment evaluation yields scores within the range of 0–48 points (>39 indicates low burnout, 34–39 signifies moderate burnout, and <34 reflects high burnout). High scores in emotional exhaustion and depersonalization correspond to higher levels of burnout, whereas a high score in personal accomplishment corresponds to a lower level of burnout in that dimension (13). The rate of item response was very high (100%) and it demonstrates excellent item-response frequency on the MBI-HSS among Serbian nurse technicians.

Statistical data analysis

The statistical processing and examination of data were performed with IBM SPSS Statistics 22 software package. Kolmogorov-Smirnov test was applied to test normal distribution. The continuous variables were represented as mean values ± standard deviation, whereas categorical variables were portrayed as the ratio of participants displaying a specific outcome. The chi-square test ($\chi 2$) was used for analyzing the association in categorical variables, while the differences in continuous variables were tested by using the independent samples T test (in the case of normal distribution of variables), respectively Mann-Whitney test (in the case of non-normal distribution of variables). A multivariable regression model was used to establish the relationship between the dependent variable (burnout syndrome) and the independent variables (sociodemographic characteristics), separately for the group of medical technicians working in intensive care units and medical technicians working in regular clinical conditions. The results were conveyed textually, through tabulation and graphically.

Results

Socio-demographic profile of the study cohort

A comprehensive overview of the socio-demographic characteristics of the study cohort is presented in Table 1.

The average score for emotional exhaustion among medical technicians employed in intensive care units was 22.47 ± 10.19 (min 1, max 54), whereas it was 21.43 ± 11.94 (min 0, max 45) within the group of medical technicians working under standard clinical conditions. Although the mean sub-score for emotional fatigue was marginally higher in the subset of medical technicians stationed in intensive care units when compared to their counterparts in routine clinical settings (implying a greater level of professional burnout among intensive care unit technicians), no statistically significant distinction was recorded between these two participant subsets (Independent samples T test, $p = 0.579$).

The average score for depersonalization among medical technicians employed in intensive care units amounted to 4.10 ± 5.05 (min 0, max 18) and it was 3.31 ± 4.61 (min 0, max 24) for medical technicians working in regular clinical conditions. A higher depersonalization sub-score within the group of medical technicians in intensive care units suggests an increased level of burnout. Nevertheless, the disparity in depersonalization between the two cohorts of participants did not yield statistically significant results (Mann Whitney test, $p = 0.764$).

The average value of the score for personal accomplishments among the group of medical technicians engaged in the units of intensive care amounted to 34.74 ± 11.27 (minimum 2, maximum 48), while the same value for the cohort of medical technicians working under regular clinical conditions was 35.23 ± 10.24 (minimum 6, maximum 48) (Mann Whitney test, $p = 0.965$). Lower sub-scores for personal accomplishments within the subset of technicians in intensive care units also supports the assumption that burnout syndrome is more pronounced (although not statistically significant) within this group compared to technicians in standard clinical environments. In alternate terms, no statistically significant distinction was evidenced in the mean sub-scores concerning the manifestation of burnout syndrome between the two groups of respondents.

As observable from Table 2, upon scrutinizing variances in the average sub-scores for the degree of burnout within the context of two distinct assemblies of medical technicians, a statistically noteworthy differentiation was recorded for emotional exhaustion and personal accomplishment with Two Independent Samples T-test. However, this did not hold true for depersonalization. On the other hand, the mean score values across the different burnout levels (low, moderate, high) were similar for the two cohorts of respondents ($p > 0.005$).

Namely, it has been ascertained that medical technicians within intensive care units manifest a moderately heightened degree of emotional exhaustion within the context of the low "burnout" classification in relation to the cohort of medical technicians working in conventional clinical settings (13.20 ± 4.12 vs. 9.07 ± 5.71) ($p = 0.005$). Analogously, a statistically significant divergence

TABLE 1 Socio-demographic characteristics of the study population evaluation of the degree of burnout symptoms in the workplace.

		Medical technicians		*p*
		Intensive care unit $n = 70$	Regular clinical conditions $n = 70$	
Gender	Male	12 (17.1%)	15 (21.4%)	$p = 0.669$
	Female	58 (82.9%)	55 (78.6%)	
Age/X ± SD		36.35 ± 10.01	38.14 ± 12.87	$p = 0.361$
Education/school	Secondary school	31 (44.3%)	31 (44.3%)	$p = 0.276$
	College	19 (27.1%)	26 (37.1%)	
	High school	20 (28.6%)	13 (18.6%)	
Marital status	Single	30 (42.9%)	34 (48.6%)	$p = 0.527$
	Married	37 (52.9%)	31 (44.3%)	
	Divorced	3 (4.3%)	5 (7.1%)	
Number of household members/X ± SD		3.46 ± 1.40	3.23 ± 1.65	$p = 0.379$
Number of children/X ± SD		1.0 ± 1.05	1.01 ± 1.12	$p = 0.938$
Cigarette consumption	Yes	36 (51.4%)	23 (32.9%)	**$p = 0.040$**
	No	34 (48.6%)	47 (67.1%)	
Alcohol consumption	Yes	16 (22.9%)	14 (20%)	$p = 0.837$
	No	54 (77.1%)	56 (80%)	
Nutrition	Regular	24 (34.3%)	15 (21.4%)	$p = 0.131$
	Irregular	46 (65.7%)	55 (78.6%)	
Physical activity	Yes	36 (51.4%)	34 (48.6%)	$p = 0.866$
	No	34 (48.6%)	36 (51.4%)	
Material status	Very good	3 (4.3%)	4 (5.7%)	$p = 0.067$
	Good	64 (91.4%)	55 (78.6%)	
	Bad	3 (4.3%)	11 (15.7%)	
Work experience/year/X ± SD		15.0 ± 9.52	16.45 ± 12.54	$p = 0.440$
Employment Status	Unspecified	57 (81.4%)	57 (81.4%)	$p = 1$
	Certain	13 (18.6%)	13 (18.6%)	
Organization of work	Shift work	64 (91.4%)	28 (40%)	**$p < 0.001$**
	Shift work + on-call		15 (21.4%)	
	One shift	6 (8.6%)	26 (37.1%)	
	Other	/	1 (1,4%)	
Contact with persons with COVID-19 infection	Yes	60 (85.7%)	64 (91.4%)	$p = 0.426$
	No	10 (14.3%)	6 (8.6%)	
Use of protective equipment	Yes	70 (100%)	70 (100%)	/
	No	/	/	

The bold values are statistical significance.

has been underscored within the low "burnout" classification for personal accomplishment, signifying that the mean metric was comparatively lower in medical technicians (or rather, a more pronounced "burnout" state) in the intensive care units as opposed to their counterparts engaged in regular clinical environments (40.46 ± 2.54 vs. 42.83 ± 2.82) ($p = 0.017$).

In the subsequent phase of our investigation, we delved deeper into the average subscale scores associated with burnout syndrome, considering the socio-demographic attributes within the cohort of medical technicians in intensive care units (Table 3) and the cohort of medical technicians in conventional clinical environments (Table 4). Drawing upon the collected data, it can be inferred that there is a discrepancy in the intensity of burnout with respect to gender in terms of depersonalization among the technicians in intensive care units. Notably, the higher average score recorded among male individuals serves as an indicator of

TABLE 2 Relationship between mean subscale scores and the extent of "burnout" across two participant groups.

MBI-HSS subscores		Medical technicians					
		Intensive care unit		Regular clinical conditions		P^*	P^{**}
		n (%)	X ± SD	*n* (%)	X ± SD		
Emotional exhaustion	Low "burn" <19	30 (42.9%)	13.20 ± 4.12	28 (40.0%)	9.07 ± 5.71	0,793	**0.005**
	Moderate "burn" 19–26	15 (21.4%)	22.80 ± 2.43	15 (21.4%)	23.20 ± 2.81	1	0.624
	High "burn" >26	25 (35.7%)	33.40 ± 6.54	27 (38.6%)	33.26 ± 5.35	0.782	0.861
Depersonalization	Low "burn" < 6	56 (80%)	1.39 ± 1.56	48 (68.6%)	1.10 ± 1.66	**<0.001**	0.138
	Moderate "burn" 6–9	7 (10%)	7.43 ± 1.27	9 (12.9%)	7.44 ± 1.33	0.682	0.981
	High "burn" >9	7 (10%)	14.57 ± 4.31	13 (18.6%)	12.84 ± 2.79	0.587	0.393
Personal accomplishment	Low "burn" >39	30 (42.9%)	40.46 ± 2.54	30 (42.9%)	42.83 ± 2.82	0.232	**0.017**
	Moderate "burn" 34–39	14 (20%)	36.62 ± 1.76	8 (11.4%)	37.07 ± 1.43	0.272	0.570
	High "burn" <34	26 (37.1%)	24.31 ± 8.02	32 (45.7%)	24.21 ± 7.05	0.249	0.748

*Chi-square ($\chi 2$) test. **Independent samples *T* test/Mann Whitney test. The bold values are statistical significance.

an amplified levels of burnout ($p = 0.008$). Similarly, our findings demonstrate a positive correlation between physical activity and personal accomplishment in this group. Specifically, our results suggest that a greater degree of burnout within the realm of personal accomplishments is present among technicians who are not engaged in regular physical activity ($p = 0.022$).

Table 4 testifies to the fact that among medical technicians working under conventional conditions, emotional exhaustion is more pronounced in older individuals ($p = 0.015$), those with a higher number of household members ($p = 0.044$), those with a work experience exceeding 20 years ($p = 0.029$), and those employed on an indefinite basis ($p = 0.016$).

Based on the results of the multivariable regression analysis, we can conclude that the prevalence of burnout syndrome among medical technicians from intensive care units depends on marital status, physical inactivity (in terms of its impact on personal accomplishment). As demonstrated in Table 5, the prevalence of burnout syndrome among medical technicians working in regular clinical conditions depends on the following independent variables: age, number of children, length of service, indefinite employment (in terms of its impact on emotional exhaustion), middle, and higher level of education, alcohol consumption (in terms of influence on personal accomplishment).

Discussion

Occupational burnout occurs most frequently in professions of public trust that involve helping other people, which is especially emphasized in case of nursing. The previous studies have confirmed that nursing is the most stressful job among the 40 analyzed professions (14) and that nurses experience very high levels of burnout, dissatisfaction, and work-related stress (15). Nurses work with many people, including patients, families, and co-workers, which exposes them to occupational burnout (16). Some studies have revealed that the overall MBI score was the highest in nurses from intensive care units (17). The results of our research show that medical technicians within intensive care units manifest an averagely heightened levels of emotional exhaustion and personal accomplishment within the context of the low "burnout" classification in relation to the cohort of medical technicians working under conventional clinical circumstances. This did not hold true for depersonalization. However, the mean score values across the different burnout levels (low, moderate, high) exhibited similarity amidst the two cohorts of respondents. In addition, the results indicate that there are certain correlations between the demographic and socio-economic characteristics of the participants and the levels of burnout experienced in both investigated groups. In the cohort of medical technicians working in conventional working conditions, emotional exhaustion is more pronounced in older people, those with a larger number of household members, those with work experience over 20 years, and those with indefinite employment. Among technicians working in intensive care units, our results suggest that a higher levels of personal accomplishment burnout is observed in male technicians who do not engage in regular physical activity.

Some studies have revealed that respondents who are older than 35 years were less likely to develop emotional exhaustion and depersonalization. Longer working hours in intensive care units are associated with a reduced sense of personal accomplishment. Among nurses, males have a lower sense of professional accomplishment, and not exercising regularly is associated with more emotional exhaustion and less depersonalization. Working in cardiology intensive care units makes them less likely to have a reduced sense of personal accomplishment (8).

Other authors emphasize that elevated levels of emotional exhaustion (EE) can be linked to personal factors such as being single and having childcare responsibilities, as well as work-related factors such as long working days, poor quality of work life, and

TABLE 3 Presentation of the relationship between components of burnout syndrome and the socio-demographic characteristics of participants working in intensive care units.

		Burnout syndrome					
		Emotional exhaustion	*P**	Depersonalization	*P**	Personal accomplishment	*P**
Gender	Male	23.58 ± 7.90	0.681	5.25 ± 4.11	**0.008**	31.0 ± 13.34	0.322
	Female	22.24 ± 10.64		2.91 ± 4.64		36.10 ± 9.38	
Age	19–35	20.81 ± 9.75	0.214	3.75 ± 5.09	0.366	35.62 ± 10.24	0.684
	36–64	23.86 ± 10.46		2.94 ± 4.20		34.89 ± 10.36	
Education/school	Secondary school	21.80 ± 12.14	0.626	3.32 ± 4.37	0.981	34.29 ± 11.20	0.861
	College	21.57 ± 9.29		3.16 ± 3.74		35.21 ± 10.91	
	High school	24.35 ± 7.57		3.45 ± 5.80		36.70 ± 8.14	
Marital status	Single	21.30 ± 10.36	0.638	2.50 ± 3.04	0.442	37.26 ± 9.24	0.099
	Married	23.56 ± 10.20		3.89 ± 5.61		34.43 ± 10.11	
	Divorced	20.67 ± 10.21		4.33 ± 3.78		24.66 ± 17.24	
Number of household members	≤3	23.17 ± 10.83	0.639	3.32 ± 3.86	0.992	33.53 ± 10.17	0.262
	>3	22.00 ± 9.84		3.31 ± 5.09		36.35 ± 10.25	
Number of children	≤2	22.47 ± 10.35	0.987	3.23 ± 4.56	0.589	35.20 ± 9.89	0.934
	>2	22.40 ± 8.48		4.40 ± 5.68		35.60 ± 15.56	
Cigarette consumption	Yes	24.42 ± 9.62	0.101	3.66 ± 5.19	0.597	33.94 ± 10.12	0.284
	No	20.41 ± 10.51		2.94 ± 3.95		36.58 ± 10.34	
Alcohol consumption	Yes	24.18 ± 7.96	0.447	4.12 ± 4.60	0.227	32.81 ± 9.18	0.129
	No	21.96 ± 10.77		3.07 ± 4.63		35.94 ± 10.50	
Nutrition	Regular	21.0 ± 10.36	0.387	2.79 ± 3.86	0.622	34.04 ± 11.09	0.488
	Irregular	23.23 ± 10.13		3.58 ± 4.97		35.84 ± 9.83	
Physical activity	Yes	20.72 ± 8.77	0.141	4.05 ± 5.08	0.102	38.05 ± 6.64	**0.022**
	No	24.32 ± 11.34		2.53 ± 3.97		32.55 ± 12.24	
Material status	Very good	24.67 ± 9.61	0.797	0.33 ± 0.57	0.261	45.0 ± 3.64	0.195
	Good	22.50 ± 10.39		3.42 ± 4.72		34.96 ± 10.33	
	Bad	19.67 ± 8.14		4.0 ± 4.0		31.0 ± 8.18	
Work experience/year	1–20	21.56 ± 9.94	0.498	3.75 ± 5.11	0.459	34.87 ± 10.77	0.793
	21–45	23.23 ± 10.47		2.94 ± 4.17		35.52 ± 9.90	
Employment Status	Unspecified	23.12 ± 10.50	0.266	3.49 ± 4.93	0.793	34.49 ± 10.64	0.210
	Certain	19.61 ± 8.48		2.54 ± 2.82		38.46 ± 7.75	
Organization of work	Shift work	22.42 ± 9.6	0.769	3.57 ± 4.77	0.176	35.00 ± 10.66	0.825
	Shift work + on-call	16.00		2.00		40.00	
	One shift	24.00 ± 16.52		0.83 ± 1.60		36.83 ± 5.38	
	Other	/		/		/	
Contact with persons with COVID-19 infection	Yes	22.03 ± 9.80	0.382	3.02 ± 4.50	0.189	35.65 ± 9.98	0.403
	No	25.10 ± 12.56		5.10 ± 5.11		32.70 ± 11.90	

The bold values are statistical significance. *Independent samples *T* test/Mann Whitney test.

TABLE 4 Presentation of the relationship between components of burnout syndrome from the perspective of socio-demographic attributes of participants engaged in regular clinical conditions.

		Burnout syndrome					
		Emotional exhaustion	*p*	Depersonalization	*p*	Personal accomplishment	*p*
Gender	Male	16.93 ± 10.93	0.100	4.33 ± 6.28	0.812	39.26 ± 9.04	0.080
	Female	22.65 ± 12.00		4.03 ± 4.73		33.50 ± 11.57	
Age	19–35	17.88 ± 11.19	**0.015**	3.67 ± 5.16	0.354	36.44 ± 11.52	0.223
	36–64	24.77 ± 11.79		4.50 ± 4.99		33.14 ± 10.94	
Education/ school	Secondary school	22.54 ± 12.12	0.768	4.58 ± 5.30	0.062	33.90 ± 11.74	0.066
	College	20.84 ± 11.91		4.73 ± 5.08		32.53 ± 11.30	
	High school	19.92 ± 12.24		1.69 ± 3.90		41.15 ± 7.96	
Marital status	Single	18.94 ± 11.22	0.120	4.41 ± 5.53	0.656	36.67 ± 11.31	0.370
	Married	24.71 ± 12.56		4.22 ± 4.84		32.71 ± 11.39	
	Divorced	18.00 ± 9.30		1.20 ± 1.30		34.20 ± 10.03	
Number of household members	≤3	19.09 ± 11.58	**0.044**	3.85 ± 5.09	0.299	35.47 ± 11.13	0.509
	>3	24.92 ± 11.80		4.46 ± 5.07		33.64 ± 11.60	
Number of children	≤2	20.38 ± 11.58	**0.041**	3.95 ± 5.05	0.527	34.80 ± 11.53	0.897
	≤2	29.50 ± 12.35		5.25 ± 5.31		34.25 ± 9.67	
Cigarette consumption	Yes	20.69 ± 13.61	0.722	4.17 ± 4.93	0.711	35.69 ± 12,63	0.624
	No	21.78 ± 11.17		4.06 ± 5.16		34.27 ± 10.66	
Alcohol consumption	Yes	20.85 ± 12.90	0.843	6.28 ± 6.55	0.135	33.37 ± 11.82	0.060
	No	21.57 ± 11.80		3.55 ± 4.51		40.21 ± 6.54	
Nutrition	Regular	19.73 ± 12.37	0.539	6.06 ± 6.17	0.174	35.53 ± 9.89	0.762
	Irregular	21.89 ± 11.89		3.56 ± 4.62		34.52 ± 11.69	
Physical activity	Yes	19.08 ± 10.70	0.112	4.47 ± 5.37	0.710	35.32 ± 12.52	0.679
	No	23.63 ± 12.75		3.75 ± 4.78		34.19 ± 10.10	
Material status	Very good	19.75 ± 11.41	0.652	2.75 ± 3.20	0.848	42.25 ± 7.04	0.340
	Good	20.94 ± 11.59		4.40 ± 5.30		33.94 ± 11.54	
	Bad	24.45 ± 14.34		3.09 ± 4.36		36.00 ± 10.74	
Work experience/year	1–20	19.19 ± 12.28	**0.029**	4.50 ± 5.17	0.368	35.02 ± 10.95	0.777
	21–45	25.70 ± 10.17		3.33 ± 4.83		34.21 ± 12.09	
Employment Status	Unspecified	23.05 ± 11.77	**0.016**	4.56 ± 5.31	0.092	33.91 ± 11.09	0.199
	Certain	14.31 ± 10.24		2.07 ± 3.20		38.38 ± 11.78	
Organization of work	Shift work	21.25 ± 12.85	0.163	4.57 ± 5.43	0,260	33.35 ± 11.95	0.763
	Shift work + on-call	16.53 ± 10.80		2.86 ± 5.47		36.13 ± 11.87	
	One shift	23.88 ± 10.97		4.04 ± 4.33		35.69 ± 10.56	
Contact with persons with COVID-19 infection	Yes	21.60 ± 12.25	0.682	4.37 ± 5.18	0.154	34.37 ± 11.48	0.377
	No	19.50 ± 8.38		1.16 ± 1.83		38.66 ± 8.52	

The bold values are statistical significance.

insufficient time for self-emperor (18, 19). Shift work and factors related to work patterns have been explored across various studies which reported ambiguous findings concerning the relationship between nocturnal employment and weekly labor hours and burnout. Nocturnal shift labor has been linked to emotional exhaustion, whereas rotational shift employment heightens shift

TABLE 5 Multivariable regression analysis of the association of socio-demographic characteristics with the burnout syndrome through two participant groups.

Variables		Burnout syndrome intensive care unit					
		Emotional exhaustion		Depersonalization		Personal accomplishment	
		OR (95%CI)	*p*	OR (95%CI)	*p*	OR (95%CI)	*p*
Gender	Male	1.955 (1.342–2.493)	0.681	2.336 (0.550–5.223)	0.111	0.916 (0.514–1.307)	0.117
	Female	1		1		1	
Age		0.164 (0.081–0.327)	0.510	0.072 (0.039–0.150)	0.484	0.158 (0.087–0.402)	0.202
Education/ school	Secondary school	2.544 (1.424–3.337)	0.391	1.996 (1.127–2.807)	0.925	2.410 (1.511–4.430)	0.419
	College	2.771 (1.340–3.798)	0.403	2.701 (0.863–3.286)	0.846	1.489 (0.810–2.123)	0.654
	High school	1		1		1	
Marital status	Single	0.786 (0.633–1.305)	0.919	1.883 (0.742–3.758)	0.515	1.260 (0.465–2.473)	**0.042**
	Married	0.901 (0.411–1.521)	0.640	1.441 (0.510–2.777)	0.874	0.976 (0.264–1.796)	0.110
	Divorced	1		1		1	
Number of household members		0.991 (0.760–2.512)	0.389	0.687 (0.301–1.276)	0.222	0.996 (0.855–2.612)	0.335
Number of children		1.807 (0.539–2.886)	0.648	0.759 (0.069–1.364)	0.571	1.818 (0.539–2.897)	0.649
Cigarette consumption	Yes	4.005 (0.798–8.808)	0.101	1.486 (0.725–2.937)	0.515	1.644 (0.752–2.237)	0.284
	No	1		1		1	
Alcohol consumption	Yes	3.583 (2.225–8.032)	0.447	1.051 (0.798–2.679)	0.428	0.691 (0.017–1.076)	0.186
	No	1		1		1	
Nutrition	Regular	2.039 (1.239–2.892)	0.387	2.795 (1.532–3.123)	0.498	1.806 (0.971–3.359)	0.488
	Irregular	1		1		1	
Physical activity	Yes	3.601 (1.221–7.423)	0.141	1.096 (0.661–1.526)	0.168	0.764 (0.550–1.024)	**0.024**
	No	1		1		1	
Material status	Very good	2.181 (1.181–5.00)	0.555	2.267 (0.969–3.890)	0.366	1.400 (0.529–3.052)	0.096
	Good	1.498 (0.931–2.833)	0.644	0.578 (0.211–1.045)	0.833	1.069 (0.799–1.592)	0.510
	Bad	1		1		1	
Work experience/year		0.156 (0.102–0.360)	0.431	0.079 (0.038–0.155)	0.520	0.193 (0.116–0.375)	0.375
Employment Status	Unspecified	4.507 (2.773–9.748)	0.266	1.889 (0.953–3.794)	0.506	2.283 (1.022–3.970)	0.210
	Certain	1		1		1	
Organization of work	Shift work	0.722 (0.571–1.104)	0.722	2.738 (1.197–4.673)	0.169	1.067 (0.700–1.833)	0.680
	Shift work + on-call	1.421 (0.800–3.021)	0.475	1.167 (0.984–1.780)	0.816	2.551 (1.917–3.167)	0.778
	One shift	1		1		1	
Contact with persons with COVID-19 infection	No	1.487 (0.879–3.892)	0.382	2.083 (1.044–5.211)	0.188	0.950 (0.045–1.945)	0.403
	Yes	1		1		1	
Variables		**Burnout syndrome regular clinical conditions**					
		Emotional exhaustion		Depersonalization		Personal accomplishment	
Gender	Male	3.434 (1.131–5.721)	0.100	1.483 (0.297–2.663)	0.842	1.780 (0.696–3.234)	0.080
	Female	1		1		1	
Age			**0.005**	0.048 (0.005–0.097)	0.968	0.115 (0.095–0.325)	0.278
Education/ school	Secondary school	2.665 (0.658–3.988)	0.513	2.888 (0.406–4.182)	0.085	1.997 (0.498–3.631)	**0.050**
	College	0.923 (0.106–1.260)	0.823	3.038 (1.791–4.457)	0.078	2.308 (1.165–3.733)	**0.025**

(Continued)

TABLE 5 (Continued)

Variables		Burnout syndrome regular clinical conditions					
		Emotional exhaustion		Depersonalization		Personal accomplishment	
	High School	1		1		1	
Marital status	Single	1.186 (0.458–1.800)	0.240	2.426 (1.630–3.212)	0.190	2.476 (1.302–4.264)	0.648
	Married	1.028 (0.941–1.122)	0.868	1.240 (0.846–2.441)	0.219	1.490 (0.935 −2.034)	0.785
	Divorced	1		1		1	
Number of household members		1.277 (0.728–2.468)	0.407	0.371 (0.035–0.776)	0.925	0.827 (0.148–1.503)	0.859
Number of children		3.157 (0.699–5.614)	**0.013**	0.822 (0.217–1.306)	0.692	1.738 (0.687–3.111)	0.574
Cigarette consumption	Yes	3.058 (1.092–5.010)	0.722	1.296 (0.110–2.696)	0.933	2.885 (1.419–4.339)	0.624
	No	1		1		1	
Alcohol consumption	Yes	3.593 (1.884–6.455)	0.843	2.732 (1.839–5.696)	0.070	2.078 (0.839 −3.291)	**0.041**
	No	1		1		1	
Nutrition	Regular	1.617 (0.129–2.158)	0.539	1.452 (0.395–2.503)	0.089	1.006 (0.604–2.255)	0.762
	Irregular	1		1		1	
Physical activity	Yes	2.823 (1.082–4.551)	0.122	1.704 (0.721–3.145)	0.555	1.129 (0.713–2.713)	0.679
	No	1		1		1	
Material status	Very good	4.705 (1.873–7.030)	0.506	2.796 (1.281–4.600)	0.909	2.250 (0.873–4.227)	0.345
	Good	3.509 (0.882–4.428)	0.381	2.051 (1.309–3.670)	0.440	1.947 (1.095–2.778)	0.583
	Bad	1		1		1	
Work experience/year		0.318 (0.100–0.535)	**0.005**	0.090 (0.008–0.105)	0.877	0.120 (0.096–0.312)	0.379
Employment Status	Unspecified	2.469 (1.678–3.541)	**0.016**	2.484 (0.581–5.550)	0.110	2.410 (1.135–4.472)	0.199
	Certain	1		1		1	
Organization of work	Shift work	2.475 (1.234–3.862)	0.222	2.175 (1.670–3.846)	0.216	2.858 (1.786–4.357)	0.647
	Shift work + on-call	3.065 (1.121–4.756)	0.113	2.962 (1.856–5.222)	0.124	3.133 (1.543–5.170)	0.493
	One shift	1		1		1	
Contact with persons with COVID-19 infection	No	2.109 (1.234–3.976)	0.682	3.208 (1.061–5.249)	0.138	2.667 (1.391–4.822)	0,377
	Yes	1		1		1	

The bold values are statistical significance.

frequency. Extra work hours have yield burnout outcomes. The quantity of working hours has been reported to be connected to burnout, whereas demands associated with on-call duties demonstrate no significant association with any aspect of the Maslach Burnout Inventory. Prolonged shifts extending to 12 h or more can be associated with all components of the Maslach Burnout Inventory, as well as emotional exhaustion, whereas shorter shifts confer a protective shield against burnout. Having more than 8 days of respite per month has been identified as correlated with reduced burnout (20–22).

Our results show that there is a positive correlation between emotional exhaustion and the age of the respondents, the number of children and the length of service in technicians working under regular conditions. There is no statistically significant correlation among nurses in intensive care units. When it comes to work organization (shift work), the results show that there are no statistically significant differences in emotional exhaustion, depersonalization and personal accomplishment in any of the investigated groups.

This study has many limitations, one of which is that the replies are self-reported. Consequently, the responses are subjective and not backed up by clinical evidence. It is also important to note that certain factors, such as the unequal distribution of genders of the participants (more females than males), have also limited the generalizability of the results obtained through this study. Based on our results, we are not able to conclude which work system affects the professional burnout of nurses. There is a lack of more detailed data on the conditions and organization of work and on human resources. The differences in levels of burnout highlight the importance of considering the clinical settings. These results can be the basis for future, more comprehensive and detailed research. It would be good to investigate what coping strategies nurses can use and what measures they propose for improving working conditions and work organization.

The results indicate a need for tailored interventions and support programs specifically designed for nurses working in high-stress settings such as intensive care units. Programs can focus on providing active coping strategies and seeking emotional and instrumental support. It is also necessary to improve the organization of work. The differences in burnout levels highlight the importance of implementing sustainable practices that support the wellbeing of healthcare workers.

Conclusion

The results indicate that medical technicians in intensive care units exhubit an averagely higher levels of emotional exhaustion and personal accomplishment in the context of a low burnout classification compared to a cohort of medical technicians working in conventional clinical circumstances. Also, the existence of a correlation between certain demographic and socio-economic characteristics of the participants and the levels of burnout experienced in both investigated groups was determined. Investigations of this nature are both significant and necessary to identify burnout-related factors within nursing and to implement effective interventions and strategies for the mitigation and prevention of burnout among healthcare personnel.

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 humans were approved by Ethics Committee of Institute of Cardiovascular Diseases Dedinje. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AN: Writing—original draft. SR: Writing—review & editing. SJ: Conceptualization, Writing—review & editing. JG: Data curation, Methodology, Writing—original draft. MSo: Formal analysis, Supervision, Writing—original draft. MSp: Project administration, Writing—original draft. ND: Validation, Visualization, Writing—original draft. DV: Funding acquisition, Writing—review & editing. DS: Methodology, Writing—review & editing. GD: Supervision, Writing—original draft. OD: Data curation, Writing—original draft. JV-F: Software, Writing—review & editing. RZ: Investigation, Writing—review & editing. MSe: Writing—original draft, Writing—review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 04 December 2023
DOI 10.3389/fpubh.2023.1261286

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OPEN ACCESS

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RECEIVED 19 July 2023
ACCEPTED 17 November 2023
PUBLISHED 04 December 2023

CITATION
Bai Y, Wang L and Bi Y (2023) Psychological screening, providing social security or strengthening training? How can government and labor unions protect the mental health of young employees.
Front. Public Health 11:1261286.
doi: 10.3389/fpubh.2023.1261286

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Psychological screening, providing social security or strengthening training? How can government and labor unions protect the mental health of young employees

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As the mental health problems of young employees become more and more prominent, the government and labor unions need to take measures to protect the mental health of young employees. Considering that the main mental health safeguard measures are divided into psychological screening, providing social security and strengthening training, this article constructs a differential game model under these three modes. The balanced efforts and social benefits of the government and labor unions under the three modes are obtained, and the applicable conditions of various mental health protection modes are compared. The results show that if the government pays a lower cost, the government gets the highest economic benefit under the training mode, followed by the security mode, and the government gets the lowest economic benefit under the psychological screening mode. If the reputation of the labor unions improved by its efforts is low, the equilibrium benefits of the labor unions under psychological screening and providing security are the same, and greater than the equilibrium benefits under the intensive training mode. If the labor unions have a higher reputation enhanced by its efforts, the balance return of the labor unions under the guarantee mode is the highest, followed by the balance return under the intensive training mode, and the balance return of the labor unions under the psychological screening mode is the lowest.

KEYWORDS

mental health, differential game, government, labor unions, social benefits

1 Introduction

The rate of mental health problems among young employees has increased. Many factors may contribute to mental health problems in young employees, such as job stress, job imbalance, career development pressure, financial pressure, and job-related uncertainty (1). In addition, the extensive use of modern technology and social media may also have an impact on the mental health of young employees. The exact percentages vary by region and study. According to the World Health Organization, anxiety affects more than 200 million people worldwide each year, and young people are among the hardest hit (2). The high rates of mental health issues among young employees are also a reminder to take mental health issues more seriously in work and

educational settings, and provide the necessary support and resources to help them cope and manage their mental health.

The mental health problems of young employees are caused by many aspects. First, young employees may face the challenge of work pressure. Long hours of intense work can lead to anxiety, depression and physical health problems. Second, in the modern economy, young employees may face career uncertainty. This uncertainty can lead to feelings of anxiety, helplessness and loss. Third, it is a challenge for young employees to balance work and personal life. Fourth, young employees may lack support and recognition in the work environment. This can have a negative impact on their self-esteem and mental health. Fifth, some young employees may face inadequate skills matching. This can lead to anxiety and self-doubt. Only when the causes of psychological problems of young employees are found can targeted interventions be carried out (3). The poor mental health of young employees may lead to a series of consequences, such as decreased job performance, stunted career development, physical health, relationship problems, and overall decreased quality of life.

In order to protect the mental health of young employees, a variety of measures are needed. For example, first, the government and labor unions can conduct regular psychological screening of employees to help identify potential psychological distress and diseases (4). But this method can only screen out a certain percentage of young employees with mental health problems. Second, the government and labor unions can provide security for the life of employees, can help young employees better adapt to the work environment, improve job satisfaction and quality of life, and lay a foundation for their future development (5). However, this method is easy to bring employees negative feelings of sabotage. Third, the government and labor unions can provide training for employees. By strengthening employee training, organizations can improve the skill level and performance of employees, stimulate the potential and creativity of employees, and promote the innovation and development of enterprises. However, training can take up employees' time and lead to employee dissatisfaction.

Understanding the causes of mental health problems among young employees can not only help young employees better understand the problem, but also provide them with appropriate interventions and support. In the long run, this understanding can help promote the mental health and overall well-being of young employees. Some scholars have studied the causes of mental health problems. These causes mainly include three aspects: external macro environment, corporate environment, and personal conditions. In terms of external macro environment, inappropriate working conditions and challenging socio-economic conditions are the main causes of mental health problems among young female employees in India (6). Public health crises can lead to psychological problems among nurses (7). In terms of corporate environment, the impact of human resource management on employees' psychological contract (8). How emotional labor affects employees' mental health (9). The impact of challenging pressure and task performance on the mental health of university employees (10). The negative impact of customer abuse on service employees (11). In terms of personal conditions, gender, age, and type of education lead to anxiety among Chinese teachers during the COVID-19 pandemic (12).

In the face of factors affecting the mental health of young employees, effective solutions must be found. Some scholars have studied how to protect the mental health of employees. These studies mainly focus on treatment methods, leadership types, psychological support, working environment, training, external media, etc. Some scholars have studied how to treat the mental problems of employees. For example, from an ethical and moral perspective, prevention can be more effective, while from the perspective of efficacy and efficiency, treatment can be more effective (13). In terms of leadership types, Roberge and Boudrias (14) studied how empowered leadership active performance regulates the mental stress of employees. Ahmed et al. (15) studied how inclusive leadership protects the mental health of employees during trauma and crisis. In terms of psychological support, Fukuti et al. (16) studied how to protect the mental health of medical workers through psychological support during COVID-19. Li et al. (17) believed that it is necessary to enhance the professional commitment of nursing students to protect their mental health. In terms of working environment, Aboujaoude (18) believed that the mental health of employees can be protected by protecting their privacy. Plugge (19) analyzed how to protect the mental health of prison workers during COVID-19. Torquati et al. (20) studied how to protect the mental health of shift workers. Zhu et al. (21) believed that a high degree of workplace inclusion could buffer the potential negative psychological impact of disability on an individual level. In terms of training, Slobodianiuk (22) believed that psychological training for future teachers should be strengthened. In terms of external media, Zhang et al. (23) believed that social media communication had a positive impact on employees' psychological state.

However, the mental health status of young employees is constantly changing. Every young employee may face different challenges and pressures, so the psychological issues will be different. With career development and increased work experience, young employees may face higher levels of challenges and responsibilities. At the same time, government and labor unions measures to protect the mental health of young employees are constantly changing. The study does not show such a change. In order to solve the shortcomings of the above research, differential game is adopted in this article. This is a continuous time game. Many scholars have applied it to logistics mode selection (24), environmental governance (25), supply chain (26), etc. This method can clearly describe the dynamic change process of mental health protection. At the same time, this approach has other advantages of game theory. First, the method can analyze the interaction between the government and young employees, and between labor unions and young employees. Second, it can reveal the benefits of protecting the mental health of young employees, and promote the efforts of the government and labor unions to protect the mental health of young employees. Third, governments and labor unions should be encouraged to develop policies to safeguard the mental health of young employees.

Meanwhile, the above research did not analyze the mental health problems of employees from an economic perspective, and did not consider the reputation of the government and labor unions. In order to make up for the shortcomings of the above research, this article analyzes the impact of the protection of employees' mental health on the reputation of the government and labor unions from the perspective of utility function.

In the selection of game parties, this article chooses the government and the labor union as the game parties. This is because governments and labor unions have an important role to play in improving the mental health of young employees. The government's

role in improving the mental health of young employees is crucial. By developing policies and regulations, providing mental health education and advocacy, establishing networks of mental health services, supporting research and data collection, and providing insurance and benefit programs, governments can help create a more mentally healthy and supportive work environment and improve the mental health of young employees. Meanwhile, labor unions have an important role to play in improving the mental health of young employees. They can help employees cope with psychological stress by providing support and counseling, advocating for employee rights, strengthening employee support networks, and providing mental health insurance and benefit programs to create a healthier and supportive work environment.

To improve the mental health of young employees, the government and labor unions have three modes.

(1) Psychological screening mode. Providing psychological screening for employees is an important initiative that can help predict and identify potential mental health problems and take appropriate interventions early (27). For example, young employees can be screened for mental health through questionnaires, psychological assessment tools, and regular health check-ups. Specifically, psychological behavior data can be used to identify and verify people's psychological conditions (28). However, due to the reluctance to disclose the privacy and data-related data of young employees, psychological screening cannot completely screen out young employees with psychological problems.
(2) Provide social security mode. Providing security for young employees is key to maintaining their quality of work and life. For example, young employees can be provided with reasonable pay and benefits, working hours and vacation policies, health and safety guarantees, and so on. Specifically, governments and labor unions should ensure that young employees receive fair and reasonable remuneration packages that reflect their skills and contributions. In addition, comprehensive welfare plans are provided, including medical insurance, pensions, supplementary pensions, etc., to meet their basic living needs (29). However, providing a higher level of protection for young employees is likely to lead to some young employees' slack in their work.
(3) Strengthen training mode. The spending of the government and labor unions can have an impact on education or training (30). Training young employees is important because they are the new force in the organization and have the potential to become future leaders. Specifically, governments and labor unions can provide young employees with an experienced mentor or coach who can provide hands-on experience and guidance. Through the above methods, organizations can strengthen the training of young employees, stimulate their potential, enhance their capabilities, and train new leaders for the future development of the organization.

There are many factors to consider when protecting mental health (31). Each mode of mental health improvement has its own advantages and disadvantages. It is important for the government and labor unions to choose appropriate ways to protect the mental health of young employees. Only by choosing the right mental health improvement mode can we provide the necessary psychological support and resources for young employees to help them cope with pressure, adjust their mentality, maintain positive mental health, and promote the sustainable development of individuals and organizations (32). The relationship between different mental health protection modes is shown in Appendix Figure 1 (See Appendix 1 for details).

2 Methodology

2.1 Differential game, hypothesis and variable definition

2.1.1 Differential game

The role of game theory is to help us understand and predict the underlying principles of human behavior and decision making, and to provide a formalized framework for solving these problems. It is important for formulating the best strategy, optimizing resource allocation and understanding strategic interactions (33). Differential game, also known as dynamic game or evolutionary game. It is a branch of game theory that is used to study the changes in the game process over time. Unlike static games, differential games focus on the changes in the strategies and behaviors of the participants in the game, and are analyzed over continuous time periods. In differential games, the participants adjust their strategies according to a certain equation or system. This equation or system is usually established based on the dynamic laws of interaction between the participants. By studying the optimal strategies and behaviors of the participants, the evolutionary laws and stable results of the game can be obtained at continuous equilibrium points in time (34).

The application of differential game can help to understand and develop more effective strategies to ensure the mental health of young employees. Differential game focuses on the dynamic change of participants' behavior and strategy over time, which makes it easier to understand and predict how various factors affecting the mental health of young employees, such as work pressure, interpersonal relationship and job satisfaction, change over time. The following are some possible advantages of using differential game analysis to ensure the mental health of young employees. First, dynamic analysis. Differential game can help us make dynamic prediction and simulation of the mental health of young employees, and observe and evaluate the impact of various factors on the mental health of young employees on the time axis (35). Second, cause-and-effect relationship revealing. Differential game can reveal the interaction and influence relationship between various factors affecting the mental health of young employees, helping us find out the root cause of the problem and put forward the most effective solution. Third, strategy optimization. Differential game provides a systematic method to optimize the mental health strategy of employees, so that we can maximize the mental health of young employees by adjusting relevant factors. Fourth, prevention mechanism construction. Differential game can better predict the influence of various factors on the mental health of young employees, develop preventive management measures to prevent the occurrence of mental health problems of employees. For example, preventive stress reduction activities, mental health education, etc. Fifth, improve the accuracy of management decisions. Through differential game, we can accurately measure and predict the actual effect of various management strategies on the mental health of

young employees, making management decisions more scientific and accurate.

2.1.2 Hypothesis

(1) The protection of the mental health of young employees by the government and labor unions is in line with economic principles.

Government and labor union guarantees for the mental health of young employees can be consistent with a number of economic principles, especially those relating to labor markets and human capital. First, it would make labor markets more efficient. Mental health problems can lead to reduced employee productivity and lower quality of work. By providing protection for the mental health of young employees, governments and labor unions can reduce the loss of employee productivity due to mental health problems and improve the efficiency of the labor market. Second, it conforms to the theory of human capital investment. Mental health is a kind of human capital of individuals, which has an important impact on individual's work ability and career development. By providing mental health protection, governments and labor unions are actually investing in the human capital of young employees to enhance their future working capacity and income levels. Third, health and social security. The concept of social security in economics emphasizes the need for government and organizational support to mitigate the inevitable risk borne by individuals. Mental health problems can have a negative impact on an individual's economic and social life. The provision of mental health protection by the government and labor unions can help address the risks faced by young employees in this area and provide them with a safe and stable working environment. Fourth, the long-term economic impact. Young employees are important resources for future economic vitality and social development. By focusing on and safeguarding their mental health, governments and labor unions can promote their development and potential release at work, thereby contributing to long-term economic growth and sustainable development of society.

(2) Labor unions are concerned about their reputation.

The reputation of labor unions as organizations representing the rights and interests of employees is crucial to their influence and credibility. Here are a few reasons why labor unions are concerned about their reputation. First, this can involve member recruitment and retention. The reputation of a labor union can play an important role in attracting new members and retaining existing ones. A union with a good reputation attracts more employees and increases membership loyalty and engagement. Second, it can involve government and employer relations. The reputation of labor unions also affects their relations with governments and employers. If labor unions have a good reputation, governments and employers may be more willing to cooperate and dialogue with them to address the rights and interests of employees (36). Thirdly, it can garner public opinion and public support. The reputation of a labor union also affects the level of public recognition and support. A union with a good reputation will be more likely to command public support and sympathy, and thus have more power to fight for rights and push for change.

(3) The mental health status of young employees is constantly changing.

Young adults are an important stage of life development, experiencing great physical, emotional and cognitive changes, as well as being affected by socio-economic changes (37). Therefore, their mental health may also be diverse and dynamic. When young employees enter the workplace, they may need to adapt to new environments and responsibilities, and face new positions, job requirements and work pressures. This shift can have an impact on their mental health, such as anxiety, stress and self-doubt. Young employees are often in the beginning stages of their career path, and they may face uncertainties and challenges in their career development. Uncertain job prospects and career planning stress can have an impact on their mental health. Young employees may face work-life balance issues. They may need to adjust to long working hours, overtime and job stress, while neglecting other important areas of life such as family, social and personal interests. This imbalance can have a negative impact on their mental health. Understanding this dynamic and providing support and protection are critical to maintaining the mental health of young employees. Stakeholders such as governments and labor unions can help young employees cope with and manage changes in mental health by providing adaptive support, promoting work-life balance, providing training and development opportunities, and promoting a healthy work culture (Table 1).

2.1.3 Variable definition

2.2 Differential game of different mental health protection mode

Globalization and the rapid development of information technology have brought increasing pressure to young employees around the world. With the increasingly fierce competition in the world, many young employees around the world are facing great mental pressure for job stability and career development, resulting in an increasing number of young people suffering from mental health problems (2). In response, both governments and labor unions need to take action to support young workers to improve their resilience to stress, which can have a significant impact on their physical and mental health.

The psychological protection of global employees requires unlimited time, mainly because the maintenance of mental health is a lasting process, not a one-time action. It requires sustained attention at all levels, including prevention, intervention and recovery. All three stages take time, so the psychological protection of global employees is unlimited. Moreover, due to the constant change of personal conditions, work environment, work pressure and other factors, it is required that enterprises should always pay attention to the mental health status of employees and provide continuous and personalized psychological protection measures (15). Therefore, psychological protection is a lasting process and should not have a time limit.

The social welfare function of governments and unions consists of the benefits gained from psychological screening, the costs of psychological screening, and the benefits generated by psychological screening. At the same time, this paper mainly selects the reputation of government and labor union as state variables for the following reasons. In differential games, the reputation of government and labor unions is chosen as a state variable because it plays a key role in many social situations. First, reputation is a persistent and stable variable that can be used to describe the performance or behavior of governments and unions over a period of time, and thus predict their

TABLE 1 The main definition of variables and parameters in this article.

Variables and parameters	Specific meaning
$Y = \{S, G, T\}$	Three modes for improving mental health (psychological screening, provide social security, strengthen training)
Independent variable	
$F_{Y1}(t)$	The level of government efforts under the mental health improvement mode Y
$F_{Y2}(t)$	The level of labor union efforts under the mental health improvement mode Y
$x_{Y1}(t)$	The reputation of the government under the mental health enhancement mode Y
$x_{Y2}(t)$	The reputation of the labor union under the mental health enhancement mode Y
Parameter	
ρ	The discount rate that occurs over time, the discount factor, $0 \le \rho \le 1$
δ	The decay rate of reputation, $\delta > 0$
a_{Y1}, a_{Y2}	The unit gain to the government or labor union from the improvement of the mental health of young employees. Among them, 1 represents the government and 2 represents the labor union (the same below). $a_{Y1}, a_{Y2} > 0$
l	The positive impact of the organization's reputation, $l > 0$
I_S	The difficulty for the government to obtain information on the number of youth units, $I_S > 0$
f_1, f_2	Employee dissatisfaction caused by unit level psychological screening, $f_1, f_2 > 0$
c_{Y1}, c_{Y2}	The unit cost of improving the mental health of young employees to governments or labor union, $c_{Y1}, c_{Y2} > 0$
p_1, p_2	The probability of government or labor union can screen out troubled a young employees, $p_1, p_2 > 0$
β_1, β_2	The enhanced reputation for unit effort by government or union, $\beta_1, \beta_2 > 0$
d	Resistance of young employees to the unit level of training, $d > 0$
b_{T1}	The contribution of young employees to society by improving the unit level of skill, $b_{T1} > 0$
b_{G2}	The passive sabotage caused by the young employees due to accepting unit security, $b_{G2} > 0$
Function	
$J_{Yi}(t)$	The social welfare function of government or labor union under the mental health improvement mode Y
$V_{Yi}(t)$	The social benefits of the government or labor union under the mental health improvement mode Y

likely performance in the future. Second, reputation can influence the decisions of governments and unions. A good reputation may lead to more opportunities, such as gaining more approval ratings. Therefore, understanding reputation can help us understand behavior and decision-making.

In general, the solving steps of differential game include the following stages. First, establish the game model. Identify the participants, define their objective function (or cost function), and the variables (strategies) they can control and influence. Usually, this model is an optimization problem with constraints. Second, according to the optimization theory, the above problem is transformed into the Hamilton-Jacobi-Bellman (HJB) equation, which describes the dynamic behavior of the optimal strategy of the players (38). Third, solve the HJB equation. In many practical cases, the HJB equation is very complex and may not have an explicit solution. At this time, numerical methods (such as finite difference method, finite element method, etc.) are often needed to approximate the solution (39).

2.2.1 Psychological screening

If the government and the labor union can carry out psychological screening of young employees, then the psychological problems of employees can be found in time. And take measures to correct the symptoms of employees, help employees to relieve depression and anxiety, improve the mental health of employees. Young employees work in an enterprise, because of long-term contact, the union has a clearer grasp of the information of the employees. As a result, psychological screening costs are higher for the government than for labor unions. Under the psychological screening mode, the social benefits of the government and the labor union are respectively:

$$J_{S1} = \int_0^{\infty} \left[a_{S1} F_{S1}(t) p_1 - \frac{c_{S1} \ln(e + I_S)}{2} F_{S1}^2(t) + l x_{S1}(t) \right] e^{-\rho t} dt \quad (1)$$

$$J_{S2} = \int_0^{\infty} \left[a_{S2} F_{S2}(t) p_2 - \frac{c_{S2}}{2} F_{S2}^2(t) + l x_{S2}(t) \right] e^{-\rho t} dt \quad (2)$$

Among them, $a_{S1} F_{S1}(t) p_1$ represents the benefits of the government's psychological screening of young people. $\frac{c_{S1} \ln(e + I_S)}{2} F_{S1}^2(t)$ represents the cost of psychological screening by the government. The government can obtain the information of young employees through questionnaires and interviews. However, it is harder for governments to get information this way than it is for labor unions. Among them, $\ln(e + I_S)$ indicates how difficult it is for the government to get information from young employees. $l x_{S1}(t)$ represents the social reputation that psychological screening has brought to the government. $a_{S2} F_{S2}(t) p_2$ represents the benefits of the union's psychological screening of youth groups. $\frac{c_{S2}}{2} F_{S2}^2(t)$ represents the cost of psychological screening by the union. $l x_{S2}(t)$

represents the social reputation that psychological screening brings to the union. P_1 represents the probability that the government could find a problematic employee. P_2 represents the probability that the union could find a problem employee.

Government and labor union psychological screening of employees can make employees with psychological problems feel that they are taken seriously. Therefore, psychological screening can improve the favorable impression of young employees on the government and labor unions. At the same time, the psychological screening of young employees by the government and labor unions will delay the time of young employees, so this will lead to dissatisfaction of some employees. The change in the reputation of governments and labor unions can be expressed as:

$$\dot{x}_{S1}(t) = p_1\beta_1 F_{S1}(t) - f_1 F_{S1}(t) - \delta x_{S1}(t) \tag{3}$$

$$\dot{x}_{S2}(t) = p_2\beta_2 F_{S2}(t) - f_2 F_{S2}(t) - \delta x_{S2}(t) \tag{4}$$

Among them, $p_1\beta_1 F_{S1}(t)$ represents psychological screening improves the reputation of the government. $p_2\beta_2 F_{S2}(t)$ represents psychological screening improves the reputation of labor unions. $f_1 F_{S1}(t)$ represents young employees are unhappy with government screening. $f_2 F_{S2}(t)$ represents young employees are unhappy with union screenings. $\delta x_{S1}(t)$ represents a decline in the government's reputation. $\delta x_{S2}(t)$ represents a decline in the reputation of labor unions.

2.2.2 Provide social security

If the government and labor unions provide security to employees, it will increase the satisfaction of young employees. But providing protection for workers costs governments and labor unions a lot of money. At the same time, if the employee accepts the guarantee, it will lead to the employee's passive work. Under the provision of security mode, the social benefits of the government and the labor union are as follows:

$$J_{G1} = \int_0^\infty \left[a_{G1} F_{G1}(t) - \frac{c_{G1}}{2} F_{G1}^2(t) + lx_{G1}(t) \right] e^{-\rho t} dt \tag{5}$$

$$J_{G2} = \int_0^\infty \left[a_{G2} F_{G2}(t) - \frac{c_{G2}}{2} F_{G2}^2(t) - b_{G2} F_{G2}(t) + lx_{G2}(t) \right] e^{-\rho t} dt \tag{6}$$

Among them, $a_{G1} F_{G1}(t)$ represents the improvement in the mental health of young employees as a result of government protection. $\frac{c_{G1}}{2} F_{G1}^2(t)$ represents the cost of government protection. $lx_{G1}(t)$ represents the reputation gained by the government under the government-provided security mode. $b_{G2} F_{G2}(t)$ represents the loss caused by passive work. $a_{G2} F_{G2}(t)$ represents the improvement in the mental health of young employees as a result of the protection provided by the labor union. $\frac{c_{G2}}{2} F_{G2}^2(t)$ represents the cost of union protection. $lx_{G1}(t)$ represents the reputation gained by the union under the mode of provide social security.

Many young employees have psychological problems. In such cases, governments and labor unions can enhance their reputations by providing guarantees to employees. The change in the reputation of governments and labor unions can be expressed as:

$$\dot{x}_{G1}(t) = \beta_1 F_{G1}(t) - \delta x_{G1}(t) \tag{7}$$

$$\dot{x}_{G2}(t) = \beta_2 F_{G2}(t) - \delta x_{G2}(t) \tag{8}$$

Among them, $\beta_1 F_{G1}(t)$ represents an increase in the government's reputation as a result of providing security. $\beta_2 F_{G2}(t)$ represents an increase in the reputation of the union as a result of providing security. $\delta x_{G1}(t)$ represents the decline of the government's reputation under the mode of providing social security. $\delta x_{G2}(t)$ represents the decline of the union's reputation under the mode of providing social security.

2.2.3 Strengthen training

If you strengthen training for employees, then the ability of employees will be improved to a certain extent, so as to obtain a certain psychological satisfaction. At the same time, it costs a certain amount to strengthen training for employees. With the improvement of young employees' abilities, they can better give back to society. Under the enhanced training mode, the social benefits of the government and the labor union are as follows:

$$J_{T1} = \int_0^\infty \left[a_{T1} F_{T1}(t) - \frac{c_{T1}}{2} F_{T1}^2(t) + b_{T1} F_{T1}(t) + lx_{T1}(t) \right] e^{-\rho t} dt \tag{9}$$

$$J_{T2} = \int_0^\infty \left[a_{T2} F_{T2}(t) - \frac{c_{T2}}{2} F_{T2}^2(t) + lx_{T2}(t) \right] e^{-\rho t} dt \tag{10}$$

Among them, $a_{T1} F_{T1}(t)$ represents the improvement in the mental health of young employees as a result of the government's enhanced training for young employees. $\frac{c_{T1}}{2} F_{T1}^2(t)$ represents the cost of increased government training. $b_{T1} F_{T1}(t)$ represents the contribution of young employees to society through training. $lx_{T1}(t)$ represents the reputation gained by the government under the mode of enhanced training. $a_{T2} F_{T2}(t)$ represents the improvement in the mental health of young employees as a result of the union's enhanced training for young employees. $\frac{c_{T2}}{2} F_{T2}^2(t)$ represents the cost of enhanced training by the union. $lx_{T2}(t)$ represents the labor union gained a reputation under the mode of enhanced training.

Some young employees have psychological problems because of their limited work ability, it is difficult to get a high-paying position or be recognized by others. In this case, training is needed in order to improve the mental health of employees. However, the training needs to consume a lot of staff time, which causes staff dissatisfaction. Thus, the change in the reputation of the government and labor unions can be expressed as:

$$\dot{x}_{T1}(t) = \beta_1 F_{T1}(t) - dF_{T1}(t) - \delta x_{T1}(t) \tag{11}$$

$$\dot{x}_{T2}(t) = \beta_2 F_{T2}(t) - dF_{T2}(t) - \delta x_{T2}(t) \tag{12}$$

Among them, $dF_{T1}(t)$ represents the government training took time away from employees and led to employee dissatisfaction. $dF_{T2}(t)$ represents employee dissatisfaction caused by union training taking up employees' time. $\beta_1 F_{T1}(t)$ represents an increase in the government's reputation as a result of strengthen training. $\beta_2 F_{T2}(t)$ represents an increase in the reputation of the union as a result of strengthen training. $\delta x_{T1}(t)$ represents the decline of the government's reputation under the mode of strengthen training. $\delta x_{T2}(t)$ represents the decline of the union's reputation under the mode of strengthen training.

3 Results

In the differential game, the social welfare of the government and the labor union is not only affected by the control variables and parameters, but also constantly changes with time and the mental health of young employees. In order to better calculate the improvement of the mental health status of young employees and the social benefits of the government and labor unions, the HJB formula is adopted in this article. HJB formula is a partial differential equation, which is the core of optimal control.

3.1 HJB formula

The application of HJB equation to the solving process of differential game is usually in the analysis of dynamic strategy problems including time and state. The strategy selection problem of each participant in the game process needs to be formalized into an optimal control problem, in which the control variable is the strategy of each participant. The solving process can be roughly divided into the following steps. First, describe the strategy space. First of all, the strategy space of the participant needs to be described, that is, all possible strategy choices. Second, set the objective function. The goal of the participant in the game process can usually be expressed by an expected utility function. This function depends on the strategy choice of the participant and the strategy choice of other participants. Third, establish the HJB equation. Through the Hamilton minimization principle, the HJB equation describing the system can be obtained. This equation includes the strategy choice of the participant, the strategy choice of other participants and the utility function of the participant (40). Fourth, solve the HJB equation. By solving the HJB equation, the strategy that maximizes the expected utility can be found, which is the optimal strategy of the participant. The dynamic programming method and numerical approximation method in mathematics may be used to solve the HJB equation (41). Finally, by comparing the optimal strategies of different participants, the Nash equilibrium of the differential game can be found, that is, at this equilibrium point, any participant changing his strategy will not improve his utility.

When the psychological screening mode is adopted for mental health protection, the HJB equation under this mode are:

$$\rho V_{S1} = \max_{F_{S1}(t)} \left\{ \left[a_{S1} F_{S1}(t) p_1 - \frac{c_{S1} \ln(e + I_S)}{2} F_{S1}^2(t) + l x_{S1}(t) \right] + \frac{\partial V_{S1}}{\partial x_{S1}} \left[p_1 \beta_1 F_{S1}(t) - f_1 F_{S1}(t) - \delta x_{S1}(t) \right] \right\} \tag{13}$$

$$\rho V_{S2} = \max_{F_{S2}(t)} \left\{ \left[a_{S2} F_{S2}(t) p_2 - \frac{c_{S2}}{2} F_{S2}^2(t) + l x_{S2}(t) \right] + \frac{\partial V_{S2}}{\partial x_{S2}} \left[p_2 \beta_2 F_{S2}(t) - f_2 F_{S2}(t) - \delta x_{S2}(t) \right] \right\} \tag{14}$$

When the mode of providing social security is adopted for mental health protection, the HJB equation under this mode are:

$$\rho V_{G1} = \max_{F_{G1}(t)} \left\{ \left[a_{G1} F_{G1}(t) - \frac{c_{G1}}{2} F_{G1}^2(t) + l x_{G1}(t) \right] + \frac{\partial V_{G1}}{\partial x_{G1}} \left[\beta_1 F_{G1}(t) - \delta x_{G1}(t) \right] \right\} \tag{15}$$

$$\rho V_{G2} = \max_{F_{G2}(t)} \left\{ \left[a_{G2} F_{G2}(t) - \frac{c_{G2}}{2} F_{G2}^2(t) - b_{G2} F_{G2}(t) + l x_{G2}(t) \right] + \frac{\partial V_{G2}}{\partial x_{G2}} \left[\beta_2 F_{G2}(t) - \delta x_{G2}(t) \right] \right\} \tag{16}$$

When the strengthen training mode is adopted for mental health protection, the HJB equation under this mode are:

$$\rho V_{T1} = \max_{F_{T1}(t)} \left\{ \left[a_{T1} F_{T1}(t) - \frac{c_{T1}}{2} F_{T1}^2(t) + b_{T1} F_{T1}(t) + l x_{T1}(t) \right] + \frac{\partial V_{T1}}{\partial x_{T1}} \left[\beta_1 F_{T1}(t) - dF_{T1}(t) - \delta x_{T1}(t) \right] \right\} \tag{17}$$

$$\rho V_{T2} = \max_{F_{T2}(t)} \left\{ \left[a_{T2} F_{T2}(t) - \frac{c_{T2}}{2} F_{T2}^2(t) + l x_{T2}(t) \right] + \frac{\partial V_{T2}}{\partial x_{T2}} \left[\beta_2 F_{T2}(t) - dF_{T2}(t) - \delta x_{T2}(t) \right] \right\} \tag{18}$$

3.2 Result of equilibrium

Proposition 1: In the psychological screening mode, the effort degree of government and labor unions to improve the mental health of young employees, and the social benefits of government and labor unions are, respectively (See Appendix 2 for details):

$$F_{S1}^{*}(t)=\frac{a_{S1}p_1+\frac{l}{\rho+\delta}(p_1\beta_1-f_1)}{c_{S1}\ln(e+I_S)} \tag{19}$$

$$F_{S2}^{*}(t)=\frac{a_{S2}p_2+\frac{l}{\rho+\delta}(p_2\beta_2-f_2)}{c_{S2}} \tag{20}$$

$$\begin{aligned}V_{S1}^{*}=&\frac{l}{\rho+\delta}x_{S1}+\frac{1}{\rho}a_{S1}\frac{a_{S1}p_1+\frac{l}{\rho+\delta}(p_1\beta_1-f_1)}{c_{S1}\ln(e+I_S)}p_1\\&-\frac{1}{\rho}\frac{c_{S1}\ln(e+I_S)}{2}\left[\frac{a_{S1}p_1+\frac{l}{\rho+\delta}(p_1\beta_1-f_1)}{c_{S1}\ln(e+I_S)}\right]^2\\&+\frac{1}{\rho}\frac{l}{\rho+\delta}(p_1\beta_1-f_1)\frac{a_{S1}p_1+\frac{l}{\rho+\delta}(p_1\beta_1-f_1)}{c_{S1}\ln(e+I_S)}\end{aligned} \tag{21}$$

$$\begin{aligned}V_{S2}^{*}=&\frac{l}{\rho+\delta}x_{S2}+\frac{1}{\rho}a_{S2}\frac{a_{S2}p_2+\frac{l}{\rho+\delta}(p_2\beta_2-f_2)}{c_{S2}}p_2\\&-\frac{1}{\rho}\frac{c_{S2}}{2}\left[\frac{a_{S2}p_2+\frac{l}{\rho+\delta}(p_2\beta_2-f_2)}{c_{S2}}\right]^2\\&+\frac{1}{\rho}\frac{l}{\rho+\delta}(p_2\beta_2-f_2)\frac{a_{S2}p_2+\frac{l}{\rho+\delta}(p_2\beta_2-f_2)}{c_{S2}}\end{aligned} \tag{22}$$

Conclusion 1: In the psychological screening mode, the balanced efforts of the government and the labor union are proportional to the probability of screening the problematic young employees. At the same time, it is inversely proportional to the level of employee dissatisfaction caused by psychological screening.

Proposition 2: In the mode of providing social security, the effort degree of government and labor unions to improve the mental health of young employees, and the social benefits of government and labor unions are, respectively (See Appendix 3 for details):

$$F_{G1}^{*}(t)=\frac{a_{G1}+\frac{l}{\rho+\delta}\beta_1}{c_{G1}} \tag{23}$$

$$F_{G2}^{*}(t)=\frac{(a_{G2}-b_{G2})+\frac{l}{\rho+\delta}\beta_2}{c_{G2}} \tag{24}$$

$$\begin{aligned}V_{G1}^{*}=&\frac{l}{\rho+\delta}x_{G1}+\frac{1}{\rho}a_{G1}\frac{a_{G1}+\frac{l}{\rho+\delta}\beta_1}{c_{G1}}-\frac{1}{\rho}\frac{c_{G1}}{2}\left[\frac{a_{G1}+\frac{l}{\rho+\delta}\beta_1}{c_{G1}}\right]^2\\&+\frac{1}{\rho}\frac{l}{\rho+\delta}\beta_1\frac{a_{G1}+\frac{l}{\rho+\delta}\beta_1}{c_{G1}}\end{aligned} \tag{25}$$

$$\begin{aligned}V_{G2}^{*}=&\frac{l}{\rho+\delta}x_{G2}+\frac{1}{\rho}a_{G2}\frac{(a_{G2}-b_{G2})+\frac{1}{\rho+\delta}\beta_2}{c_{G2}}\\&-\frac{c_{G2}}{2}\frac{1}{\rho}\left[\frac{(a_{G2}-b_{G2})+\frac{l}{\rho+\delta}\beta_2}{c_{G2}}\right]^2\\&-\frac{1}{\rho}b_{G2}\frac{(a_{G2}-b_{G2})+\frac{1}{\rho+\delta}\beta_2}{c_{G2}}\\&+\frac{1}{\rho}\frac{l}{\rho+\delta}\beta_2\frac{(a_{G2}-b_{G2})+\frac{1}{\rho+\delta}\beta_2}{c_{G2}}\end{aligned} \tag{26}$$

Conclusion 2: Under the mode of providing social security, the balance effort of the government is inversely proportional to the contribution of the young employees to the society by improving the unit skills.

Proposition 3: In the strengthen training mode, the effort degree of government and labor unions to improve the mental health of young employees, and the social benefits of government and labor unions are, respectively (See Appendix 4 for details):

$$F_{T1}^{*}(t)=\frac{(a_{T1}+b_{T1})+\frac{l}{\rho+\delta}(\beta_1-d)}{c_{T1}} \tag{27}$$

$$F_{T2}^{*}(t)=\frac{a_{T2}+\frac{l}{\rho+\delta}(\beta_2-d)}{c_{T2}} \tag{28}$$

$$\begin{aligned}V_{T1}^{*}=&\frac{l}{\rho+\delta}x_{T1}+\frac{1}{\rho}a_{T1}\frac{(a_{T1}-b_{T1})+\frac{l}{\rho+\delta}(\beta_1-d)}{c_{T1}}\\&-\frac{1}{\rho}\frac{c_{T1}}{2}\left[\frac{(a_{T1}-b_{T1})+\frac{l}{\rho+\delta}(\beta_1-d)}{c_{T1}}\right]^2\\&+\frac{1}{\rho}b_{T1}\frac{(a_{T1}-b_{T1})+\frac{1}{\rho+\delta}(\beta_1-d)}{c_{T1}}\\&+\frac{1}{\rho}\frac{l}{\rho+\delta}(\beta_1-d)\frac{(a_{T1}-b_{T1})+\frac{1}{\rho+\delta}(\beta_1-d)}{c_{T1}}\end{aligned} \tag{29}$$

$$V_{T2}^{*}=\frac{l}{\rho+\delta}x_{T2}+\frac{1}{\rho}a_{T2}\frac{a_{T2}+\frac{l}{\rho+\delta}(\beta_2-d)}{c_{T2}}-\frac{1}{\rho}\frac{c_{T2}}{2}\left[\frac{a_{T2}+\frac{l}{\rho+\delta}(\beta_2-d)}{c_{T2}}\right]^2+\frac{l}{\rho+\delta}(\beta_2-d)\frac{a_{T2}+\frac{l}{\rho+\delta}(\beta_2-d)}{c_{T2}} \quad (30)$$

Conclusion 3: In the strengthen training mode, the balanced efforts of government and labor union are inversely proportional to the resistance of young employees to training.

3.3 Numerical analysis

In order to more clearly depict the social benefits of the government and the labor union, this article carries out numerical analysis. Therefore, the following assumptions are made about the values of parameters in this article. The discount factor ρ is 0.9. Reputation decay rate $\delta=0.1$. The government gains a_{Y1} from the improvement of young employees' mental health is 1.5. Gains a_{Y2} to the labor union from improved mental health of young employees is 2. The positive impact l of unit reputation is 1. Employee dissatisfaction f_1 caused by unit level psychological screening is 0.6. Employee dissatisfaction f_2 caused by unit level psychological screening is 0.4. The probability p_1 that the government can screen out problematic young employees is 0.4. The probability p_2 that the union can detect the problem young employees is 0.5. The difficulty I_S for the government to obtain information on the number of youth units is 2. The resistance d of young employees to training at the unit level is 2. The contribution b_{T1} of young employees to society by improving the unit skill is 3. Negative work sabotage b_{G2} caused by young employees' acceptance of unit security is 1.5. Both the government and the union have a reputation x of 1.

When the enhanced reputation β_1 for unit effort by government is 1, this article can calculate:

$$V_{S1}^{*}=1+0.054\times\frac{1}{c_{S1}} \quad (31)$$

$$V_{G1}^{*}=1+3.47\times\frac{1}{c_{G1}} \quad (32)$$

$$V_{T1}^{*}=1+6.87\times\frac{1}{c_{T1}} \quad (33)$$

This article can make the following graph, named Figure 1.

When the enhanced reputation β_1 for unit effort by government is 2, this article can calculate:

$$V_{S1}^{*}=1+0.224\times\frac{1}{c_{S1}} \quad (34)$$

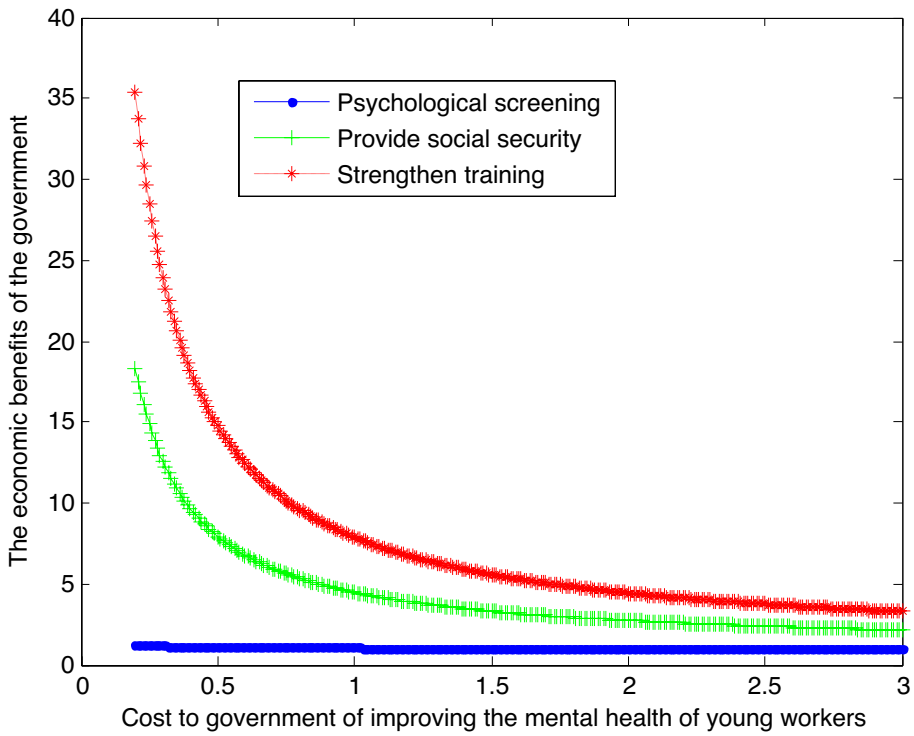

FIGURE 1
Impact of mental health care costs on government benefits.

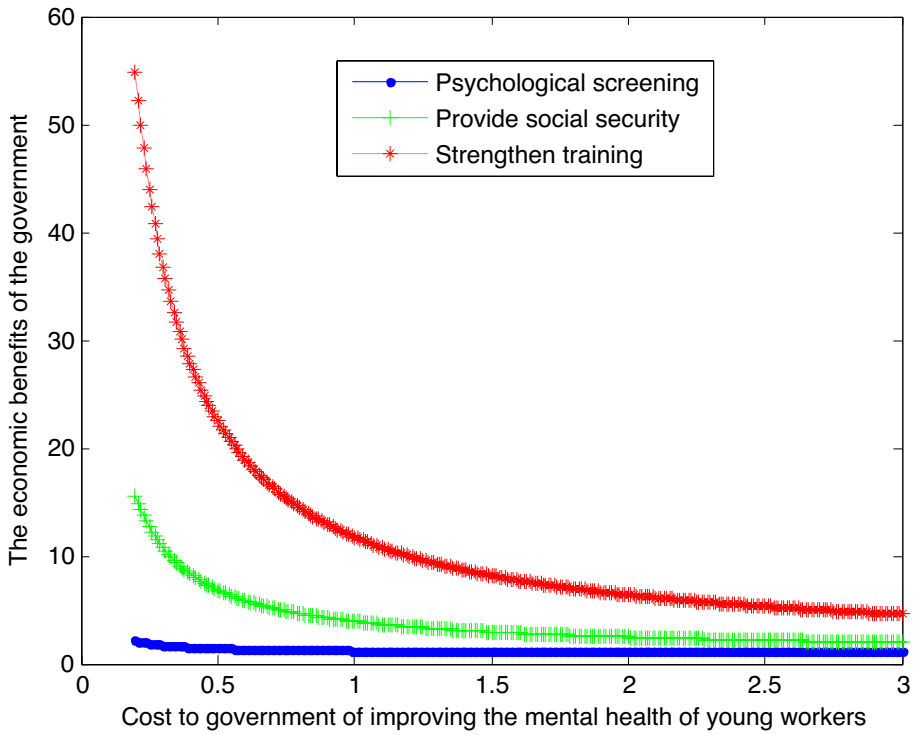

FIGURE 2
Impact of mental health care costs on government benefits.

$$V_{G1}^{*} = 1 + 2.92 \times \frac{1}{c_{G1}} \tag{35}$$

$$V_{T1}^{*} = 1 + 10.75 \times \frac{1}{c_{T1}} \tag{36}$$

This article can make the following graph, named Figure 2.

According to Figures 1, 2, conclusion 4 can be drawn.

Conclusion 4: If the government pays a lower cost, the government gets the highest economic benefit under the training mode, followed by the security mode, and the government gets the lowest economic benefit under the psychological screening mode. However, with the increase of the cost paid by the government, the economic benefits of the government under the three modes gradually decrease and tend to be the same.

When the enhanced reputation β_2 for unit effort by labor union is 1, this article can calculate:

$$V_{S2}^{*} = 1 + 1.25 \times \frac{1}{c_{S2}} \tag{37}$$

$$V_{G2}^{*} = 1 + 1.25 \times \frac{1}{c_{G2}} \tag{38}$$

$$V_{T2}^{*} = 1 + 0.66 \times \frac{1}{c_{T2}} \tag{39}$$

This article can make the following graph, named Figure 3.

According to Figure 3, conclusion 5 can be drawn.

Conclusion 5: If the reputation of the union improved by its efforts is low, the equilibrium benefits of the union under the psychological screening and providing security modes are the same, and greater than the equilibrium benefits under the intensive training mode. However, with the increase of the cost paid by the government, the equilibrium benefits of the union under the three modes gradually decrease and tend to be the same.

When the enhanced reputation β_2 for unit effort by labor union is 2, this article can calculate:

$$V_{S2}^{*} = 1 + 3.21 \times \frac{1}{c_{S2}} \tag{40}$$

$$V_{G2}^{*} = 1 + 4.09 \times \frac{1}{c_{G2}} \tag{41}$$

$$V_{T2}^{*} = 1 + 3.33 \times \frac{1}{c_{T2}} \tag{42}$$

This article can make the following graph, named Figure 4.

According to Figure 4, conclusion 6 can be drawn.

Conclusion 6: If the labor union has a higher reputation enhanced by its efforts, the labor union under the guarantee mode has the highest equilibrium return, followed by the enhanced training mode, and the labor union under the psychological screening mode has the lowest equilibrium return. However, with the increase of the cost paid by the government, the equilibrium benefits of the union under the three modes gradually decrease and tend to be the same.

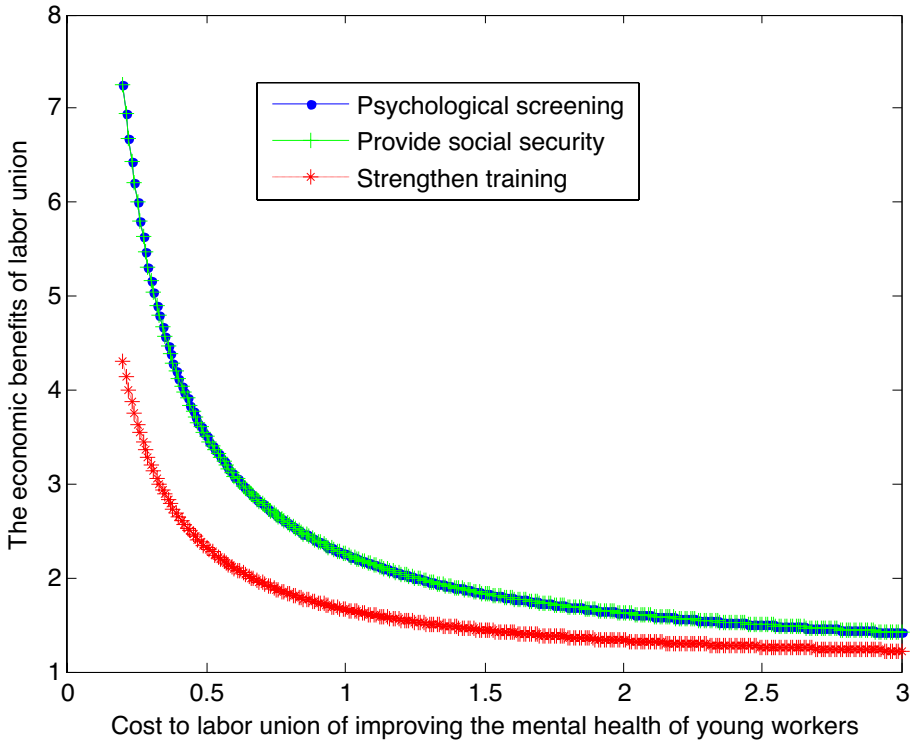

FIGURE 3
Impact of mental health care costs on labor union benefits.

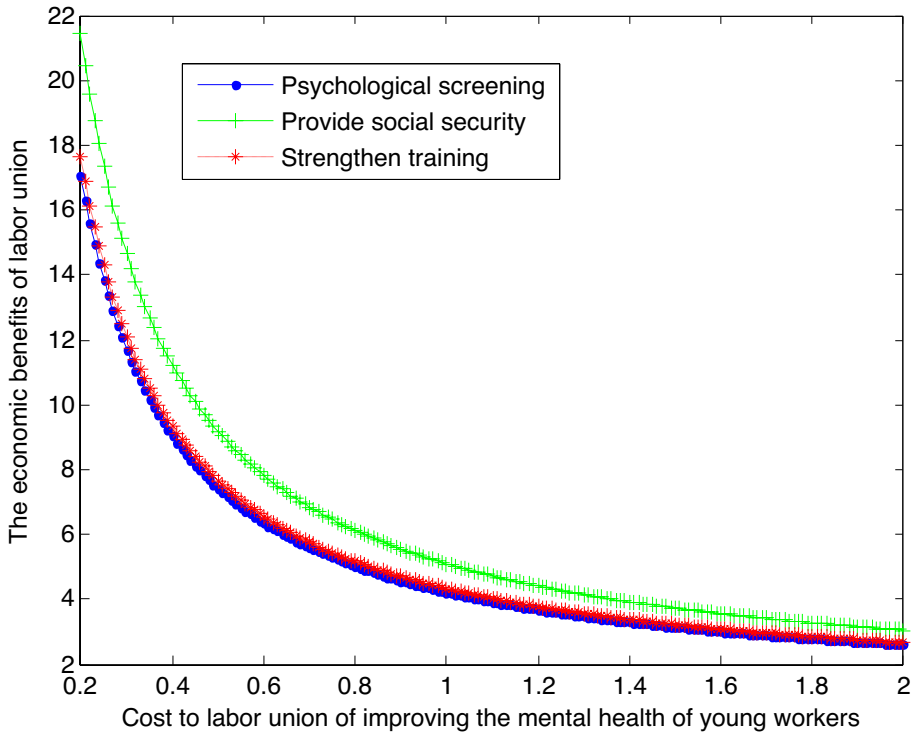

FIGURE 4
Impact of mental health care costs on labor union benefits.

4 Discussion

According to Conclusion 1, it is possible that the level of government and union effort is proportional to the probability of screening out problematic young employees. There are some parallels with the research of Poddar and Madupalli (42). They believe that companies should actively pay attention to the impact of problematic customers on employee turnover and serve these employees. Conclusion 1 is mainly caused by the following reasons. First, the government and labor unions are willing to invest more money in mental health resources, including mental health education, training and psychological counseling services. This will increase the coverage and quality of screening and improve the probability of finding problematic young employees. Second, the government and labor unions actively promote and raise public awareness of the importance of mental health, encourage young employees to pay attention to their mental health, and encourage them to participate in screening. This will greatly increase the number of people involved in screening and improve the probability of finding problematic employees. Third, governments and labor unions work with mental health agencies and professionals to provide screening services and support, including the provision of psychological assessment tools and support from counselors and therapists. This will improve the accuracy and professionalism of screening and increase the probability of finding problematic employees.

The balanced effort of the government to improve the mental health of young employees is inversely proportional to the contribution of young employees to the society by improving their work skills. Conclusion 2 is different from Ozaki et al. (43). Ozaki et al. (43) believe that workplace psychological distress is related to a sense of social contribution, and workplace mental health promotion should consider employees' sense of contribution to society. Conclusion 2 is mainly caused by the following reasons. The increased contribution of young employees to society can positively affect the mental health of employees. First, enhance the self-confidence of young employees. By constantly upgrading their skills, young employees can perform better at work and achieve better results. This will increase their confidence and satisfaction and help improve their mental health. Second, reduce the work pressure of young employees. With stronger skills and abilities, young employees are better equipped to deal with challenges and pressures at work. They are able to complete tasks more easily and reduce the negative impact of work stress on mental health. Third, provide a career path. Skills upgrading provides more career development opportunities for young employees. This opportunity for professional development can bring satisfaction and a sense of accomplishment, improving the mental health of employees.

The level of balanced efforts of the government and labor unions is inversely proportional to the level of resistance of young employees to training. This is the main point of Conclusion 3. This is similar to Clercq et al. (44). They argue that the mitigating effect of goal alignment is more pronounced among employees with a lower propensity to learn. Conclusion 3 is mainly caused by the following reasons. The possibility of task variation reduces employees' motivation to invest in task-specific skills (45). To this end, governments and labor unions should not focus so much on training that they ignore the objections of young employees. In order to reduce the resistance of young employees to training, the following needs to be done. First, improve the content and quality of training. If the training content does not match the actual needs and interests of employees, or the quality of training is not high, it may lead to the resistance of young employees to the training. Second, pay attention to time and cost input. Training may require additional time and resource investment and may interfere with the work and personal lives of young employees, causing them to resist their willingness to participate in training. Third, timely communication and participation. If the government and the labor unions fail to communicate and consult adequately, and if they fail to obtain the views and participation of the employees, the young employees may hold an opposing position to the training. Governments and labor unions should actively consider the needs and views of young employees when promoting training programs, and provide effective communication, flexible training formats and visible recognition mechanisms for results. Through such efforts, the degree of resistance of young employees to training can be reduced and their career development and social contribution can be better promoted.

The government can achieve the highest economic benefits under the training mode, because it provides effective training and education at a lower cost, enabling people to acquire better skills and knowledge, thereby improving employment opportunities and economic output (46). The second is the provision of security mode, which may refer to the government to provide social welfare and security measures for young employees, such as social insurance, medical security and so on. Such a mode may be more expensive than the psychological screening mode, but it can improve the living conditions of young employees by reducing poverty and providing basic protection, thereby boosting economic growth. Finally, there is the psychological screening mode, which may refer to the government conducting psychological assessments and screenings to help people improve their mental health. Although this mode may have a positive impact on some people, compared with the first two modes, it only has a certain probability of screening out young employees with psychological problems. At the same time, this mode may require higher costs and its economic benefits may be lower.

Labor unions may focus more on ensuring workers' interests and welfare through psychological screening and providing guarantees. This is different from coercive stress, even though coercive stress regulates job security, coordination, and psychological safety along with employee performance (4). Through psychological screening, labor unions can determine the level of depression and anxiety in young employees (47), thereby helping workers to get a job that is suitable for them. This will reduce the likelihood of psychological stress and maladjustment. In the provision of security mode, labor unions can fight for and ensure that workers receive reasonable wages, benefits and working conditions, thereby improving their overall income and living standards. In contrast, under the enhanced training mode, although workers may acquire better skills and knowledge, if the union has a low reputation, it may not be effective in negotiating for better wages and treatment. Therefore, in this case, the psychological screening and provision of guarantees mode may be more beneficial to the equilibrium gains of labor unions and workers.

Under the providing social security mode, if the reputation of the union is high, workers can rely more confidently on the union to negotiate better wages, benefits, and working conditions. Labor unions can reach more favorable labor contracts with employers

through negotiation and mediation, so that workers can benefit from obtaining stable income and social security. Under the enhanced training mode, although workers can acquire better skills and knowledge through training, if the reputation of the union is high, the union can strive for better opportunities and treatment for workers. Labor unions can be involved in setting industry standards and norms that push employers to offer more equitable and competitive pay and promotion opportunities, thereby improving workers' earnings and career advancement. Under the psychological screening mode, if the labor union has a low reputation, it may not be able to effectively fight for better treatment and rights, resulting in lower equilibrium benefits for workers.

5 Conclusion

The scope of each mode of improving mental health is an important question. The purpose of this study is to compare and analyze the scope of application of different modes, so as to provide reference for the government and labor unions to protect the mental health of young employees. Therefore, this article establishes three differential game models of psychological screening, providing security and strengthening training, and makes a comparative analysis of them. The main contribution of this article is to provide reference for how the government and labor unions can improve the mental health level of young employees. The research shows that under the condition that the cost paid by the government is low, the training mode can make the government obtain the maximum economic benefits. When the labor unions' reputation improved through efforts is low, the equilibrium return of the labor union under psychological screening and providing security is the same, but greater than that under intensive training. If the union has promoted a high reputation through efforts, the guarantee mode can make the labor union obtain the highest equilibrium benefit.

This article has some shortcomings. First, the research scope of this article is global employees, not employees in a particular country. However, the role and intensity of the role played by labor unions in different countries may not be completely consistent. Second, this article is based on the game theory model to study how to improve the mental health level of young employees, and there are few specific relevant data. At the same time, this study does not involve young people in specific regions and companies, but the specific conditions faced by young employees in different countries or companies may not be exactly the same. In future studies, we can add relevant specific data to study the improvement of the mental health level of young employees in specific countries. The research of this article has certain expansibility. For example, this article argues that the protection of the mental health of young employees by the government and labor union is in line with economic principles, labor unions are concerned about their own reputation, and the mental health status of young employees is in constant change. In future studies, we can consider that the mental health of young employees conforms to other non-economic principles, that labor unions pay more attention to their own economic interests, and that the mental health status of young employees remains unchanged. Meanwhile, some gaps in the research can be solved in future research. Firstly, it is necessary to determine the specific standards for the mental health guarantee mode for young employees in different situations. Secondly, the achievements of the government and the labor unions on the mental health guarantee mode for young employees can be transformed into practical policy recommendations. Thirdly, in the process of formulating the mental health guarantee mode for young employees in different regions, the government and the labor union should determine the order of action of relevant research, rather than taking action simultaneously. In addition, this study is not only applicable to the mental health problems of young employees, but also has certain reference significance for the research on the mental health problems of left-behind children and older adults living alone.

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

YBa: Conceptualization, Data curation, Investigation, Methodology, Writing – original draft, Writing – review & editing. LW: Investigation, Software, Writing – original draft. YBi: Writing – original draft.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This work was financially supported by Social Science Planning Foundation of Chongqing in China (2021BS080) and National Natural Science Foundation of China (72304157).

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

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2023.1261286/full#supplementary-material

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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 19 December 2023
DOI 10.3389/fpubh.2023.1309667

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OPEN ACCESS

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RECEIVED 08 October 2023
ACCEPTED 30 November 2023
PUBLISHED 19 December 2023

CITATION
Zhou F, Long K, Shen H, Yang Z, Yang T, Deng L and Zhang J (2023) Resilience, organizational support, and innovative behavior on nurses' work engagement: a moderated mediation analysis.
Front. Public Health 11:1309667.
doi: 10.3389/fpubh.2023.1309667

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Resilience, organizational support, and innovative behavior on nurses' work engagement: a moderated mediation analysis

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Objectives: To investigate the status of nurses' work engagement and the relationship among resilience, organizational support, and innovative behaviors.

Methods: In this cross-sectional study, we investigated 496 nurses in Hunan, China, from July 2022 to December 2022. A descriptive statistical approach, Pearson's correlation analysis and Hayes' PROCESS Macro Models 4 and 14 were used to analyze the available data.

Results: The level of work engagement among nurses was found to be moderate. Resilience positively predicted work engagement among nurses. Organizational support played a partially mediating role in the association between resilience and work engagement. Furthermore, innovative behavior played a moderating role in the association between adaptive resilience and work engagement.

Conclusion: Based on the results, greater attention needs to be paid to nurses' work engagement. A high level of resilience, organizational support, and innovative behavior may increase work engagement among nurses. Nursing leaders can take measures to increase work engagement among nurses by improving nurses' resilience and organizational support, and cultivating innovative behavior.

KEYWORDS

work engagement, resilience, organizational support, innovative behavior, nurse, nursing management

1 Introduction

The global nursing workforce shortage is well-known (1). According to the World Health Organization (WHO), there is a shortage of 7.2 million healthcare workers in terms of health needs, while the report of the Third Global Forum on Human Resources for Health estimates that the nursing gap will reach 12.9 million by 2035 (2). This is exacerbated by an aging population and the increasing burden of chronic caregiving (3, 4). Improving the efficiency of nursing staff and increasing the work engagement of nurses are proven ways to improve the current stressful situation.

Work engagement is a state of motivation and fulfillment characterized by high mental and physical energy levels, enthusiasm, dedication, and complete absorption in work activities

(5). Previous studies have shown that work engagement is associated with work resources (6), leadership (7), and social recognition (8). A cohort study showed a significant positive association between work engagement and job performance (9). Rising healthcare costs, a global shortage of nurses, and the reality of the demand for quality care pose significant challenges to health systems and governments around the world (10). Work engagement in nursing is a focused, engaging, and dynamic nursing practice that stems from an environment of autonomy and trust and leads to safer, more cost-effective patient outcomes (11). Nurses account for 59% of all health professionals worldwide, and their work engagement plays an important role in the delivery of healthcare services (12). There is clear evidence that nurses' work engagement plays a key role in the quality of care (13). A high level of work engagement positively affects nurses' physical and mental status and career development, stimulating their work potential, reducing their willingness to leave, and directly influencing the presentation of patient health-centered care behaviors (14).

There are many unpredictable situations that can happen to nurses in the course of their work. These situations can cause great psychological stress for nurses (15). One study showed that nurses' positive psychological factors are positively correlated with work engagement (16). Resilience is a positive psychological factor that improves nurses' mental health, reduces occupational stress, and enhances their productivity and intrinsic motivation (17). Another factor often emphasized in nurses' work engagement is organizational support (18). Organizational support is defined as the respect and care that employees feel from their organization or institution (19). Many studies have determined that organizational support is associated with nurses' work engagement (20, 21). Overall, both resilience and organizational support were positive factors that influenced nurses' work engagement.

The innovative behaviors of nurses are those that are designed to promote health, prevent disease, and improve the quality of care for patients. The process by which nurses seek and develop new methods, techniques, and ways of working introduces and applies them to their work behaviors after obtaining the support of others (22). Research supports the idea that innovative behavior is significantly associated with work engagement (23). As an indispensable key force during medical reform and development, nurses are not compatible with the rapid development of clinical medical disciplines, and their high or low innovation abilities directly affect the overall innovation ability of the hospital.

Resilience, organizational support, innovative behaviors, and work engagement are all related. However, the pathways among them that influence work engagement have rarely been explored. The theoretical model we applied was the Job Demands-Resources (JD-R) model. According to the JD-R model, the inter process of job input that the gain process is triggered by an abundance of job resources, including resilience and organizational support. In addition, innovative behavior is a positive individual factor. This study proves that innovative behavior is significantly related to the innovative climate provided by an organization (organizational support) (24). Therefore, based on the JD-R model and literature review, we developed a research hypothesis as shown in Figure 1. Resilience, organizational support, and innovative behavior can synergistically influence nurses' work engagement through a certain path.

2 Methods

2.1 Design, setting, and participants

This study employed a cross-sectional design. Participants were recruited from July 2022 to December 2022 using convenience sampling taken from four tertiary hospitals in Hunan, China. The inclusion criteria of all participants were as follows: (1) obtaining a licensed nurse qualification certificate and having more than one year of nursing experience and (2) voluntarily participating in the survey. Exclusion criteria were as follows: if participants (1) had more than 3 months of vacation in the past year and (2) had left nursing. This study was conducted using an online survey and questionnaire. The recruitment poster included the purpose of the study, criteria, procedures, and contact information for the corresponding author. The corresponding author obtained informed consent from nurses who volunteered to participate in the study and distributed the online link. The study participants completed the questionnaire through an online link.

We used the formula $n = (Z\alpha\sigma/\delta)2$ to calculate the sample size. The parameter was $\alpha = 0.05$, and the value of $Z\alpha$ was 1.96. The σ represents the standard deviation. According to the survey results of Chinese scholars on nurses' work engagement, we took the value of σ as 10.83 (25). The δ represents the allowable error, and smaller values indicate greater sample size and precision. Previous research has shown that the allowable error can be set to 0.25 ~ 0.5 times the standard deviation (26). Therefore, the range of δ can be 2.71 ~ 5.42. However, in this study, to improve the precision of the results, we took the value δ to be 1. Considering a 10% sample attrition rate, the final sample size was calculated to be 495.

2.2 Measures

2.2.1 Demographic characteristics

Sociodemographic data (gender, age, education level, marital status, fertility status, etc.) and occupational characteristics (hospital grade, job level, mode of appointment, monthly income, weekly working hours, and night shifts) were collected.

2.2.2 Work engagement

The Chinese version of the Utrecht Work Engagement Scale (UWES-9) was used to assess the participants' levels of work engagement (27). The scale includes 3 subscales of vitality (3 items), dedication (3 items), and concentration (3 items), with a total of 9 items. Each item is a 7-point Likert scale with a score ranging from 0 (*never*) to 6 (*every day*). The total scores ranged from 0 to 54. Higher scores indicate higher levels of work engagement. The Cronbach's alpha coefficient for this scale was 0.96.

2.2.3 Resilience

The Chinese version of the Psychological Resilience Questionnaire for Nurses was used to measure the level of resilience of the participants (28). The scale consisted of 4 dimensions: self-efficacy (3 items), hope (3 items), resilience (3 items), and optimism (3 items), with a total of 12 items. Each item was scored on a Likert 6-point scale with a score ranging from 1 (*strongly disagree*) to 6 (*strongly agree*).

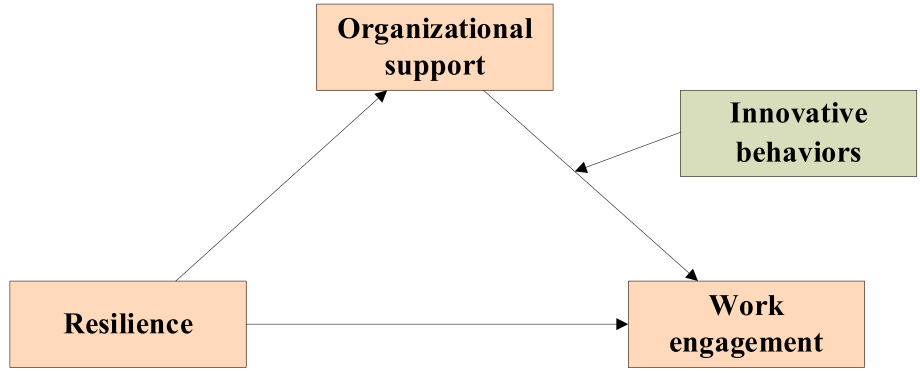

FIGURE 1
Hypothesis of this study.

The total scores ranged from 12 to 72. Higher scores indicate higher resilience. The Cronbach's alpha coefficient for this scale was 0.96.

2.2.4 Organizational support

The Chinese version of the Nurses' Sense of Organizational Support Scale was used to measure the participants' levels of organizational support (29). The scale was divided into two dimensions, emotional support (10 items) and instrumental support (3 items), with a total of 13 items. Each item was scored on a Likert 5-point scale with a score ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The total scores ranged from 13 to 65. Higher scores indicate better perceived organizational support. The Cronbach's alpha coefficient for this scale was 0.97.

2.2.5 Innovative behavior

The Chinese version of the Nurse Innovative Behavior Scale was used to measure the level of organizational support of the subjects (30). The scale was divided into 3 dimensions generating ideas (3 items), obtaining support (3 items), and realizing ideas (4 items), with a total of 10 items. Each item was rated on a 5-point Likert scale, with scores ranging from 1 (*never*) to 5 (*frequently*). The total scores ranged from 10 to 50. The higher the score, the more innovative behavior at work is demonstrated. The Cronbach's alpha coefficient for this scale was 0.96.

2.3 Data collection

This research was conducted using the WeChat applet SOJUMP. First, we selected 40 nurses in the Second Xiangya Hospital as the initial respondents and explained the inclusion criteria to them. Then, they invited colleagues who met the inclusion criteria to participate in the study. Participants had to answer questions sequentially during the fill-in process and not skip or miss questions. Three investigators verified and sifted the final data for subsequent statistical analysis.

2.4 Ethical consideration

The study was approved by the Second Xiangya Hospital of Central South University (Ethical review number: E2020142) and performed in accordance with the Declaration of Helsinki. Before the formal investigation, all investigators were trained on registration, checking the completeness of questionnaires, and ethical tenets of conducting research. In addition, all participants were informed about the purpose of this study and gave their consent. Not incentives or inducements were peovided to complete the questionnaire. After submission, the participants were informed that all the contents of the questionnaire would be anonymous and confidential and that it would only be used for academic research.

2.5 Data analysis

Statistical analysis were performed using SPSS 27.0 and PROCESS macros for version 4.2 (31). In addition to descriptive statistics, t-tests, ANOVA, and Spearman's correlation analysis were used to test the correlation between variables. The PROCESS macro (Model 4) was used to test the mediating role of organizational support in psychological resilience and work engagement using a bootstrap sample of 5,000. In addition, the PROCESS macro (Model 14) was used to test the moderating role of innovative behavior between organizational support and work engagement by constructing a mediating model with moderation using a bootstrap sample of 5,000. The effect was considered significant if the 95% confidence interval (CI) did not include zero.

3 Results

3.1 Descriptive statistics and univariate analysis of demographic characteristics related to work engagement in nurses

As shown in Figure 2, 550 questionnaires were distributed and 510 were completed, of which 14 had missing data. Finally, 496 nurses were included. Table 1 describes the demographic and work characteristics of the participants and their relationships with work engagement. The participants were mostly women accounting for 89.3%. They were mostly from tertiary care centers. Of the participants, 74.8% were married. We distributed 550 questionnaires,

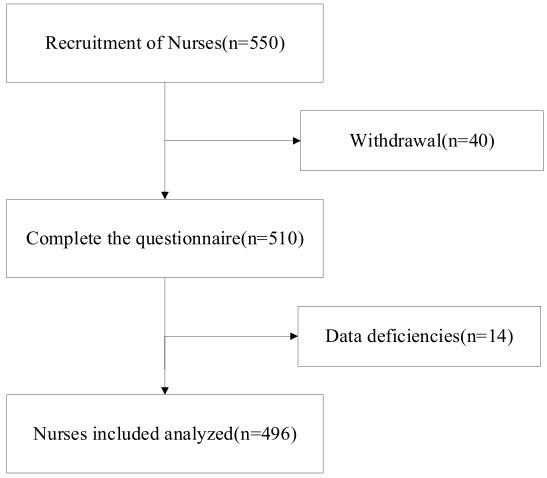

FIGURE 2
Flow diagram of participants.

and finally obtained 496 valid questionnaires, with an efficiency rate of 90.2%.

3.2 Descriptive statistics of variables

Table 2 shows the means, standard deviations, and score ranges of resilience, organizational support, innovative behavior, and work engagement. The score for clinical nurses' work engagement was 35.61 ± 13.66.

3.3 Spearman's correlation analysis of variables

Table 3 presents the results of the correlation analysis of resilience, organizational support, innovative behavior, and work engagement. Resilience, organizational support, and work engagement were positively correlated. Furthermore, innovative behavior was also positively correlated with organizational support and work engagement.

3.4 Moderated mediation effect analysis

Figure 3 shows that the total effect of resilience on work engagement was significantly positive (c path. $\beta = 0.861$, $p < 0.001$). Resilience was significantly and positively correlated with organizational support (a path, $\beta = 0.576$, $p < 0.001$; b path, $\beta = 0.497$). The results of the bootstrap show that the effect of resilience on work engagement is partially mediated by organizational support. According to Figure 4, the interaction between innovative behavior and organizational support could also affect nurses' work engagement (m path, $\beta = -0.010$, $p < 0.05$). It demonstrates that innovative behavior plays a moderating role in the mediating path of "resilience-organizational support-work engagement." To interpret the interaction results, we plotted the interaction effects in Figure 5.

TABLE 1 Descriptive statistics and univariate analysis of demographic characteristics related to work engagement in nursess ($N = 496$).

Variables	Categories	*N* (%)	*t/F* values	*p* values
Gender	Male	53 (10.7)	t = −0.961	0.337
	Female	443 (89.3)		
Age	≤30	179 (36.1)	*F* = 7.167	<0.001
	31–40	220 (44.4)		
	41–50	79 (15.9)		
	≥51	18 (3.6)		
Hospital level	Medical centre (level 3)	436 (87.9)	*F* = 0.095	0.910
	Regional hospital (level 2)	37 (7.5)		
	Other	23 (4.6)		
Education	Junior college or below	48 (9.7)	*F* = 0.817	0.442
	College	385 (77.6)		
	Graduate school and above	63 (12.7)		
Marital ststus	Single	113 (22.8)	*F* = 0.211	0.810
	Married	371 (74.8)		
	other	12 (2.4)		
Fertility circumstance	Unfertilized	138 (27.8)	*F* = 1.937	0.145
	A child	207 (41.7)		
	Two children or above	151 (30.4)		
Professional title	Junior	180 (36.3)	*F* = 5.175	0.002
	Intermediate	242 (48.8)		
	Senior Deputy	59 (11.9)		
	Senior	15 (3.0)		
Monthly income	≤5,000	63 (12.7)	*F* = 0.937	0.392
	5,001–10,000	299 (60.3)		
	>10,000	134 (27.0)		
Weekly working hours	≤35 h	62 (12.5)	*F* = 0.458	0.712
	36-45 h	244 (49.2)		
	46-55 h	120 (24.2)		
	>55 h	70 (14.1)		
Weekly night shifts	≤1	284 (57.3)	*F* = 7.885	<0.001
	2–3	147 (29.6)		
	>3	65 (13.1)		

4 Discussion

4.1 Status of work engagement among nurses

In this study, we found that nurses' work engagement was at a moderate level. Another study in China found that nurses' work

TABLE 2 Descriptive statistics of measurements ($N = 496$).

Variables	Range	M	SD
Resilience	12 ~ 72	54.67	10.28
Organizational support	13 ~ 65	47.72	10.22
Innovative Behavior	10 ~ 50	34	7.86
Work engagement	0 ~ 54	35.61	13.66

M, mean. SD, standard deviation.

engagement was at high levels (32). This discrepancy is likely related the differences in the participants. The latest threat to global health is the ongoing outbreak of respiratory disease, the Covid-19 outbreak, which has posed a serious challenge to the public health, research and medical communities (33). We found that nurses' work engagement in China was lower than that reported in pre-COVID-19 Sweden (34) and post-COVID-19 Spain (35). Besides geographical differences, sociocultural differences may also contribute to the differences (36).

TABLE 3 Correlations between resilience, organizational support, innovative behavior, and work engagement.

	Resilience	Organizational support	Innovative Behavior	Work engagement
Resilience	1			
Organizational support	0.580**	1		
Innovative Behavior	0.632**	0.611**	1	
Work engagement	0.648**	0.622**	0.673**	1

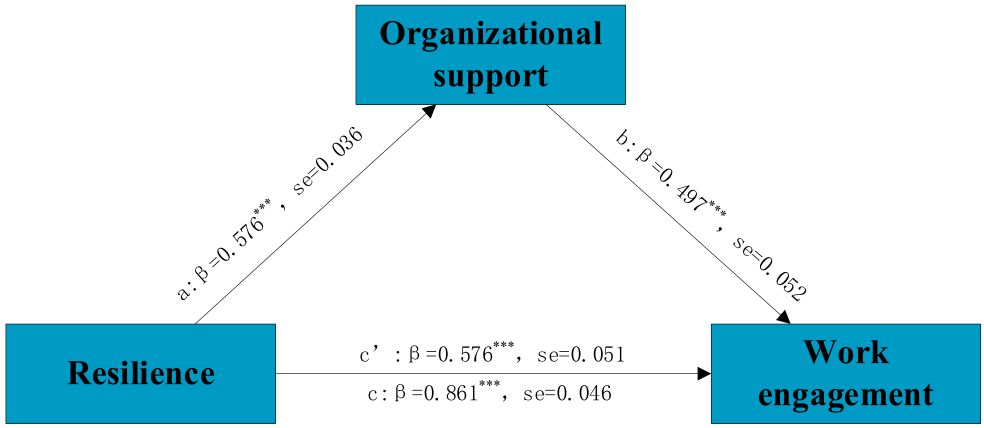

FIGURE 3
The mediated model. ***p<0.001. path c: total direct effect, path c': direct effect, path a and b: indirect effect.

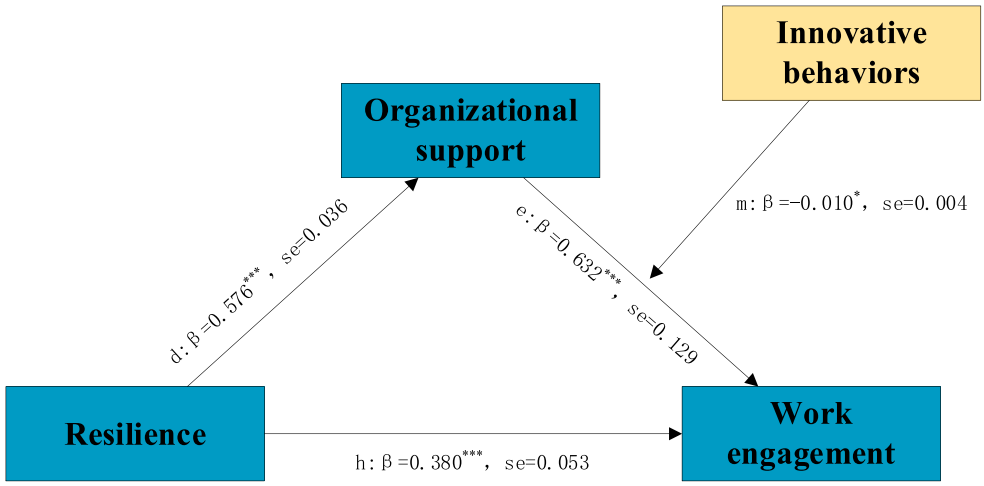

FIGURE 4
The moderated mediation model. *p<0.05, ***p<0.001. path d: relation between resilience and organizational support, path e: relation between organizational support and work engagement, path h: relation between resilience and work engagement, the moderating effect of innovative behaviors in the relationship between organizational support and work engagement.

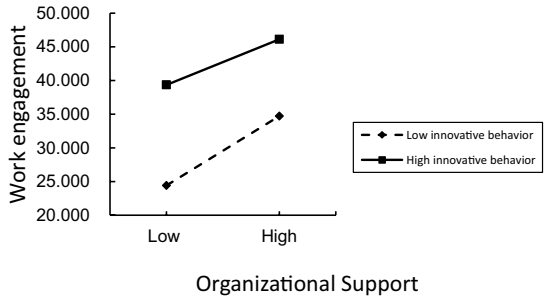

FIGURE 5
The moderation plot for innovative behavior.

In China, the low status and poor professional recognition of nurses for historical reasons significantly impact the enthusiasm for work. Moreover, after media coverage of doctors fighting the pandemic, the role of nurses in outbreak response was devalued, leading to decreased work engagement (37). This suggests that medical managers should understand the working environment of front-line nurses from a social perspective and formulate relevant policies to stabilize nursing teams.

4.2 Resilience and work engagement

We found that resilience has an important impact on nurses' work engagement. This is consistent with previous studies (38, 39). Studies have shown hat the nursing specificity of suppressing emotions during interactions with patients and colleagues may negatively impact their work enthusiasm (40, 41). When individuals feel restricted and unable to act on their values, it may contribute to professional burnout (42). Resilience is considered a positive individual psychological resource. Some scholars have found that nurses with low levels of resilience have low professional value identity (43, 44). These nurses often fail to carry out positive self-regulation, which gradually depletes individual emotions and reduces work enthusiasm. It is believed that work engagement is based on psychological identification with work (11, 45). Work performance reflects personal core values. Nurses with high resilience can adhere to professional principles and values, and play a deeper role in their work (46, 47). They tend to demonstrate active work engagement by refracting cognition, correctly articulating ideas, and effectively managing relationships. Therefore, nursing managers should focus on improving nurses' resilience to stimulate enthusiasm and increase work engagement.

4.3 Mediating role of organizational support

The JD-R model encompasses a personal resources component and has been shown to predict work engagement empirically. Organizational support is considered a positive social resource to combat the negative outcomes of negative job stress and burnout in the workplace (36, 48). Our study demonstrated that organizational support could mediate the relationship between resilience and work engagement. That is, resilience can indirectly affect nurses' work engagement through organizational support. When nurses possess high levels of resilience, they are more likely to perceive emotional, technical support, respect and understanding from the organization, resulting in a strong sense of belonging. This sense of belonging can increase organizational dedication and promote emotional adjustment for better productivity (49). The idea of organizational personification states that the relationship between nursing managers and nurses reflects the organization's care and support (50). This suggests that while cultivating nurses' resilience, nursing managers should also respect and affirm nurses' labor efforts and create a supportive work environment to increase their work enthusiasm.

4.4 Moderating role of innovative behavior

We found that innovative behavior plays a moderating role in the mediating path of "resilience-organizational supposition-work engagement." Highly innovative behavior can effectively improve the effectiveness of organizational support on work engagement. This is consistent with the JD-R working model claim results (51). Individuals and the environment are mutually shaped and motivated. Individuals with great innovation abilities can mine clinical problems or opportunities, gain support from colleagues, and promote active engagement in clinical practice (52). We found that organizational support has a stronger association with job engagement than resilience, especially when innovation is taken into account. This indicates that the regulatory pathway in the model may be more critical. Furthermore, organizational support had a weaker positive effect on work engagement as innovation behavior increased (Figure 5). This suggests that interventions tailored to nurses with low levels of innovation may be more effective. Therefore, managers should encourage nurses with low innovative behavior to join nursing innovation teams and develop autonomous innovation through behavioral plans. This will promote innovation from individuals to organizations and advance practical transformation.

4.5 Limitations

This study has a few limitations. First, its cross-sectional design means that it is not possible to rely on the results to infer causality. Second, the population of this study was from one province in China. Therefore, the representativeness of the results may be open to examination. Further expansion of the sample size of this study is needed to verify its findings. Third, the questionnaire in this study was collected by self-reporting, which may have caused recall bias.

4.6 Theoretical strengths

Most previous resource studies have focused on using family resources (family mastery) (53), individual resources (autonomous decision-making, professional commitment, etc.) (51), or a combination (healthy work environment and resilience) (54) to predict work engagement, with less attention paid to social resources. In this study, we aimed to describe the impact of social resources (organizational support) and personal resources (resilience and innovative behavior) on nurses' work engagement through the JD-R theoretical framework. Specifically, the organizational support introduced in this study can comprehensively assess nurses'

instrumental support and social support (29). According to the China Labor Force Dynamics Survey (55), the external social support of the working population is proportional to the happiness index, which is related to work enthusiasm. Moreover, Maslow's hierarchy of needs theory also emphasizes the need for individual social support (56). Therefore, consideration of this variable not only helps to extend the JD-R model in terms of social functioning and emotion but also provides a basis for clinical development to improve nurse work engagement.

4.7 Practical strengths

The study showed that resilience, organizational support, and innovative behavior contribute significantly to nurses' work engagement. Based on this evidence, it would be valuable for nursing managers to develop effective strategies based on this evidence to improve nurses' work engagement and stabilize the nursing team, further reduce medical costs and minimize adverse health outcomes in patients. The current COVID-19 pandemic has had a significant negative impact on nurses' work engagement. Ensuring high standards of care during and after emergencies is a top public health priority. However, these large-scale outbreaks have shown that working in stressful situations can have a significant impact on work engagement. The results of this study support the impact of psychological resilience, organizational support, and innovative behaviors on nurses' work engagement. The findings of this study have the potential to inform supportive interventions and enhance nurses' willingness to provide assistance in affected areas during health crises, thereby bolstering their work engagement and ultimately saving lives.

5 Conclusion

This study indicated that organizational support plays a mediating role in resilience and work engagement, and that innovative behaviors play a moderating role in the pathways of organizational support and work engagement. The results contribute to a deeper understanding of the pathways that influence work engagement in nurses. The results of this study suggest that policy makers and nurse managers need to focus on nurses' resilience, improve organizational support, and develop innovative behaviors. Future studies need to further explore the networks that influence nurses' work engagement. The intervening factors identified in this study also need to be validated by further randomized controlled trials.

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 humans were approved by the Ethics Committee of Xiangya School of Nursing, Central South University (E2022142). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

FZ: Conceptualization, Data curation, Investigation, Methodology, Software, Visualization, Writing – original draft. KL: Conceptualization, Data curation, Investigation, Methodology, Software, Visualization, Writing – original draft. HS: Data curation, Formal analysis, Investigation, Writing – review & editing. ZY: Data curation, Visualization, Writing – review & editing. TY: Data curation, Visualization, Writing – review & editing. LD: Data curation, Visualization, Writing – review & editing. JZ: Supervision, Validation, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This research was supported by the Natural Science Foundation of Hunan Province (Grant No. 2019JJ40446).

Acknowledgments

The authors thank all outpatient nurses who generously responded to the questionnaire and thank the hospital management boards for their support in recruiting the sample.

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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frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 04 January 2024
DOI 10.3389/fpsyg.2023.1258177

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OPEN ACCESS

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RECEIVED 17 July 2023
ACCEPTED 11 December 2023
PUBLISHED 04 January 2024

CITATION
Chu X, Yu J, Litifu A, Zhao W, Wei X, Wang P and Wei J (2024) Organizational support and task performance: a multiple mediation model.
Front. Psychol. 14:1258177.
doi: 10.3389/fpsyg.2023.1258177

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Organizational support and task performance: a multiple mediation model

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Objective: Organizational support has been identified as one of the causes for task performance, while previous studies have not adequately explored the underlying mechanisms. Thus, this study aims to reveal the potential mechanisms that linked organizational support to task performance.

Methods: A questionnaire survey was conducted among the 720 participants from 12 audit firms in Beijing in December 2020. Participants completed anonymous questionnaires assessing their organizational support, task performance, organizational commitment, and job satisfaction. Data analysis was conducted with SPSS 26.0.

Results: (1) Organizational support was positively associated with task performance, (2) job satisfaction and organizational commitment both mediated the relationship between organizational support and task performance respectively, and (3) the relationship between organizational support and task performance was also serially mediated by job satisfaction and then organizational commitment.

Conclusion: Job satisfaction and organizational commitment played a serial multiple mediating role in the association between organizational support and task performance, which provides a potential path for improving task performance.

KEYWORDS

organizational support, task performance, organizational commitment, job satisfaction, auditors

1 Introduction

Task performance can be understood as behavioral patterns that are directly involved in production and service provision, or activities that offer support indirectly to the organization's core technical processes (Van Scotter et al., 2000). It encompasses activities prescribed by the formal job role (Shen and Benson, 2016), which is related to the execution and maintenance of core technical processes in an organization (Motowidlo et al., 1997). It reflects an employee's effectiveness in completing the core job or role-based responsibilities (Singh, 2019). Empirical studies suggest that task performance not only facilitates employees' professional advancement (Van Scotter et al., 2000) but also

promotes accomplishment of organizational goals (Tett and Burnett, 2003). An important potential cause for task performance is organizational support. Organizational support refers to the value that organizations place on the contributions of their members and the concern for their well-being (Eisenberger et al., 1986). A meta-analysis study finds that organizational support positively links to task performance (Rhoades and Eisenberger, 2002), and a longitudinal study further reveals that organizational support positively predicts task performance in 1 year (Affuso et al., 2023). Besides, this potential influence might be stronger for Chinese employees. Traditionally, Chinese employees are supposed to view their organization as a symbolic family, especially in some organizations such as state-owned enterprises (Zhang et al., 2012), which might increase the potential influence of organizational support for Chinese employees. Empirical studies also support this notion. As revealed in a meta-analysis, organizational support is more strongly related to job attitudes and performance in the East than in the West (Rockstuhl et al., 2020). Hence, it is of greater significance to investigate the potential influence of organizational support on task performance in Chinese context. Although some studies have tested the direct relationship between organizational support and task performance (Rhoades and Eisenberger, 2002), previous studies have not adequately explored the underlying mechanisms. Based on social exchange theory, self-determination theory, happy-productive worker hypothesis, and goal setting theory, this study constructed and empirically tested a theoretical model to investigate the mediating mechanisms and to provide scientific suggestions for developing a multi-stage strategy to enhance Chinese employees' task performance.

1.1 Organizational support and task performance

Organizational support can be a potential cause for task performance. According to social exchange theory (SET), social behaviors can be the result of exchanges guided by the principle of reciprocity. When one party provides material and non-material support, the counterpart is inclined to exhibit more favorable behaviors as a form of reciprocation (Homans, 1958). Specifically, when an organization cares about the well-being and interests of employees, they tend to reciprocate with higher levels of performance (Wayne et al., 1997). Empirical findings repeatedly support this view. A meta-analysis study indicates a positive correlation between organizational support and task performance (Rhoades and Eisenberger, 2002). The correlation is stronger in Eastern countries, as revealed by a cross-culture meta-analysis (Rockstuhl et al., 2020). A cross-lagged study further finds that organizational support positively predicts employees' proactive behaviors toward the organization 4 months later, while employees' proactive behaviors cannot predict organizational support (Caesens et al., 2015). In addition, a longitudinal study shows that teacher support can positively predict students' academic performance in 1 year (Affuso et al., 2023). Moreover, an experimental study further confirms that organizational social recognition enhances both individual and team performance (Li et al., 2016). Based on the above analyses, this study hypothesized:

> *H1*: Organizational support positively predicts employees' task performance.

1.2 The mediating role of job satisfaction

Job satisfaction can play a mediating role between organizational support and task performance. Essentially, job satisfaction is defined as an evaluation of the favorability of a job, continuously ranging from positive to negative (Weiss, 2002), and includes internal satisfaction and external satisfaction (Weiss et al., 1967).

Job satisfaction can be a potential consequence of organizational support. Self-determination theory suggests that social support satisfies relational needs, and boosts well-being (Deci and Ryan, 1985). Besides, organizational support increases overall job satisfaction by meeting social emotional needs, improving performance reward expectations, and expressing the availability of assistance when needed as well (Rhoades and Eisenberger, 2002). In line with this notion, a meta-analysis confirms that organizational support is positively related to job satisfaction (Rhoades and Eisenberger, 2002). Moreover, a longitudinal study reveals that employees' supervisor support can positively predict their job satisfaction in 2 years (Jokisaari and Nurmi, 2009).

Meanwhile, employees' job satisfaction can be an underlying reason for their task performance. According to the happy-productive worker hypothesis, employees who are more satisfied with their jobs will better perform the tasks (Zelenski et al., 2008). Job satisfaction is one of the reflections on happiness (Cropanzano and Wright, 2001). The happy individuals also incline to solve problems creatively and fulfill work responsibilities actively, thus leading to better performance in their work (Fredrickson and Branigan, 2001; Zelenski et al., 2008; Wan et al., 2022). Several meta-analysis studies confirm that job satisfaction is positively related to task performance (Petty et al., 1984; Riketta, 2008; Whitman et al., 2010). Furthermore, some longitudinal studies reveal that task performance can be predicted by positive moods 3 weeks earlier (Tsai et al., 2007) and by job satisfaction 1 year before (Alessandri et al., 2017). Moreover, an experimental study further confirms that happiness facilitates performance (Oswald et al., 2015). In consideration that organizational support positively predicts job satisfaction, which further positively predicts task performance, a second hypothesis can be put forward:

> *H2*: Job satisfaction mediates the association between organizational support and task performance.

1.3 The mediating role of organizational commitment

Organizational commitment can also play a mediating role between organizational support and task performance. Organizational commitment refers to employees' tendency to serve their organizations on an ongoing basis (Becker, 1960). It encompasses a heightened sense of unilateral commitment to the organization, which is reflected through the allocation of personal resources to the organization and the acquisition of skills that can only be used in the current

organization (Becker, 1960). It can be understood as the degree of employees' identification with and intensity of involvement in the organization, suggesting that high organizational commitment is characterized by three features: a strong belief in the goals and values of the organization, a clear willingness to contribute to the organization, and a strong desire to maintain membership in the organization (Mowday et al., 1979).

Organizational support might influence organizational commitment of the employee. According to social exchange theory, the social behavior can be seen as an exchange process with both parties following the principle of reciprocity (Homans, 1958). When an organization cares for the well-being of its members and looks after their interests, the employees not only have positive attitudes toward the organization but also tend to develop a sense of obligation to better serve the organization (Cropanzano et al., 2001). Empirical studies also support this view. A meta-analysis study based on 588 studies indicates that organizational support is positively related to affective organizational commitment (Kurtessis et al., 2017). Furthermore, a cross-lagged study finds that organizational support can predict organizational commitment in 2 and 3 years, while organizational commitment cannot significantly predict organizational support later (Rhoades et al., 2001). Moreover, an experimental study further confirms that improved organizational climate, which includes organizational support (Sun et al., 2008), can enhance employees' organizational commitment (Gattiker et al., 2014).

Meanwhile, higher organizational commitment might lead to better task performance. According to goal setting theory, actions are governed by conscious intention, which can be manifested as goals (Locke, 1968). Organizational goals that accepted by employees contribute to greater individual effort and persistence, which further enhances performance (Vigoda-Gadot and Angert, 2007). Employees with high organizational commitment not only hold a firmer belief in and evinced stronger desire for the realization of the organizational goals (Mowday et al., 1979), but also tend to set higher performance goals themselves along with more effort to realized them (Wallace, 1995). Thus, they exhibit better performance in general. Empirical studies also support this view. For instance, a meta-analysis study confirms that organizational commitment is positively related to task performance (Wang et al., 2019). Furthermore, a longitudinal study reveals that organizational commitment positively predicts job performance in 3 years (Maia et al., 2016). Moreover, a meta-analysis of panel studies finds that organizational commitment can positively predict task performance at both short-time and long-time lags, while performance cannot significantly predict organizational commitment (Riketta, 2008). For the reason that organizational support positively predicts organizational commitment and organizational commitment positively predicts task performance, the third hypothesis could be posited:

> *H3*: Organizational commitment mediates the association between organizational support and task performance.

1.4 The multiple mediation model

Job satisfaction might lead to organizational commitment. According to social exchange theory, employees satisfied with their job are inclined to have solid willingness to contribute to the organization (Cropanzano et al., 2001). They usually have greater recognition and attachment to work, along with increased job involvement, which further contributes to stronger organizational commitment (Culibrk et al., 2018). Empirical studies also support this view. A meta-analysis research confirms that job satisfaction is positively related to organizational commitment (Fragkos et al., 2020), and a longitudinal study further reveals that job satisfaction can positively predict organizational commitment in 6 months (Abdelmoteleb, 2019). For the reason that both job satisfaction and organization commitment mediate between organizational support and task performance, while job satisfaction positively predicts organizational commitment, this study hypothesized:

> *H4*: Job satisfaction and organizational commitment play serial mediating role in the relationship between organizational support and task performance.

1.5 The present study

To uncover the underlying relationship between organizational support and task performance, this study took a process-oriented approach by testing a serial mediation model (see Figure 1). In particular, the following questions were addressed: (a) whether organizational support positively associates with task performance through (b) job satisfaction and (c) organizational commitment; and (d) whether job satisfaction and organizational commitment play a serial mediating role in the association.

2 Method

2.1 Participants

Convenient sampling was applied in this study. The minimal sample size was determined through calculations using the G*Power 3.1.9.6 computer program software with the effect sizes between variables obtained from reports of previous meta-analysis studies of the relevant concepts (Lee et al., 2000; Rhoades and Eisenberger, 2002; Ng et al., 2009; Rockstuhl et al., 2020). Power analysis indicated the minimal sample size for this study is 329 to keep type I error less than 0.05 and power higher than 0.95. After obtaining informed consent, an anonymous self-report questionnaire was distributed to a cluster sample of 720 participants from 12 audit firms in Beijing in December 2020. Participants consisted of 367 males (50.97%) and 353 females (49.03%). The age of participants ranged from 20 to 68 years old (M = 32.43, SD = 8.63). The demographic characteristics of the participants are presented in Table 1.

2.2 Measures

Organizational support was assessed by Perceived Organizational Support Scale. This scale was developed by Eisenberger et al. (2001) and has been used among the Chinese participants (e.g., Wang et al., 2017). It uses a five-point Likert scale ranging from 1 (strongly

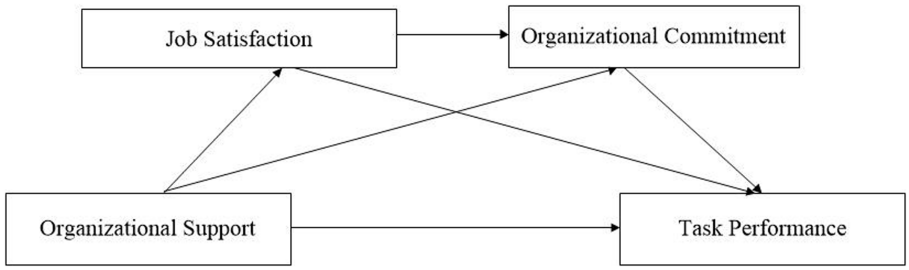

FIGURE 1
The proposed multiple mediation model.

TABLE 1 Demographic characteristics of the sample.

Variables		Frequency	Percentage
Gender	Male	367	50.97%
	Female	353	49.03%
Education level	Vocational college diploma or below	285	39.58%
	Bachelor	405	56.25%
	Master or Doctor	30	4.17%
Annual income	CNY 60,000 or below	201	27.92%
	(CNY 60,000, CNY 120,000)	295	40.97%
	(CNY 120,000, CNY 180,000)	129	17.92%
	(CNY 180,000, CNY 240,000)	52	7.22%
	Higher than CNY 240,000	43	5.97%
Marital status	Single	308	42.78%
	Married	384	53.33%
	Divorced	17	2.36%
	Others	11	1.53%
Work seniority	5 years or less	265	36.81%
	(5 years, 10 years)	210	29.17%
	(10 years, 15 years)	112	15.56%
	More than 15 years	133	18.47%

disagree) to 5 (strongly agree) and consists of 6 items. Responses of all 6 items were averaged, with higher scores indicating higher levels of organizational support. The scale was reliable with the Cronbach's alpha coefficient of 0.94 and the first extracted factor explaining 76.16% of the total variance. CFA supported the structural validity of the scale was acceptable with SRMR = 0.01, CFI = 0.99, TLI = 0.99. Task Performance Subscale of the Job Performance Scale (Han et al., 2007) was used to measure task performance. The scale consists of 10 items. Participants answered each item on a five-point Likert scale ranging from 1 (never) to 5 (always). The mean score was calculated, with higher scores indicating higher levels of task performance. Cronbach's alpha coefficient in the present study was 0.76, with the first extracted factor explaining 43.27% of the total variance. The job satisfaction was assessed by Chinese version of Minnesota Satisfaction Short-Form Questionnaire (which was publicly provided by Department of Psychology, University of Minnesota, with the following link: https://vpr.psych.umn.edu/sites/vpr.umn.edu/files/files/chinese_msq_1977_short_form_2.pdf), which was developed by Weiss et al. (1967). The scale consists of 20 items and uses a five-point Likert scale ranging from 1 (strongly dissatisfied) to 5 (strongly satisfied). Responses of all 20 items were averaged, with higher scores indicating higher levels of job satisfaction. The Cronbach's alpha coefficient in this study was 0.96, with the first extracted factor explaining 56.25% of the total variance. CFA supported the structural validity of the scale was acceptable with SRMR = 0.04, CFI = 0.88, TLI = 0.87. Organizational Commitment Short-Form Questionnaire, developed by Mowday et al. (1979) and revised by Long (2002), was used to measure organizational commitment. It consists of 9 items and uses a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Responses of all 9 items were averaged, with higher scores indicating higher levels of organizational commitment. The Cronbach's alpha coefficient in the current study was 0.94, with the first extracted factor explaining 68.04% of the total variance. CFA supported the structural validity of the scale was acceptable with SRMR = 0.03, CFI = 0.95, TLI = 0.94.

2.3 Statistical analyses

The data analysis was conducted with SPSS 26.0. Firstly, potential common method bias was checked. After calculations of bivariate correlations, Hayes' PROCESS macro Model 4 (mediation model, i.e., X → M → Y) was performed to test the mediating effect of job satisfaction and organizational commitment, respectively. Then, Model 6 (multiple mediation model, i.e., X → M1 → M2 → Y) was performed to test the hypothesized serial mediating effect of job satisfaction and organizational commitment in the relationship between organizational support and task performance (Hayes, 2013). Before application of Model 4 and 6, standardized scores of all variables were computed. The significance of indirect effects was tested with bias-corrected percentile bootstrap method (with 5,000 resamples).

3 Results

3.1 Descriptive statistics and correlation analysis

Descriptive statistics and correlation matrix of organizational support, work autonomy, job satisfaction, and organizational

commitment are provided in Table 2. Results of bivariate correlation analysis show that organizational support, job satisfaction, organizational commitment, and task performance were significantly and positively correlated with each other ($p < 0.001$), supporting Hypothesis 1.

3.2 Mediating effect of job satisfaction

The PROCESS macro for SPSS (Model 4, i.e., X → M → Y) was applied to test Hypothesis 2. The results indicated that task performance was positively predicted by organizational support ($b = 0.30$, $p < 0.001$, Model 1 of Table 3), which also supported Hypothesis 1. Moreover, organizational support positively predicted job satisfaction ($b = 0.62$, $p < 0.001$, Model 2 of Table 3), which in turn predicted task performance ($b = 0.22$, $p < 0.001$, Model 3 of Table 3). Job satisfaction therefore played a mediating role in the link between organizational support and task performance (indirect effect = 0.14, 95% CI = [0.07–0.22]), supporting Hypothesis 2.

3.3 Mediating effect of organizational commitment

Hypothesis 3 was also tested with the PROCESS macro for SPSS (Model 4, i.e., X → M → Y). Results indicated that organizational support positively predicted organizational commitment ($b = 0.68$, $p < 0.001$, Model 4 of Table 3), which further positively predicted task performance ($b = 0.32$, $p < 0.001$, Model 5 of Table 3). Organizational commitment therefore played a mediating role in the link between organizational support and task performance (indirect effect = 0.22, 95% CI = [0.16–0.28]), supporting Hypothesis 3.

3.4 Serial mediating effects of job satisfaction and organizational commitment

The PROCESS macro for SPSS (Model 6, i.e., X → M1 → M2 → Y) was used to test the multiple mediation model. Results showed that organizational support positively predicted both job satisfaction ($b = 0.62$, $p < 0.001$, Model 2 of Table 4) and organizational commitment ($b = 0.49$, $p < 0.001$, Model 3 of Table 4); Furthermore, job satisfaction positively predicted organizational commitment ($b = 0.31$, $p < 0.001$, Model 3 of Table 4); Besides, both job satisfaction ($b = 0.14$, $p < 0.01$, Model 4 of Table 4) and organizational commitment ($b = 0.27$, $p < 0.001$, Model 4 of Table 4) positively predicted task performance. The pathway of "organizational support → job satisfaction → organizational commitment → task performance" was significant (indirect effect =0.05, 95% CI = [0.03–0.08]), which supported Hypothesis 4 (Table 5).

TABLE 2 Descriptive statistics and correlation matrix of all variables.

Variables	*M*	*SD*	1	2	3	4
OS	3.54	0.86	1			
JS	3.88	0.65	0.62***	1		
OC	3.09	0.59	0.68***	0.61***	1	
TP	3.95	0.59	0.30***	0.33***	0.38***	1

OS, Organizational Support; JS, Job Satisfaction; OC, Organizational Commitment; TP, Task Performance. N = 720, ***$p < 0.001$, same below.

4 Discussion

This study investigated the relationship between organizational support and task performance with mediating roles of job satisfaction and organizational commitment. The results indicated that organizational support can be indirectly linked to task performance through both job satisfaction and organizational commitment respectively, as well as via the serial multiple mediation of job satisfaction and organizational commitment. The results supported our theoretical hypotheses and extended the findings of previous studies by providing potential mechanisms linking organizational support to employees' task performance.

4.1 Organizational support and task performance

Correlation analysis indicated that organizational support was positively linked to task performance, which supported Hypothesis 1. The finding is congruent with the view of social exchange theory (Homans, 1958) as well as previous empirical findings (Rhoades and Eisenberger, 2002; Caesens et al., 2015; Li et al., 2016; Rockstuhl et al., 2020). The positive relationship indicated that employees' excellent performance could be in return for the value organization place on their contributions and the concern for their well-being.

4.2 Mediating roles of job satisfaction and organizational commitment

Job satisfaction and organizational commitment both played mediating roles, respectively, in the association between organizational support and task performance. For the mediating role of job satisfaction, empirical results from this study confirmed Hypothesis 2, which was deduced from self-determination theory (Deci and Ryan, 1985) and happy-productive worker hypothesis (Zelenski et al., 2008). Organizational support can meet the basic needs of the employee, facilitating satisfaction with job (Deci and Ryan, 1985). The satisfied individuals incline to reward the organization with more favorable behaviors (Homans, 1958; Eisenberger et al., 1986), to solve problems creatively, and to fulfill work responsibilities actively, thus leading to better performance (Fredrickson and Branigan, 2001; Zelenski et al., 2008; Wan et al., 2022). Similarly, for the mediating role of organizational commitment, empirical result from this study verified Hypothesis 3, which was proposed derived from social exchange theory (Homans, 1958) and goal setting theory (Locke, 1968). It is easier for the employees, whose well-being was cared by the organization, to develop a sense of obligation to better serve the organization (Cropanzano et al., 2001). They usually have a strong belief and desire for the realization of the goal of the organization (Mowday et al., 1979), which contributes to high levels of performance (Vigoda-Gadot and Angert, 2007).

10.3389/fpsyg.2023.1258177

TABLE 3 Testing the mediating effect of job satisfaction and organizational commitment respectively.

Regression model	Outcome	Predictors	*R*	R^2	*F*	*b*	*SE*	*t*
Model 1	TP		0.30	0.09	72.73***			
		OS				0.30	0.04	8.53***
Model 2	JS		0.62	0.38	443.94***			
		OS				0.62	0.03	21.07***
Model 3	TP		0.35	0.12	50.21***			
		OS				0.17	0.04	3.71***
		JS				0.22	0.04	5.02***
Model 4	OC		0.68	0.46	613.81***			
		OS				0.68	0.03	24.78***
Model 5	TP		0.38	0.15	62.18***			
		OS				0.08	0.05	1.81
		OC				0.32	0.05	6.85***

Each variable was standardized before brought into the regression equation, same below. ***$p < 0.001$.

TABLE 4 Testing the serial mediating effects of job satisfaction and organizational commitment.

Regression Model	Outcome	Predictors	*R*	R^2	*F*	*b*	*SE*	*t*
Model 1	TP		0.30	0.09	72.73***			
		OS				0.30	0.04	8.53***
Model 2	JS		0.62	0.38	443.94***			
		OS				0.62	0.03	21.07***
Model 3	OC		0.72	0.52	387.52***			
		OS				0.49	0.03	14.84***
		JS				0.31	0.03	9.35***
Model 4	TP		0.40	0.16	44.97***			
		OS				0.03	0.05	0.64
		JS				0.14	0.05	3.02**
		OC				0.27	0.05	5.51***

**$p < 0.01$.

TABLE 5 Testing the path ways of the multiple mediation model.

Model pathways	Estimated	*SE*	Boot LLCI	Boot ULCI
OS→JS→TP	0.09	0.04	0.02	0.17
OS→OC→TP	0.13	0.03	0.07	0.19
OS→JS→OC→TP	0.05	0.01	0.03	0.08
Total indirect effect	0.27	0.04	0.20	0.35

Consequently, both employees' satisfaction with the job and commitment to the organization play important roles for bridging between organizational support and task performance of employee. Although it is worth for the organization providing abundant social support for employees, the support organization could provide is not unlimited in consideration of the cost as well as capacity. Hence, job satisfaction and organizational commitment of the employee should also be paid close attention.

4.3 Serial mediating effects of job satisfaction and organizational commitment

Findings regarding the serial mediating effect verified "organizational support → job satisfaction → organizational commitment → task performance" pathway, which supported Hypothesis 4 that proposed mainly based on social exchange theory (Cropanzano et al., 2001). It is also congruent with the findings of previous empirical studies demonstrating relationship between each variable dyad. Specially, organizational support positively predicts job satisfaction (Dreer, 2022; Walsh and Kabat-Farr, 2022; Patterer et al., 2023), which further positively predicts organizational commitment (Fragkos et al., 2020; Marta et al., 2021; Thi et al., 2021), that can finally positively predict task performance (Che et al., 2021; Fragoso et al., 2022; Lee et al., 2022). In other words, individuals with high organizational support tend to be satisfied with their job, which increases their organizational commitment, that directly improves

their task performance. For relationship between job satisfaction and organizational commitment, employees higher in job satisfaction usually recognize and attach stronger to the work, have deeper job involvement (Culibrk et al., 2018), want to contribute more to the organization (Cropanzano et al., 2001), which all facilitate organizational commitment (Culibrk et al., 2018). The finding of the serial chain mediating effect reveals the internal mediating mechanism of how organizational support links to task performance, which extends the theories and deepens the understanding for the relationship. Providing sufficient organizational support to employees can foster their job satisfaction directly, enhance their organizational commitment thereafter, and finally promote their task performance.

4.4 Implication

The findings significantly advance our comprehension of the potential mechanisms linking organizational support to task performance. Moreover, they offer valuable scientific insights to propose a multi-stage strategy to enhance employees' task performance.

Organizational support was found positively linked to task performance. In other words, when the well-being and interests of employees are cared by the organization, they are inclined to respond with higher levels of performance (Wayne et al., 1997). These findings suggest that employees' outstanding performance may be in return for the value the organization assigns on their contributions and the concern for their well-being. Consequently, organizations should be generous with social support to their employees, which is worthwhile in the long run as it contributes to improvement of employees' performance and can finally enhance realization of organizational goals (Tett and Burnett, 2003).

Although providing organizational support might be an effective way enhancing employees' task performance, it is not unlimited or without cost. As revealed in the previous section, job satisfaction and organizational commitment played a serial mediating role in the association between organizational support and task performance. In other words, providing substantial organizational support to employees may firstly foster their job satisfaction, subsequently enhance their organizational commitment, and ultimately promote their task performance, which implies a potential multi-stage strategy to enhance employees' task performance. In addition to organizational support, any practices that can boost job satisfaction or advance organizational commitment should be adopted, such as implementing a fair performance evaluation system and providing clear organizational objectives (Kim, 2023), developing workplace safety policies (Bajrami et al., 2021), and implementing effective participation and communication mechanisms (Lee et al., 2021).

To sum up, we recommend a strategic focus on improving organizational support, while also paying attention to the serial multiple mediating role of job satisfaction and organizational commitment to effectively improve employees' task performance.

4.5 Limitations and future directions

The current study has provided a theory on how organizational support links to task performance. However, several limitations still exist and need to be addressed in future studies. Firstly, although it is reasonable to deduce an "organizational support → job satisfaction → organizational commitment → task performance" path from theories and previous empirical studies, causal relationships should be taken with caution since questionnaire survey was the method for data collection. In future research, experimental or intervention methods should be adopted to make stronger claims on the causal direction of the effects. Secondly, more work is needed to fully uncover the mechanisms between organizational support and task performance. Although the paths revealed in this study are important, there may be other paths linking organizational support to organizational commitment. Future research should continue to explore possible mediating and moderating variables between organizational support and organizational commitment. Thirdly, future study should use a random sample to further validate the findings of this study. Despite these limitations, current study has advanced our understanding of the mechanisms linking organizational support to organizational commitment. The findings may help provide practical advices for improving task performance.

5 Conclusion

Despite existing evidence of the general connection between organizational support and task performance, exploring the underlying mechanisms of their relationship is crucial for developing a multi-stage strategy to enhance employees' task performance. This study investigated the relationship between organizational support and task performance with a serial multiple mediating role of job satisfaction and organizational commitment. Specially, the following results were revealed in this study:

1. Organizational support was positively associated with employees' job satisfaction, organizational commitment, and task performance. Job satisfaction and organizational commitment were both positively associated with task performance. Job satisfaction was also positively associated with organizational commitment.
2. Organizational support indirectly linked to task performance through the mediating roles of job satisfaction and organizational commitment, respectively. Organizational support can meet employees' basic needs, promoting job satisfaction or elevating levels of organizational commitment, thus indirectly linked to employees' task performance.
3. Organizational support was indirectly associated with task performance through the chain mediating role of job satisfaction and organizational commitment. Individuals with high organizational support often find satisfaction in their work, which further increases their organizational commitment and finally enhances their task performance.

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 humans were approved by Human Research Committee of Beijing University of Posts and Telecommunications. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

XC: Conceptualization, Data curation, Methodology, Writing – original draft, Writing – review & editing. JY: Conceptualization, Data curation. Methodology, Writing – original draft, Writing – review & editing. AL: Methodology, Writing – original draft, Writing – review & editing. WZ: Writing – original draft, Writing – review & editing. XW: Writing – review & editing. PW: Writing – review & editing. JW: Writing – original draft, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Acknowledgments

We thank Yu Guo who provided assistance to collect data. We thank all the participants who contributed to this study by providing important personal data.

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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 26 January 2024
DOI 10.3389/fpubh.2023.1298428

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OPEN ACCESS

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RECEIVED 21 September 2023
ACCEPTED 27 December 2023
PUBLISHED 26 January 2024

CITATION
Khan HS, Chughtai MS, Ma Z, Li M and He D (2024) Adaptive leadership and safety citizenship behaviors in Pakistan: the roles of readiness to change, psychosocial safety climate, and proactive personality. *Front. Public Health* 11:1298428. doi: 10.3389/fpubh.2023.1298428

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Adaptive leadership and safety citizenship behaviors in Pakistan: the roles of readiness to change, psychosocial safety climate, and proactive personality

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Challenging times have put organizations in a perilous and chaotic state that demands immediate resolution and calls for effective leadership to help navigate out of the crisis. In this context, we focused on psychosocial safety climate theory to investigate the influence of adaptive leadership on safety citizenship behaviors by looking at the mediating effect of readiness to change and the moderating impact of psychosocial safety climate and proactive personality, particularly in the Pakistani healthcare sector. To test the hypotheses, the data were collected from 397 employees working in the healthcare sector of Pakistan at two different times. The results of this study supported the model. The moderated path analysis revealed that psychosocial safety climate strengthens the direct effect of adaptive leadership on readiness to change, whereas the moderating impact of a proactive personality also strengthens the relationship between readiness to change and safety citizenship behaviors. Similarly, both moderators significantly moderated the indirect impact of adaptive leadership on safety citizenship behaviors via readiness to change. To conclude, the present study has significant implications for organizations and practitioners in both steady and uncertain environments.

KEYWORDS

adaptive leadership, readiness to change, psychosocial safety climate, proactive personality, safety citizenship behavior, healthcare, moderated mediation model

1 Introduction

> "Knowing how the environment is pulling your strings and playing you is critical to making responsive rather than reactive moves." (Ronald Heifetz)

The world is currently faced with a chaotic situation that has sabotaged the normal infrastructure in terms of health, business, political environment, and ecology (1, 2). Human life has been critically affected by the inevitable changes due to unforeseen circumstances that call for restructuring or redesigning the organizational mold (3, 4). The whole system is collapsing, making it impossible to imagine how the new world will appear; this requires competent leadership to hold the system in place (5, 6).

Safety is of utmost value in healthcare organizations due to high-risk professions (7). Post-pandemic circumstances also increase the importance of safety behaviors as changes in professional working processes demand extraordinary safety behaviors to reduce the risk factors of any physical and psychological injury (8, 9). Safety citizenship behaviors (SCBs) have been described as voluntary behaviors aimed at enhancing employee group cooperative performance (10, 11). At this conjuncture, leaders' proactive and prosocial behaviors ensure a safe working atmosphere (8), making it mandatory for organizations to bring adaptive leadership (AL) to demonstrate SCBs.

The involvement of individuals in the process of change is of utmost importance, and the concept of readiness to change (RTC) is widely recognized as a crucial factor in successfully implementing various change initiatives (12, 13). Administering change is not just an operational procedure but a vital competency for organizations that desire to stand tall in the future (14). Given this, RTC is a factor associated with leadership (15). Very few studies have investigated the impact of RTC, a pathway in leadership, and safety-related outcomes (16). These gaps are vital since AL aims to set the direction in turbulent situations (17), especially pandemics.

Psychosocial safety climate (PSC) indicates psychological circumstances at work because it is an expanded notion about a good and healthy workplace (18). The involvement and commitment of senior management show their guarantee to the employees through the activities of psychological health and safety policies and practices to prevent stress and uncertainty that may occur due to organizational change activities, which leads to higher level PSC at the workplace (19).

Employees' safety behaviors can be triggered by several elements, and individual factors, i.e., proactive personality (PP), is one of them (20, 21). The PP trait is famous for taking the initiative at the workplace (20), and for higher SCB, individuals with these characteristics are essential. Highly proactive individuals find opportunities from problems and are not threatened by challenging and difficult circumstances (20), which usually occur during organizational change, especially in healthcare organizations.

Our study, which employed the PSC theory (22, 23), explains the impact of AL on SCBs and highlights the critical mediating role of RTC and moderating factors of PSC and PP that contribute to the leadership and organizational behavior literature in the following ways. Given the need for adaptive leaders to be helpful for the achievement of change objectives by giving new paths of working (24), we answer calls from Dartey-Baah et al. (25) and London (26) to explore the role of AL as a predictor of SCBs. Furthermore, this study also responds to the call from Sengupta et al. (27), which proposes the mediating impact of RTC that helps an organization to survive rather than struggle in the course of a global crisis by resulting in consistent SCB. Subsequently, the present study tests the moderating conditions of PSC leadership that have been overlooked to date, which Mansour (28) advocated in their recent review; our theorizing identifies an important PSC factor in employee behavior––that enhances the effects of AL on SCB. Next, by linking AL with SCBs and examining the moderating effect of PP, our study answers recent calls (29) to decipher mechanisms through which AL interactions impact SCBs in employees. Additionally, this study responds to the call from Tsandila-Kalakou et al. (30) by assessing the healthcare professionals' adaptive capacity of employees and the role of contextual factors that could be used by hospitals to improve SCBs through educational efforts, individualized training, and motivational support. Our model presents the interplay of AL with PSC and PP through RTC for promoting SCBs in the healthcare sector, as illustrated in Figure 1.

2 Theory and hypotheses development

2.1 Psychosocial safety climate theory

This study's pedestal was laid on the psychosocial safety climate (PSC) theory to support our hypotheses. This theory denotes "*organizational policies, practices, and procedures for protecting worker psychological health and safety*" (31). Scholars ordained that PSC determines the organizational structure policies and values that prompt communications and prevent work stress (32). Considering this, leaders are known to tune up the organizational climate through effective communication and stress management tactics (33). In this sense, AL is recognized as an effective leadership that consists of various strategies and conduct, which aids in a safe environment (34). A leader engages in facilitation activities to assist followers in learning, adapting, and changing their thinking, values, beliefs, and work routines after determining the sorts of difficulties (technical or adaptive) (35). The change of views and thinking by the leaders enables the subordinates to change their perceptions about organizational change and ultimately show their physical and psychological support (27, 36). Aligned with this, we posit that AL demonstrates helping behaviors and takes initiatives and safety measures that portray SCBs.

Furthermore, following the PSC theory, researchers conceded that a high PSC environment enables leaders to safeguard workforce well-being and ensure that the employees' demands are manageable (37). Moreover, contemporary meta-analysis indicated that the health perils and motivational channels are mechanisms through which work demands and available resources are associated with a safe climate (38). Thus, we anticipated that a positive link between PSC and resources exists. Numerous studies have also endorsed PSC culture's significance in organizations (22, 32, 39). Dollard and Bakker (31) established that high PSC was significantly linked to reduced work stress, emotional demands, and heightened skill discretion, which may be needed during the organizational change process. Ultimately, demands and resources conduit PSC's influence level on perceived psychological health (31, 37). Moreover, Dollard and Bailey (40) asserted that PSC increases the coping abilities and personal energy of the individuals through which they can manage their job demands and reduce their stress, which may occur due to uncertainty of the organizational change. Thus, we examined the moderating role of PSC on AL and RTC.

Similarly, organizations with a substantial amount of PSC realize the need to make individuals feel protected to work in an atmosphere favorable to achieving organizational goals (18). Proactive individuals engage themselves by influencing the workplace environment to achieve higher performance (41, 42). Based on this notion, we argued that individuals belong to proactive personality traits; when they feel protected at the workplace, they participate more in extra-role behaviors (i.e., SCBs). In addition, the lens of PSC theory (22, 23) further explains that organizational climate encourages employees'

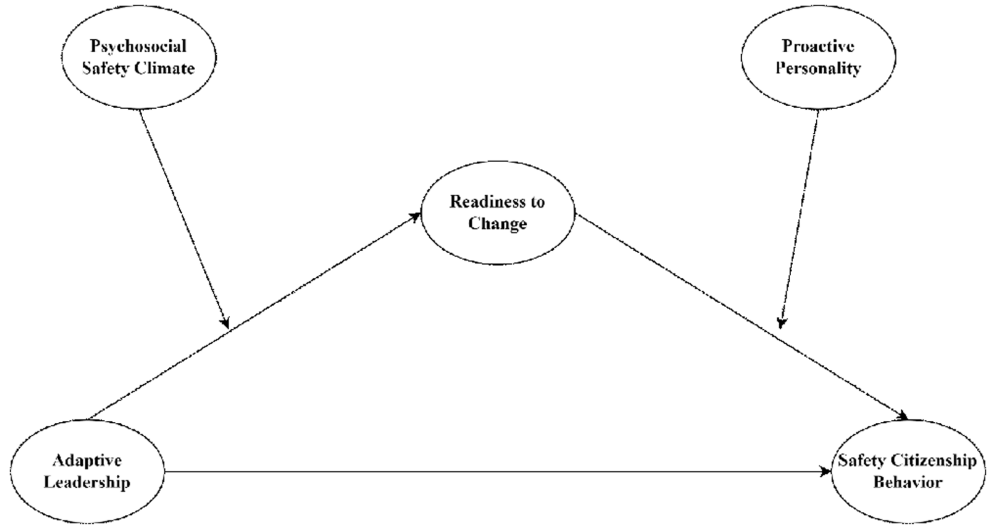

FIGURE 1
Research model.

growth and development, and proactive individuals have the main characteristic for dealing with complex problems at the workplace with the aim of opportunities for them. It has been observed that PP plays a vital role in the demonstration of extra-role and safety behaviors (20, 43). Therefore, we expect that when individuals show their RTC with the support of PSC and AL, the employees of PP may bring more SCBs to the workplace, especially in healthcare organizations.

2.2 Adaptive leadership and safety citizenship behaviors

To deal with perplexing, uncertain, and shifting work environments, leaders must adapt (44) and possess the capacity to effectively communicate with followers (45) to bring about constructive change in vibrant work environments (46, 47). Shedding light on adaptive leaders' roles exudes confidence and creates a favorable atmosphere where everyone feels secure (48). Researchers acceded that AL is an effective leadership approach in the field of management due to rapid organizational changes (49–51), such as in pandemics. Leaders respond to supportive gestures by executing citizenship behaviors and demeanor treasured by the organizations (44). Corroborating this, adaptive leaders exude confidence and create a favorable atmosphere where everyone feels secure (49). Organizations provide adequate resources to the managers to take appropriate action when threatening situations lead to safety measures (52). Studies of high-risk-oriented organizations demonstrate that AL is linked to effective environmental performance and safety (53). However, studies have investigated the phenomena related to safety and environmentally specific leadership, but AL and SCB associations require further exploration. Moreover, the PSC theory also advocates the importance of a healthy work environment that facilitates a safe climate and positive outcomes. Thus, we formulate the following hypotheses:

> *H1:* Adaptive leadership is positively related to safety citizenship behaviors.

2.3 The mediating role of readiness to change

Leadership is a primary driver for organizational success, including functional and business performance outcomes (54, 55). A fundamental factor of successful organizational changes is that RTC relies primarily on the support of its leaders (56–58). Researchers have found that RTC has a favorable impact on organizational performance (24, 59). The concept of RTC means the degree to which workers consider how they are going to adapt to the change implementation in an organization (60). Workers constitute the primary stakeholders in an organization's transformation and respond differently to the organization's change implementation (61). Some staff members believe it will bring them happiness, pleasure, and benefits, while others may worry and feel they would suffer if the change is adopted in the organization (60). Furthermore, the literature indicates that RTC is critical for organizational change implementation and safety behaviors (62). Furthermore, the safety climate provided by the leaders encourages employees to engage in safety behaviors at work (63). As a result, AL has the ability to influence and encourage others to change their behavior correspondingly. Employees in healthcare organizations face different levels of stress and pressure, and workers must strive both physically and mentally to be safe and sound (38). These factors motivate adaptive leaders to shift employees' views about change. The mindset of the leader redefines problem-solving by providing novel viewpoints on taking on roles, transforming obligations, and making sacrifices during difficult times (64). According to this, leadership could have an impact on RTC by influencing staff behaviors, which are unavoidable when preparing for change efforts, and subsequently influencing SCB. Thus, based on the above thrashing out, we hypothesize,

> *H2:* Readiness to change mediates the relationship between adaptive leadership and safety citizenship behaviors.

2.4 Moderating role of psychosocial safety climate

Psychological safety climate is recognized as an essential ingredient of organizational climate that constitutes individuals' perceptions about policies, procedures, and practices (31). Earlier studies elaborated that these perceptions are related to management support, effective communication, leader's priorities, and participation regarding the workforce's workplace safety and psychosocial health (22, 31, 32). According to Idris et al. (32) and Zadow et al. (65), a philosophical distinction exists between PSC and other notions, i.e., team psychological climate and safety climate. The focus of the safety climate is only on the policies, procedures, and practices regarding the physical safety of the employees at the workplace (66). In contrast, PSC focuses explicitly on the psychological health of the individuals at the workplace, covering a wide range of stressors that may occur due to interpersonal social relationships (32). Indeed, the management needs to emphasize PSC more than productivity (67). Furthermore, researchers expressed that PSC in an organization supports the change process, where leaders act according to the needs of the circumstances (22). Studies on organizational change have stressed leadership's role concerning RTC (68). In line with this, leaders are considered agents of change that fulfill organizational needs (69, 70). It is also noted that high PSC aids psychological health and safeguards employees' welfare (32). Moreover, PSC is a social factor determining workforce health and productivity (22). Accordingly, the PSC theory also supports the notion that a favorable work environment augments the leaders' capability to become change agents (16). Because of these above arguments, we postulate the following hypotheses,

> *H3:* Psychosocial safety climate moderates the relationship between adaptive leadership and readiness to change.
>
> *H4:* Psychosocial safety climate moderates the indirect effect of adaptive leadership on safety citizenship behaviors via readiness to change.

2.5 Moderating role of proactive personality

The concept of PP pertains to an individual's proactive efforts and actions aimed at successfully influencing their current circumstances, identifying potential opportunities, surmounting challenges and obstacles, and attaining their objectives while simultaneously exerting influence on their external events (41, 71, 72). Safety citizenship behavior is considered the employees' discretionary safety activities to manage the risk at the workplace (11). Moreover, these safety activities are not required of employees in their job tasks, not for the formal reward or promotion, but they perform them voluntarily for smooth and effective functioning at the workplace (73). Different research findings show that PP can deal better with uncertain and adverse workplace situations, and by devoting their skills and abilities, they improve organizational well-being (74, 75). Moreover, proactive persons exhibit an optimistic orientation by independently initiating and doing preemptive initiatives to strategically plan and effectuate personal or environmental modifications in a favorable trajectory (71, 76). Numerous studies have reflected that individuals with higher levels of proactivity are more likely to achieve organizational and personal goals, i.e., innovative work behaviors (77), work engagement (78), professional identity (79), safety behaviors (20), proactive career behaviors (80), and cope with negative emotions, i.e., anger and stress (81). Based on this notion, we propose the moderating effect of PP between the relationship of RTC and SCBs, as we expect that proactive individuals during the organizational change process in the healthcare sector may demonstrate SCBs as they are willing cognitively to face challenges and want to learn from the environment. Thus, we hypothesize that:

> *H5:* Proactive personality moderates the relationship between readiness to change and safety citizenship behaviors.
>
> *H6:* Proactive personality moderates the indirect effect of adaptive leadership on safety citizenship behaviors via readiness to change.

3 Materials and methods

The present study is quantitative in nature, using a deductive approach to test the proposed hypotheses. For data collection purposes, a simple random sampling technique was applied, and close-ended questionnaires were distributed using the survey method to this study's participants in two separate temporal time lags. The gap between the two time lags was 3 weeks to minimize the possibility of common method bias (CMB) (82). By following the recommendations by Podsakoff et al. (82, 83) and Rosenthal and Rosnow (84), we collected data from employees (i.e., subordinates and supervisors) to minimize the CMB and for the higher external validity of the data. For data collection purposes, healthcare sector institutions were randomly selected from the major cities of Pakistan (i.e., Rawalpindi, Islamabad, Lahore, Faisalabad, and Sargodha) in 2022 (February–April). Moreover, this study included data from different departments of healthcare institutions by collecting data randomly from employees who are directly linked with the health and care of the patients, i.e., operations, research, and development, and hospital services (front desks and pharmacy) (85, 86). At the same time, we excluded some departments, i.e., HR/admin, audit, budget, and planning. We randomly selected the employees of the healthcare sector of different cadres, i.e., medical trainees, medical officers, paramedical, and administrative staff. The reason behind the selection of these cadres is that these cadres are directly linked with patients' health (in emergency and wards).

3.1 Procedures and participants

Respondents of this study participated in the survey voluntarily, and respondents (employees) were briefed about the research objectives and were assured of the information's confidentiality. At the time lag one, we collected data from employees for PSC (first moderating variable) and RTC (intervening variable); in the second

phase, we collected data from those employees who participated in the first phase to rate the perception of PP (second moderating variable) and AL (predicting variable) of their supervisors. We also collected data from immediate supervisors of employees who participated in both data collection phases to rate their subordinates' SCBs (criterion variable).

At the time lag one, 350 survey questionnaires were distributed to subordinates in the first phase to collect their opinion about PSC (first moderating variable) and RTC (intervening variable), out of which 305 questionnaires were received and completed correctly. At time lag two, researchers distributed questionnaires to those subordinates who participated in the first phase for the collection of their opinions about PP (second moderating variable) and rated the characteristics of AL (predicting variable) about their respective supervisors/immediate officers, and at the end of the second phase of subordinates, 274 questionnaires were received, which were considered correct for further statistical analysis, so the response rate of subordinate questionnaires was 78.29%. Moreover, 200 questionnaires were distributed to supervisors/immediate officers to rate the SCBs (criterion variable) of their subordinates, and 123 questionnaires were received, which were completed from all aspects, so the response rate was 61.5%; the overall response rate was 72.18%. This study's non-respondent rate was 27.82%, and we further performed a paired *t*-test using a 50/50 rule of early and late responses (87), and we cannot find any significant difference between both responses, which shows that there is no such influence of non-respondents on this study's results. From the sensitivity analysis point of view, we perform single factor analysis suggested by Harman (88); according to Harman, if the cumulative % of total variance explained is less than 50%, then there is no issue of CMB, and the present study's cumulative value was 28.35%. Moreover, we also performed inter-class correlation to check the comparability of the data between supervisor and subordinate responses, and we found a moderate degree of reliability where ICC was 0.610***, $p < 0.001$, with 95% confidence intervals (LL/UL-CIs = 0.533.677).

3.2 Measurement scales

The scales used in this study are validated in different Western and Eastern organizational contexts, but very few are tested in the Pakistani organizational contexts. For instance, the scales of adaptive leadership and psychosocial safety climate were tested in different Pakistani organizational contexts (24, 89–91). Moreover, the measurement of PP, RTC, and SCB are currently at an embryonic stage for assessment in the Pakistani healthcare sector. These scales are validated and widely used by numerous studies conducted in other cultures (20, 25, 59, 81, 92–96). Thus, this study is one of the very few to report these measures in the healthcare sector of Pakistan.

3.2.1 Adaptive leadership

Adaptive leadership was assessed through a 15-item scale five items for each dimension, "Get on the Balcony," "Identify the Adaptive Challenges," "Regulate Distress," adopted from Northouse (49). Sample items of the scale were "People recognize that my officer/manager has the confidence to tackle challenging problems" and "My officer/manager thrives on helping people find new ways of coping with organizational problems."

3.2.2 Readiness to change

Readiness to change was evaluated through a 6-item scale developed by Vakola (97). Sample items of the scale were "When changes occur in my organization, I believe that I am ready to cope with them" and "When changes occur in my organization, I always have the intention to support them."

3.2.3 Psychosocial safety climate

Psychosocial safety climate was assessed through a 12-item scale formulated by Hall et al. (67). Sample items of the scale were "Psychological well-being of staff is a priority for this organization" and "In my organization, the prevention of stress involves all levels of the organization."

3.2.4 Proactive personality

Proactive personality was assessed using a 6-item scale developed by Li et al. (98). Sample items of the scale were "I use opportunities quickly in order to attain my goals" and "Whenever something goes wrong, I search for a solution immediately."

3.2.5 Safety citizenship behaviors

Safety citizenship behaviors were measured using a 10-item scale established by Hofmann et al. (99) and Tucker et al. (52). Sample items of the scale were "He/she makes suggestions about how safety can be improved" and "He/she is assisting others to make sure they perform their work safely."

3.2.6 Control variables

This study includes some control constructs such as age, sex, education, and service. We controlled these confounding factors (demographics) during this study's statistical analysis (correlation, direct, indirect, and moderation). We controlled these confounding factors by following the earlier studies (100, 101) and for the generalizability of the results.

4 Results

4.1 Demographic details

Table 1 demonstrates the demographic details of the participants (subordinates and supervisors).

4.2 Confirmatory factor analysis, validity, and correlations

Before testing the proposed hypotheses of this study, we performed confirmatory factor analysis (CFA) and structural equation modeling (SEM) using statistical software, i.e., analysis of moment structures (AMOS). Table 2 shows the fit indicators of CFA, where X^2/df is 2.05, and other fit values, i.e., GFI (0.88), AGFI (0.75), CFI (0.92), TLI (0.91), NFI (0.86), RMR (0.07), and RMESA (0.06); these all meet the generally accepted thresholds as suggested by Hu and Bentler (102), Tanaka (103), and Hair et al. (104). Moreover, in the SEM, the X^2/df is 2.20, and fit indicators, i.e., GFI (0.86), AGFI (0.74), CFI (0.91), TLI (0.90), NFI (0.85), RMR (0.08) and RMESA (0.06) meet the thresholds as suggested by Hu and Bentler (102), Tanaka (103), and Hair et al. (104).

TABLE 1 Demographic details (subordinates and supervisors).

Demographics		Subordinates		Supervisors	
Sex	Male	204	74.45	90	73.17
	Female	70	25.55	33	26.83
Age	20–30 years	85	31.02	51	41.46
	31–40 years	130	47.45	34	27.64
	41–50 years	45	16.42	21	17.07
	51–60 years	14	5.11	17	13.82
Education	PhD	7	2.55	4	3.25
	MS/M.Phil.	32	11.68	23	18.70
	Masters	114	41.61	39	31.71
	Graduation	121	44.16	57	46.34
Experience	1–5 years	63	22.99	17	13.82
	6–10 years	58	21.17	51	41.46
	11–15 years	86	31.39	39	31.71
	16–20 years	45	16.42	13	10.57
	More than 21 years	22	8.03	0	0.00

TABLE 2 Model measurement.

Measurement indicators	Acceptable range	CFA	SEM
CMIN/DF	1–3	2.05	2.20
GFI	>0.90	0.88	0.86
AGFI	>0.80	0.75	0.74
CFI	>0.90	0.92	0.91
TLI	>0.90	0.91	0.90
NFI	>0.90	0.86	0.85
RMR	<0.09	0.07	0.08
RMESA	<0.08	0.06	0.06

GFI, goodness of fit index; AGFI, adjusted goodness of fit index; CFI, comparative fit index; TLI, Trucker Lewis index; NFI, normative fit index; RMR, root mean square residual; RMESA, room mean square error of approximation; CFA, confirmatory factor analysis; SEM, structural equation modeling.

Table 3 demonstrates the values of discriminant and convergent validity using statistical techniques of the heterotrait-monotrait ratio of correlations (HTMT) and Fornell and Larker criterion. According to Hair et al. (105), composite reliability (CR) and average variance extracted (AVE) tests were performed to check the discriminant validity of the constructs, and for good validity, the values of CR and AVE must be 0.700 and 0.500. Table 3 shows the values of CR for all construct AL (0.986), RTC (0.874), PSC (0.923), PP (0.864), and SCB (0.919), which are in accordance with the threshold limits, whereas the values of AVE for all constructs AL (0.529), RTC (0.536), PSC (0.509), PP (0.515), and SCB (536) also meet the minimum threshold limit. The values of HTMT and Fornell and Larker criterion are also in line (as shown in Table 3, where diagonal values are higher than the others shown in rows and columns) with the recommendations of Hair et al. (105). Moreover, Table 3 also demonstrates the blindfolding values, which is a technique of recycling data for the cross-validation of all construct data, and if the values are zero or above zero, it shows the significance of predictive constructs (105).

TABLE 3 Validity.

Variables	Convergent validity		Blindfolding		
	CR	AVE	SSO	SSE	Q2
AL	0.986	0.829	4845.000	4845.000	0.000
RTC	0.874	0.536	1938.000	1841.489	0.050
PSC	0.923	0.509	3876.000	3876.000	0.000
PP	0.864	0.515	1938.000	1938.000	0.000
SCB	0.919	0.536	3230.000	2990.027	0.074

Variables	Heterotrait-monotrait ratio of correlations (HTMT)				
	AL	RTC	PSC	PP	SCB
AL					
RTC	0.322				
PSC	0.155	0.243			
PP	0.284	0.705	0.237		
SCB	0.120	0.332	0.225	0.416	

Variables	Fornell–Larker criterion				
	AL	RTC	PSC	PP	SCB
AL	0.911				
RTC	0.292	0.718			
PSC	0.142	0.213	0.714		
PP	0.265	0.582	0.215	0.732	
SCB	0.122	0.307	0.208	0.379	0.732

AL, adaptive leadership; RTC, readiness to change; PSC, psychosocial safety climate; PP, proactive personality; SCB, safety citizenship behaviors; CR, composite reliability; AVE, average variance extracted.

Table 4 shows the values of descriptive statistics, reliability, and correlations; the values of Cronbach alpha values are between 0.80 and 0.90, which shows good reliability of data and meets the threshold limit suggested by Sekaran and Bougie (106). Moreover, the correlation values of all study variables are positive and moderate as per the suggestions of Ratner (107). Table 4 shows the correlation values of all study variables where AL positively and significantly correlated with RTC ($r=0.255^{**}$, $p<0.01$), PSC ($r=0.145^{**}$, $p<0.01$), PP ($r=0.288^{**}$, $p<0.01$), and SCB ($r=0.110^{*}$, $p<0.05$). RTD positively and significantly lined with PSC ($r=0.203^{**}$, $p<0.01$), PP (0.576**, $p<0.01$) and SCB ($r=0.359^{**}$, $p<0.01$). PSC positively and significantly associated with PP ($r=0.208^{**}$, $p<0.01$) and SCB ($r=0.204^{**}$, $p<0.01$), and PP is also positively and significantly correlated with SCB ($r=0.284^{**}$, $p<0.01$).

4.3 Hypotheses testing

To test the proposed hypotheses of this study (direct, indirect, moderation, and moderated mediation), we use 5,000 bootstrapping sample sizes through PROCESS-macro by following the suggestion of Hayes (108). Table 5 lists the results of direct, indirect, moderation, and moderated mediation. In the first phase, we analyze data to test out the direct effect hypothesis, which predicts that AL had a positive

TABLE 4 Model statistics and correlations.

Variables		Mean	SD	Alpha	1	2	3	4	5
1	AL	3.71	0.8547	0.98		0.255**	0.145**	0.288**	0.110*
2	RTC	3.67	0.7958	0.83			0.203**	0.576**	0.359**
3	PSC	3.17	0.8647	0.91				0.208**	0.204**
4	PP	3.71	0.7590	0.81					0.284**
5	SCB	3.63	0.7737	0.90					

AL, adaptive leadership; RTC, readiness to change; PSC, psychosocial safety climate; PP, proactive personality; SCB, safety citizenship behaviors, $^{**}p<0.01$, and $^{*}p<0.05$.

TABLE 5 Direct, indirect, moderation, and conditional indirect effects.

Relationships	Coeff	SE	*t*-value	*p*-value	LL/UL-CIs
Direct effects					
AL → SCB	0.118	0.050	3.357	0.001	0.081/0.117
AL → RTC	0.238	0.050	4.786	0.000	0.140/0.336
RTC → SCB	0.344	0.050	6.941	0.000	0.247/0.442
Mediation effects					
LOs → CSE → ACTC	0.082	0.021	3.848	0.000	0.047/0.131
Moderation effects					
AL → RTC	0.214	0.049	4.326	0.000	0.117/0.311
PSC → RTC	0.158	0.053	2.979	0.003	0.054/0.262
AL × PSC → RTC	0.131	0.062	3.499	0.001	0.090/0.151
RTC → SCB	0.299	0.069	4.316	0.000	0.163/0.436
PP → SCB	0.118	0.077	2.531	0.004	0.034/0.270
RTC x PP → SCB	0.174	0.066	3.129	0.001	0.055/0.204
Conditional indirect effects (model-7)					
AL → RTC → SCB conditional on PSC at +1 SD	0.087	0.025	2.722	0.007	0.029/0.156
AL → RTC → SCB conditional on PSC at mean	0.078	0.021	3.671	0.000	0.042/0.126
AL → RTC → SCB conditional on PSC at −1 SD	0.068	0.031	2.778	0.005	0.022/0.118
Conditional indirect effects (model-14)					
AL → RTC → SCB conditional on PP at +1 SD	0.086	0.030	2.876	0.004	0.038/0.156
AL → RTC → SCB conditional on PP at mean	0.074	0.023	3.171	0.002	0.036/0.127
AL → RTC → SCB conditional on PP at −1 SD	0.063	0.023	2.741	0.006	0.024/0.114

AL, adaptive leadership; RTC, readiness to change; PSC, psychosocial safety climate; PP, proactive personality; SCB, safety citizenship behaviors; UL/LL-CI, upper and lower-level class intervals.

significant direct effect on SCB ($b=0.118$, SE = 0.050, $t=3.357$, $p<0.001$, LL/UL-CIs = 0.081/0.117); therefore, the impact of AL on SCB is fully supported and thus prove *H1* of this study.

In the second phase, we perform analysis to test our mediation hypothesis, and Table 5 illustrates the indirect effect results, which shows that RTC positively and significantly mediates the relationship with AL ($b=0.082$, SE = 0.021, $t=3.848$, $p<0.001$, LL/UL-CIs = 0.047/0.131); these results support *H2* of this study because no zero was found been the values of upper/lower limit class intervals and explains a partial mediation of RTC. In other words, these results show that RTC is also a cause of the relationship between AL and SCB, which means AL increases the readiness level of individuals, which leads to the demonstration of SCB.

In the third phase, we performed statistical analysis to test both moderation hypotheses. Table 5 first shows the effect of predictor (AL), moderator (PSC), and interaction term (AL × PSC) on criterion variable (RTC), where a positive significant effect of interaction terms (AL × PSC) was found effect on RTC ($b=0.131$, SE = 0.062, $t=3.499$, $p<0.001$, LL/UL-CIs = 0.090/0.151), which demonstrated that PSC strengthens the relationship of AL and RTC; thus, our *H3* was supported. In other words, these results show that when perceptions of individuals about AL and PSC were higher, it leads to RTC.

Table 5 further shows the moderation of second moderating variable (PP) with mediating variable (RTC) on criterion variable (SCB), a positive significant moderation (RTC × PP) effect found on SCB ($b=0.174$, SE = 0.066, $t=3.129$, $p<0.001$, LL/UL-CIs = 0.055/0.204), which demonstrated that PP strengthens the relationship of RTC and SCB; thus, our *H5* was supported. In other words, these results show that when the readiness level of individuals was higher and they were at a higher level of their proactive personality, they demonstrated higher SCB.

Furthermore, the interaction effects were illustrated by a graphical representation of RTC, as shown in Figure 2. The interaction term (AL × PSC) indicates that a higher level of PSC and AL enhanced the level of RTC.

Furthermore, the interaction effects were shown by a graphical representation of SCBs, as shown in Figure 3. The interaction term (RTC × PP) illustrates that when individuals were at higher levels of RTC, their proactivity was also higher, and they demonstrated higher levels of SCBs.

Table 5 shows the values of conditional indirect effects (with PSC as moderator) which were calculated at ±1 SD. The values of conditional indirect effects were significant at +1SD (effect = 0.087, SE = 0.025, *t*-value = 2.722, $p < 0.01$, LL/UL-CIs = 0.029/0.156); these results also show that SCBs of individuals were higher via RTC when there was higher support of leadership, and they have higher perceptions about PSC because now zero was found between lower/upper class intervals. Thus, these results support our *H4*. In other words, higher support by the leadership (AL) and organizational environment (PSC) increases the readiness level of employees through which they become able to demonstrate higher SCB.

Moreover, Table 5 also shows the values of conditional indirect effects (with PP as moderator), which were also calculated at ±1 SD. The values of conditional indirect effects were significant at +1SD (effect = 0.086, SE = 0.030, *t*-value = 2.876, $p < 0.01$, LL/UL-CIs = 0.038/0.156); these results indicated that AL indirectly influences SCBs in the presence of a PP via RTC as no zero was found between the upper and lower limit confidence intervals. Thus, our *H6* was supported. In other words, higher support by the leadership (AL) increases the readiness level of employees, and personality characteristics (PP) enforce them to demonstrate higher SCBs.

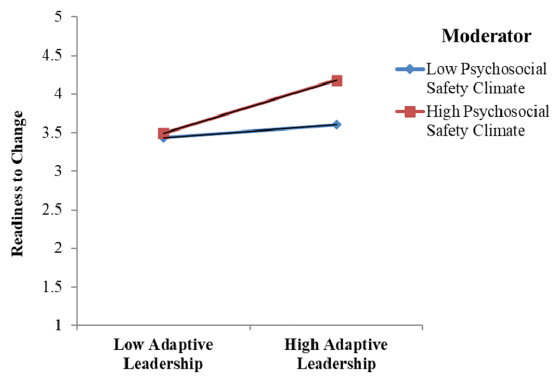

FIGURE 2
The interaction effects (AL × PSC) on RTC.

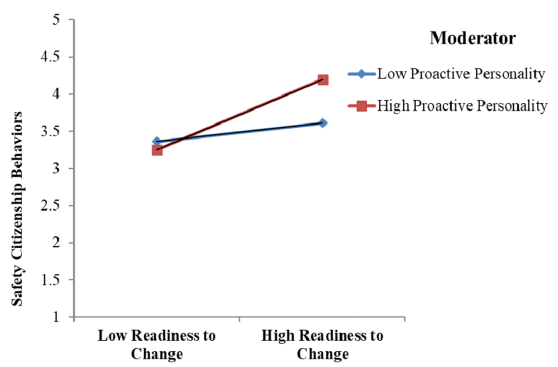

FIGURE 3
The interaction effects (RTC × PP) on SCB.

5 Discussion

Using the theoretical lens of PSC theory (31), we hypothesize the research model of this study to test the impact of AL on SCBs in healthcare organizations. Moreover, we also investigate the mediating mechanism of RTC between AL and SCBs in turbulent times of healthcare organizations. Furthermore, we examine the moderating roles of PSC and PP between AL and RTC and between RTC and SCBs relationships, respectively. The first hypothesis of our study predicted that AL has a positive impact on SCBs, and the results of this study support the hypothesis. Moreover, these findings demonstrate that the role of leadership is imperative for the modification of subordinates' attitudes and behaviors, especially in critical situations, i.e., organizational change (29, 89, 109). Through empathy, support, and motivation, such as AL, leaders can shape the SCBs of the employees (25, 44, 110). The second hypothesis of our study predicted the mediation mechanism of RTC between the relationship of AL and SCB, and this study's findings demonstrated a partial mediation of RTC. These findings demonstrate that support of leadership (AL) using motivation increases the employees' confidence, enabling them to face the uncertain circumstances of change (27, 111), and they demonstrate their willingness in the form of SCBs. The third and fourth hypotheses of this study predicted the moderating role of PSC, and the findings of this study provide support. The results explain that a higher level of PSC in the organization with the support of leadership (AL) directly increases the RTC and indirectly increases the SCBs. These findings are also in line with the earlier studies, which explain that a higher level of commitment and value by the management about the physical and psychological health of employees decreases the threat of uncertainty and enables them to deal with complex problems at the workplace (28, 112, 113). The fifth and final hypothesis of this study predicted the moderated role of PP, and the findings of this study support these hypotheses. The findings of this study explain that individuals who demonstrate a higher level of willingness to accept and support change policies and belong to the higher trait of PP perform SCB. These findings are also inconsistent with the earlier studies, which explain that proactive individuals, by their nature, modify the workplace circumstances for the betterment of the organization and the achievement of personal goals through the conversion of challenges into opportunities (20, 94, 114).

6 Conclusion

Most of the studies in management and leadership have encompassed steady work environments; the present pandemic and former critical events indicated that the right kind of leadership is imperative for organizational stability and workforce safety. In this sense, we proffered the influence of AL in the presence of contextual factors such as PSC, PP, and RTC that assist in amplifying the SCBs in

challenging times. This aspect calls for organizations to have a changed outlook regarding the leadership roles for maintaining and establishing a pro-environmental workforce.

This study constitutes a framework to address the effect of AL on SCBs with the mediating effect of RTC and moderating effects of PSC and PP in the target population. The present study has been carried out on the healthcare employees working in different hospitals in Pakistan. This study revealed the influential role of AL in managing change and employees' behaviors. Although several studies have been conducted on different types of leadership styles, there are very few studies that focused on AL in implementing change and assisting employees to display safety citizenship behaviors. This offers a significant contribution to the leadership and employee safety citizenship literature.

Furthermore, in developing countries such as Pakistan, healthcare is going through a multifaceted crisis, and we need leaders who can effectively and efficiently handle these complexities. More precisely, we require adaptive leaders more than ever before—people who support innovation, change, and experimentation. Therefore, this study emphasized the relationship of AL on SCBs with certain mechanisms in the healthcare sector of Pakistan. Moreover, the roles of RTC, PP, and PSC are neglected in healthcare institutions of Pakistan, and most studies are conducted on different sectors (24, 90, 115). As a result, the findings of this study can serve as a baseline for future interventions. It demonstrates the feasibility of such a survey in a developing country. It also lays the foundation for future research on aspects such as instrument validity and reliability in Pakistan. We look forward to studies investigating and promoting safety culture in developing nations. Additionally, this study reveals the importance of these aspects during recruitment or placing a proactive workforce in jobs in which roles may be vague. For new hiring, department placements, and project team launches, it could be useful to determine the proactive nature of applicants and use the findings for placement or selection. Moreover, proactive staff members could be assigned extra roles or work-related duties, which will enable them to solve problems on their own. The organizations, by supporting their members' change-directed behaviors, will aid in the advancement of innovation and organizational change. Additionally, healthcare policymakers could pay close attention to the leadership style within their organizations since the current survey's empirical findings indicate that an appropriate leadership style, such as AL, is necessary to cultivate an environment in which employees are encouraged to display their SCBs at the workplace. Moreover, this study unveiled the importance of SCBs for any emergency readiness, which is timely needed, especially in the healthcare sector of Pakistan.

6.1 Theoretical implications

This investigation is a minute addition to the existing knowledge body and the PSC theory. We go beyond the earlier studies and test the impact of AL as an organizational source for demonstrating SCBs. This study also uses PSC as a moderator, which also works as an organizational source with AL, enabling employees to fulfill complex job tasks during organizational change. Adaptive leaders, through their affective communication, motivation, and encouragement, increase the willingness and confidence of employees, whereas higher level PSC also gives psychological support to the employees to deal with uncertain circumstances; therefore, they demonstrate higher RTC and SCBs. In addition, we use PP as a moderator, a personal source of motivation through which individuals can face complex job tasks and challenges at the workplace, and here, adaptive leaders indirectly provide support to proactive individuals who also increase their willingness. Our moderated mediation models of PSC and PP facilitated us to keenly study the role of AL in forming SCBs in disruptive situations through RTC.

6.2 Practical implications

This study has many practical implications for management, researchers, and practitioners, focusing on leadership and safety perspectives and redefining the existing organizational structure in every situation. This study recommends that researchers and practitioners pay attention to phenomenal AL that helps to boot up the SCBs in critical times, especially in the healthcare sector in post-pandemic circumstances globally. Considering the current and future challenges, we brought to light the AL style to suit the globalized changing environment, as these leaders have the mastery of controlling the work arena effectively. Similarly, RTC is an imperative component for implementing change policies, especially in healthcare organizations where AL, through the encouragement, motivation, and empathic behaviors with their subordinates, enables them to display SCBs. Furthermore, it is suggested that organizations must focus on higher-level PSC so that their workforce supports the organizational change policies during critical times, as healthcare employees generally face a stressful workplace environment. Finally, it is suggested that organizations also focus on personality traits and, for that purpose, at the time of recruitment, they must test the employees' personality traits to recruit a proactive workforce who can deal with crisis times willingly.

6.3 Limitations and future research directions

Regardless of its greater contribution to empirical, theoretical, and practical studies, this research has some limitations that should be focused on in future studies. First, we controlled the confounding factors, i.e., sex, age, education, and service; it is suggested that future researchers could also consider other confounding factors, such as department, marital status, and organization size. Second, in the present study, we collected data from employees (supervisor-subordinate rated) and used temporal separation during the data collection for predictor and criterion constructs to minimize the common method bias. It is suggested that future researchers may also adopt other data collection strategies to minimize the bias/sensitivity factor of the data as suggested by Podsakoff et al. (82, 83), i.e., tailoring of scale items to minimize the ambiguity of the words, which also reduce the social desirability bias and balance between positive and negative items of the scale. Thus, future studies could also investigate the possible interactions between two samples and comparability features. The third limitation of our study is that we investigated only SCBs as an outcome of AL, which allows researchers to explore other related outcomes, such as organizational performance and psychological well-being. In addition, this study examined two

moderation mechanisms, PSC and PP; future investigations could focus on other instruments to explore further. Finally, this model could be tested in other cultural settings to divulge diverse findings.

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 Ethics Committee at Faculty of Management Sciences, International Islamic University, Islamabad, Pakistan. The patients/participants provided their written informed consent to participate in this study. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

HK: Conceptualization, Investigation, Project administration, Writing – original draft, Writing – review & editing. ZM: Conceptualization, Funding acquisition, Investigation, Project administration, Resources, Supervision, Writing – original draft, Writing – review & editing. ML: Funding acquisition, Project administration, Resources, Supervision, Validation, Writing – review & editing. DH: Project administration, Resources, Writing – review & editing. MC: Project administration, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This study acknowledges the support of the National Natural Science Foundation of China (71974082), the Jiangsu Funding Program for Excellent Postdoctoral Talent (2022ZB643, 2022ZB644, 2022ZB646, and 2023ZB759), and the National Foreign Expert Project (Foreign Youth Talent Program) (QN2023014006).

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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 26 February 2024
DOI 10.3389/fpubh.2024.1333139

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OPEN ACCESS

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RECEIVED 04 November 2023
ACCEPTED 08 February 2024
PUBLISHED 26 February 2024

CITATION
Lee Y-H, Wu Y-H, Chen C-Y, Chiao-Tzu Lee P, Lin T-H and Lai C-Y (2024) Relationship between workplace violence and mental/physical health of security guards during the COVID-19 pandemic in Taiwan.
Front. Public Health 12:1333139.
doi: 10.3389/fpubh.2024.1333139

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Relationship between workplace violence and mental/physical health of security guards during the COVID-19 pandemic in Taiwan

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Objectives: To investigate the relationship between workplace violence (WPV) and mental and physical health (MPH) of security guards during the COVID-19 pandemic in Taiwan.

Methods: A cross-sectional survey was conducted in 15 representative security companies across northern, central, and southern Taiwan, and outlying islands from July 2021 to June 2022 during the COVID-19 pandemic. 1,200 questionnaires were distributed. A total of 1,032 valid questionnaires were collected.

Results: 13.18% of the participants reported that they had experienced WPV during the COVID-19 pandemic, including physical violence (PhV), psychological violence (PsV), verbal violence (VV), and sexual harassment (SH). The most common violence was VV (54.19%), followed by PsV (20.69%). Community residents and property owners were the primary perpetrators, followed by strangers. The study showed that the security guards who had experienced WPV had higher scores on the 12-item Chinese Health Questionnaire (Taiwan version) (CHQ-12), indicating poorer MPH than those who had never experienced WPV. The result showed that VV had strong correlations with the lack of effective communication, dissatisfaction with treatment and service attitude, and work stress. PsV was strongly associated with excessive waiting times.

Conclusion: There were correlations among PhV, VV, and PsV and they had adverse impacts on MPH, except for SH. The study found that the primary perpetrators of WPV against security guards were community residents and property owners. The causes were the lack of effective communication, dissatisfaction with treatment and service attitude, excessive waiting times, and work stress, which further led to turnover intention and poor MPH. The findings of this study have useful implications and it is recommended to enhance the understanding of workplace violence against security guards and to formulate appropriate local and international strategies to address it.

KEYWORDS

workplace violence, security guards, mental and physical health, COVID-19, CHQ-12

1 Introduction

The main responsibilities of security guards are to watch over the premises, manage visitor entries at the gates, protect the stationed locations, safeguard any ongoing events, and traffic control. Since the COVID-19 outbreak, security guards had to conduct several additional duties such as greeting the visitors with hand sanitizer and temperature measurement gun, instructing visitors to sanitize their hands, wear masks, and forbidding entry to people who did not comply to the rules (1). In 2022, there were 90,000 current employees in the security industry in Taiwan; the majority was static security guards, comprising around 80%. Security guards not only needed to carry out regular job duties, but were also required to undertake additional preventive measures as per government guidelines during the COVID-19 pandemic. Meanwhile, they were not granted any legal authority, leaving them to experience frequent incidents of workplace violence (2).

During the pandemic, medical professionals, police officers, and security guards had to be on the front line of epidemic prevention, facing rampant epidemics, increased workload, work stress, and therefore their physical and mental health (MPH) were negatively affected during this period of time. (3, 4). A systematic review in the United States (U.S.) that COVID-19 was a catalyst for the occurrence of Workplace violence (WPV) (5, 6). The workers were undergoing a deterioration of mental health caused by the increased WPV (7). Previous epidemiological research found that workers who have experienced WPV or workplace bullying tend to experience a higher risk of mental and physical diseases, including anxiety, depression (8–12), and sleep problems (13, 14).

According to U.S. National Crime Victimization Survey (15), private security work was rated as the third-most violence-prone occupation after bartenders and law enforcement officers. A Finnish study estimated monthly prevalence rates of security guards were 39% for verbal aggression, 19% for threats of assault, and 15% for physical acts (16). Additionally, French security guards reported a 40% of exposure rate for physical and verbal violence (17). Moreover, in 2014, a Taiwanese government agency surveyed on workplace violence among employees of 30 occupations and found that security workers experienced the highest prevalence rate of 16.7% for any form of violence (8). However, a study in the United States showed that violence against security guards dropped from 20 to 11 cases within 4 months in hospitals, and from 13 to 4 cases in the emergency departments (ED), respectively during the COVID-19 period (18). It showed that the WPV against security personnel during the pandemic needed further investigation.

Workplace violence is a significant concern in public health and occupational safety. The International Labor Organization (ILO) and the World Health Organization (WHO) define workplace violence as: "Incidents where staff are abused, threatened or assaulted in circumstances related to their work, involving an explicit or implicit challenge to their safety, well-being or health" (19). Physical violence (PhV) involves intentional use of violence, in which the aggressor acts against an individual or a group, leading to physical, sexual, or psychological harm. Verbal violence (VV) causes harm to the victim through direct or indirect means, whether verbally or in writing. Psychological Violence (PsV) means different forms of malicious behaviors. Victims are often afraid or unable to resist effectively due to power inequality and end up feeling threatened, humiliated or embarrassed. Sexual harassment (SH) is defined as any unwanted, unreciprocated, and unwelcome behavior of a sexual nature that is offensive to the individual involved, resulting in feelings of threat, humiliation, or embarrassment (20). According to the ILO, WPV perpetrated between coworkers is defined as "horizontal violence"; while WPV that takes place between supervisors and subordinates is "vertical violence". In addition, WPV caused by customers, residents, patients, or the public is defined as "third party violence" (21).

The aim of this study is to investigate WPV experienced by security guards during COVID-19 pandemic, including the WPV types, primary perpetrators, relevant factors, and the relationship between MPH. The results of this research study hold useful implications which can be employed as a reference for the government, academic institutions, and relevant agencies in developing policies to prevent workplace violence.

2 Materials and methods

2.1 Research design and research subjects

Due to the limitations imposed by the COVID-19 pandemic, this study conducted a cross-sectional survey and adopted purposive sampling among the 2,477 employees who were willing to participate in the survey from 15 security companies across northern, central, and, southern, the outlying islands of Taiwan. Data were collected anonymously by distributing hard-copy questionnaires (22). The categories of security guards included system, static, private, and patrol security. However, supervisors, such as the general manager, vice-general manager, deputy director, team leaders, and unpaid/absent employees were excluded.

This study used questionnaire of "Study on Industries with High-Risk Workplace Violence and Preventive Strategies" conducted by the Institution of Labor, Occupational Safety and Health, Ministry of Labor, Taiwan (23), which was based on the questionnaire by ILO/ICN/WHO/PSI. The content validity was reviewed by an expert committee, consisted of one security guard manger and four principal investigators. Those are expert and experiences on Workplace Violence field in Taiwan. Then, the internal reliability was measured by pre-test and post-test done in 30 participants. This study has been approved by the Behavioral and Social Science Research Ethics Committee, China Medical University Hospital (Identifier: CMUH110-REC1-124); the survey time frame spanned from July, 2021 to June, 2022.

The sample size was determined using G-power software 3.1 (24), the F-test multiple regression analysis was conducted to analyze the prediction of questionnaires, which resulted in a coefficient of determination $R^2 = 0.29$, indicating the explanatory power of this study, with an effect size $f^2 = 0.408$, error probability $\alpha = 0.05$, a power (I-β error probability) of 0.8, and 200 number of predictors. The calculation indicated that a sample size of 286 participants would be sufficient. However, after considering response rate and the desire to enhance the accuracy of statistical inference, the researchers opted to distribute 1,200 participants. 1,133 participants were collected, and the response rate was 94%. Invalid questionnaires were identified due to missing information. Eventually, 101 invalid questionnaires were excluded. There were 1,032 participants in the final analysis and net response rate was 86%.

2.2 Measurements of key variables

The questionnaire content consisted of closed-ended and open-ended questions and was divided into six sections. The first section is social demographic information, including sex, age, education level, and medical records. Also, there are employment-related variables, including tenure in current position and categories of job duties. In some survey questions, we include "others" and open-ended questions as an option for participants to fill out detailed information. The second to the fifth sections pertained to PhV, VV, PsV, and SH. In these sections, we asked respondents questions like: "In the last 12 months, have you experienced physical violence (verbal violence, psychological violence, and sexual harassment) at your workplace?" The responses were "yes" or "no." These sections included questions regarding the frequency of WPV in the previous year, perceptions about the occurrences of WPV, the perpetrators, locations, reasons, and responses to the incidents.

In the sixth section, we used the 12-item Chinese Health Questionnaire (CHQ-12) revised in 1986 to measure the participants' MPH (25). There are 12 self-administered questions with responses using four-point scale: from "not at all," "same as usual," "rather more than usual," to "much more than usual." Questions from 1 to 10 were positively worded, while questions 11 and 12 were negatively worded, with a total score ranging from 0 to 12. The options for negative were assigned 0-0-1-1, respectively, and the corresponding marks for positive ones were reversed (26). In addition, the 12 questions were categorized into four facets: questions 1–4 addressed somatization symptoms; questions 6, 9, and 11 focused on anxiety and worry; questions 7, 8, 10, and 12 examined depression or poor family relationships, while question 5 specifically targeted sleep disorders (27, 28). In this study, a score of 5 represented the cut-off point, and the scores greater than or equal to 5 meant poor MPH (29, 30). Before 1,200 questionnaires were distributed, we conducted a pre-test and post-test of 30 questionnaires. The reliability scale, as measured by Cronbach's alpha = 0.85. Overall, in the case of missing items (up to one-third missing items allowed), the total score is calculated by multiplying the mode of the responses by the number of missing answer.

2.3 Statistical analysis

This study adopted SAS version 9.4 statistical software to analyze the data. Descriptive statistical analysis was used to present the distributions of demographic characteristics and WPV prevalence. Cronbach's alpha was used to measure the reliability of different scales and assess the internal consistency of these scales. Multiple logistic regression was conducted to investigate the risk factors of WPV and the relationship between WVP experience and MPH of the security guards. Moreover, Wilcoxon's rank-sum test was employed to present the differences between the MPH of the security guards who had experienced WPV versus those who had not.

3 Results

Table 1 showed the distribution of demographic variables, categories of job duties, job tenure, medical records, and WPV experience. The majority of participants were males (92.00%). The average age of the male participants ranged from 31 to 40 years old (27.61%). Most of the participants received high school or vocational school education (46.99%). There were 637 (61.72%) static, 132 (12.79%) private, 96 (9.3%) systematic, 80 (7.75%) patrol security guards, and 87 (8.43) others. Static security guards took up the highest percentage of participants. The rest were administrative staff, totaling 87 (8.43%). A total of 39.41% of the participants had been working for 1–3 years. There were 199 (20.97%) participants having medical records. Table 1 presented the types of WPV. In our sample, the prevalence of participants' experiences with different types of violence in the preceding 12 months were: PhV (3.59%), VV (10.66%), PsV (4.07%), and SH (0.36%), respectively. A total of 89 participants scored higher than or equal to 5 in CHQ-12 (8.62%) and 943 participants scored lower than 5 (91.38%).

Table 2 presents the relationships between various types of WPV and MPH. The results showed that $r = 0.46$ ($p < 0.001$) for physical with verbal violence, $r = 0.28$ ($p < 0.001$) for physical with psychological violence, and $r = 0.29$ ($p < 0.001$) for physical with sexual harassment. Additionally, significant correlations with $r = 0.36$ ($p < 0.001$) for verbal violence and psychological violence and $r = 0.18$ ($p < 0.001$) for verbal violence and sexual harassment were identified. A moderate correlation between psychological violence and sexual harassment was also found, with $r = 0.23$ ($p < 0.001$). Moreover, we conducted a correlation analysis between PHV, VV, PSV, and SH, with CHQ-12 (MPH) total scores, obtaining correlation coefficients of 0.09 ($p < 0.01$), 0.18 ($p < 0.0001$), 0.25 ($p < 0.0001$), and 0.03 ($p > 0.05$), respectively. The results showed that all forms of WPV were significantly associated with MPH ($p < 0.05$), except for sexual harassment $r = 0.03$ ($p > 0.05$), which did not reach a statistically significant correlation.

Table 3 presented the distribution of the factors which affected MPH. This research indicates the primary source of VV and PsV were third-party perpetrators, comprising 81.82 and 64.29%, followed by horizontal violence (10.00 and 19.05%) and vertical violence (8.18 and 16.67%). There was a statistically significant correlation between MPH among those exposed to verbal violence and vertical violence (from supervisors/subordinates). VV and PsV were the primary WPV, which resulted from the lack of effective communication (46.79 and 57.14%), followed by attitude problems (32.11 and 57.14%). The contributing factors for VV and PsV reported by the security guards were organizational reform (10.09 and 14.29%), workload (26.61 and 45.24%), and work stress (51.38 and 45.24%). It was found that among those who experienced VV, the main reason for their poorer MPH was work stress ($p < 0.05$). The main behavioral reaction after experiencing VV and PsV was seeking colleagues' assistance (41.82 and 33.33%), followed by burnout management (24.55 and 33.33%) and conceiving turnover intention (14.55 and 14.29%). Among them, the turnover intention of VV and PsV had a significant correlation with MPH ($p < 0.05$).

From the results of logistical regression in Figures 1–4, we found that after controlling potential confounding variables, including sex, age, education level, categories of job duties, and medical records, the experience (vs. non-experience) of any form of WPV was associated with poor MPH. The MPH of security guards was statistically related to PhV, VV, as well as PsV, and the ORs (95%CI) were 0.18 (0.08, 0.41), 0.20 (0.12, 0.34), and 0.09 (0.05, 0.19), respectively.

TABLE 1 Distribution of demographic variables of participants.

Variables	Total (*n* = 1,032)		Male (*n* = 949, 92%)		Female (*n* = 83, 8.0%)	
	n/mean	(%)SD	*n*/mean	(%) SD	*n*/mean	(%)SD
Age						
≦30	101	9.79	81	8.54	20	24.10
31–40	280	27.13	262	27.61	18	21.69
41–50	273	26.45	257	27.08	16	19.28
51–60	267	25.87	247	26.03	20	24.10
≧60	111	10.76	102	10.75	9	10.84
Education level						
Junior high and under	55	5.33	49	5.16	6	7.23
High/Vocational school	669	64.83	630	66.39	39	46.99
College and above	308	29.84	270	28.45	38	45.78
Position category						
System security	96	9.30	87	9.17	9	10.84
Static security	637	61.72	605	63.75	32	38.55
Private security	132	12.79	127	13.38	5	6.02
Patrol security	80	7.75	79	8.32	1	1.20
Others	87	8.43	51	5.37	36	43.37
Tenure, year						
Under 1	148	14.34	128	13.49	20	24.10
1–3	414	40.12	374	39.41	40	48.19
3–5	283	27.42	269	28.35	14	16.87
5–10	109	10.56	102	10.75	7	8.43
≧10	78	7.56	76	8.01	2	2.41
Medical record						
None	818	79.26	750	79.03	68	81.93
Yes	214	20.74	199	20.97	15	18.07
WPV						
None	896	86.82	828	87.25	68	81.93
PhV	37	3.59	34	3.58	3	3.61
VV	110	10.66	99	10.43	11	13.25
PsV	42	4.07	38	4.00	4	4.82
SH	14	1.36	9	0.95	5	6.02
CHQ-12						
<5	943	91.38	871	91.78	72	86.75
≧5	89	8.62	78	8.22	11	13.25

Table 4 analyzed the influence of WPV on somatization symptoms, anxiety and worry, depression, dysfunction of family relationship, and sleep disorders on the CHQ-12. The result shows that security guards who experienced (vs. non-experienced) WPV had both higher scores and medians in the various aspects in CHQ-12, indicating that WPV significantly affected somatization symptoms, anxiety and concern, depression, dysfunction of family relationship, and sleep disorders.

The Cronbach's α for the CHQ-12 questionnaire in this study was 0.87, The Cronbach's α of PhV CHQ12, VV CHQ12, PsV CHQ12, and SH CHQ12 were 0.84, 0.83, 0.76, and 0.88 (Cronbach's α >0.7 indicates high reliability). In addition, the Cronbach's α of the security guards who experienced PhV, VV, PsV, and SH were 1.00, 0.57, 1.00, and 1.00 (0.30 < Cronbach's Alpha <0.7 suggests moderate reliability).

4 Discussion

Our analysis revealed that the position category may have a role in WPV experiences. The majority of the participants in this study were static security guard (61.72%), who were our main study subject.

During the COVID-19 pandemic, in addition to their regular duties, security guards undertook additional tasks, such as working with government health authorities for public awareness of COVID-19 virus development and monitoring, controlling, and providing the updates of residents in home quarantine to relevant agencies for pandemic prevention. Therefore, the security guards not only undertook heavier workloads due to the pandemic (7) but they also suffered deteriorating MPH resulting from WPV experience, social insecurity, and work stress (6).

This study found that the prevalence of any forms of WPV experienced by the participants during the pandemic was 13.18%. The most common was VV (54.19%), followed by PsV (20.69%). The prevalence of each type of WPV experienced by male and female security guards were PhV being 3.58 and 3.61%, VV being 10.43 and 13.25%, PsV being 4.00 and 4.82%, as well as SH being 0.95 and 6.02%. This result was close to the levels of WPV in the workplaces in Taiwan (8), showing that the most common type of WPV was VV, followed by PsV. It was consistent with the research conducted in other countries (16). One interesting finding was that, based on the research done in 2014, the prevalence of WPV against security guards in Taiwan was 16.71% (8), which was higher than our result. Moreover, a United States study on the violence against security guards in hospitals and ED dropped during the pandemic (6). Therefore, the

TABLE 2 The bivariate correlation between various types of WPV.

Variables	PhV	VV	PsV	SH	CHQ
PhV	1				
VV	0.46***	1			
PsV	0.28***	0.36***	1		
SH	0.29***	0.18***	0.23***	1	
CHQ	0.09**	0.18***	0.25***	0.03	1

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

TABLE 3 The distribution and analysis of factors affecting the MPH of participants who had experienced VV and PsV, and their behavioral reactions.

Variables	CHQ-12 (≧5 score)					
	VV (n = 110)			PsV (n = 42)		
	n	%	p	n	%	p
Perpetrators						
Horizontal (from colleagues)	11	(10.00)	-	8	(19.05)	-
Vertical (from supervisors/subordinates)	9	(8.18)	*	7	(16.67)	-
Third-party violence (clients/third part)	90	(81.82)	-	27	(64.29)	-
Causes						
Long waiting times	25	(22.94)	-	4	(9.52)	*
Miscommunication	51	(46.79)	*	24	(57.14)	-
Mismanagement	19	(17.43)	*	9	(21.43)	-
Attitude problems	35	(32.11)	-	24	(57.14)	-
Excessive force	10	(9.17)	-	3	(7.14)	-
Interest conflict	8	(7.34)	-	3	(7.14)	-
Personal reason	19	(17.43)	-	9	(21.43)	-
Others	19	(17.43)	-	7	(16.67)	-
Implicit factors						
Organizational reform	11	(10.09)	-	6	(14.29)	-
Workload	29	(26.61)	-	19	(45.24)	-
Work stress	56	(51.38)	*	19	(45.24)	-
Social insecurity	34	(31.19)	-	9	(21.43)	-
Deterioration of interpersonal relationship	36	(33.03)	-	13	(30.95)	-
Response						
Burnout management	27	(24.55)	-	14	(33.33)	-
Verbal warning	15	(13.64)	-	3	(7.14)	-
Legal action	2	(1.82)	-	1	(2.38)	-
Colleagues' assistance	46	(41.82)	-	14	(33.33)	-
Psychological counseling	-	-	-	1	(2.38)	-
Position transfer	4	(3.64)	-	3	(7.14)	-
Turnover intention	16	(14.55)	***	6	(14.29)	*

-, not significant; *p < 0.05; **p < 0.01; and ***p < 0.001.

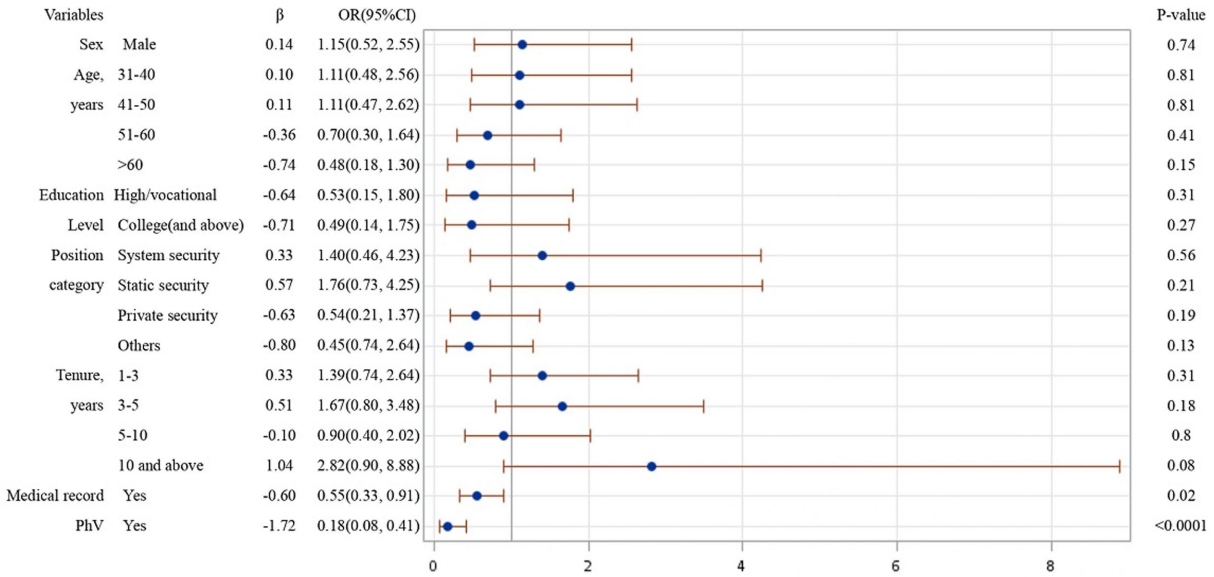

FIGURE 1
Logistic regression analysis on risk factors affecting MPH of participants experienced PhV.

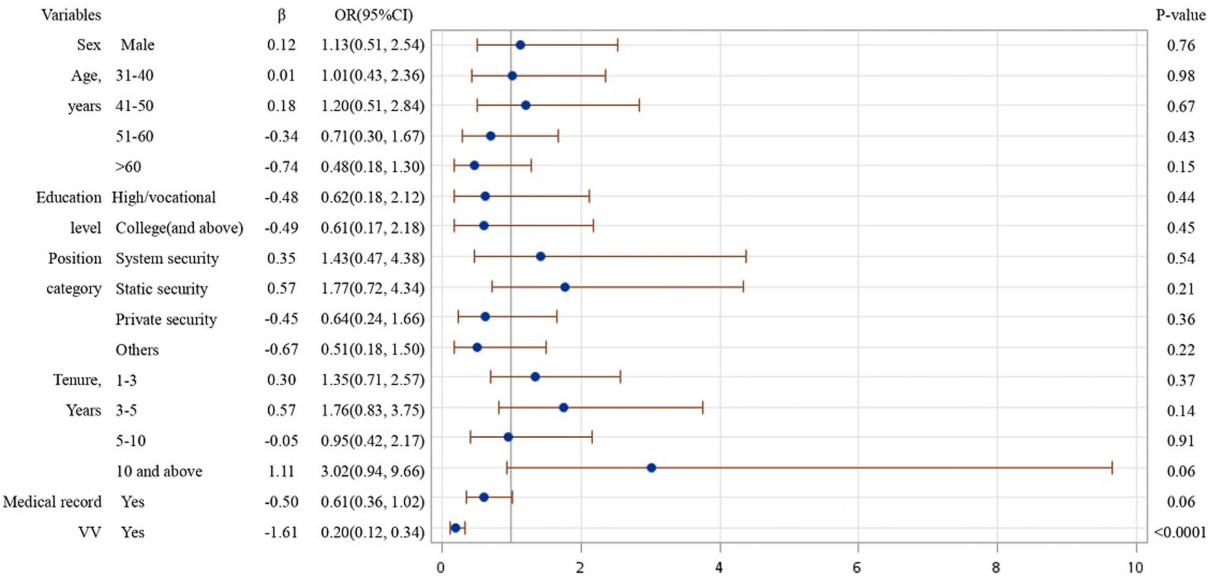

FIGURE 2
Logistic regression analysis on risk factors affecting MPH of participants experienced VV.

prevalence of WPV against security guards might have decreased during the pandemic.

During the COVID-19 pandemic, when security guards performed epidemic preventive measures, the excessive waiting times and dissatisfaction with treatment often resulted in occurrences of VV and PsV against the guards. Their experiences with WPV significantly impact their MPH and led to burnout and turnover intention. In Taiwan, a study revealed the influence of psychosocial work conditions on the mental health of public health workers in 2023, pointing out that the employees who ever experienced WPV had a higher chance of intention to leave their jobs (31). It is important for the security industry to address and prevent WPV to protect the health and well-being of their staff. It could include implementing violence prevention programs, providing support and resources for employees who have experienced violence.

The main sources of WPV are from vertical, horizontal, and third-party perpetrators (21). According to our analysis, the main factors affecting MPH of the participants were VV and PsV from the third-party perpetrators, with community residents and property owners constituting the majority. Its main reason was the lack of effective

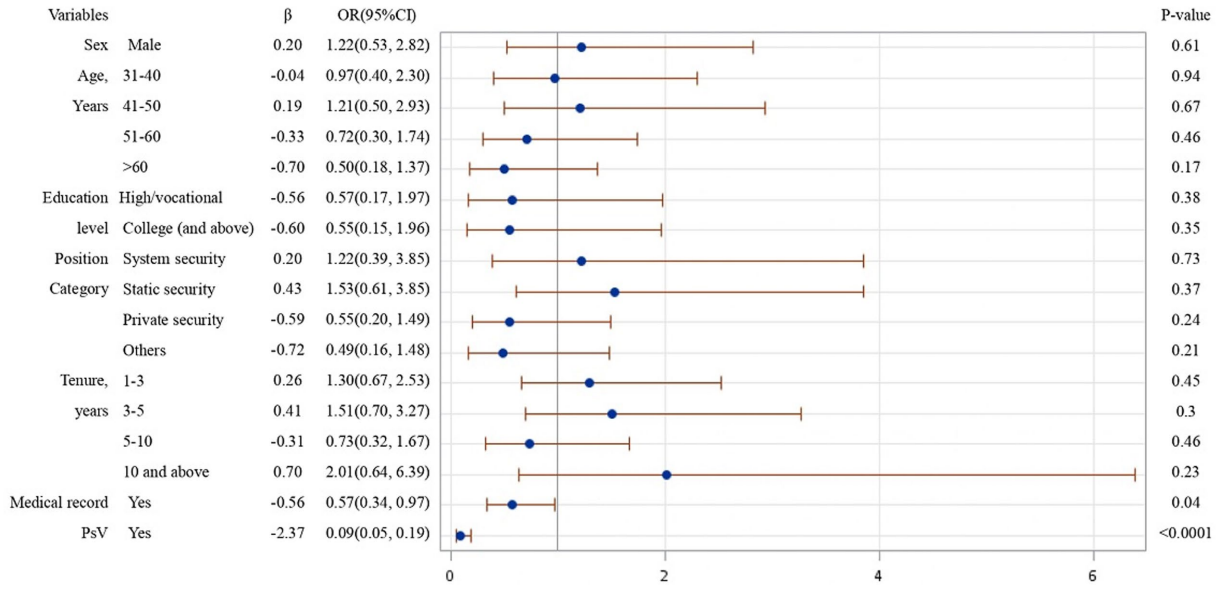

FIGURE 3
Logistic regression analysis on risk factors affecting MPH of participants experienced PsV.

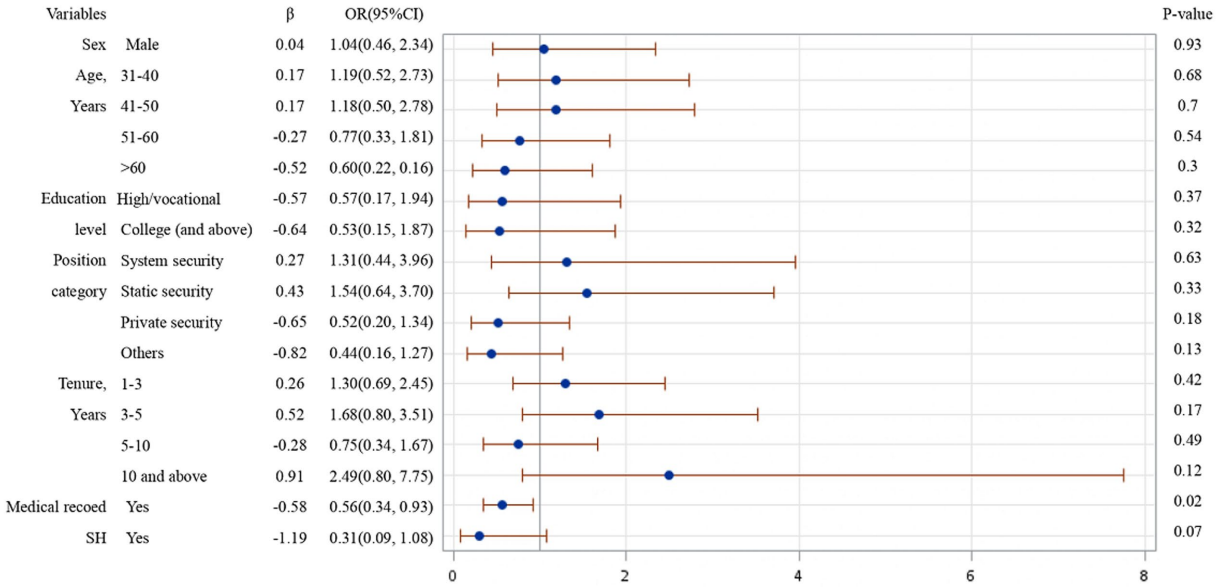

FIGURE 4
Logistic regression analysis on risk factors affecting MPH of participants experienced SH.

communication. After experiencing VV and PsV, most of the victims would seek colleagues' assistance. A study conducted in Italy addressed that high social support was a protective factor for healthcare sector workers, preventing them from third-party violence (32). Although the examined work sectors were different, the WPV perpetrators both came from the third party, which required further study to explore the relevant risk factors.

Table 1 addressed that the male and female security guards experienced different forms of WPV in different levels. The percentages of the WPV experienced by male and female were: PhV (3.52 and 3.61%), VV (10.43 and 13.25%), PsV (4 and 4.82%), and SH (0.95 and 6.02%). Furthermore, by performing Chi-square test, the result addressed that there was no statistical significance between gender differentiation and experiencing any forms of WPV, PhV, VV, and PsV ($p = 0.1693$, 0.9881, 0.4245, 0.7690). Nevertheless, the relation between gender differentiation and experiencing SH at the workplace showed statistically significance ($p = 0.0034$). A study in the United States on WPV among physicians demonstrated that there were gender differences in experiencing workplace violence. The result showed that males and females reported similar frequency of physical

TABLE 4 If WPV has significant impact on physical symptoms, anxiety, and concern, depression and dysfunctional family relationships in CHQ-12.

Variables	Physical symptoms	Anxiety and concern	Depression and dysfunctional family relationships	Sleep disorders
	Medians (Q1–Q3)	Medians (Q1–Q3)	Medians (Q1–Q3)	Medians (Q1–Q3)
PhV				
Yes ($n = 37$)	0 (0–0)	1 (1–2)	1 (1–1)	0 (0–0)
No ($n = 995$)	0 (0–0)	1 (1–1)	1 (1–1)	0 (0–0)
p value	***	***	-	**
VV				
Yes ($n = 110$)	0 (0–1)	1 (1–2)	1 (1–1)	0 (0–1)
No ($n = 922$)	0 (0–0)	1 (1–1)	1 (1–1)	0 (0–0)
p value	***	***	***	***
PsV				
Yes ($n = 42$)	1 (0–1)	2 (1–2)	1 (1–2)	1 (0–1)
No ($n = 990$)	0 (0–0)	1 (1–1)	1 (1–1)	0 (0–0)
p value	***	***	***	***
SH				
Yes ($n = 14$)	0 (0–1)	1 (0–2)	1 (1–2)	0 (0–1)
No ($n = 1,018$)	0 (0–0)	1 (1–1)	1 (1–1)	0 (0–1)
p value	**	-	-	*

-, not significant; *$p < 0.05$; **$p < 0.01$; and ***$p < 0.001$.

abuse (2.2%), while females (33%) were more likely to experience verbal violence than males (28%). Moreover, sexual harassment was reported by 19.9% of women and 3.9% of men. Our research revealed that there was a higher prevalence of VV and SH occurred on the female security guards than males, which was correspondent in the security industry and surgical residency (33).

Our analysis reveals that work stress was related to verbal violence, but not to other types of violence. In addition, the security guards who had experienced WPV had higher risk of having poorer MPH than those who had not experienced WPV. This result was consistent with an investigation on the association between the WPV violence and the health status of Taiwanese employees (8), denoting WPV led to poor health. Furthermore, a longitudinal analysis on Swiss population of professional caregivers suggested that psychophysiological stress response is primarily associated with combined verbal and physical aggression (34). It was proved that health of the professions in both service or healthcare sectors were adversely affected due to WPV.

Furthermore, our analysis discovered that WPV experienced by security guards was significantly associated with somatization symptoms, anxiety and concerns, depression and dysfunction of family relationships, and sleep disorders. At the same time, their experience of PhV, VV, or PsV was significantly correlated with the scores of CHQ-12. In other words, the security guards who experienced PhV, VV, or PsV had poorer MPH. A Taiwanese study on workers of public health agencies found a significant correlation between high prevalence of workplace violence in and increased risk of mental disorders (31). A Japan study in 2022 also revealed that public healthcare workers (HCWs) who experienced increased harassment could have a higher risk of depression and anxiety (35). The research showed that, compared to other occupations, the negative impacts of WPV on mental health were more severe for both security guards and HCWs.

The negative impact of WPV is evident and requires attention of nations to enact laws and policies, endeavoring to ensure the rights and physical and mental health of workers. For instance, in 2020, the Italian Parliament passed a law to impose harsher punishments for acts of violence against medical professionals, particularly when there was an injury associated (36). In Taiwan, the Taiwanese Government revised Occupational Safety and Health Act in 2014 to prevent physical or mental unlawful infringement caused by the actions of others during the execution of job duties. These legal changes have demonstrated that relevant government authorities committed to addressing the issues of WPV and the potential health impact. Because security guards are in a high-risk occupation susceptible to WPV, as well as workplace physical and psychological harm (37), their health and safety should be taken into special consideration regarding legal enforcement in the workplaces. Furthermore, future research on determining the relationship between WPV and MPH of security guards is also recommended.

The limitations and future studies should be highlighted. A cross-sectional survey was conducted on the security guards and data were collected from purposive sampling. First, it implied the uncertainty of the causes and sequence of WPV. Second, the causal relationship between WPV experience and medical records could not be assessed. Third, there might be sampling and selection biases, meaning the study might have introduced sample selection bias and memory recall bias of the participants. Fourth, the survey result might be affected by the subjective consciousness of participants, which impacted the

self-reported data. Fifth, in this study lacked the analysis on gender differentiation due to the gender distribution of the security industry. Therefore, we could not collect sufficient data of the females.

5 Conclusion

This study is the first exploration of the impact of WPV on the MPH of security guards during the COVD-19 pandemic. It revealed that during the pandemic, there were statistically significant relationships among PhV, PsV, and VV, which adversely affected the MPH of security guards. The primary WPV perpetrators against static security guards were from the third party, including community residents and property owners. The factors contributing to WPV included the lack of effective communication, dissatisfaction with treatment and service attitude, excessive waiting times, and, work stress, which further resulted in burnout, turnover intention, and poor MPH. In the meanwhile, the results of this study can provide a reference for government authorities, academic institutions, and relevant agencies to enact laws and policies to prevent workplace violence and to protect the physical and mental health of security guards.

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 research was approved by the Behavioral and Social Science Research Ethics Committee, China Medical University Hospital (Identifier: CMUH110-REC1-124). The participants provided their written informed consent to participate in this study.

Author contributions

Y-HL: Conceptualization, Formal analysis, Methodology, Writing – original draft. Y-HW: Conceptualization, Data curation, Project administration, Visualization. C-YC: Writing – review & editing. PC-T: Visualization, Writing – review & editing. T-HL: Formal analysis, Methodology, Visualization. C-YL: Visualization. All authors have read and agreed to the published version of the manuscript.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Acknowledgments

The authors would like to thank Cheng, Andrew Tai Ann from the Institute of Biomedical Sciences, Academia Sinica for giving us the CHQ-12 (Taiwan 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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 07 March 2024
DOI 10.3389/fpubh.2023.1277622

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RECEIVED 14 August 2023
ACCEPTED 13 December 2023
PUBLISHED 07 March 2024

CITATION
Rancic NK, Veljkovic DR, Mirkovic MR, Kulic LM, Jovanovic VS, Stamenkovic BN, Maksimovic NS, Ciric VM, Marinkov-Zivkovic EM, Giljaca SD, Đorđevic G, Đorđevic OG, Stojanovic MM, Bojanic NZ, Miljkovic DP and Otasevic SA (2024) Relationship between socio-descriptive characteristics, burnout syndrome, and quality of life of employees. *Front. Public Health* 11:1277622. doi: 10.3389/fpubh.2023.1277622

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Relationship between socio-descriptive characteristics, burnout syndrome, and quality of life of employees

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Introduction: Burnout syndrome develops as a consequence of chronic stress among employees. The study objective was to examine what socio-descriptive characteristics of employees might be associated with the appearance of the occupational burnout and to evaluate the relationship between job burnout and the quality of life among security employees of the professional private security sector in Central Serbia.

Methods: A multicenter cross-sectional questionnaire-based study was performed. A multivariate logistic regression analysis and ANOVA post choc test was applied.

Results: A total of 353 respondents (330 male and 23 female) participated in the study. Female sex and older age were associated with a higher risk of total burnout and the development of emotional exhaustion while male sex, higher education, and managerial position were associated with higher personal achievement and lower risk of total burnout. Male sex, marital union, two or more children, and direct contact with clients were significantly associated with a lower quality of life of employees. A significant negative correlation was found between total burnout and the Physical Health Composite Score (PHC) score with a correlation coefficient (r_s) of −0.265 (95%CI from −0.361 to −0.163); between total burnout and the and Mental Health Composite Score (MHC) score with a r_s of −0.391 (95%CI from −0.480 to −0.301); and between total burnout and TQL score with a r_s of −0.351 (95%CI from −0.445 to −0.258).

Conclusion: Female sex and older age were associated with a higher risk of total burnout and the development of EE while a managerial position and higher education were protective factors in relation to the development of burnout. Male sex, marital union, two or more children, and direct contact with clients were significantly associated with a lower quality of life of the employees. Shift work significantly reduced the total quality of life, while managerial positions increased the quality of life.

KEYWORDS

burnout syndrome, security employees, professional private sector, quality of life, Central Serbia

1 Introduction

The police job is considered stressful, leading to poor physical and mental health outcomes over time, in which burnout is included (1, 2). Working in the private security sector is most similar to police work in most countries, whereby security employees have almost the same responsibilities and perform similar tasks (3, 4). Russell et al. (5) stated that security work is the most stressful job and because of that security officers suffer more burnout and illnesses than other employees do (5). Private security is as stressful as public security (6). Burnout syndrome develops as a consequence of chronic stress among employees, particularly those who perform high-risk jobs or care and protection jobs or jobs involving helping other people (7). Christiana Maslach defined burnout as "a psychological syndrome of emotional exhaustion (EE), depersonalization (DP), and a lowered sense of personal accomplishment (PA) that can be observed in people working with others in a certain specific manner" (8).

Emotional exhaustion is characterized by a sense of emotional overextension as a result of work; depersonalization is characterized by emotional indifference and dehumanization of service recipients; diminished sense of personal accomplishment is characterized by a sense of professional stagnation, incapability, incompetence, and unfulfillment. DP refers to the development of an insensitive and cynical attitude toward people who are service recipients, a negative attitude toward work, and the loss of a sense of own identity. A diminished sense of PA refers to a negative self-assessment of competences and accomplishments at a workplace, and the symptoms manifest as a lack of motivation to work, as well as a decline in self-esteem and general productivity (9, 10).

In the United States of America (USA), the prevalence of burnout was explored in a sample of 13,000 police officers from across 89 police agencies, describing that 19% of the sample felt emotionally exhausted on a weekly basis, and 13% had severe levels of depersonalization (11) describing that 19% of the sample felt emotionally exhausted on a weekly basis and 13% had severe levels of depersonalization. In Sweden (12), in a sample of 856 patrolling police officers, 28% reported high levels of emotional exhaustion and 56% increased levels of depersonalization. In Spain, in a sample of 747 and in police officers and guards in prisons in Spain, the percentage of those with burnout was 43.6% (13). According to the results of Lastvikova et al. (13), in the European Union (EU), about 8% of the German working population believe they suffer from burnout syndrome (14). In Costa Rica, the prevalence of total burnout was 44.4% (15).

According to Aguayo et al. (16), the role of socio-demographic factors in the development of the burnout syndrome is important because of: these factors might have a direct influence on burnout levels and its subscales and second, the identification of risk factors may define a risk profile of an employees and would facilitate the development of primary and secondary intervention programs.

Prior studies about burnout generally showed a male–female difference (17) although the results are inconsistent. Some studies have shown that women suffer more from burnout than men (18, 19), while others have indicated that males report higher burnout levels (20–23) and pointed out the influence of underlying, job-related factors such as working time hours (21). De Solana reported that being younger contributed to increased burnout levels (18) and the results of some studies point to an inverse relationship between age and burnout, such that people will experience lower levels of burnout as their age increases (12, 24).

A systematic review of the determinants of job burnout (25) found a significant relationship between increasing age and increased risk of DP; on the other hand, there was also a higher level of PA. Some researchers have found the opposite, namely that older employees are more at risk (26, 27). It is well known that single individuals are more at risk than those who live with a partner (28, 29) or are married. The number of children in a family can also play an important role in burnout (30–33). According to the interesting findings of Dutch researchers (32), the presence of young children and doing more household chores were positively related to feelings of burnout, whereas having children reduced employees' feelings of burnout. In a study by Brady et al. (33), a higher number of children was correlated with a lower level of burnout.

The majority of studies show that individuals with a higher level of education are more at risk (30, 34) and results are inconsistent too. A review investigating the risk factors for stress among police officers reported that officers who worked in big cities were more prone to higher levels of stress and post-traumatic stress disorder as they were more frequently exposed to violent and extreme situations (35).

Burnout has serious professional and personal consequences, including lack of professionalism (often sick-leaves, reduced efficiency at work, lack of interest, and non-collegiality), problems in communication with close persons, divorces, losing friends, alienation, and aggressiveness (33, 35), which has a negative impact on the employees. Several studies have concluded that employees with higher levels of burnout are more likely to suffer from a variety of physical health problems such as musculoskeletal pain, gastric alterations, cardiovascular disorders, headaches, insomnia, and chronic fatigue, as well as increased vulnerability to infections (36, 37) and job burnout reduce the quality of life among security employees.

The following hypothesis were tested:

Abbreviations: EE, Emotional exhaustion; DP, Depersonalization; PA, Personal accomplishment; MBI-HSS, Maslach Burnout Inventory Human Services Survey; SF-36, Short Form 36 Health Survey; TQL, Total quality life; PHC, Physical health composite score; MHC, Mental health composite score; OR, Odds ratio; CI, Confidence intervals; EU-OSHA, European Agency for Safety and Health at Work; ANOVA, Analysis of variance.

Hypothesis 1: Males has significant higher level of total burnout and higher EE and PA subscale, and decreased quality of life than females.

Hypothesis 2: Older age is in the significant relationship with the higher burnout.

Hypothesis 3: Security employees who are married show higher levels of quality of life.

Hypothesis 4: Security employees without children or with one child had a significantly higher MHC score and total quality of life, compared to employees with two, three, or more children.

Hypothesis 5: Managerial position and higher education are in significant positive relation with higher PA subscale and with the increased quality of life.

Hypothesis 6: Shift working is in the significant negative relationship with the decreased quality of life.

Hypothesis 7: Job burnout has significant impact on the reduction on the quality of life of the security employees.

2 Materials and methods

2.1 Private security sector in Central Serbia

The main characteristics of the professional private security sector in Central Serbia are as follows: the third largest group of people under arms, with about 40,000 employees (38); employees have different levels of training and different levels of education; employees have low social and economic status. Employees in the professional private security sector are exposed to various risk factors that can cause stress for an individual. In a country such as Serbia, which has undergone economic, political, and social reforms, as well as military and police reforms, a somewhat different hierarchy is expected with regard to job stressors, compared to developed countries. It is impossible to remove all the workplace stressors within a private company, but it is necessary to identify the stressors in order to reduce exposure and prevent the occurrence and development of burnout syndrome (14, 39, 40).

2.2 Study design

A multicenter cross-sectional study was done. The study was conducted on a representative sample, the size of which was determined using http://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower.html (41).

The study included security staff employed at private agencies in seven cities in Central Serbia: Nis, Kraljevo, Kragujevac, Cacak, Krusevac, Belgrade, and Novi Sad. The representative sample size was 439, the study strength was 80%, and the type 1 error probability α was 0.05. The study included 353 questionnaires that were completely filled out. The response rate was 80%. The study was performed in the period from March 3 to April 30, 2019.

The Ethics Committee of the Faculty of Medicine of the University of Pristina with temporary seat in Kosovska Mitrovica by the Decision No -09-972-1 dated September 10, 2018.

The study inclusion criteria were as follows: adults 18–65 years of age, citizens of the Republic of Serbia, and full-time employees, who were licensed to work in private security, had-finished the basic training for using weapons, and were working longer than 12 months. Exclusion criteria were as: staff in the process of obtaining the license, discontinuity at work longer than 1 year, long-term sick leaves or multiple workplace changes in the past 5 years, respondents recently exposed to major psychophysical trauma regardless of the private environment (illness or death of a close person, divorce…etc.), and refusal to participate in the study.

The total score of the each respondent was obtained by summing up the matrix with a specific key for each of the three previously mentioned subscales, and the total degree of occupational burnout is represented by a comprehensive scale calculated based on a precise formula. High level of burnout at work is reflected in high scores on the emotional exhaustion and depersonalization subscales and low scores on the personal accomplishment subscale.

This means that high scores on the EE and DP scales contribute to the burnout syndrome, while high scores on the professional accomplishment scale diminish it. A medium level of burnout is a reflection of mean scores on all three subscales. A low level of burnout at work is reflected in low scores on the EE and DP subscales and high scores on the PA subscale. The PA scale is relevant only if confirmed with the EE or DP scale.

2.2.1 The Maslach burnout inventory human services questionnaire

This is an internationally accepted burnout measuring standard that measures three burnout subscales, and it is often used as a model for the evaluation of validity of other burnout risk assessment scales. We have used the questionnaire for staff employed at institutions who are in direct contact with people (Human Services Survey, MBI-HSS) with 22 variables (42).

In the Republic of Serbia, licenses for the Maslach Burnout Inventory Human Services Survey (MBI-HSS) questionnaire and the evaluation key, as well as usage permission, were obtained directly from the current license owners-the SINAPSA EDITION Company (license No. 2/2018, dated May 9, 2018).

The managers of private security agencies provided written approval for the research. All respondents were informed in detail about the research, and they signed the consent forms to participate in the study.

Maslach Burnout Inventory Human Services Survey consists of 22 questions that are subsequently used in the calculation of three subscales measuring different occupational burnout aspects.

It is a self-administered questionnaire. Each question consists of a series of statements expressing the degree of agreement with the expressed statements. The seven-point Likert scale was used in the study and responders assessed each item on this scale from 0 to 6 (0—never, 1—once a year or less, 2—once a month or less, 3—a few times a month, 4—once a week, 5—a few times a week, and 6—every day).

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2.2.2 Short form 36 health survey

Short Form 36 Health Survey is the most commonly used general questionnaire that measures subjective health, i.e., the health-related quality of life (HRQoL). The questionnaire is a generic instrument for measuring health status and quality of life. It is standardized and very sensitive for assessing the overall impact of health on the quality of life. It consists of 36 questions covering a period of 4 weeks. It is designed to analyze self-ranking individual perception of health, functional status, and sense of well-being (43). The questions cover eight domains in the field of health: physical functioning, limitations due to physical health, body pain, general health, vitality, social functioning, limitations due to emotional problems, and mental health. When the total of each individual domain is calculated, the next step is calculating the Physical Health Composite Score (PHC) and Mental Health Composite Score (MHC), which are related to the quality of life.

The eight domains of this questionnaire were used to assess the category (dimension) of functional health and the sense of well-being; four for physical and four for mental status. Very important for measuring the physical health are the following dimensions: physical functioning, physical role, body pain, and general health. All individual scores and both composite scores can have values ranging from 0 to 100, where 0 is very poor quality of life and 100 is ideal quality of life resulting from good physical and mental health. Composite scores of physical and mental health are used to calculate the total quality of life (TQL) score. The scales of vitality and general health have good validity; and the questionnaire is used to compare different conditions and diseases, and it is considered the "gold standard" in assessing the quality of life related to health.

2.3 Statistical analyses

All analyses were conducted in the SPSS-version 22 program package. We calculated means, odds ratios (ORs), and confidence intervals (CIs), and we performed variance analysis (ANOVA). Repeated-measures ANOVA was applied to test the statistical significance of changes in values of the indicators of quality of life. For the comparison of numerical characteristics, we used Student's *t*-test. The chi-squared test was used to compare frequencies between groups, or the Fisher test was used when the expected frequency was <5 in one of the cells. A univariate logistic regression analysis, followed by a multivariate one was used to assess the relationship between burnout and the socio descriptive characteristics of the respondents obtained from the questionnaires. Tukey's test was used to analyze values between two samples. Spearman correlation analysis was used to assess the association of burnout and the quality of life of responders, and Spearman's coefficient of rank correlation was calculated (r), too. A value of $p < 0.05$ was considered statistically significant.

3 Results

3.1 Socio-descriptive characteristics of the respondents

Of the total number of people contacted (439), a total of 353 respondents (330 male and 23 female) participated in the study. The response rate was 80%. Men represented 93.5% of all respondents, and they were significantly older than women: 44.09 ± 11.44 vs. 36.91 ± 7.92 years ($F = 8.752$; $p = 0.003$).

Overall, 224 (64.3%) respondents were married, about 1/3rd did not have children (33.7%), and more than half had completed high school (54.7%). A minority of the employees had a university degree (7.6%). There were 300 (78.00%) employees in service; about 22.7% held managerial positions, 288 (81.6%) worked in shifts, and most respondents (as many as 277; 78.5%), worked 8–12 h a day.

3.2 Burnout in security employees in the private sector

Figure 1 shows the values of subscales of burnout syndrome by severity—high, moderate, and low.

More than half of the employees $n = 234$, (66.3%) had a high level of EE, 19.8% ($n = 70$) had a moderate level and 13.9% ($n = 49$) had a low level of EE. Cumulatively, high and moderate levels of EE were present in 86.1% of employees. The largest number of employees, 82.4% ($n = 291$), had a high level of DP. Moderate level of DP was present in 16.2% ($n = 57$) and low level in 1.4% ($n = 5$) of employees. Low PA was recorded in 34.5% ($n = 122$), moderate in 32.9% ($n = 116$), and high in 32.6% ($n = 115$) of employees (Figure 1).

For each subscale of burnout (EE, DP, and PA) and for total burnout, multivariate logistic regression analysis was performed, and the results are presented in Table 1.

Table 2 shows the results of EE, DP, and PA subscales and for the total burnout, modeling with the application of multivariate logistic regression analysis in regard to the socio-descriptive characteristics as independent variables: (sex, age, marital union, number of children, education, and managerial position).

The independent variable "sex" was found to be significant at the $p = 0.10$ level; its cross-ratio (i.e., the male category in relation to the female reference category) was 0.277, while its corresponding 95% confidence interval (CI) for the cross-ratio was 0.098–0.780. On the basis, it was determined that employed men were 82% less likely to exhibit EE compared to employed women.

The independent variable "age" of the employees also showed a significant effect on a high degree of EE in the examined group ($p < 0.001$). The chances of an employee having a high degree of EE increased with age, at a ratio of 0.962, (95% CI: 0.946–0.979). With each additional year of life, EE increased by 3.8%. The effect of dependent variables on the independent variable (i.e., level of depersonalization) was not determined.

The reference category was represented by high and moderate levels of PA. The sex of the respondents stood out as a significant variable in the dependent PA variable modeling. The cross-ratio of "male" in comparison to the reference category "female" amounted to 2.644, significant at the level of $p = 0.10$, while its corresponding 95%

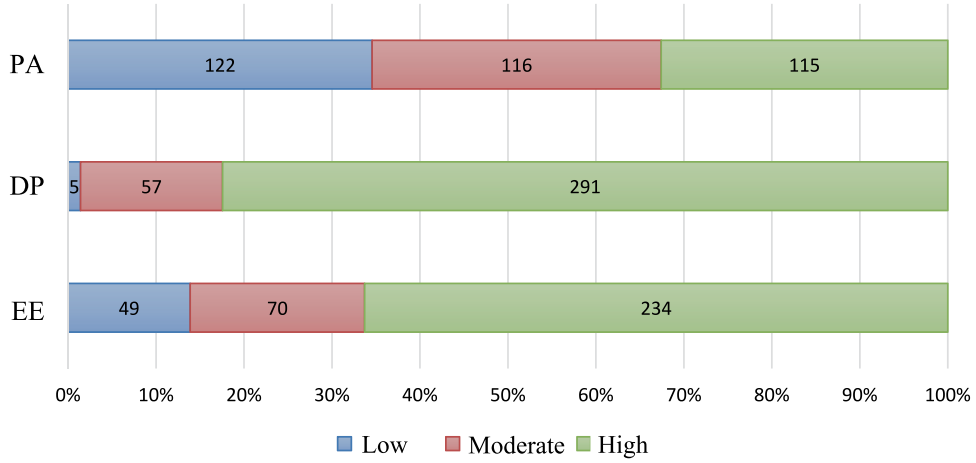

FIGURE 1
MBI-HSS subscales with regard to the severity of burnout symptoms. Reprinted with permission from Veljkovic et al. (44). © Dejan Veljkovic.

TABLE 1 Results of multivariate logistic regression analyses of dependent variables EE, DP, and PA, as well as total burnout.

		Emotional exhaustion (EE)		Depersonalization (DP)		Personal accomplishment (PA)		Total Burnout	
Characteristics		OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Sex	Female (reference value)								
	Male	0.277	0.081–0.951	0.689	0.198–2.395	2.644	0.879–7.954	0.303	0.088–1.041
Age		0.962	0.943–0.982	0.989	0.898–1.005	0.997	0.955–1.048	1.006	0.987–1.024
Marital union	Married (reference value)								
	Unmarried	5.731	0.561–3.338	0.921	0.207–2.206	1.067	0.316–1.961	1.139	0.704–1.844
	Extramarital union	7.038	0.183–2.535	1.037	0.139–4.542	1.448	0.283–4.217	1.122	0.363–3.462
	Divorced	4.200	0.455–3.042	0.747	0.196–1.885	1.559	0.746–4.459	0.321	0.092–1.113
	Widowed	6.857	0.13–1.491			2.027		3.365	0.637–17.793
Number of children	(reference value)								
	1	1.088	0.594–3.399	1.586	0.403–4.463	0.884	0.299–1.775	0.386	0.415–1.314
	2	0.880	0.526–2.847	0.891	0.249–2.462	0.884	0.314–1.834	0.907	0.637–1.682
	3	0.731	0.281–2.978	0.500	0.116–2.108	0.952	0.238–2.770	0.685	0.293–2.099
Education	3 years of secondary school (reference value)								
	4 years of secondary school	0.944	0.582–1.613	0.663	0.323–1.285	1.050	0.631–1.805	0.927	0.635–1.661
	Higher education −2-years of vocational studies	1.612	0.492–5.571	0.682	0.165–2.829	3.698	1.354–12.598	0.813	0.415–3.236
	Higher education-3 years of vocational or academic studies	1.343	0.380–4.740	0.577	0.093–1.740	2.219	0.753–7.699	0.939	0.303–2.966
	University	2.364	0.864–7.937	0.692	0.195–2.067	1.525	0.550–3.539	0.693	0.536–2.765
Managerial position	No (reference value)								
	Yes	0.813	0.397–1.397	1.049	0.434–2.118	1.293	0.356–1.306	0.980	0.546–1.759

OR, Odds ratio; 95% CI, 95% Confidence interval.

confidence interval for the cross-ratio was 0.879–7.954. The probability that male responders manifested burnout in the form of lowered PA was reduced by 164% in comparison to female respondents.

The respondents' education also stood out as a significant variable in the dependent PA variable. The cross-ratio of "university" education in comparison to the reference category of "3 years of secondary

TABLE 2 Average scores of the eight domains of the SF-36 questionnaire.

Domains	*N*	Minimum	Maximum	$\bar{x}$	SD
PF	353	35.00	100.00	93.68	9.31
RF	353	0.00	100.00	74.50	35.62
RE	353	0.00	100.00	85.08	26.30
VT	353	20.00	100.00	62.15	17.19
MH	353	44.00	100.00	80.00	10.61
SF	353	25.00	100.00	82.11	15.77
BP	353	22.50	100.00	85.13	18.25
GH	353	5.00	100.00	66.60	19.27

PF, Physical functioning; RF, Physical role; RE, Emotional role; VT, Vitality; MH, Mental health; SF, Social functioning; BP, Body pain; GH, General health. $\bar{X}$, Arithmetic mean; SD, Standard deviation.

school" amounted to 3.698, significant at the level of $p = 0.10$, while its corresponding 95% CI for the cross-ratio amounted to 1.237–11.051. The probability that responders with university education manifested the burnout in the form of lowered PA was reduced by 269% in comparison to the respondents with 3-year of secondary school.

Table 2 shows the average scores of the basic eight domains of the SF-36 questionnaire.

Quality of life is a subjective dimension whose evaluation is extremely important in the identification of risks to employees'.

Physical functioning (PF) was the domain with the highest average score (93.68), while the average scores for vitality (VT): 62.15, and that for general health (GH): 66.60, were the lowest (Table 3).

Table 3 shows a composite score of PHC in relation to the socio-descriptive characteristics of employees.

Compared to men, a significantly higher PHC score was observed in women ($p = 0.011$), as well as in unmarried participants ($p = 0.001$). PHC score was significantly higher in employees without children ($p = 0.001$), compared to employees with children. Employees working in shifts had significantly higher average values of PHC score ($p = 0.005$). Working hours had no significant impact on the PHC score ($p = 0.147$), whereas the managerial position had a significant impact on increasing PHC score ($p = 0.009$).

Table 4 shows the composite MHC score in relation to the socio-descriptive characteristics of employees.

There was no significant difference in the average MHC score in relation to the sex of employees ($p = 0.071$). Widows/widowers had a significantly lower MHC score compared to employees with different marital status ($p = 0.001$). Employees without children or with one child had a significantly higher MHC score compared to employees with two or three children ($p = 0.049$). The level of education had no significant impact on the average MHC score ($p = 0.598$). Work in shifts ($p = 0.070$), working hours ($p = 0.171$), and managerial position ($p = 0.355$) had no significant impact on the average MHC score.

The mean total quality of life (TQL) score was 78.66 ± 13.77. The mean composite score was 79.98 ± 17.57 for PHC and 77.33 ± 13.14 for MHC.

Table 5 shows the TQL score in relation to the socio-descriptive characteristics of employees.

Compared to women, men had a significantly lower average score of total quality of life ($p = 0.013$). Married employees had a significantly lower TQL score compared to those who were not married ($p = 0.001$). Widowed employees had the statistically lowest TQL score. Employees without children or with one child had a significantly higher TQL score, compared to employees with two, three, or more children ($p = 0.001$).

Education did not have a significant impact on the average TQL score ($p = 0.160$). Shift work has a significant impact on the reduction in average TQL score ($p = 0.007$). Employees in managerial positions had a significantly higher TQL score compared to those who did not hold managerial positions ($p = 0.034$).

The first hypothesis proposed that males are at higher risk of develop burnout than females but males had higher PA subscale. Females were at higher risk for total burnout and EE than males ($p < 0.001$). Males had significantly decreased quality of life.

The second hypothesis indicated that older age is in the significant relationship with the higher subscale EE of the burnout ($p < 0.001$).

Hypothesis 3 indicated that employees who are married show lower levels of the quality of life than unmarried employees. ANOVA ($F = 9.248$; $p = 0.001$) showed that employees who are married have significantly decreased quality of life, and the further *post hoc* analysis confirmed the same.

The fourth hypothesis proposed that employees without children or with one child had a significantly higher MHC score and total quality of life, compared to employees with two, three, or more children. Employees without children or with one child had a significantly higher MHC score compared to employees with two or three children ($p = 0.049$).

The fifth hypothesis proposed significant positive relationship between managerial position and higher level of education with higher PA subscale and a lower risk of total burnout the quality of life. The managerial position had a significant impact on increasing PHC score ($p = 0.009$) and on the total quality of life compared to employees who did not hold managerial positions ($p = 0.034$).

The sixth hypothesis proposed that shift work has a significant impact on the reduction in total quality of life ($p = 0.007$). Long working hours are in the significant negative relationship with the decreased quality of life. Working hours from 8 to 12 h per day based on ANOVA ($F = 2.069$; $p = 0.128$) are significantly decrease the quality of life (Table 6).

Hypothesis 7: There is a significant negative correlation between job burnout and the quality of life of the security employees.

A significant negative correlation was found between total burnout and PHC with Spearman correlation coefficient (r_s) of −0.265 (95%CI from −0.361 to −0.163), between total burnout and MHC with r_s, of −0.391 (95%CI from −0.480 to −0.301) and between total burn and TQL with r_s, of −0.351 (95%CI from −0.445 to −0.258).

There is a significant negative correlation between EE and PHC with r, of −0.311 (95%CI from −0.407 to −0.205), between EE and MHC with r, of −0.434 (95%CI from −0.516 to −0.344) and between EE and TQL with r, of −0.393 (95%CI from −0.482 to −0.29 o 7).

A significant negative correlation between DP and PHC with r, −0.231 (95%CI from −0.327 to −0.140), between DP and MHC with r, of −0.331 (95%CI from −0.433 to −0.233), and between DP and TQL with r, of −0.302 (95%CI from −0.402 to −0.212).

There is a significant positive correlation between PA and PHC with r, of 0.145 (95%CI from 0.033 to 0.253), between PA and MHC with r, of 0.230 (95 from %CI 0.123 to 0.328), and between PA and TQL with r, of 0.200 (95% CI from 0.094 to 0.305).

TABLE 3 Composite PHC score in relation to the socio-descriptive characteristics of employees.

Characteristics		N	x̄	SD	SEM	95% CI		Min	Max
						Lower	Upper		
Sex	Male	330	79.35	17.75	0.97	77.43	81.27	27.50	100.00
	Female	23	88.99	11.79	2.45	83.89	94.09	49.38	100.00
	$F = 6.574$; $p = 0.011$								
Marital union	Married	227	76.72	18.34	1.21	74.32	79.12	27.50	100.00
	Unmarried	87	88.23	12.78	1.37	85.50	90.95	38.75	100.00
	Extramarital union	12	91.19	10.64	3.07	84.43	97.95	64.38	100.00
	Divorced	23	79.05	12.65	2.63	73.58	84.52	57.50	100.00
	Widower/widow	4	56.87	24.91	12.4	17.22	96.53	34.38	92.50
	$F = 10.785$; $p = 0.001$								
Number of children	0	120	86.76	13.36	1.22	84.35	89.18	38.75	100.00
	1	84	79.65	17.94	1.95	75.76	83.55	33.75	100.00
	2	129	74.74	18.61	1.63	71.49	77.98	27.50	100.00
	3	20	74.44	18.79	4.20	65.64	83.23	42.50	96.25
	$F = 11.382$; $p = 0.001$								
Education	3 years of high school	103	78.99	17.57	1.73	75.55	82.42	33.75	100.00
	4 years of high school	193	79.80	17.80	1.28	77.27	82.32	33.75	100.00
	Higher education-2 years of vocational studies	16	72.85	19.72	4.93	62.34	83.36	27.50	97.50
	Higher education-3 years of vocational or academic studies	14	84.15	18.12	4.84	73.68	94.61	48.75	100.00
	$F = 2.076$; $p = 0.083$								
Work in shifts	Yes	288	78.72	18.26	1.07	76.60	80.84	27.50	100.00
	No	65	85.54	12.82	1.59	82.37	88.72	55.00	100.00
	$F = 8.157$; $p = 0.005$								
Work hours	≤8 h	36	84.96	13.39	2.23	80.43	89.50	55.63	97.50
	8–12 h	277	79.71	17.68	1.06	77.61	81.80	27.50	100.00
	≥12 h	40	77.37	19.56	3.09	71.11	83.63	33.75	100.00
	$F = 1.931$; $p = 0.147$								
Workplace	Boss of security service	53	85.81	12.79	1.75	82.28	89.34	54.38	100.00
	Security officer	300	78.95	18.11	1.02	76.89	81.00	27.50	100.00
	$F = 6.986$; $p = 0.009$								

$\bar{X}$, Arithmetic mean; SD, Standard deviation; SEM, Standard error of mean; 95% CI, 95% Confidence interval; Min, Minimum value; Max, Maximum value; and F, ANOVA.

4 Discussion

Private security refers to the security protection services that private security organizations provide to control crimes, protect lives and other assets, and maintain order at their employers' facilities (4–6). Working in the private security sector is most similar to police work in most countries (5, 11) and the basic difference between public police officers and private security officers is reflected in the fact that public police officers have legal power delegated by the state. On the other hand, private security employees do not have the status of authorized officers.

Security work is considered a male occupation in many countries, and this is no different in Serbia; thus, the sex differences were expected. Our study show that female sex and older age were associated with a higher risk of total burnout and the development of EE subscale. The first hypothesis is partially confirmed. The second hypothesis is confirmed. We found a significant association of socio-descriptive characteristics such as male sex, higher education, and managerial position with higher PA subscale and a lower risk of total burnout. We did not found significant association of socio-descriptive characteristics and DP subscale.

According to presented results, male sex, marital union, two or more children, and direct contact with clients were significantly associated with a lower total quality of life of the employees. Hypotheses 1, 3, 4, and 5 are confirmed. Shift work significantly reduced the total quality of life, while managerial positions increased the quality of life of the examined employees. We confirmed hypotheses 5 and 6.

TABLE 4 Composite MHC score in relation to socio-descriptive characteristics of employees.

Characteristics		N	x̄	SD	SEM	95% CI		Min	Max
						Lower	Upper		
Sex	Male	330	77.00	13.00	0.71	75.59	78.41	30.38	100.00
	Female	23	82.11	14.41	3.00	75.88	88.35	48.71	100.00
	$F = 3.275$; $p = 0.071$								
Marital union	Married	227	76.53	12.22	0.81	74.93	78.13	30.38	100.00
	Unmarried	87	80.99	13.77	1.47	78.05	83.93	33.75	100.00
	Extramarital union	12	76.85	18.13	5.23	65.32	88.37	37.00	95.25
	Divorced	23	75.42	12.78	2.66	69.89	80.95	39.46	95.50
	Widower/widow	4	55.63	8.10	4.05	42.73	68.53	48.71	66.50
	$F = 4.961$; $p = 0.001$								
Number of children	0	120	79.55	13.49	1.23	77.11	81.99	33.75	100.00
	1	84	78.06	13.99	1.52	75.03	81.10	39.46	100.00
	2	129	75.17	12.48	1.09	72.99	77.34	30.38	100.00
	3	20	74.93	9.06	2.02	70.69	79.17	56.33	91.00
	$F = 2.653$; $p = 0.049$								
Education	3 years of high school	103	103	77.18	12.8	1.26	74.68	79.690	40.13
	4 years of high school	193	193	76.99	13.4	0.96	75.09	78.903	30.38
	Higher education-2 years of vocational studies	16	16	74.96	14.7	3.69	67.07	82.850	37.00
	Higher education-3 years of vocational or academic studies	14	14	81.19	13.7	3.67	73.26	89.129	48.42
	$F = 0.692$; $p = 0.598$								
Work in shifts	Yes	288	76.73	13.45	0.79	75.17	78.29	30.38	100.00
	No	65	80.00	11.36	1.40	77.19	82.82	53.75	100.00
	$F = 3.305$; $p = 0.070$								
Work hours	≤8 h	36	79.14	11.14	1.85	75.37	82.91	53.75	96.50
	8–12 h	277	77.60	12.83	0.77	76.08	79.11	30.38	100.00
	≥12 h	40	73.89	16.29	2.57	68.68	79.11	39.46	96.75
	$F = 1.773$; $p = 0.171$								
Workplace	Boss of security service	53	78.88	12.25	1.68	75.50	82.25	50.88	100.00
	Security officer	300	77.06	13.29	0.76	75.55	78.57	30.38	100.00
	$F = 0.857$; $p = 0.355$								

x̄, Arithmetic mean; SD, Standard deviation; SEM, Standard error of mean; 95% CI, 95% Confidence interval; Min, Minimum value; Max, Maximum value; and F, ANOVA.

About one-third of responders had symptoms of total burnout syndrome. A much higher number of employees developed a moderate or high level of burnout symptoms on individual subscales: EE (high 66.3%, moderate 19.8%, and low 13.9%); DP (high 82.4%, moderate 16.2%, and low 1.4%); and PA (low 34.5%, moderate 32.9%, and high 36.2%). All values of total burnout and EE and DP subscales were higher in our examined population than in Brazilian similar population, only was lower PA subscale in our responders: EE 46, 25, and 29%; DP 21, 30, and 49%; PA 41, 31, and 28% (45), and in Mexican too, a prevalence of total burnout was 23.36% of the Mexican police officers, high EE in 44.16%, DP in 49.29%, and PA in 41.03% (20).

Our findings are compatible with published studies that demonstrate an increased risk of burnout among women (23–25, 36, 46). In our study, the male sex of the employees also stood out as a significant variable for the higher PA subscale. In the study of Adecola et al. (47) males had higher level of PA subscale than women although this subscale was reduced in both sexes. There have also been different results in the literature according to which men are protected from EE if they are in an emotional relationship, while women are at risk of developing EE if they have a family (19, 35, 36). In one study, similar to ours, the EE subscale of burnout presented the highest score in participants (47).

TABLE 5 TQL score in relation to the socio-descriptive characteristics of employees.

Characteristics		*N*	x̄	SD	SEM	95% CI		Min	Max
						Lower	Upper		
	Female	23	85.55	11.90	2.48	80.41	90.70	49.04	100.00
	$F = 6.260$; $p = 0.013$								
Age	Male	330	44.09	11.44					
	Female	23	36.91	7.92					
	$F = 8.752$; $p = 0.003$								
	Married	227	76.63	13.64	0.90	74.84	78.41	33.63	100.00
	Unmarried	87	84.61	12.25	1.31	82.00	87.22	36.25	100.00
	Extramarital union	12	84.02	13.01	3.75	75.75	92.29	56.00	97.00
	Divorced	23	77.23	11.48	2.39	72.26	82.20	54.42	95.25
	Widower/widow	4	56.25	14.10	7.05	33.80	78.70	42.31	74.79
	$F = 9.248$; $p = 0.001$								
Number of children	0	120	83.16	11.94	1.09	81.00	85.32	36.25	100.00
	1	84	78.86	14.67	1.60	75.67	82.04	36.69	100.00
	2	129	74.95	13.93	1.22	72.52	77.38	33.63	100.00
	3	20	74.68	11.61	2.59	69.25	80.12	52.02	93.63
Education	3 years of high school	103	78.09	13.77	1.35	75.39	80.78	36.94	100.00
	4 years of high school	193	78.39	13.94	1.00	76.41	80.37	33.63	100.00
	Higher education-2 years of vocational studies	16	73.90	15.14	3.78	65.84	81.97	41.71	97.13
	Higher education-3 years of vocational or academic studies	14	82.67	15.52	4.14	73.71	91.63	48.58	97.75
Work in shifts	Yes	288	77.73	14.32	0.84	76.06	79.39	33.63	100.00
	No	65	82.77	10.11	1.25	80.27	85.28	56.46	100.00
	$F = 7.247$; $p = 0.007$								
Work hours	≤8 h	36	10.20	10.06	1.67	78.64	85.46	64.38	97.00
	8–12 h	277	78.47	13.75	0.82	77.02	80.28	33.63	100.00
	≥12 h	40	11.33	16.18	2.55	70.46	80.81	36.69	97.63
	F = 2.069; $p = 0.128$								
Workplace	Boss of security service	53	12.00	10.09	1.38	79.56	85.12	57.90	100.00
	Security officer	300	78.00	14.24	0.82	76.39	79.62	33.63	100.00
	$F = 4.513$; $p = 0.034$								

x̄, Arithmetic mean; SD, Standard deviation; SEM, Standard error of mean; 95% CI, 95% Confidence interval; Min, Minimum value; Max, Maximum value; and F, ANOVA.

State police officers who were in an emotional relationship were more prone to EE but experienced higher PA, and there was no significant difference between state police officers in the civil service who had children or not, with regard to the development of burnout (16, 21, 30, 35, 36). Employed women, due to their responsibilities toward their family and work, have difficulties in harmonizing professional and private obligations. In certain studies, women were found to be more prone to EE (33, 36), while men were more susceptible to DP.

Our findings are compatible with published studies that demonstrated an increased risk of job burnout with increased age. Results of a study performed on the professional military personnel of the Serbian Armed Forces (46) showed that the highest level of burnout was measured on the subscales EE in military personnel aged 23–30 years of age ($p < 0.05$). De Solana reported that being younger contributed to increased burnout levels (18).

In relation to marital status, employees who were unmarried seemed to be more exposed to burnout compared to those who lived with a partner, in our study. However, such findings seem to be more appropriate in men, as, in the case of working women, it constitutes an additional risk factor, since working women are usually responsible for household chores, therefore, this may pose

TABLE 6 Spearman correlation of the total burnout and the subscales of the burnout EE, DP, PA with the PHC and MHC composite scores, and total QOL of the SF-36 questionnaire.

Statistical values			PHC	MHC	TQL
Total burnout	*r*		−0.265**	−0.391**	−0.351**
	p		0.000	0.000	0.000
	N		353	353	353
	Bootstrap[c]	Bias	0.000	0.000	0.000
		SE	0.050	0.046	0.048
		95% CI	−0.361	−0.480	−0.445
			−0.163	−0.301	−0.258
Emotional exhaustion (EE)	*r*		−0.311**	−0.434**	−0.393**
	p		0.000	0.000	0.000
	N		353	353	353
	Bootstrap[c]	Bias	−0.001	0.000	−0.001
		SE	0.051	0.043	0.047
		95% CI	−0.407	−0.516	−0.482
			−0.205	−0.344	−0.297
Depersonalization (DP)	*r*		−0.231**	−0.331**	−0.302**
	p		0.000	0.000	0.000
	N		353	353	353
	Bootstrap[c]	Bias	−0.002	−0.002	−0.002
		SE	0.049	0.049	0.048
		95% CI	−0.327	−0.433	−0.402
			−0.140	−0.233	−0.212
Personal accomplishment (PA)	*r*		0.145**	0.230**	0.200**
	p		0.006	0.000	0.000
	N		353	353	353
	Bootstrap[c]	Bias	−0.001	−0.001	−0.001
		SE	0.055	0.052	0.054
		95% CI	0.033	0.123	0.094
			0.253	0.328	0.305

**Statistically significant; r_s, Spearman correlation coefficient; SE, Standard error; 95%CI, 95% confident interval; Bootstrap, Internal validation.

a difficulty in reconciling personal and professional life (21, 22, 34, 36). No significant association with burnout was found (10). This finding is linked to the greater emotional support supplied by the partner or his/her children. Married employees can also share living expenses with a partner and in this way lessen the feeling of financial responsibility.

The number of children in a family can also play an important role in appearance of burnout. In a study by Brady et al. (33), a higher number of children was correlated with a lower level of burnout. According to the findings of Dutch researchers that the presence of young children and doing more household chores were positively related to feelings of burnout, whereas having children reduced employees' feelings of burnout (32). Having children is associated with lower PA (16, 29, 32, 36). Our study showed that employees without children or with one child had a significantly higher MHC score and total quality of life, compared to employees with two, three, or more children. Based on our results, a managerial position and higher education were protective factors in relation to the development of burnout. The hypothesis 5 is confirmed. In our study, ≤10% of participants had a university degree. In a similar study, conducted with state police officers in Spain, there were almost twice as many employees with a university degree, compared to employees from our study but no significant relationships were found between educational level and burnout in this study (29). According to our results, risk of appearance of job burnout decreased with the increase in academic qualifications, which is consistent with the results from the literature (14, 28, 31, 48). In EU countries, there are significantly more employees in private security sector with higher education and university degrees (12, 13, 33, 49–51) than in Serbia.

According to the findings of Ronen and Pines (19), te Brake et al. (21), and Maccaaro (22), male sex, shift work, and a low score in relationships with superiors at the work-place were connected with a higher rate of burnout than females. According to results of similar studies, women have a greater tendency to utilize emotion focused coping their manner of support, leading to greater work–family conflict (36, 52).

A possible explanation could be the fact that managers are less exposed to direct contact with clients and potential attackers; moreover, they do not usually work in shifts and have shorter working hours. They also don't have an obligation to carry a weapon at the workplace. Educated individuals with more work experience have more self confidence in the performance of their duties; they show greater self-control in contact with various stressors and experience less emotional trauma (16, 18, 22, 53).

Job burnout affects the quality of life (QOL) of employees and some socio-descriptive characteristics, too. According to our findings, male sex, marital union, two or more children, and direct contact with clients were significantly associated with a lower quality of life in security employees. The hypothesis 7 is confirmed. Despite married employees having a low total quality of life, in our study, widowed employees had the lowest quality of life. While shift work significantly decreased the total quality of life, managerial positions increased the total quality of life of the employees. We found a significant negative correlation between job burnout and the quality of life of the security employees. Only PA subscale was inversely correlated with the quality of life. Correctional officers in Brazil showed the presence of both burnout and reduced quality of life (45). De Moraes et al. (54) presented that 19.2% of their total sample had high levels of burnout, and the same participants also exhibited reduced quality of life (54).

There are inconsistent findings on police officers' sex and perceived quality of life. A Greek study suggests that female and male police officer's scores do not differ significantly overall, but females reported lower levels of subscales of health-related quality of life which is—like job satisfaction—negatively associated with perceived stress. However, significant interactions were not revealed (55). Other studies have found no significant sex differences concerning police officers' quality of life (48–51, 56, 57). However, research on police officers' quality of life is only recently emerging (50–52, 58). The emphasis on job burnout prevention by the state authorities and workers in the EU shows that burnout syndrome is a problem that confers an economic burden (53); in the context of employee's effectivity and health, it has to be dealt with. With such a perspective, the European Agency for Safety and Health at Work (EU-OSHA) supports the prevention of

occupational stress-related disorders thought the campaign: "Healthy workplaces manage stress" (53).

The possibility of developing occupational burnout among employees in the professional private security sector in the Central Serbia can be seen in a broader context by examining general values, political and economic opportunities, and instability in the region. Bearing in mind the specifics of the job, an examination of the socio-descriptive characteristics of candidates before employment is necessary, which would enable the identification of persons at higher risk for burnout. In this way, a better selection of candidates for security jobs can be established, and the risk of burnout can be prevented or reduced, while mitigating the negative effects on employees quality of life. Monitoring employee job satisfaction, continuously improving work organization, continuously educating-employees in security work, and bringing awareness to burnout symptoms can enable timely treatment, rehabilitation, temporary job changes, or, permanent job changes, with the aim of preserving the health and life of employees.

As a strength, this is the first study of burnout and the quality of life in professional private security employees in Central Serbia. The employees were interested in this topic and willingly participated in the study. According to the results obtained in our study, the following factors bother employees the most: working in shifts and working 8–12 h a day.

There were several limitations of our study. Only cross-sectional data were used; hence, no causal relationships could be identified. The quality of life was self-assessed, which may have led to desirability bias. The possible influence of significantly higher number of males than females in the study.

Practical applications of the findings of our study in the daily work of security employees can be implemented immediately after its completion. All employees with a high score of total burnout can be referred to a psychologist and, if necessary, to a psychiatrist. An occupational medicine specialist can be included in the consultation with employees. Employees may change workplace, whether temporary, but if necessary, or permanent, according to a psychologist's advice. Security officers whose biggest problem is working in shifts can be transferred to the workplace only for a daily shift and working hours can also be reduce in some employees. In many cases, private security officers receive inadequate training (18).

5 Conclusion

On the basis of the presented results, female sex and older age were associated with higher scores of occupational burnout and higher levels emotional exhaustion. Male sex, higher education, and managerial position were associated with higher personal achievement and a lower risk of total burnout. Socio-descriptive characteristics such as male sex, marital union, two or more children, and direct contact with clients were significantly associated with a lower quality of life of the employees. Shift work significantly reduced the total quality of life, while managerial positions increased the quality of life of the examined employees. Occupational burnout negatively correlated with the quality of life of employees. According to our results, employees with a higher score of total burnout or a particular (emotional exhaustion or depersonalization) subscale were partaking in psychological consultation, with a suggestion to temporarily or permanently change the workplace. The accelerated development of the professional private security sector in Central Serbia requires additional research on burnout and quality of life in this group of employees.

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.

Ethics statement

The studies involving humans were approved by the Ethics Committee of the Faculty of Medicine of the University of Pristina with temporary seat in Kosovska Mitrovica by the Decision No 09-972-1 dated September 10, 2018. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

NR: Conceptualization, Investigation, Writing – original draft. DV: Conceptualization, Data curation, Investigation, Methodology, Writing – review & editing. MM: Conceptualization, Methodology, Supervision, Writing – review & editing. LK: Conceptualization, Methodology, Supervision, Writing – review & editing. VJ: Methodology, Supervision, Writing – review & editing. BS: Data curation, Investigation, Methodology, Writing – review & editing. NM: Formal Analysis, Methodology, Writing – review & editing. VC: Data curation, Investigation, Validation, Writing – review & editing. EM-Z: Data curation, Investigation, Project administration, Writing – review & editing. SG: Data curation, Formal Analysis, Investigation, Writing – review & editing. ĐG: Data curation, Investigation, Formal Analysis, Writing – review & editing. OĐ: Data curation, Investigation, Software, Writing – review & editing. MS: Data curation, Investigation, Resources, Writing – review & editing. NB: Data curation, Investigation, Project administration. DM: Data curation, Investigation, Writing – review & editing. SO: Conceptualization, Supervision, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 12 March 2024
DOI 10.3389/fpubh.2024.1360940

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OPEN ACCESS

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RECEIVED 24 December 2023
ACCEPTED 22 February 2024
PUBLISHED 12 March 2024

CITATION
Chen Jy, Chen Hf, Wang Xh, Zong Qz and Yao Zz (2024) Moral sensitivity and caring behavior in nursing interns: the mediating role of empathy.
Front. Public Health 12:1360940.
doi: 10.3389/fpubh.2024.1360940

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Moral sensitivity and caring behavior in nursing interns: the mediating role of empathy

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Background: The main purpose of this study is to analyze the relationship between moral sensitivity, empathy, and caring behaviors and to explore the mediating effect of empathy on moral sensitivity and caring behaviors of nursing interns.

Methods: A cross-sectional survey was conducted from August to September 2022 in which 261 nursing interns from two Grade 3A Hospitals in Xi'an participated. The questionnaires used in the survey include the General Information Questionnaire (GIQ), the Moral Sensitivity Questionnaire—Revised Version translated into Chinese (MSQ R-CV), the Chinese version of the Jefferson Empathy Scale (JSE), and the Chinese version of the Caring Behavior Inventory (C-CBI). The obtained data were analyzed through descriptive statistics, a one-way analysis of variance (ANOVA), and Pearson's correlation coefficient, and the mediating effect of empathy was tested through structural equations.

Results: The overall mean of moral sensitivity of nursing interns in two Grade 3A Hospitals in Xi'an is 40.84 ± 8.73, the overall mean of empathy is 100.51 ± 21.56, and the overall mean of caring behavior is (113.81 ± 21.05). Statistical analysis showed that there is a positive correlation between moral sensitivity and caring behavior of nursing interns ($r = 0.376$, $p < 0.01$), between their empathy and moral sensitivity ($r = 0.336$, $p < 0.01$), and between their empathy and caring behavior ($r = 0.394$, $p < 0.01$). The empathy of nursing interns has a mediated effect on the relationship between moral sensitivity and caring behavior. The mediated effect value was 0.14, accounting for 31.82% of the total effect.

Conclusion: The moral sensitivity of nursing interns can have a direct impact on predicting the caring behavior and indirect influences their caring behaviors mediated by empathy, with the latter effect being mediated by empathy. Therefore, nursing educators and hospital administrators should adopt targeted interventions to improve the moral sensitivity and empathy of nursing interns, which can further prove to be beneficial in improving their caring behaviors, leading to enhanced quality of nursing care and reduced nurse–patient conflicts and finally to a stabilized nursing team.

KEYWORDS

nursing interns, moral sensitivity, empathy, caring behavior, the mediation effect

1 Introduction

The Outline of the Healthy China 2030 Plan pointed out that "it is necessary to strengthen the humanistic care of medical services and to improve the humanistic caring ability of nurses" (1). Caring behavior refers to the intentional behavior of nurses paying attention to the physical care and emotional concerns of patients to improve the latter's sense of security (2). Lack of caring behavior in nurses increases nurse–patient conflicts and leads to their burnout (3). At present, the nursing curriculum in China mainly focuses on imparting skills and pays little attention to humanities. Most courses are designed to teach only theory. In addition, a scenario of Insufficient cooperation between nursing schools and hospitals and not adding humanistic caring ability in practical education have led to nursing interns in China having a low humanistic caring ability (4). As nursing interns form the reserve force of the nursing team, their caring behavior will directly affect the quality of future clinical care.

Moral sensitivity, also known as ethical sensitivity, refers to the adherence to moral values in a conflict situation and self-awareness of one's roles and responsibilities in that situation (5, 6). This is a prerequisite for individuals to engage in ethical decision-making and behavior (7). In China, nurses often encounter various ethical issues during their clinical work, and their improper handling causes increased psychological pressure on them or even their departure from the job (8). Currently, the total score of moral sensitivity of nursing interns is at a moderate level with some room for improvement (9). Johnson et al. showed that the higher the moral sensitivity the nurses have, the more proactive they are in providing care and assistance to patients (10). Enhancing the moral sensitivity of nursing staff could improve the quality of care and stabilize the nursing team (11). Therefore, it is clear that a high level of moral sensitivity can motivate nursing interns to provide a better quality of service to patients, which is important for the development of nursing and human health.

Empathy, also known as sympathy (12), is the ability to understand a patient's situation, feelings, and actions from the perspective of the patient in a helpful or therapeutic way (13). Empathy, an important part of medical humanities, is the basic and practical quality that nurses should have to foster a healthy nurse–patient relationship. Empathy is seen as an important component of a supportive relationship, and the higher the level of empathy, the greater the humanistic caring skills nurses will have (14). A research survey has shown that nursing interns experience a decline in empathy when they enter the clinical practicum phase (15). In addition, research has shown that there is a positive correlation between nurses' moral sensitivity and their empathy (16). Nurses with a high level of empathy are more able to communicate effectively with patients and their families and are more likely to think differently to identify patient needs in a timely manner and make clinical decisions that are in the interests of the patient (17).

Although previous studies have proved that nurses' moral sensitivity, empathy, and caring behavior are positively correlated (10, 14, 16), most of them have focused on the general nurse population. There are fewer studies on the specific mechanism of the role of and on the construction of a model using these three variables. Therefore, this study focuses on a group of nursing interns to investigate the intrinsic mechanisms and mediating effects of empathy, moral sensitivity, and caring behavior among them. Based on the previous literature review, the following hypotheses about the nursing interns are formulated:

H1: Moral sensitivity is positively correlated with caring behaviors.

H2: Empathy is positively correlated with moral sensitivity.

H3: Empathy is positively correlated with caring behaviors.

H4: Empathy mediates the effect of moral sensitivity and caring behavior.

The purpose of this study is to explore the intrinsic mechanisms and mediating effects of empathy, moral sensitivity, and caring behaviors among nursing interns and further to provide a basis for nursing educators and hospital administrators to develop strategies to improve the caring behaviors of nursing interns.

2 Methods

2.1 Subjectivity and data collection

2.1.1 Subjectivity

A cross-sectional survey was conducted from August to September 2022 in which 261 nursing interns from two Grade 3A Hospitals in Xi'an participated. The inclusion criteria were internship in the hospital for more than 1 month and consent to participate in this survey. The exclusion criteria included the actual internship period for shorter than 1 month for various reasons and other reasons that make them not suitable for this survey. According to descriptive research, the sample size formula is as follows (18): N = [number of variables× (5–10)×[1 + (10–15%)]. There were 19 variables in this survey, and considering 15% of the questionnaires as invalid, the final sample size was determined to be 109–219. The final sample size of this study was 261.

2.1.2 Data collection

The QR code of the questionnaire was created through the Questionnaire Star Platform. After getting permission from each hospital, an uniformly trained researcher contacted the nursing department and distributed the questionnaire to the respondents through WeChat. The questionnaire was answered anonymously. To help the respondents understand the purpose of the study and know how to complete the questionnaire, guidelines were provided at the beginning of the questionnaire. Among 280 questionnaires sent out, 261 valid responses were received, accounting for the response rate of 93.21%. Moreover, 19 invalid questionnaires were excluded for being answered regularly or wrongly.

2.2 Measurements

2.2.1 General information questionnaire

The general information questionnaire, designed by the research team, elicited the sex, age, level of education, internship period, and place of birth of the participants and featured questions such as whether you are the only child of your family, whether you have any religious beliefs, have you ever been hospitalized? whether you have a

degree of fondness of your major, whether you have ever taken a nursing ethical course, and whether you have ever received any humanistic caring training during your school or training in the hospital.

2.2.2 Moral sensitivity questionnaire-revised version into Chinese (MSQ R-CV)

The Moral Sensitivity Questionnaire-Revised Version into Chinese (MSQ R-CV) was translated into Chinese by Huang et al. (6). It contains two dimensions and nine items after cultural adaptation. The nine items are moral strength and responsibility (five items) and a sense of moral burden (four items). The items were rated on a 6-point Likert scale from "completely disagree" to "completely agree," with a total score varying between 9 and 54 points. The higher the scores, the greater moral sensitivity nurses have. The Cronbach's α coefficient of this questionnaire was 0.929.

2.2.3 The Chinese version of Jefferson Empathy Scale (JSE)

The Chinese version of the Jefferson Empathy Scale (JSE), which was translated into Chinese by Ma Li (19), was mainly used for self-assessment of nursing staff's empathy. This questionnaire had three dimensions (20 items in total), including viewpoint selection, emotional care, and transpersonal thinking, and it was scored on a 7-point Likert scale, ranging from "strongly disagree" to "strongly agree," with 10 items scored in a reverse order. The total score of the scale was between 20 and 140, with higher scores indicating higher levels of nurses' awareness on empathy. The Cronbach's α coefficient of this questionnaire was 0.945.

2.2.4 The Chinese version of Caring Behaviors Inventory (C-CBI)

The Chinese version of the Caring Behaviors Inventory (C-CBI) was translated into Chinese by Da Chaojin (20). This inventory included respect and connection (10 items), knowledge and skills (five items), and support and reassurance (nine items) in three dimensions (24 items in total). A 6-point Likert scale was used, ranging from "never" to "always." The total score was in the range of 24–144. The higher the score, the better the caring behavior of the nursing interns. Based on the mean score of the items, the caring behavior was divided into three levels, with a score of <2 as the low level, 2 to <5 as the medium level, and ≥5 as the high level. The Cronbach's α coefficient for this scale was 0.977.

2.3 Statistical analysis

Statistical analysis was performed using Excel, SPSS 26.0 software, and AMOS 24.0 software. Enumeration data are expressed as frequencies and percentages, and part of the data that conform to a normal distribution are expressed as $\bar{x} \pm S$. A one-way analysis of variance (ANOVA) was used to compare the scoring differences in empathy, moral sensitivity, and caring behavior among nursing interns whose demographics are different. Pearson's correlation analysis was used to explore the correlation among empathy, moral sensitivity, and caring behaviors of the nursing interns. The mediating effect of empathy between moral sensitivity and caring behavior was tested by the Bootstrap method using AMOS 24.0 software, and the difference was considered statistically significant at a p-value of <0.05.

3 Results

3.1 Moral sensitivity, empathy, and caring behavior scores of nursing interns with different demographic characteristics

Table 1 shows the characteristics of the participants and the scores of moral sensitivity, empathy, and caring behaviors of nursing interns coming from different demographic backgrounds Of the 261 nursing interns, (1) 44 were male, accounting for 16.9% of the total intern population, and 217 were female, accounting for 83.1% of the total intern population (sex); (2) 65 nurses were 20 years old, accounting for 24.9%, 139 nurses were 20–25 years old, accounting for 53.3%, and 57 nurses were > 25 years old, accounting for 21.8% of the population (age); and (3) 37 nurses were college students, accounting for 14.2% of the population, 205 nurses were undergraduates, accounting for 78.5% of the population, and 19 nurses were masters, accounting for 7.3% of the population (level of education). (4) The internship period was 1–5 months for 122 nursing interns, accounting for 46.7% of them, 6–10 months for 132 nursing interns, accounting for 50.6% of them, 11–15 months for 7 nursing interns, accounting for 2.7% of them. (5) The place of birth was city for 52 nursing interns (19.9%), town for 39 of them (14.9%), countryside for 170 of the participants (65.1%). (6) To the question whether you are the only child in your family, responses from 45 were that they were the only child, accounting for 17.2%, and 216 were not the only child, accounting for 82.8%. (7) For the question whether you have any religious beliefs, eight held religious beliefs, accounting for 3.1%, and 253 had no religious beliefs, accounting for 96.9%. (8) To the question have you ever been hospitalized? 96 nursing interns responded positively, accounting for 36.8%, while 165 did not have that experience, accounting for 63.2%. (9) For the degree of fondness of your major, the responses were "very like" by 25 nursing interns, accounting for 9.6% of them; "like" by 120 nursing interns, accounting for 46.0% of them; "unclear" by 78 nursing interns, accounting for 29.9% of them; "dislike" by 30 nursing interns, accounting for 11.5% of them; and "very dislike" by eight nursing students, accounting for 3.1% of them. (10) When asked whether you have ever learned a nursing ethical course, 226 nursing students said they had learned, 18 nursing interns have not learned but knew something about it and 17 nursing interns have not learned and still knew nothing about it. (11) To the question whether you have ever received any humanistic caring training during your school or training in the hospital, 217 said yes (accounting for 83.1%), while 44 said no (16.9%). The result of the univariant analysis showed that there is a statistically significant difference ($p < 0.05$) on (1) the moral sensitivity of nursing interns in terms of sex, fondness of their major, and receiving humanistic caring training; (2) the empathy of nursing interns in terms of fondness of their major and receiving humanistic caring training; and (3) the caring behaviors of nursing interns in terms of sex, fondness of their major, learning the nursing ethical courses, and receiving humanistic caring training.

10.3389/fpubh.2024.1360940

TABLE 1 Moral sensitivity, empathy and caring behavior scores of nursing interns from two Grade 3A hospitals in Xi'an City ($N = 261$).

	N(%)	Moral sensitivity	t/F	*p*	Empathy	t/F	*p*	Caring behavior	t/F	*p*
Sex										
Male	44(16.9%)	4.87 ± 0.81	2.67	$p < 0.05$	4.91 ± 1.16	0.609	$p < 0.05$	5.04 ± 0.82	2.359	$p < 0.05$
Female	217(83.1%)	4.44 ± 0.99			4.79 ± 1.21			4.70 ± 0.88		
Age										
20	65(24.9%)	4.60 ± 1.02	0.355	$p > 0.05$	4.93 ± 1.22	0.487	$p > 0.05$	4.77 ± 1.06	1.804	$p > 0.05$
20–25	139(53.3%)	4.48 ± 0.99			4.75 ± 1.11			4.68 ± 0.82		
>25	57(21.8%)	4.51 ± 0.87			4.80 ± 1.39			4.94 ± 0.80		
Levels of education										
College students	37(14.2%)	4.18 ± 0.92	3.049	$p > 0.05$	4.78 ± 1.24	0.306	$p > 0.05$	4.68 ± 0.82	0.194	$p > 0.05$
Undergraduate	205(78.5%)	4.55 ± 1.00			4.83 ± 1.22			4.77 ± 0.90		
Masters	19(7.3%)	4.77 ± 0.64			4.61 ± 1.02			4.82 ± 0.81		
Internship period										
1–5 months	122(46.7%)	4.53 ± 0.89	0.431	$p > 0.05$	4.73 ± 1.17	0.565	$p > 0.05$	4.67 ± 0.88	1.383	$p > 0.05$
6–10 months	132(50.6%)	4.49 ± 1.06			4.89 ± 1.24			4.83 ± 0.88		
11–15 months	7(2.7%)	4.84 ± 0.79			4.69 ± 0.96			5.00 ± 0.81		
Place of birth										
City	52(19.9%)	4.58 ± 1.08	0.195	$p > 0.05$	4.77 ± 1.36	0.072	$p > 0.05$	4.84 ± 1.04	0.35	$p > 0.05$
Town	39(14.9%)	4.54 ± 1.13			4.87 ± 1.12			4.69 ± 0.71		
Countryside	170(65.1%)	4.49 ± 0.90			4.80 ± 1.18			4.75 ± 0.86		
Only child or not?										
Yes	45(17.2%)	4.40 ± 1.02	−0.919	$p > 0.05$	4.71 ± 1.31	−0.578	$p > 0.05$	4.87 ± 1.00	0.924	$p > 0.05$
No	216(82.8%)	4.54 ± 0.97			4.83 ± 1.18			4.73 ± 0.85		
Having religious beliefs?										
Yes	8(3.1%)	4.78 ± 1.02	0.789	$p > 0.05$	4.36 ± 1.03	−1.074	$p > 0.05$	4.90 ± 1.03	0.455	$p > 0.05$
No	253(96.9%)	4.51 ± 0.97			4.82 ± 1.21			4.75 ± 0.88		
Had in hospital?										
Yes	96(36.8%)	4.49 ± 1.03	−0.326	$p > 0.05$	4.81 ± 1.21	0.028	$p > 0.05$	4.84 ± 0.88	1.138	$p > 0.05$
No	165(63.2%)	4.53 ± 0.95			4.81 ± 1.20			4.71 ± 0.88		
Degree of fondness of the major										
Very like	25(9.6%)	5.21 ± 0.90	4.558	$p < 0.05$	5.55 ± 1.16	2.783	$p < 0.05$	5.12 ± 0.75	2.703	$p < 0.05$
Like	120(46.0%)	4.48 ± 0.95			4.74 ± 1.16			4.80 ± 0.86		
Unclear	78(29.9%)	4.51 ± 0.85			4.69 ± 1.07			4.75 ± 0.84		
Dislike	30(11.5%)	4.16 ± 1.09			4.73 ± 1.59			4.39 ± 1.07		
Very dislike	8(3.1%)	4.28 ± 1.40			4.93 ± 1.04			4.48 ± 0.81		
Have you ever taken a nursing ethical course?										
Yes	226(86.6%)	4.55 ± 0.97	2.201	$p > 0.05$	4.86 ± 1.16	1.909	$p > 0.05$	4.81 ± 0.86	3.054	$p < 0.05$
Never and knew nothing about it	17(6.5%)	4.04 ± 1.09			4.32 ± 1.61			4.33 ± 1.14		
Never, but knew some about it	18(6.9%)	4.59 ± 0.79			4.60 ± 1.20			4.52 ± 0.74		
Have received any humanistic caring training?										
Yes	217(83.1%)	4.59 ± 0.94	2.621	$p < 0.05$	4.87 ± 1.16	1.979	$p < 0.05$	4.81 ± 0.85	2.269	$p < 0.05$
No	44(16.9%)	4.17 ± 1.06			4.48 ± 1.36			4.49 ± 1.00		

3.2 Current situation of moral sensitivity, empathy, and caring behaviors of nursing interns

Table 2 shows the scores of moral sensitivity, empathy, and caring behavior of the participating nursing interns. The overall mean scores of moral sensitivity, empathy, and caring behavior are 40.84 ± 8.73, 100.51 ± 21.56, and 113.81 ± 21.05, respectively.

3.3 Correlation analysis of moral sensitivity, empathy, and caring behavior of nursing students

Table 3 shows the results of the correlation analysis of moral sensitivity, empathy, and caring behavior of nursing interns. There exists a positive correlation between all dimensions of moral sensitivity and all dimensions of caring behaviors ($r = 0.376$, $p < 0.01$), between all dimensions of empathy and all dimensions of moral sensitivity ($r = 0.336$, $p < 0.01$), and between all dimensions of empathy and caring behaviors ($r = 0.394$, $p < 0.01$).

3.4 Analysis of the mediating effect of empathy between moral sensitivity and caring behavior

To further validate the mechanism of moral sensitivity on caring behavior, a structural equation model was developed with moral sensitivity as the independent variable, caring behavior as the dependent variable, and empathy as the mediating variable. The mechanism was validated using AMOS 24.0 software (see Figure 1). The results of model fitting showed that $\chi 2/df = 1.799$, RMSEA = 0.055, GFI = 0.97, AGFI = 0.937, NFI = 0.971, RFI = 0.952, IFI = 0.987, TLI = 0.978, and CFI = 0.987 and all the fitting indexes were located at the standard range (see Table 4). The estimation results of the model path coefficients show that all factor loadings are $p < 0.01$ (see Table 5). After testing through the Bootstrap procedure with 2000 repetitions of sampling and calculation on 95% CI, the results showed that the 95% CI for the direct and indirect effects of moral sensitivity on caring behaviors of nursing interns did not contain zero, suggesting that empathy partially mediates the relationship between moral sensitivity and caring behaviors. The direct effect value of nursing interns' moral sensitivity on caring behavior was 0.30, the mediating effect value was 0.14 (0.41 × 0.33), the total effect value was 0.44 (0.30 + 0.14), and the mediating effect percentage was (0.14/0.44) × 100% = 31.82% (see Table 6).

4 Discussion

4.1 Analysis on the current situation of nursing interns' moral sensitivity, empathy, and caring behavior

At first, the results of this study showed that the nursing interns' scores on moral sensitivity was 40.84 ± 8.73, which was at a medium level and was lower than the results of the study by Ouyang Lixia (21). The reason for the medium score on moral sensitivity have been explained in previous studies. The nursing age is an influencing factor on the moral sensitivity of the nurses, and the higher the nursing age, the richer clinical experiences the nurses have. When facing ethical issues, the nurses with richer experiences have the ability to adopt a skillful and calm approach to solve the problem (22). The nursing interns, experiencing a period of transition from campus to clinical work, are unfamiliar with nursing skills and lack clinical experience and ethical practice. Therefore, it is recommended that schools and hospital administrators help them understand and analyze the ethical clinical issues and improve their moral sensitivity through game-based teaching methods, debate-based teaching methods, lectures on ethics, role-playing, and the creation of a positive ethical environment (23–25). In addition, Palazoğlu et al. (26) showed that nurses' moral sensitivity can be improved through training and education, suggesting that nursing administrators can improve the moral sensitivity of nursing interns by reinforcing this content in their daily training.

Then, the results in this study showed that the nursing interns' scores on empathy was 100.51 ± 21.56 at a medium level and slightly lower than the results of Zhao Y (27) and other authors, which can be explained through the fact that, compared with nursing interns,

TABLE 2 Moral sensitivity, empathy, and caring behavior scores of nursing interns ($N = 261$, $\bar{x} \pm S$).

Variables	Items	Scoring range	Mean ± SD	Mean ± SD
Moral sensitivity	9	9 ~ 54	40.84 ± 8.73	4.52 ± 0.97
Moral strength and responsibility	5	5 ~ 30	23.56 ± 5.16	4.71 ± 1.03
Sense of moral burden	4	4 ~ 24	17.29 ± 4.39	4.32 ± 1.10
Empathy	20	20 ~ 140	100.51 ± 21.56	4.81 ± 1.20
Viewpoint selection	10	10 ~ 70	55.96 ± 9.61	5.60 ± 0.96
Emotional care	8	8 ~ 56	35.87 ± 11.49	4.49 ± 1.44
Transpersonal thinking	2	2 ~ 14	8.68 ± 3.46	4.34 ± 1.74
Caring behavior	24	24 ~ 144	113.81 ± 21.05	4.76 ± 0.88
Respect and connection	10	10 ~ 60	46.06 ± 9.66	4.61 ± 0.97
Knowledge and skills	5	5 ~ 30	24.07 ± 4.90	4.81 ± 0.98
Support and reassurance	9	9 ~ 54	43.68 ± 8.58	4.85 ± 0.95

TABLE 3 Correlation analysis of moral sensitivity, empathy, and caring behaviors of nursing interns ($N = 261$).

Variables	1	2	3	4	5	6	7	8	9	10	11
1	1.000										
2	0.908*	1.000									
3	0.919*	0.670*	1.000								
4	0.336*	0.300*	0.314*	1.000							
5	0.216*	0.203*	0.192*	0.809*	1.000						
6	0.230*	0.189*	0.230*	0.875*	0.614*	1.000					
7	0.389*	0.355*	0.356*	0.905*	0.618*	0.650*	1.000				
8	0.376*	0.366*	0.322*	0.394*	0.319*	0.270*	0.418*	1.000			
9	0.367*	0.340*	0.330*	0.387*	0.278*	0.280*	0.418*	0.894*	1.000		
10	0.343*	0.335*	0.294*	0.356*	0.303*	0.244*	0.370*	0.922*	0.729*	1.000	
11	0.314*	0.322*	0.255*	0.331*	0.288*	0.212*	0.353*	0.912*	0.710*	0.783*	1.000

*$p < 0.01$, 1 = Moral sensitivity; 2 = moral strength and responsibility;3 = sense of moral burden; 4 = empathy; 5 = viewpoint selection; 6 = emotional care; 7 = transpersonal thinking; 8 = caring behavior; 9 = respect and connection; 10 = knowledge and skills; 11 = support and reassurance.

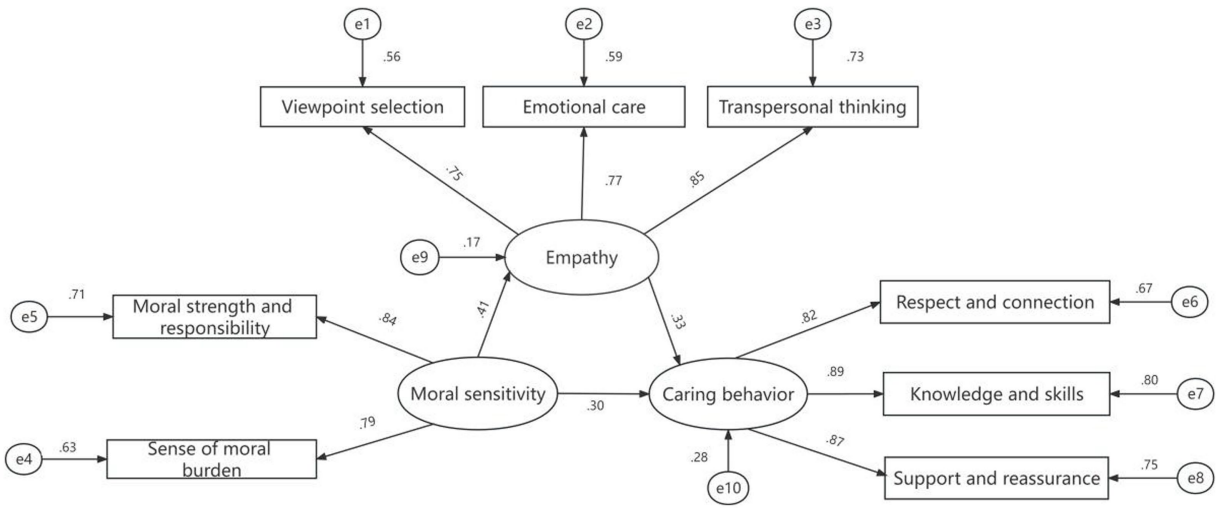

FIGURE 1
Structural equation model of the mediating effect of empathy between moral sensitivity and caring behaviors among 261 nursing interns in 2 Grade 3A hospitals in Xi'an City, China.

nurses in military hospital received psychological education more widely, which helps them more easily accept the feelings and ideas of the patients. The level of empathy could be motivated, cultivated, and improved by repetitive practice, imaginative teaching methods, good examples, and learning under teachers' supervision (28). Therefore, schools need to include empathy-related courses in their curriculum to cultivate nursing interns' levels of empathy and the hospital administrators should strengthen and promote empathy-related education through setting good examples. In addition, studies have shown that it is important to focus on the psychological adjustment of nurses and that empathy training can be carried out by means of narrative nursing education (29) and digital storytelling (30) in order to enhance the level of empathy of nursing interns.

Next, the results of this study showed that the nursing interns' scores on caring behavior was 113.81 ± 21.05, which was at a medium level. These scores were higher than the normative score of clinical nurses in China (77.0 ± 17.36) (31) and lower than the results reported by Zhang ZQ (32) and others. This finding may be related to later development of nursing education in China. The single form of teaching focuses on fundamental courses and does not include humanistic caring courses and related training (33). Therefore, schools need to offer more humanistic caring courses. Clinical instructors need to establish a harmonious and stable nurse–patient relationship and strengthen the use of nurse–patient communication skills in the clinic, so as to enhance the nursing nurses' understanding of the importance of caring behaviors and to improve their caring behaviors. In addition, caring behaviors of nursing interns can be enhanced through training such as role modeling, cognitive reappraisal training, non-violent communication (34), emotion regulation skills training (35), and humanistic care lectures.

TABLE 4 Structural equation model fitting metrics.

Fit indices	χ^2/df	RMSEA	AGFI	GFI	NFI	CFI	RFI	IFI	TLI
Result	1.799	0.055	0.937	0.97	0.971	0.987	0.952	0.987	0.978
Threshold	<3	<0.08	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9

TABLE 5 Estimation results of model path coefficients.

Path	Estimate	SE	CR	*p*
Empathy<---Moral sensitivity	0.342	0.065	5.219	$p<0.01$
Caring behavior<---Empathy	0.365	0.084	4.359	$p<0.01$
Caring behavio<---Moral sensitivity	0.276	0.07	3.949	$p<0.01$

4.2 Correlation analysis on nursing interns' moral sensitivity, empathy and caring behaviors

The results of this study also showed that moral sensitivity and caring behaviors of nursing interns were positively correlated, validating Hypothesis H1, namely, as moral sensitivity increases, caring behaviors increase, and conversely moral insensitivity or inability to recognize ethical challenges may lead to inappropriate caring behaviors, which is in line with the findings of the literature (36, 37). Nursing interns with high moral sensitivity can keenly identify ethical issues, make correct ethical decisions, improve their sense of professional identity and job satisfaction, and provide quality humanistic nursing services to patients, thus enhancing the level of care for patients. Therefore, nursing educators and administrators can simulate real-life situations and adopt experiential teaching and other methods to enhance the moral sensitivity of nursing interns to improve their caring behaviors toward patients (38). The positive correlation between empathy and moral sensitivity of nursing interns verified hypothesis H2, that is, the higher the empathy, the higher the moral sensitivity, which is consistent with the findings of the literature (39, 40). Empathy, which improves moral sensibility, is one of the most important aspects of nursing ethics, without which, nursing interns could not appropriately identify the needs and problems of their patients and fulfill their ethical responsibilities. Therefore, nursing educators and hospital administrators need to design a systematic and practical training program for improving the levels of empathy and moral sensibility among nursing students. The positive correlation between empathy and caring behaviors of nursing interns verified hypothesis H3—improving the empathy skills of nursing interns would improve their caring behaviors toward patients, which is similar to the findings of the literature (38, 41). Nursing interns with higher levels of empathy were able to put themselves in the patient's shoes, understand the patient's sorrow and unhappiness in a timely manner, and provide them with appropriate help and support, which in turn resulted in an increased care for the patients. Therefore, nursing educators and hospital administrators need to enhance the caring competence of nursing interns through group counseling on empathy, clinical simulation teaching, and the formation of a systematic training program on empathy competence.

4.3 Analysis on the mediating effect of empathy between moral sensitivity and caring behavior in nursing interns

Finally, the results of this study showed that the empathy of nursing interns partially mediated the relationship between moral sensitivity and caring behavior, with a mediating effect value of 0.14, accounting for 31.82% of the total effect, which suggests that the moral sensitivity of nursing interns directly predicts their caring behavior and indirectly influences their caring behavior mediated by empathy, validating hypothesis H4. Nursing interns with high empathy have high moral sensitivity and can promptly understand the sorrow and needs of patients, think from a transpersonal perspective, focus on communication with patients, empathize with patients, and further display more caring behaviors during their clinical practice, such as respecting, supporting, caring, and helping (42, 43). The nursing interns with low empathy generally can neither understand the patients' point of view nor have the ability to think about the latter's problems. It is not easy to perceive the patients' emotions sensitively and find out the ethical problems in time. These interns are likely to have ethical conflicts with the patients, which is not conducive to the implementation of caring behaviors. Therefore, nursing educators and hospital administrators need to focus on the improvement of nursing interns' moral sensibility and training on their empathy, which further could promote their caring behavior, reduce the nurse–patient conflicts, and stabilize the nursing team.

4.4 Limitations

This study has limitations such as the small size of the sample and the restricted scope for sampling. In addition, the results of this study does not depict the overall situation of nursing interns in China because of regional differences. In future studies, the sampling range could be expanded and the relationship among moral sensitivity, empathy, and caring behavior of nursing interns in different regions and levels of hospitals could be further explored. In addition, future studies need to focus on other variables that may influence the caring behaviors of nursing interns.

5 Conclusion

In summary, moral sensitivity has a direct and indirect predictive effect on caring behavior, and empathy plays a partially

TABLE 6 Effect values of moral sensitivity, empathy, and caring behavior of nursing interns in two Grade 3A hospitals in Xi'an, China.

Effect	Path	Standardized effect value	Percent (%)	95%*CI*
Direct effect	Moral sensitivity→Caring behavior	0.30	68.18%	0.120 ~ 0.480
Indirect effect	Moral sensitivity→Empathy→Caring behavior	0.14	31.82%	0.068 ~ 0.227
Total effect		0.44	100%	0.264 ~ 0.590

mediating role on moral sensitivity and caring behavior. Nursing educators and hospital administrators should pay attention to the interrelationships and roles of empathy, moral sensitivity, and caring behavior and should use a variety of educational and training methods to cultivate the moral sensitivity and empathy of nursing interns so as to improve their caring behavior.

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).

Ethics statement

The studies involving humans were approved by the Ethics Committee of Shaanxi Provincial Hospital of Traditional Chinese Medicine. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. 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

JC: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Visualization, Writing – original draft. HC: Funding acquisition, Investigation, Methodology, Project administration, Resources, Writing – review & editing. XW: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft. QZ: Data curation, Methodology, Project administration, Software, Writing – review & editing. ZY: Investigation, Software, Validation, Writing – original draft.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. The study was carried out with financial support from the Shaanxi Provincial Key Scientific Research Program (2022SF-176).

Acknowledgments

We would like to thank all the people who helped us, first of all, we would like to thank our graduate supervisor HC, for the careful guidance of our thesis, your rigorous and serious attitude and tireless teaching that we will benefit for a lifetime. Secondly, we would like to express our heartfelt thanks to the teachers of the university and the hospital for providing us with learning and research resources, to each teacher for their serious and patient guidance, to each student in our group for their help and support along the way, which helped us to overcome all the difficulties in our study and life, and to the Shaanxi Provincial Key Scientific Research Program for their financial support. Finally, we would like to thank all the teachers of the journal for taking time out of their busy schedules to review our paper. We wish all of you good luck in your work and all the best.

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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 14 March 2024
DOI 10.3389/fpubh.2024.1326227

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RECEIVED 23 October 2023
ACCEPTED 04 March 2024
PUBLISHED 14 March 2024

CITATION
Abdul Aziz AF and Ong T (2024) Prevalence and associated factors of burnout among working adults in Southeast Asia: results from a public health assessment.
Front. Public Health 12:1326227.
doi: 10.3389/fpubh.2024.1326227

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Prevalence and associated factors of burnout among working adults in Southeast Asia: results from a public health assessment

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The COVID-19 pandemic has spotlighted the mental health crisis among employees worldwide. However, burnout research is often industry- or occupation-specific, and limited knowledge currently exists on the prevalence of burnout in the general working population of Southeast Asia. This study aims to examine the prevalence of employee burnout and its associated factors among working adults in Southeast Asia using secondary data. 4,338 full-time employees aged 18–65 years old living in Malaysia, Singapore, Philippines, and Indonesia were assessed for burnout, depression, anxiety, stress, and sociodemographic characteristics as part of an online public health assessment in October 2022. The prevalence of burnout in the region was 62.91%. Burnout was highest among employees in the Philippines (70.71%) and lowest in Malaysia (58.13%). Experiencing burnout was associated with severe or extremely severe depression (AOR = 6.48 [95% CI = 5.06–8.33]), anxiety (AOR = 2.22 [1.74–2.85]), and stress (AOR=5.51 [4.13–7.39]). Working more than 50 hours a week (AOR = 1.38 [1.04–1.82]) and being very dissatisfied with the job led to higher odds of burnout (AOR = 16.46 [8.99–30.53]). Alarmingly, more than half of working adults in the region are reporting increased levels of burnout, and improving employee mental health and work conditions may be key to improving employee burnout in the region. Findings contribute to existing research on burnout prevalence in the region and provide more comprehensive insights into understanding the factors driving employee burnout in the working population of Southeast Asia 2 years after the onset of the pandemic.

KEYWORDS

burnout, employee mental Health, employee burnout, Southeast Asia (SEA), mental health

1 Introduction

The COVID-19 pandemic has led to an unprecedented rise in employee burnout worldwide (1, 2), as the global workforce faces major changes in work norms and practices in the short span of 3 years (3–5). Defined as a work-related state of exhaustion, burnout is characterized by extreme tiredness or fatigue, an impaired ability to regulate cognitive and emotional processes, and mental distancing (6). Specific to the occupational context (7), burnout corresponds to prolonged and chronic workplace stress rather than occasional one-off stressors (8, 9), and under the Job Demands-Resources (JDR) theory, is thought to result from an imbalance between work demands and employee resources (10). When left unaddressed, burnout can lead to adverse health consequences for individuals and can translate into a

substantial economic burden to employers as it facilitates absenteeism, presenteeism, counterproductive organizational behaviors, increased turnover intentions, and reductions in work performance (10).

Although burnout was initially studied within the context of healthcare workers, it has now been established that burnout can occur across most occupational groups, though professions that involve constant demands and emotional labor tend to be disproportionately affected (8). Demographic variables such as age, gender, and marital status have also been studied in relation to the development of burnout, though findings have mostly been inconclusive with regard to which groups are more vulnerable to burnout (10–13). Separately, work-related factors such as working hours (14), emotional labor (15), workload (16), and job dissatisfaction (17), are known to directly correlate with burnout. Despite burnout being an entirely separate and distinct phenomenon (18), symptomatic overlapping can occur between burnout and other forms of mental illness (19), with existing research showing burnout to correlate with symptoms of depression, anxiety, and stress (5, 20).

Existing research on the prevalence of employee burnout is often centered around employees in the healthcare industry. Woo et al. reported a global burnout prevalence of 11.23% among nurses across 49 countries (21), while the global prevalence of burnout among general practitioners was estimated at 37% (22). In Southeast Asia, a pooled regional prevalence of burnout among gastroenterologists has been estimated at 17.1%, with inter-country variations identifying Malaysia, Singapore, and Brunei as countries with a burnout prevalence rate exceeding 30% (23). However, these prevalence rates only reflect that of healthcare workers' burnout and do not represent the prevalence of employee burnout in the general working population. Given the short- and long-term effects of the COVID-19 pandemic on employee well-being worldwide (24), it is critical to attain a comprehensive understanding of the phenomenon of employee burnout, irrespective of occupation and industry.

To our knowledge, there is insufficient evidence on the prevalence of employee burnout among the general working population of Southeast Asia. Given that unmanaged burnout leads to adverse psychological, behavioral, health, and economic consequences to both individuals and organizations (10, 25), it is crucial to understand the full extent of the phenomenon in the region to guide future intervention or prevention efforts. Hence, the primary objectives of this study are to determine the prevalence of employee burnout among full-time working adults in Southeast Asia and to identify the associated factors that contribute to the development of burnout among working adults in the region. As a secondary objective, this study also looks into the prevalence of depression, anxiety, and stress among working adults in Southeast Asia.

2 Materials and methods

2.1 Study design and procedures

This cross-sectional epidemiological retrospective study uses secondary data collected as part of an annual public mental health assessment conducted by Naluri Hidup Sdn Bhd (Naluri), in conjunction with a month-long Mental Health Awareness Campaign. Throughout October 2022, respondents were recruited through convenience sampling via paid advertising on Naluri's social media channels (e.g., Facebook, LinkedIn, Instagram) and advertising platforms (e.g., Google). Respondents who were interested in the mental health assessment were directed to an online questionnaire hosted at www.naluri.life. The mental health assessment questionnaire was divided into three sections in the following order: (1) psychological distress; (2) burnout, and; (3) optional sociodemographic questions. The landing page of the assessment displayed instructions on how to complete the assessment, as well as information on the nature and purpose of the mental health assessment.

2.2 Ethical consideration

By proceeding with the assessment, participants provided implied consent by accepting and agreeing with Naluri's data policy, which includes a clause stating that their anonymised data may be used for research purposes. Ethics approval for this study was obtained from the Medical Research & Ethics Committee, Ministry of Health Malaysia (NMRR ID-22-02193-GDR). Although this study was planned prior to data collection, ethics approval was only obtained toward the end of the data collection period, which led to changing the study's design from prospective to retrospective. No personally identifiable information was collected and all data was obtained anonymously and handled confidentially. Participants did not receive any tokens or incentives as part of participation in the study. In line with the EQUATOR Network reporting guidelines, a complete STROBE checklist for this study is provided (Supplementary Table S1).

2.3 Study participants

Participants of this study were respondents of the mental health assessment who fulfilled the study inclusion criteria, which were set to full-time employed adults aged 18–65 years old living in Southeast Asia, specifically in Malaysia, Singapore, Philippines, and Indonesia, who had completed the English-language version of the survey on Naluri's website. A convenience sampling strategy was employed to select only respondents who fulfilled the pre-specified inclusion criteria out of all the responses from the mental health assessment. Respondents who were outside of the target age range, did not hold full-time employment, resided outside of the target countries, and completed the assessment in a local non-English language were excluded. Although the mental health assessment was available in multiple languages, setting the inclusion criteria to those who completed the assessment in English was done to optimize the study's validity as the instruments used in the mental health assessment were validated in English. Additionally, the mental health assessment was designed to allow respondents to skip sociodemographic questions in order to encourage as many respondents to complete the assessment as possible. Hence, only complete responses across all sections of the assessment were included in the study. Our initial protocol was specified to include responses from residents in Thailand, with a minimum sample size of $n = 384$ required based on an estimated prevalence of 49.3% and a precision of 5% (26–28). However, as only

$n = 44$ responses from Thailand fulfilled the inclusion criteria, we elected to remove responses from Thailand from our final analysis as a small sample size would have resulted in inaccurate and imprecise estimates (29, 30).

2.4 Measures and instruments

2.4.1 Burnout assessment tool (BAT-12)

Burnout was measured using the work version of the 12-item Burnout Assessment Tool (BAT-12), a validated short-version of the BAT that measures four core symptoms of burnout - exhaustion, mental distance, cognitive impairment, and emotional impairment (6, 31, 32). The work version of the BAT-12 was chosen due to its applicability across all forms of work and professions, and for its ability to classify burnout along a continuum of "low" to "very high," which has been recommended as a superior way of measuring burnout (33). In addition, the BAT-12 was also preferred for its ability to provide a composite score that comprehensively reflects the overall experience of burnout, as opposed to more traditional burnout measurements, like the Maslach Burnout Inventory, which was developed primarily as an instrument to detect the different dimensions of burnout (9). Items are scored on a 5-point scale from 1 - "never" to 5 - "always," and a total composite burnout score is obtained by averaging the sum of all 12 items (6). Burnout scores were classified as Low, Average, High, and Very High using the more conservative cut-offs of Low = 1.00–1.50; Average = 1.51–2.79; High = 2.80–3.66; Very High = 3.67–5.00 (6). The use of more conservative cut-off scores is intended to control for possible cross-cultural bias, as previous cross-cultural research revealed that Asian populations tend to score higher in the BAT compared to Western populations (34). The presence of burnout was defined as recording 'High' or 'Very High' levels of burnout based on the BAT-12. The BAT has previously been validated for cross-cultural and online use (34), and its convergent validity against traditional burnout measures such as the Maslach Burnout Inventory has been established (35). The internal reliability of the BAT-12 for this study is $\alpha = 0.94$.

2.4.2 Depression, anxiety, stress scales (DASS-21)

Psychological distress was measured using the DASS-21, a set of self-report scales comprising 21 items equally divided into three subscales measuring the emotional states of depression, anxiety, and stress (36). Items are scored on a 4-point Likert scale ranging from 0 – "did not apply to me at all" to 4 – "applied to me very much or most of the time," and final scale scores are obtained by multiplying subscale scores by 2, with higher scores indicating higher severity for each scale. Cutoff scores for each subscale are used to further classify the scores into conventional severity labels - Normal, Mild, Moderate, Severe, and Extremely Severe (36). The presence of depression, anxiety, and stress was, respectively, defined as recording 'Severe' or 'Extremely Severe' levels of each domain based on scores of the DASS-21.

2.4.3 Sociodemographic questions

The exposure variables were measured using sociodemographic questions on demographic and work-related characteristics. Specifically, participants were asked to supply their year of birth, gender, country of residence, relationship status, employment status, work industry, job seniority, the average number of hours they worked per week (inclusive of overtime), current working setup (i.e., in-office, remote, hybrid), and job satisfaction. Job satisfaction was assessed using a single-item measure, "Taking everything into consideration, how do you feel about your job as a whole?," rated on a seven-point Likert scale (1 = extremely dissatisfied, 7 = extremely satisfied) with higher scores indicating higher levels of job satisfaction, which has been shown to be valid and reliable in assessing job satisfaction among employees (37). The sociodemographic questions were not compulsory for the respondents to complete.

2.5 Statistical analysis

All analyses were performed on RStudio version 2022.07.0 + 548, using R version 4.2.1. Statistical tests performed were 2-sided and evaluated at a $p < 0.05$ significance threshold. The prevalence of burnout, depression, anxiety, and stress were reported with their respective 95% confidence intervals (CIs). In addition, means and standard deviations for burnout, depression, anxiety, and stress scores were reported for the overall sample, as well as for each sociodemographic group (Supplementary Table S2).

Simple logistic regressions were performed to investigate the possible relationship between sociodemographic variables, depression, anxiety, stress, and burnout. Variables significant at $p < 0.25$ were subsequently entered into a stepwise multivariate logistic regression model. Reference categories for the categorical independent variables were chosen based on guidelines recommended by Johfre and Freese (38). For variables that categorize a quantity or rank (age, seniority, depression, anxiety, stress levels), the smallest quantities or lowest ranks are chosen as the reference groups (18–30 years old, entry level, normal or mild levels of depression, anxiety, and stress levels). For variables that unfold from a single group, such as relationship status, average hours worked per week, current work setup, and job satisfaction, the normative groups (single, 40–50 h per week, fully onsite, extremely satisfied) are chosen as the reference groups. For variables with symmetric categories (gender, country), groups that result in positive coefficient estimates are chosen as the reference groups.

Model fit was assessed using Hosmer & Lemeshow's omnibus $\chi 2$ test, and we further report the final model's McFadden's adjusted R2, Nagelkerke's R2, and Akaike information criterion (AIC). As all predictor variables in the model were categorical in nature, linearity assumptions were thus not applicable. Multicollinearity checks were conducted to ensure no multicollinearity between all predictors (GVIF<5.00). *A priori* sample size calculations following Bujang et al.'s (39) rule of thumb of $n = 100 + 50i$, where i refers to the number of independent variables in the final logistic regression model, revealed that a minimum sample size of $n = 700$ was sufficient to detect accurate estimates.

3 Results

3.1 Participant characteristics

Out of the 72,883 responses in the public health assessment, 4,338 respondents fulfilled the study's inclusion criteria, leaving a final

response rate of 5.95%. Figure 1 demonstrates the flow of participant inclusion and exclusion based on the pre-set inclusion criteria. The median age of our sample was 29 (Interquartile range = 9.0). A majority of the sample were female (74.48%), aged 18–29 years old (53.69%), single (37.00%) and resided in Malaysia (54.89%). With regards to work demographic, our sample mostly worked in the education and training industry (8.41%), reported themselves as non-managerial executives (30.90%), worked 40–50 hours a week (47.10%), worked fully onsite (i.e., in-office) at the time (53.39%), and were moderately satisfied with their job (30.45%). Detailed sample characteristics are reported in Table 1.

3.2 Burnout and psychological distress

The prevalence of burnout, depression, anxiety, and stress for each level of severity in each country are shown in Tables 2, 3. Across the four countries, a majority of respondents reported high (33.93%) or

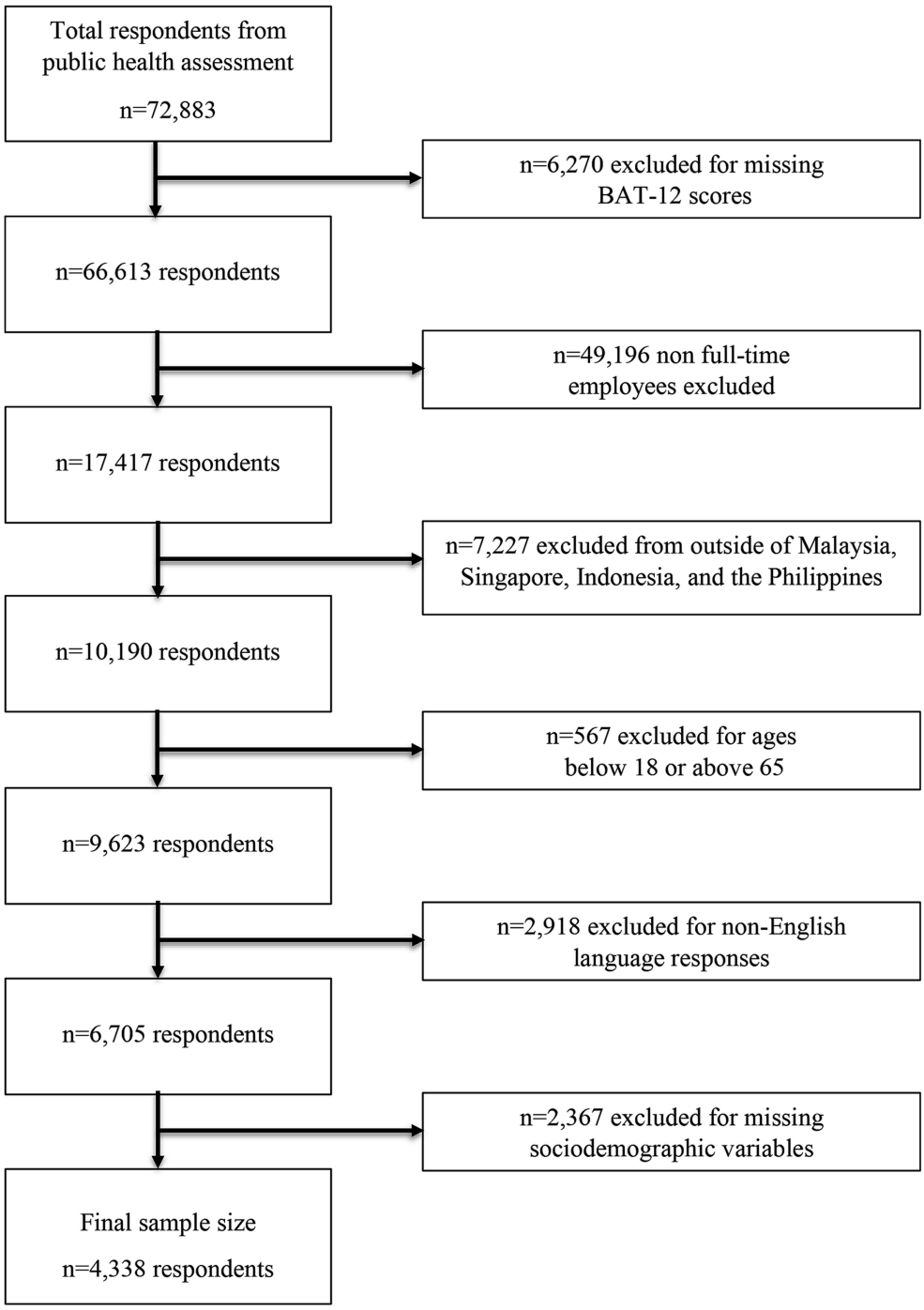

FIGURE 1
Flow chart showing participant inclusion flow into the study's final sample size.

TABLE 1 Sociodemographic characteristics of the sample (*N* = 4,338).

	N	%
Gender		
Male	1,092	25.17%
Female	3,231	74.48%
Other	15	0.35%
Age		
18–29	2,329	53.69%
30–39	1,448	33.38%
40–49	433	9.98%
50–65	128	2.95%
Country		
Malaysia	2,381	54.89%
Singapore	401	9.24%
Indonesia	337	7.77%
Philippines	1,219	28.10%
Relationship status		
Single	1,605	37.00%
Casually dating	361	8.32%
In a long-term relationship	773	17.82%
Married or in a domestic partnership	1,490	34.35%
Divorced, or separated	92	2.12%
Widowed	17	0.39%
Industry		
Science & Technology	59	1.36%
Education & Training	365	8.41%
Administration & Office Support	322	7.42%
Mining, Resources & Energy	53	1.22%
Manufacturing, Transport & Logistics	217	5.00%
Accounting	252	5.81%
Engineering	222	5.12%
Sales	98	2.26%
Call Center & Customer Service	341	7.86%
Banking & Financial Services	300	6.92%
Trades & Services	31	0.71%
Information & Communication Technology	257	5.92%
Healthcare & Medical	339	7.81%
Advertising, Arts & Media	123	2.84%
Retail & Consumer Products	139	3.20%
Hospitality & Tourism	94	2.17%
Construction	165	3.80%
Human Resources & Recruitment	133	3.07%
Design & Architecture	46	1.06%
Legal	60	1.38%
Consulting & Strategy	92	2.12%
Real Estate & Property	61	1.41%

(Continued)

TABLE 1 (Continued)

	N	%
Government & Defense	118	2.72%
Marketing & Communications	127	2.93%
Community Services & Development	36	0.83%
Sport and Recreation	9	0.21%
Insurance & Superannuation	52	1.12%
Farming, Animals & Conservation	16	0.37%
Others	211	4.86%
Seniority		
Senior management	265	4.61%
Middle management	893	15.52%
Lower management	1,201	20.87%
Non-managerial executive	1778	30.90%
Entry level	1,240	21.55%
Not applicable	377	6.55%
Average hours worked per week		
Less than 40 hours per week	2,451	38.75%
40–50 hours per week	2043	47.10%
More than 50 hours per week	614	14.15%
Current work setup		
Fully onsite	2,316	53.39%
Mostly onsite with some remote work	756	17.43%
Mostly remote with some onsite work	754	17.38%
Fully remote	512	11.80%
Work satisfaction		
Extremely satisfied	136	3.14%
Very satisfied	542	12.49%
Moderately satisfied	1,321	30.45%
Neither dissatisfied nor satisfied	912	21.02%
Moderately dissatisfied	767	17.68%
Very dissatisfied	397	9.15%
Extremely dissatisfied	263	6.06%

very high (28.98%) levels of burnout. Similar patterns are reported for respondents experiencing severe (10.88%) or extremely severe (37.37%) symptoms of anxiety, and severe (14.18%) or extremely severe (36.91%) depression. In comparison, the prevalence of severe or extremely severe symptoms of stress across our sample was only 20.40 and 15.81%, respectively.

The prevalence of high or very high levels of burnout was the highest in the Philippines sample (70.71%), followed by Singapore (66.84%). Among the four countries, respondents from the Philippines also reported the highest prevalence of severe and above symptoms of anxiety (62.67%), depression (64.07%), and stress (46.55%). Respondents in Indonesia reported the second-highest prevalence for severe and above symptoms of anxiety (54.3%), depression (55.49%), and stress (39.09%). Meanwhile, respondents in Malaysia reported the lowest prevalence for severe and above symptoms of anxiety (41.75%), depression (43.34%), and stress (31.25%).

3.3 Factors associated with high or very high burnout

Univariate logistic regressions showed that sociodemographic variables, work characteristics, and psychological distress variables were all significantly associated with experiencing high to very high levels of work burnout (Supplementary Table S3). Table 4 presents the results of a multivariate logistic regression with the aforementioned variables as predictors of burnout.

Compared to Malaysia, employees in Indonesia (AOR = 0.69, $p < 0.05$) had significantly lower odds of experiencing burnout. Separately, employees who worked either less than 40 hours per week (AOR = 1.23, $p < 0.05$) or more than 50 hours per week (AOR = 1.36, $p < 0.05$) reported significantly higher odds of experiencing burnout compared to employees who maintained the regular average of 40–50 regular work hours per week. Increasing job dissatisfaction was linked

TABLE 2 Prevalence of burnout in the region and across the four countries.

			Burnout
		N	% (95% CI)
Malaysia	Low	158	6.64 (5.64–7.64)
	Average	839	35.24 (33.31–37.16)
	High	778	32.68 (31.00–34.56)
	Very High	606	25.45 (23.70–27.20)
Singapore	Low	17	4.24 (2.27–6.21)
	Average	116	28.93 (24.49–33.37)
	High	164	40.90 (36.01–45.71)
	Very High	104	25.94 (21.65–30.22)
Indonesia	Low	16	4.74 (2.48–7.02)
	Average	106	31.45 (26.50–36.41)
	High	126	37.38 (32.22–42.55)
	Very High	89	26.40 (21.70–31.11)
Philippines	Low	48	3.94 (2.85–5.03)
	Average	309	25.35 (22.91–27.79)
	High	404	33.14 (30.50–35.78)
	Very High	458	37.57 (34.85–40.29)
Total	Low	239	5.51 (4.83–6.19)
	Average	1,370	31.58 (30.20–32.96)
	High	1,472	33.93 (32.52–35.34)
	Very High	1,257	28.98 (27.63–30.33)

to higher risks of experiencing burnout, with employees who are very dissatisfied having the highest odds of experiencing burnout compared to those who are extremely satisfied (AOR = 16.46, $p < 0.001$). With regards to psychological distress, compared to those reporting normal or mild symptoms, employees in the region who reported moderate or above symptoms of depression, anxiety, and stress all reported higher odds of experiencing burnout ($p < 0.001$). Despite having significant results at a univariate level, no significant associations were detected between burnout and gender, relationship status, employment industry, work seniority, and current work arrangement (i.e., in-office, remote, hybrid). Country-level analyses investigating associated factors of burnout within each country are presented in Supplementary Tables S4–S7.

4 Discussion

Using retrospective data obtained from a large-scale public mental health assessment, we investigated the prevalence of burnout and its associated factors among the general working population of full-time employees in four countries in Southeast Asia. Across the four countries, 62.91% of respondents reported experiencing high or very high levels of burnout. Inter-country variations revealed that the prevalence of burnout was highest in the Philippines (70.71%) and Singapore (66.84%), and lowest in Malaysia (58.13%). As a secondary objective, we also found that 51.09% of respondents in the region were reporting severe and above symptoms of depression, followed by a 48.25% prevalence of anxiety, and a 36.21% prevalence of stress. The magnitude of burnout and psychological distress identified in this study highlights the rising necessity to pay attention to employee mental health and well-being in the region.

Limited evidence exists on the prevalence of burnout in the general working population and across occupational industries (40). To our knowledge, this study is the first in the region to investigate the prevalence of employee burnout in the general working adult population of Southeast Asia. Ndongo et al. recorded a 67.9% prevalence of burnout across industry sectors in Cameroon (41). Closer to the region, Matsuo et al. found that 31.0% of the general working population of Japan was experiencing burnout (40), while Lam et al. observed that 60% of corporate employees in Hong Kong were reporting moderate to high levels of emotional exhaustion, one of the traditionally measured components of burnout (42). The usage of different measures to assess burnout prevalence limits a straightforward comparison of the findings, though the prevalence of burnout we recorded in all four respective countries is highly similar to those reported by Ndongo et al. and Lam et al. (41, 42). Otherwise, Teo et al. reported a 20.0% prevalence of burnout among healthcare workers in Southeast Asia, with those in Singapore reporting the highest prevalence of 39.0% (43). However, it is difficult to speculate on the mechanisms behind the reported differences given that Teo et al.'s study focused on an entirely different, more specific employee population than ours.

In terms of work-related risk factors, we found that both working more and less than 40–50 h a week – the average weekly mandated work hours in the region – were associated with higher odds of burnout in employees. Employees in Asia are typically more prone to

TABLE 3 Prevalence of anxiety, depression, and stress in the region and across the four countries.

			Anxiety		Depression		Stress
		N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Malaysia	Normal	802	33.73 (31.83–35.62)	666	27.97 (26.17–29.77)	1,009	42.38 (40.39–44.36)
	Mild	174	7.31 (6.26–8.35)	230	9.66 (8.47–10.85)	264	11.09 (9.83–12.35)
	Moderate	440	18.48 (16.92–20.03)	453	19.03 (17.45–20.60)	364	15.29 (13.84–16.73)
	Severe	220	9.24 (8.08–10.40)	315	13.23 (11.87–14.59)	406	17.05 (15.54–18.56)
	Extremely Severe	774	32.51 (30.63–34.39)	717	30.11 (28.27–31.96)	338	14.20 (12.79–15.60)
Singapore	Normal	103	25.69 (21.41–29.96)	77	19.20 (15.35–23.06)	116	28.93 (24.49–33.36)
	Mild	27	6.73 (4.28–9.19)	28	6.98 (4.49–9.48)	54	13.47 (10.13–16.81)
	Moderate	89	22.19 (18.13–26.26)	80	19.95 (16.04–23.86)	94	23.44 (19.30–27.59)
	Severe	47	11.72 (8.57–14.87)	68	16.96 (13.28–20.63)	90	22.44 (18.36–26.53)
	Extremely Severe	135	33.67 (29.04–38.29)	148	36.91 (32.18–41.63)	47	11.72 (8.57–14.87)
Indonesia	Normal	64	18.99 (14.80–23.18)	63	18.69 (14.53–22.86)	89	26.41 (21.70–31.12)
	Mild	18	5.34 (2.94–7.74)	23	6.82 (4.13–9.52)	51	15.13 (11.31–18.96)
	Moderate	72	21.36 (16.99–25.74)	64	18.99 (14.80–23.18)	72	21.36 (16.99–25.74)
	Severe	56	16.62 (12.64–20.59)	57	16.91 (12.91–20.91)	67	19.88 (15.62–24.14)
	Extremely Severe	127	37.69 (32.51–42.86)	130	38.58 (33.38–43.77)	58	17.21 (13.18–21.24)
Philippines	Normal	203	16.65 (14.56–18.74)	163	13.37 (11.46–15.28)	284	23.30 (20.92–25.67)
	Mild	64	5.25 (4.00–6.50)	88	7.22 (5.77–8.67)	142	11.65 (9.85–13.45)
	Moderate	188	15.42 (13.40–17.45)	187	15.34 (13.32–17.36)	228	18.70 (16.51–20.89)
	Severe	149	12.22 (10.38–14.06)	175	14.36 (12.39–16.32)	322	26.42 (23.94–28.89)
	Extremely Severe	615	50.45 (47.64–53.26)	606	49.71 (46.91–52.52)	243	19.93 (17.69–22.18)
Total	Normal	1,173	27.04 (25.72–28.36)	969	22.34 (21.10–23.58)	1,498	34.53 (33.12–35.95)
	Mild	283	6.52 (5.79–7.26)	369	8.51 (7.68–9.34)	511	11.78 (10.82–12.74)
	Moderate	789	18.19 (17.04–19.34)	784	18.07 (16.93–19.22)	758	17.47 (16.34–18.60)
	Severe	472	10.88 (9.95–11.81)	615	14.18 (13.14–15.22)	885	20.40 (19.20–21.60)
	Extremely Severe	1,621	37.37 (35.93–38.81)	1,601	36.91 (35.47–38.34)	686	15.81 (14.73–16.90)

working long and inflexible work hours in the face of rising work demands, largely owing to a strong cultural emphasis on work as a means of fulfilling social and familial responsibilities, and high levels of power distance that inhibit employees from voicing discontent over or refusing increasing workloads (44). Our findings are consistent with previous studies in the region linking more than usual work hours and higher burnout risk (40, 43). Surprisingly, we also found that employees who worked less than the average mandated weekly hours were also at higher risk of burnout, though the odds are slightly lesser compared to those working more than 50 hours a week. While shorter working hours have been generally linked to improved work quality and work-life balance (45, 46), existing research does indicate that the relationship between reduced work hours and employee health and well-being can be unclear (46), warranting a need for future studies in this area to investigate the role of potential moderators (47–49). Additionally, cultural attitudes may contribute to differences in how Asians view working hours, as cultural values such as social harmony, collectivism, and respect for authority may translate to a higher appreciation for longer working hours (50). If anything, our results indicate that employees in the region may require participating in a minimum number of working hours per week to consider themselves productive and equal contributors in the workplace, the absence of which may negatively impact employees' self-efficacy, which under the Social Cognitive Theory can make them more prone to developing burnout (10, 50, 51).

Furthermore, our results revealed that job satisfaction was significantly associated with burnout, with employees who are more dissatisfied with their work having higher odds of experiencing burnout. Previous work has established the negative relationship between job satisfaction and burnout (52–55), and how this relationship can lead to increased turnover intentions among employees (52, 56, 57). However, many employees in the region value job security, especially during uncertain economic conditions, and are thus less likely to act on their work dissatisfaction compared to their Western counterparts (58). Nevertheless, employees in Southeast Asia are traditionally faced with high work demands, work overload, work-life imbalance (44), and wage stagnation (59, 60), all of which largely contribute to reduced job satisfaction (61–63). Given the adverse organizational consequences that burnout can bring, our findings highlight the importance of addressing work dissatisfaction as part of burnout prevention among employees.

Despite the large number of studies dedicated to understanding the relationship between remote work and employee wellbeing since the emergence of COVID-19, we found no significant association

TABLE 4 Association between sociodemographic variables and psychological distress with burnout.

	Burnout		
Variable	Odds Ratios (OR)	95% CIs	*p*-values
Gender			
Male	1.00		
Female	1.22	1.00–1.49	0.055
Other	1.42	0.32–7.32	0.658
Age			
18–29	1.00		
30–39	0.83	0.67–1.03	0.088
40–49	0.86	0.62–1.19	0.363
50–65	0.86	0.49–1.51	0.614
Country			
Malaysia	1.00		
Singapore	1.00	0.73–1.36	0.949
Indonesia	0.69	0.50–0.96	**0.026**
Philippines	1.10	0.87–1.38	0.421
Relationship status			
Single	1.00		
Casually dating	0.83	0.58–1.14	0.222
In a long-term relationship	0.77	0.60–1.00	0.050
Married or in a domestic partnership	0.98	0.78–1.22	0.827
Divorced, or separated	0.90	0.49–1.67	0.727
Widowed	0.52	0.12–2.20	0.382
Industry			
Science & Technology	1.00		
Education & Training	0.76	0.35–1.64	0.496
Administration & Office Support	0.82	0.37–1.78	0.621
Mining, Resources & Energy	0.79	0.27–2.29	0.673
Manufacturing, Transport & Logistics	0.73	0.32–1.64	0.456
Accounting	0.84	0.37–1.84	0.660
Engineering	0.90	0.40–2.01	0.806
Sales	0.96	0.38–2.43	0.934
Call Center & Customer Service	0.78	0.35–1.69	0.530
Banking & Financial Services	0.80	0.36–1.74	0.578
Trades & Services	1.57	0.44–5.97	0.498
Information & Communication Technology	0.75	0.34–1.65	0.482
Healthcare & Medical	0.80	0.36–1.73	0.578
Advertising, Arts & Media	0.50	0.21–1.18	0.116
Retail & Consumer Products	0.93	0.39–2.15	0.862
Hospitality & Tourism	1.49	0.57–3.87	0.417
Construction	0.84	0.36–1.92	0.676
Human Resources & Recruitment	1.35	0.56–3.22	0.506
Design & Architecture	0.64	0.22–1.87	0.417
Legal	0.87	0.31–2.41	0.787
Consulting & Strategy	1.11	0.45–2.68	0.819
Real Estate & Property	1.82	0.65–5.05	0.252

(Continued)

TABLE 4 (Continued)

Variable	Burnout Odds Ratios (OR)	95% CIs	*p*-values
Government & Defense	0.95	0.38–2.34	0.904
Marketing & Communications	1.11	0.45–2.68	0.819
Community Services & Development	0.66	0.21–2.09	0.488
Sport and Recreation	0.85	0.07–5.78	0.886
Insurance & Superannuation	0.44	0.15–1.26	0.130
Farming, Animals & Conservation	1.30	0.24–8.83	0.775
Others	1.19	0.52–2.68	0.673
Seniority			
Entry level	1.00		
Senior management	0.85	0.53–1.37	0.509
Middle management	1.19	0.86–1.64	0.294
Lower management	1.18	0.89–1.56	0.259
Non-managerial executive	1.11	0.85–1.43	0.444
Not applicable	1.14	0.73–1.79	0.561
Average hours worked per week			
40–50 hours per week	1.00		
Less than 40 hours per week	1.23	1.02–1.48	**0.034**
More than 50 hours per week	1.36	1.03–1.81	**0.030**
Current work setup			
Fully onsite	1.00		
Mostly onsite with some remote work	1.08	0.85–1.37	0.542
Mostly remote with some onsite work	0.96	0.75–1.22	0.718
Fully remote	0.85	0.64–1.15	0.296
Work satisfaction			
Extremely satisfied	1.00		
Very satisfied	1.04	0.60–1.80	0.889
Moderately satisfied	3.04	1.82–5.10	**<0.001**
Neither dissatisfied nor satisfied	5.12	3.03–8.72	**<0.001**
Moderately dissatisfied	7.68	4.50–13.23	**<0.001**
Very dissatisfied	16.18	8.82–30.05	**<0.001**
Extremely dissatisfied	8.79	4.51–17.47	**<0.001**
Depression			
Normal or mild	1.00		
Moderate	3.04	2.41–3.83	**<0.001**
Severe or extremely severe	6.39	4.98–8.21	**<0.001**
Anxiety			
Normal or mild	1.00		
Moderate	1.99	1.58–2.52	**<0.001**
Severe or extremely severe	2.25	1.75–2.88	**<0.001**
Stress			
Normal or mild	1.00		
Moderate	2.17	1.70–2.78	**<0.001**
Severe or extremely severe	5.50	4.11–7.39	**<0.001**

Bolded *p*-values represent $p < 0.005$. McFadden's adjusted $R^2 = 0.598$; Cragg-Uhler (Nagelkerke) $R^2 = 0.755$; Akaike information criterion (AIC) = 3513.820; Hosmer & Lemeshow test $\chi 2 = 5.884$, $p > 0.05$; Multicollinearity checks indicated no multicollinearity between all listed factors (GVIF < 5.00).

between different kinds of work arrangements and burnout among the employees in the region. The existing literature in the area of remote work has so far been conflicting. Although multiple studies have established the benefits of remote work arrangements and its impact in reducing work–family conflict, improving work-life balance, work efficiency, and employee mental health (64–67), there is also an equivalent amount of evidence to suggest a negative relationship between remote or hybrid work arrangements and employee wellbeing, with remote employees being more vulnerable to increased burnout, escalating job demands, poorer self-rated mental health, intensified physical and mental exhaustion, and increased presenteeism (65, 67–70). Thus, our results further support the suggestion that an indirect relationship likely exists between remote work and employee well-being. As employees continue to demand remote and flexible work arrangements post-pandemic, there is a need for more studies in the area to establish the moderators of this relationship among employees in the region to ensure that organizations are well-equipped to manage the risks that come with remote work arrangements.

Our results reveal no significant relationship between gender and burnout, further adding to the inconsistent literature that exists in the area. Purvanova and Muros' meta-analysis of gender differences in burnout found that, while women tend to score higher on burnout measures than men, women are significantly likelier to report experiencing emotional exhaustion, whereas men are more likely to report experiencing the depersonalisation component of burnout (71). Additionally, despite a population-based study in Sweden showing that more women than men suffer from burnout, this difference was only a function of age (11), and became non-existent once all other factors were taken into account (12). Separately, when marital status is taken into account, single men and married women tend to be at higher risk of burnout compared to their counterparts (10, 13), though this association has been inconclusive in the literature (13). Our findings thus contribute to the growing body of evidence suggesting that gender alone cannot explain the difference in reports of burnout between the different gender groups (72), thus highlighting the need for more studies in the region to look into potential moderators to further understand the nuance in the relationship between gender and burnout.

While previous studies have linked the rise in COVID-19 cases and social restrictions as a contributor to deteriorating mental health (73, 74), our findings indicate a long-lasting psychological impact of the pandemic, as we continue to observe an overall decline in mental well-being in the region despite lessening COVID-19 cases and the removal of most pandemic social restrictions in 2022 (75, 76). We recorded a higher prevalence of depression, anxiety and stress symptoms than those reported in Tay et al.'s study, which reported a regional prevalence of 48.86% for depression, 49.34% for anxiety, and 36.19% for stress in the general population in 2021 (77). At the time of our data collection (October 2022), most of the countries in Southeast Asia were only beginning to undergo economic recovery post-pandemic (78), which meant that employees in the region were facing high economic pressures - not only to recover from the economic and financial impact of the pandemic (73, 79), but also to face global inflation and the rising cost of living at the time (78). In addition, as we found that experiencing moderate and above symptoms of depression, anxiety, and stress significantly increased the odds of employee burnout, it is also possible that the high prevalence rates we recorded here reflect the long-term patterns of rising mental health challenges throughout the region (80, 81), which argues for the importance of effective intervention and early prevention efforts to mitigate the deterioration of mental well-being in the region.

Several limitations should be acknowledged in assessing this study's findings. Firstly, this study utilized the BAT-12 to measure burnout due to the scale's ability to reliably provide an overall score of burnout, as well as its validated scoring classification (6), both of which were integral to the objectives of the study. However, the usage of BAT-12 over more traditional burnout measures such as the Maslach Burnout Inventory or the Copenhagen Burnout Inventory limits the direct comparisons of our findings against existing research in this field. Secondly, we did not include more elaborate work-related factors such as emotional labor, job autonomy, inter-role conflict, and social support (10), which could have provided more insight into documenting the burnout phenomenon in the region. Additionally, the nature and source of data used in this study may be a possible source of bias, as individuals who were attracted and opted to complete the online mental health assessment were more than likely to come from those with a higher degree of awareness of the importance of mental wellbeing. In turn, this may have resulted in prevalence estimates that are not reflective of a purely random and mixed sample. Separately, the logistic regression results for job satisfaction reveal wide confidence intervals for the adjusted odd ratios as dissatisfaction increases, suggesting less precise estimates that warrant further caution in interpreting the large odd ratios. In addition, our sample consists of a higher proportion of residents from Malaysia (54.896%) and the Philippines (28.10%), which limits the representability of our findings across countries. Separately, we elected to exclude participants with missing data which may have introduced selection bias in our study's population (82).

Furthermore, several of the study's limitations can be attributed to the cross-sectional design of the study. Firstly, the objectives of the study are to investigate the associated factors that contribute to the development of burnout among employees in the region. However, as a cross-sectional study, no causal relationships can be inferred from the results of our study. Secondly, as a cross-sectional study that utilizes self-report measures, the results of this study are susceptible to common-method bias which can compromise the construct validity and reliability, and inflate the relationships between our observed variables (83). Finally, as a cross-sectional study, our results were only able to capture the mental health status of employees in the region as of October 2022. Given the rapid and mass social, political and economic changes afflicting the region these past few years, and the dynamic nature of burnout itself (84), our findings hold limited temporal generalisability, warranting the need for more studies in the future that look into employee burnout and mental health in the Southeast Asian region.

In conclusion, this study looked into the prevalence of burnout among the general working population of Southeast Asia and provides evidence of rising mental health concerns across employees in the region. We found that the prevalence of burnout in the region was generally high, and that a majority of the employees are also dealing with heightened symptoms of psychological distress such as depression, anxiety, and stress. Working longer and shorter hours than the weekly average, having lower job satisfaction and having symptoms of anxiety, depression, and stress were associated with higher odds of experiencing burnout. Even as the region moves toward a

post-pandemic landscape, employees are still dealing with the long-term economic and psychological impact of the pandemic, and our findings crucially highlight the importance of burnout prevention and intervention in the region.

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 humans were approved by Medical Research & Ethics Committee, Ministry of Health Malaysia. The studies were conducted in accordance with the local legislation and institutional requirements. The ethics committee/institutional review board waived the requirement of written informed consent for participation from the participants or the participants' legal guardians/next of kin because the data used was retrospective secondary data obtained from a deidentified database.

Author contributions

AFAA: Conceptualization, Formal analysis, Methodology, Project administration, Writing – original draft, Writing – review & editing. TO: Conceptualization, Supervision, Writing – review & editing.

Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. This research was funded and supported by Naluri Hidup Sdn Bhd. No financial or political gain was obtained as a result of the public mental health campaign or the publication of this study.

Acknowledgments

The study authors wish to thank the respondents to our public mental health assessment and the co-founders of Naluri, Azran Osman-Rani and Dr. Jeremy Ting, for their support in driving this project. We would like to thank the team at Naluri involved in the data collection.

Conflict of interest

AFAA and TO are employed by Naluri Hidup Sdn Bhd. The authors declare that this study received funding from Naluri Hidup Sdn Bhd. The funder had the following involvement in the study: study design, data collection, analysis and interpretation, the writing of this article and the decision to submit it for publication.

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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.2024.1326227/full#supplementary-material

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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 15 March 2024
DOI 10.3389/fpubh.2024.1367546

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OPEN ACCESS

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RECEIVED 08 January 2024
ACCEPTED 05 March 2024
PUBLISHED 15 March 2024

CITATION
Silva AR, Rochon A, Hornby L, Lotherington K, James L, Webster R, Sucha E, Sarti A, Dhanani S and Silva e Silva V (2024) Resilience among organ donation coordinators: a Canadian mixed-methods study. *Front. Public Health* 12:1367546. doi: 10.3389/fpubh.2024.1367546

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Resilience among organ donation coordinators: a Canadian mixed-methods study

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Background: Organ and Tissue Donation Coordinators (OTDCs) are key to the success of deceased organ donation processes. However, reduced resilience can leave them susceptible to the incidence of work-related issues and decrease the quality of the care provided. Therefore, this study aimed to examine the extent of resilience and influencing aspects among OTDCs in Canada.

Methods: Mixed-method (QUAN-qual) explanatory sequential design. Quantitative data was collected using an online cross-sectional survey approach with demographic data and the validated scales and analyzed using descriptive and inferential statistics. Qualitative data was collected using a descriptive approach with a semi-structured interview guide and analyzed using content analysis.

Results: One hundred twenty participants responded to the survey, and 39 participants were interviewed. Most participants from the survey were female (82%), registered nurses (97%) and on average 42 years old. The quantitative data revealed that OTDCs had a high level of perceived compassion satisfaction (ProQOL-CS = 36.3) but a resilience score (CD-RISC = 28.5) lower than other groups of healthcare professionals. OTDCs with over a year of experience in the role were more likely to have higher levels of resilience. The qualitative data identified that participants saw resilience as crucial for their work-related well-being. Although coping strategies were identified as a key factor that enhance resilience, many OTDCs reported difficulty in developing healthy coping strategies, and that the use of unhealthy mechanisms (e.g., alcohol and smoking) can result in negative physical consequences (e.g., weight gain) and reduced resilience levels.

Conclusion: Participants reported using a series of coping and protective strategies to help build resilience, but also difficulty in developing healthy mechanisms. The lack of healthy coping strategies were seen as contributing to negative work-related issues (e.g., burnout). Our findings are being used to develop tailored interventions to improve resilience and healthy coping strategies among organ donor coordinators in Canada.

KEYWORDS

coping strategies, organ donation, organ donor coordinators, protective factors, resilience

Introduction

Organ donation supports the life-saving medical intervention of transplantation, and most transplants stem from deceased donors (1). Deceased organ donation is a highly specific and complex field, characterized by a meticulously coordinated sequence of events that must occur seamlessly to ensure successful transplantation (2). Key to this process are Organ and Tissue Donation Coordinators (OTDCs), who facilitate communication and manage procedures among donors, recipients, and healthcare professionals (3). However, the ethical landscape surrounding organ donation is multifaceted. Bioethical considerations in organ donation include obtaining informed consent, ensuring equitable allocation, addressing conflicts of interest, defining death criteria, and preventing commercialization and exploitation (4). Regulatory oversight is paramount, governed by legal frameworks, overseen by Organ Donation Organizations (ODOs), and supported by ethics committees. Compliance with international guidelines further ensures ethical conduct and standardization across jurisdictions (3). Together, adherence to ethical principles and regulatory standards safeguards the integrity and fairness of organ donation, promoting the well-being of donors, recipients, and society.

Despite their key role, OTDCs are often challenged by a unique set of stressors as they navigate emotionally intense situations while managing complex ethical, logistical, and bureaucratic factors (5). Additionally, the time-sensitive nature of the deceased organ donation process due to the urgent need to secure viable organs and tissues for transplantation often adds an extra layer of stress to their work (6). The constant exposure to this inherently demanding and challenging environment can make OTDCs susceptible to work-related issues such as burnout and compassion fatigue, which can lead to reductions in their work-related well-being, increase turnover rates and negatively impact the quality of deceased organ donation processes (6).

A recent scoping review (3) investigated the international literature on work-related issues among OTDCs. Findings from that study highlighted the key role of resilience to manage work-related stressors and how positive aspects of the job, including compassion satisfaction, may help foster inner strength among OTDCs worldwide. Resilience involves the process of effectively adjusting to demanding or challenging life experiences, particularly through mental, emotional, and behavioral adaptability, and the ability to respond flexibly to both external and internal pressures (7). Additionally, the use of healthy coping strategies has been highlighted in the literature as crucial to help healthcare professionals to manage work-related stress and build resilience (8–10). Even though the use of such strategies can help manage work-related stressors and support building resilience among healthcare professionals (11), there is a lack of evidence on this topic in the Canadian context for the specific population of OTDCs (3). Therefore, this study aimed to explore the extent of resilience and influencing aspects among Canadian OTDCs.

Materials and methods

Design

In this study, we used a mixed-method (QUAN-qual) explanatory sequential design. The quantitative approach was implemented first with a greater focus on addressing our study aims, followed by a qualitative approach to help further explore the results from the quantitative phase (12). This paper is part of a series of studies from the BRiC (Burnout and Resilience in Organ Donor Coordinators) research program (4). This study received ethics clearance from the Research Ethics Board at the Children's Hospital of Eastern Ontario (20210076) and additional approvals were obtained from specific ODO sites as needed. To guide the reporting of methods, the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) for cross-sectional studies (13) and COREQ (Consolidated Criteria for Reporting Qualitative Research) were used (14).

Study setting and recruitment

We invited all 10 Canadian Organ Donation Organizations (ODOs) to participate in our study, which included programs from the provinces of Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland and Labrador, Nova Scotia, Ontario, Quebec, and Saskatchewan. We used a convenience sampling technique to recruit participants. With support from the ODOs, all OTDCs received an e-mail invitation to take part in our study. Participants were eligible if they were healthcare professionals in the role of an OTDC who worked with deceased multiorgan donation in any Canadian province. The total available sample size was 175 OTDCs from across Canada.

Data collection

Quantitative

For the quantitative phase, we used a cross-sectional survey design approach. The survey was composed of a series of validated instruments that were used to evaluate resilience and compassion satisfaction, along with demographic information to characterize our sample (e.g., age, gender, and education). We used the Connor-Davidson Resilience Scale −10 (CD-RISC-10) (15) to measure the levels of resilience and how individuals are equipped to bounce back after stressful and difficult events. The CD-RISC-10 is a reliable scale with high internal consistency (Cronbach alpha = 0.81–0.94) that has been validated among health professionals and is comprised of 10 out of the 25 items from the original scale (16). Additionally, the measure of Compassion Satisfaction (CS) from the Professional Quality of Life Measure (ProQOL) was used to assess the positive effects of helping others who experience suffering. This is a reliable scale with high internal consistency (Cronbach alpha for CS = 0.88) that has been validated among health professionals (17). Assessing compassion satisfaction provides valuable insights into the positive aspects of OTDCS experiences, offering a nuanced perspective on how fulfilling aspects of their work may contribute to effective coping strategies and bolster overall resilience in the face of the inherent challenges within the field of deceased organ donation.

The survey was hosted online and administered by Canadian Blood Services using a third-party licensed product (®Interceptum). After participants received the e-mail invite, they accessed the survey and consented to participate prior to having access to the questions. Participants had a total of 60 days to complete the survey and

reminders were sent every 15 days (18). All participants who completed the survey received a $50 gift card.

Qualitative

We used a descriptive design for the qualitative data as this approach can be used to explore issues that are present in healthcare settings (19, 20). Participants were asked in the survey if they would have an interest in participating in the qualitative portion and we contacted those who agreed for the interviews. We used a semi-structured interview guide (Supplementary Table S1) that was developed, and pilot tested with 5 # OTDCs and as there were no considerable changes made to the guide, included the pilot test participants in the study sample. All interviews were conducted by a female member of the research team (A.R.S., RN, and Ph.D.), who had experience in qualitative research, online using the video conference feature hosted at Zoom®, and individual interviews ranged from 29 to 146 min. The interviews were performed until data saturation by repetition of findings was identified in participants' responses from each province. All interviews were video/audio recorded. The reflexive coding process in this study involved the researcher (A.R.S., RN, and Ph.D.) using descriptive and reflexive field notes during interviews to document their own thoughts and perceptions. After transcription, data analysis proceeded iteratively with open coding techniques, constantly reflecting on the researcher's biases and assumptions. Codes were organized into themes and subthemes, with constant comparison techniques ensuring rigor. Reflexive memos documented shifts in understanding throughout the process, enhancing the credibility of the findings by acknowledging the researcher's subjective influence on interpretations.

Data analysis

Quantitative

Statistical analyses were performed using ®R version 4.0.5 (21). Descriptive statistics (e.g., mean and frequency) were used to characterize the sample demographics and the tool scores. We used inferential statistics (e.g., regression analysis) to establish relationships among the variables sex, years in the role, age, and weekly hours worked. Those variables were defined based on previous literature and the relevance to address the study research questions (3). The statistical analysis was performed by professional statisticians with experience in health research (R.W. and E.S.).

Qualitative

After interviews, the recordings were transcribed verbatim by a professional transcriptionist; records were not returned to participants. For participants who opted to be interviewed in French, a translation was performed in the transcription of the recording by a professional translator. The data was imported into a qualitative data analysis software ®NVivo (QRS international, AU) to organize and manage the data. A content data analysis approach was performed by one member of the team (A.R.S.) and peer reviewed (A.R. and V.S.S.) to achieve consensus across the data and quantify the reports as needed. The processes of interview, transcription, and data analysis occurred concurrently as this enabled assessment of the need to revise the interview guide and/or continue interviews for data saturation (22). Reflexive field notes were used to support the coding of interviews but those were not coded separately. Lastly, triangulation involved a sequential approach where quantitative survey results informed the development of qualitative semi-structured interview guide to gain insights from in-depth interviews. The integration of both qualitative and quantitative findings during the interpretation phase allowed for a robust understanding of the complex interplay among the concepts of interest in this study.

Results

A total of 120 OTDCs (68.6% of the available Canadian sample) responded to the survey, and 39 (22.3%) of respondents were interviewed. Characteristics of the survey sample can be found in Table 1 (participants from interviews were not linked to the quantitative data to protect their confidentiality). Most OTDCs were female ($n = 98$; 82%), registered nurses ($n = 117$; 97%) and were on average 41.7 ± 10.2 (25–67) years old and have worked in the role for over a year ($n = 84$%).

Quantitative

Resilience – CD-RISC scale

When measuring resilience with the CD-RISC scale, our sample had a mean score of 28.5 ± 5.62, which indicates a moderate to low level of resilience (Table 2). We also assessed the data to evaluate the relationship between the mean of the CD-RISC scale and the covariates defined as: sex ($p = 0.807$); years in the role ($p = 0.006$); age ($r = 0.15$); and weekly hours worked ($r = 0.08$) using a regression analysis (Table 3). Years in the OTDC' role was the only covariate that presented a statistically significant relationship ($p = 0.006$) where professionals with over a year of experience in the role were more likely to have higher levels of resilience.

TABLE 1 Respondents characteristics of survey.

Characteristic	*N*(%)
Sex	
Female	98 (82.4%)
Male	21 (17.6%)
Missing	1 (0.8%)
Age	
Mean ± *SD* (min–max)	41.7 ± 10.2 (25–67)
Education (combined)	
Registered nurse	117 (97.5%)
Respiratory therapist	3 (2.5%)
Years working as OTDC	
1–6 months	3 (2.5%)
6 months–1 year	16 (13.6%)
More than 1 year	99 (83.9%)
Missing	2 (1.7%)

Compassion satisfaction—ProQOL-CS

When assessing for compassion satisfaction, according to the ProQOL-CS scale, the mean score was 36.3 ± 6.26. For this scale, scores below 23 can indicate a negative perception (e.g., low compassion satisfaction) regarding that domain. OTDCs in our study had a high level of perceived compassion satisfaction (Table 2).

TABLE 2 ProQOL-CS and CD-RISC scores.

	ProQOL.CS.score	CD.RISC.score
Mean ± *SD*	36.3 ± 6.26	28.5 ± 5.62
Median [min, max]	37.0 [16.0, 49.0]	29.0 [10.0, 40.0]
Missing	7 (5.8%)	2 (1.7%)

Qualitative

In the interview data, we have identified two major categories that described the meaning and role of resilience for OTDCs and strategies used to help manage work-related stressors: (1) Resilience: Building Inner Strength; and (2) Coping and Protective Strategies: Navigating Adversity.

Resilience: building inner strength

Resilience was perceived by participants as a fundamental aspect to help maintain their work-related well-being. Participants defined resilience as "*the ability to bounce back*" (P10), "*keep going when things do not always go right*" (P3), "*different ways you are able to cope*" (P4), "*being able to ask for help*" (P4), "*deal with stress and hardship*" (P9) and "*come back and do it over and over and over again*" (P29). All participants, when questioned, reported seeing themselves as a resilient person and that the OTDC role "*helped [them] to become more resilient*" (P3) as they are constantly "*pushed out of comfort zone*" (P3) and so they get used to the challenges. As one participant reported: "*Every time my pager goes off someone has died. That does not bother me any more now […] it's become a job in many respects and, and you'll get the ones that crack through, but I think that […] having that resilience or having a little thicker skin to some tragic circumstances*" (P28). Still, some participants reported that "*pushing through things is not, to some detriment, is not resiliency*" (P2).

Participants believed that there is a series of personal attributes that can make a person more resilient, such as personality, support system, and previous professional experience. Past exposure to trauma was also reported as a source of resilience, as mentioned by one participant: "*I know people who have gone through like death in their own families, really bad divorces,* various *kinds of emotional abuse, but that's made them resilient (…) they can just keep going*" (P3). Still, participants believed that "*without having a foundation of support and structure it is hard to feel resilient, it is hard to feel strong*" (P4). Lastly, OTDCs also reported that effective coping and protective strategies, as well as a sense of job satisfaction, are essential in helping build resilience.

Coping and protective strategies: navigating adversity

The use of coping and protective strategies was discussed interchangeably in our sample, and OTDCs highlighted those factors as pivotal in managing stressors, enhancing their mental health, and building resilience. The most reported method of coping among participants was the use of informal debriefing or venting. OTDCs stated that colleagues are the best source of informal support because "*they are the only ones who really understand*" (P3) what they go through. Oftentimes, OTDCs also reach out to colleagues to seek information on how to proceed in certain situations or even to ask for support when they feel overwhelmed, as reported by one participant: "*I did call my other colleagues, just to talk about it and just say, I do not think that I can be here and do this case anymore because it's really, really affecting me*" (P1). However, participants also expressed concerns that informal debriefing can leave colleagues exposed to secondary traumatic stress "*like, we [OTDCs] are like slamming at each other, like, it wasn't always good*," as well as the worry of being "*too vulnerable with co-workers*" (P4) while debriefing emotionally charged situations. The complete list of healthy coping and protective strategies mentioned by participants can be found in Table 4 along with a sample quote and the number of participants that reported each strategy.

Participants also reported that some aspects of their job can help improve their work-related well-being. For instance, some OTDCs mentioned that they are at "*the top of the pay scale*" (P3) and that no other bedside nursing job would have similar monetary compensation, which motivates them in staying in the role. The possibility of working from home during working days was also seen as a positive aspect since they can be "*more productive to be at home and to not have to commute*" (P12), as well as it increases their sense of freedom and improve mental health.

Employee Assistance Programs (EAPs), which provides mental health support along with other benefits to employees, and organizational counselors were also frequently mentioned by participants, but with ambivalent feelings. When effective, counselors can help OTDCs in managing work-related stressors, as mentioned by a participant: "*I talk to they [counselor] at least a couple times a month just to check in, just to make sure everything is okay (…) they are a really great resource for us*" (P5). However, some participants reported negative experiences where during debriefing sections with counselors: "*people got punished for sharing their thoughts, their emotions or whatever and as a result people were not trusting anymore*" (P4) referring to the use of debriefing information to evaluate performance by leadership. Additionally, many participants reported difficulties in accessing EAP resources as they had "*no idea how to access the EAP*" (P1) and felt uncomfortable asking for such information as people would start questioning them on "*what's wrong, why do you need to talk to this person?*" (P1). Participants also felt it was not worth using the EAP due to the limit of sessions that the benefit would cover where "*once you go four times, it's kind of like okay, do I keep paying for this or do I wait until the next year until I can start going again*" (P13). While others did not see the support from EAP as valuable as the counselor did not understand their area of work as one participant stated "*I had to repeat myself so many times that I got so tired of repeating myself. So, I just called in sick all the time*" (P4). Still, some participants had negative experiences with the counselors that instead of providing support for self-development were suggesting they leave the job: "*I've seen a couple of counselors, you know, over the years and every single one of them would say you need to leave your job. And I would think well that's not very effective counseling. (…) But I wasn't willing to have to leave a job*" (P14).

The use of unhealthy strategies to help cope with job stressors and negative consequences were also mentioned by some participants where they: "*smoke a little bit here and there*" (P16), "*eat fast food*"

TABLE 3 Regression analysis using the CD-RISC score.

CD-RISC score*	Variable			
Sex	Female (*N* = 98)		Male (*N* = 21)	*P*-value
Mean (*SD*)	28.4 (5.87)		29.0 (4.26)	0.807
Median [min, max]	29.0 [10.0, 40.0]		29.0 [23.0, 39.0]	
Missing	2 (2.0%)		0 (0%)	
Years working as an OTDC	1 year or less (*N* = 19)		More than 1 year (*N* = 99)	*P*-value
Mean (*SD*)	24.9 (5.47)		29.2 (5.47)	0.006
Median [min, max]	27.0 [10.0, 31.0]		30.0 [17.0, 40.0]	
Missing	1 (5.3%)		1 (1.0%)	
Difficulty of last case managed	Extremely difficult (*N* = 54)	Fairly difficult (*N* = 28)	Not difficult at all (*N* = 37)	*P*-value
Mean (*SD*)	28.1 (5.63)	28.4 (5.56)	29.0 (5.51)	0.819
Median [min, max]	29.0 [10.0, 37.0]	28.0 [14.0, 40.0]	28.0 [19.0, 40.0]	
Missing	1 (1.9%)	1 (3.6%)	0 (0%)	

*OR = 0.91; CI 95% = 0.87, 1.07; $p = 0.5$.

TABLE 4 Coping and protective healthy strategies reported with sample quotes.

Strategy	Participants	Sample quote
Debriefing or venting	*N* = 37	"*I want to say as a group of coordinators we do have a good relationship with each other, we know when someone is not doing well, we have started noticing certain things and then certain OTDC's will be the one that says 'listen, I'll be talking to them later.' So, there's always someone for someone else, that's what I – so, I do find that we can see when our colleagues aren't doing well.*" (P4)
Family or friends support	*N* = 19	"*I speak with my partner a little bit but he's not in healthcare, so he does not completely understand which is perfect because then we do not talk about healthcare all the time.*" (P16)
Taking a break	*N* = 18	"*So you know, sometimes I'll just take… give myself a moment, excuse myself or just explain to them quickly that, you know, this is emotional for me as well and, you know, just give everybody a moment to reorganize my thoughts and then take a deep breath and just try to keep going.*" (P17)
Boundaries	*N* = 16	"*It's really important to have very firm boundaries and say I'm not on call today. I have plans with my family. I'm not available to help even though it's busy. And like even establishing and maintaining those boundaries is its own source of stress because you know (…) you are saying no, that means that somebody else is under stress because of it.*" (P23)
Physical activities	*N* = 13	"*I started running and I found I was just so empowered after. There was something that it did to my body, like it's like hemostasis afterwards. So sometimes I'll go for a run if I have a really distressing day and put my headphones in, listen to some music and I feel a lot better after that as well.*" (P5)
Detachment	*N* = 8	"*I probably detach from most where I try to just keep, you know, obviously still be as compassionate as I can with the families but learning limited information. As limited as I need to get by, because you know, that's hard to carry their grief, right? Like it's challenging.*" (P21)
Self-reflection	*N* = 6	"*I usually try to get up and get away and like distract myself and kind of also try to rationale it, like I understand that he [donor family member] was upset, and I could understand, you know, just going through that in my head. Which kind of helps somewhat.*" (P11)
Going outdoors	*N* = 3	"*Being outdoors is kind of when I can just kind of clear my head or go throw the ball around with my kids or whatever.*" (P2)
Media use	*N* = 3	"*I'll just go to bed really early, you know, watch some [TV shows], and have some popcorn and catch up on sleep.*" (P5)
Focus on positive side	*N* = 2	"*When I see something bad, I become more grateful for what I have.*" (P6) "*when I'm feeling stress, probably just in general, I make sure that I do spend some time with recipients here on the island. (…) So, I just try and make sure that I remember what the big picture is and that the little parts might be difficult, but the big picture is the big picture.*" (P16)
Alternative medicine	*N* = 1	"*I do believe in my essential oils and I love them to death (…) I manage to have some sort of candles everywhere that I like that he says okay to but if I have an oil diffuser that's only in my office*" (P37)

(P21), "*drinking some*" (P14, P26, and P32) and consequently "*put on weight*" (P16) since starting the role. Furthermore, despite participants understanding of the importance of applying effective coping and protective strategies, many participants reported challenges in developing those, as one participant expressed: "*I'm not the best coper in the world and I will push through a lot of things until I break*" (P2). The lack of coping strategies was also seen by participants as a potential cause of work-related issues among OTDCs: "*I think that [lack of coping strategies] is probably one of the reasons why there's so much burnout with coordinators, (…) we are so tired after a case and then what do we do to look after ourselves?*" (P21).

Discussion

In this mixed-methods study, we sought to examine the extent of resilience and influencing aspects among OTDCs in Canada. OTDCs believe that resilience is a reflection of a multifactorial process that includes personal attributes, past professional experience, previous exposure to trauma, and ability to cope. Participants also reported using a series of coping and protective strategies to help build resilience, with *debriefing and/or venting*, *family and/or friends support*, and *taking a break* being the most often reported. Our results lend insight into OTDCs' experiences and provide valuable information on how to best support OTDCs to enhance their work-related well-being.

Although all OTDCs reported feeling resilient during the qualitative interviews, the quantitative analysis revealed that our sample exhibited a lower level of resilience when compared to previous normative samples of both healthcare professionals and the general population (23). This disparity may be attributed to the multifaceted nature of resilience and contextual influences that may have led OTDCs to perceive themselves as more resilient than the actual resilience level measured in the resilience scale results. Additionally, our study revealed that while OTDCs faced high levels of work-related stressors, they exhibited an increased level of compassion satisfaction—a clear indication of the satisfaction derived from performing their work effectively and the positive outcomes from the donation process (e.g., supporting families, transplant recipients). This finding aligns with previous studies (3), which also reported high job satisfaction among OTDCs, despite encountering significant work-related challenges.

The use of effective coping and protective strategies were also reported by participants as key to foster inner strength. Similarly, there are substantial meta-analytical findings (8–10) supporting the use of those strategies to help healthcare professionals to manage work-related stressors and foster resilience. Still, despite the importance of such management strategies, our results, which are echoed by the existing literature among Canadian OTDCs (3, 5, 6), emphasized that OTDCs often report challenges in developing healthy coping and protective strategies and that they usually keep pushing through situations without taking proper time to reflect and cope due to the highly complex and demanding environments they work in. Even though our study was focused specifically on Canadian OTDCs, the international literature similarly reported on the importance of management strategies to enhance work-related wellbeing and resilience (3, 24).

Among the most cited source of coping for OTDCs in this study is the use of informal debriefing and venting. The use of debriefing has been suggested as an important resource for coping among healthcare professionals (5, 25, 26). However, our sample expressed concerns that informal debriefing may leave individuals susceptible to secondary traumatic stress from listening to others' emotionally charged cases. Despite the importance of such findings, to the best of our knowledge, the existing literature does not provide guidance on addressing this matter, and further research should focus on that aspect. Lastly, a substantial number of participants ($n = 8$) who reported detachment as a coping strategy; however, it is important to emphasize that existing evidence suggests detachment as a symptom of compassion fatigue (27). This finding reinforces the notion that OTDCs might be experiencing work-related issues such as burnout or compassion fatigue without fully recognizing the signs and symptoms, which has also been identified in past studies (3).

Existing literature demonstrated that tailored training in deceased organ donation on how to develop coping strategies to build inner resilience can positively impact the sense of preparedness of coordinators, and patient outcomes (28–30). Despite evidence on the needs and potential impact of tailored training for coordinators, there is still a lack of initiatives in the Canadian scenario (30). Recognizing this need for Canadian OTDCs, our research team, along with national agencies (Canadian Blood Services), is working on an interventional studies to support OTDCs in developing healthy coping strategies and enhance their resilience levels; which can ultimately improve deceased organ donation outcomes.

Limitations

While our findings hold promise for informing tailored interventions aimed at enhancing the deceased organ donation process, it is essential to recognize certain limitations. The absence of measures pertaining to coping strategies in our cross-sectional design aligns with our initial objectives, yet their inclusion could bolster the robustness of our conclusions. Moreover, our sample primarily comprises Canadian OTDCs, thereby restricting the generalizability of our findings to other geographical regions. Additionally, while the provision of a framework to support OTDCs in bolstering their resilience would be valuable for readers, such insights are part of an ongoing project within our research team, and integration of these results is currently unavailable. Lastly, while most participants were active in the role of OTDCs during the study implementation, learning the perspectives of former OTDCs on those topics could help to understand the reasons that may have led them to leave their role.

Conclusion

This study lend insight into OTDCs' perceptions of resilience and the contribution of external aspects (e.g., past experience) and personal coping strategies (e.g., social support) to enhance their resilience levels. Our findings provide valuable information to organizations and researchers on how to effectively support OTDCs in cultivating resilience. For instance, through the supporting the development of healthy coping strategies to enhance OTDCs' resilience. By improving OTDCs resilience and work-related wellbeing, those interventions may also enhance the overall quality of deceased organ donation processes. While our

study focused on Canada, the work-related stressors faced by OTDCs worldwide are similar as evidenced by international literature, making our results transferable to international contexts. Lastly, interventional studies are currently needed to help address the issues identified in our study, including how to develop healthy coping and protective strategies to enhance resilience levels and mitigate the effects of work-related stressors, as well as investigations on secondary traumatic stress due to the exposure during informal debriefing with colleagues.

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 humans were approved by Children's Hospital of Eastern Ontario Research Institute. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

ARS: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. AR: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing – review & editing. LH: Conceptualization, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing. KL: Conceptualization, Funding acquisition, Investigation, Project administration, Resources, Supervision, Validation, Visualization, Writing – review & editing. LJ: Investigation, Project administration, Resources, Supervision, Writing – review & editing. RW: Formal analysis, Software, Validation, Writing – review & editing. ES: Formal analysis, Software, Validation, Writing – review & editing. AS: Data curation, Formal analysis, Writing – review & editing. SD: Visualization, Writing – review & editing, Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation. VS: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. This work was financially supported by CHAMO (Children Hospital Academic Medicine Organization) research innovation grant from Children's Hospital of Eastern Ontario and Canadian Blood Services. Canadian Blood Services receives funding from the provincial and territorial Ministries of Health and the federal government, through Health Canada. The views expressed herein do not necessarily represent the views of the federal, provincial or territorial governments. Canadian Blood Services is not responsible for the management or funding of any Canadian organ donation organization or transplant program.

Acknowledgments

The authors would like to acknowledge the use of well-established and validated tools in this study. The Connor-Davidson Resilience Scale-10 (CD-RISC-10) (15) to measure the levels of resilience and how individuals are equipped to bounce back after stressful and difficult events. The measure of Compassion Satisfaction (CS) from the Professional Quality of Life Measure (ProQOL) used to assess the positive effects of helping others who experience suffering (17).

Conflict of interest

KL and LJ are Canadian Blood Services employees. LH was a paid research consultant for Canadian Blood Service. SD receives a stipend from Ontario Health Trillium Gift of Life as a Hospital Donation Physician.

The remaining 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

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2024.1367546/full#supplementary-material

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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 04 April 2024
DOI 10.3389/fpubh.2024.1370052

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OPEN ACCESS

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RECEIVED 13 January 2024
ACCEPTED 20 March 2024
PUBLISHED 04 April 2024

CITATION
Tomaszewska K, Kowalczuk K, Majchrowicz B, Kłos A and Kalita K (2024) Areas of professional life and job satisfaction of nurses. *Front. Public Health* 12:1370052.
doi: 10.3389/fpubh.2024.1370052

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Areas of professional life and job satisfaction of nurses

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Introduction: Job satisfaction among nurses is closely related to work environment as well as organizational and professional commitment. Satisfaction is a concept derived from Latin, where "satis" means "enough," as much as is needed to fully satisfy expectations, needs, aspirations, in such a way that there is no room for complaint. Job satisfaction, on the other hand, is formulated as a positive attitude of employees toward the duties of the job, the work environment and other employees. The aim of this paper was to demonstrate how the different areas of nurses' professional life, i.e., workload, control, rewards, community, sense of justice and values, correlate with their perceived job satisfaction.

Materials and methods: A cross-sectional study was conducted in a group of 509 nurses working in a public hospital in Poland. Data were collected using a survey questionnaire, which consisted of a section containing sociodemographic data and standardized instruments: The Minnesota Satisfaction Questionnaire (MSQ) and The Areas of Worklife Survey (AWS) developed by Maslach and Leiter. Correlations were made using Spearman's rho coefficient. The calculations also used stepwise linear regression analysis after checking certain assumptions, including checking the assumption of normality of residuals and the Durbin-Watson Test.

Results: The mean score for the 20 items of the MSQ questionnaire ranged from 3.05 to 3.43 on a 5-point Likert scale. Support from the interdisciplinary team, which concerned assessing the quality of the social environment in the workplace, cooperation and showing positive feelings received the highest rating among respondents (3.51 $\pm$ 0.76). The sense of fair treatment at work averaged 3.26 $\pm$ 0.58. The area of value conflict within the organization itself or between the employee's values and those of the organization, respondents rated an average of 3.26 $\pm$ 0.65. The mean score for all areas of professional work in the surveyed group was 3.09 $\pm$ 0.45.

Conclusion: As satisfaction in particular areas of work life increases, so does the level of satisfaction in such aspects of work as achievement and a sense of fairness. The higher the level of satisfaction in the area of control, the more the sense of satisfaction with independence increases. The higher the satisfaction of respondents in the areas of values, workload and control, the higher the level of satisfaction with working conditions occurs.

KEYWORDS

areas of professional life, professional work, job satisfaction, nurse, nursing

1 Introduction

Work is the basic form of human activity. It is a value, a purposeful activity, a source of earnings, but also an opportunity to realize one's own goals, desires or personal dreams. It allows to satisfy biological, social, economic and psychological needs, including the needs for success, belonging, recognition, respect and self-fulfillment, and is also included in the system of social interactions that shape one and affect the quality of one's life (1–3). Nursing staff is considered a key part of the health care system and is the most numerous group of health care workers. However, shortages and high turnover rates have become a problem affecting the nursing profession in many countries (4). The work environment of nurses is important to the quality of patient care and is receiving increasing attention in research (5, 6).

Psychosocial burdens in the work environment have been analyzed for many years. There is no uniform definition that precisely defines the term psychosocial burden and classifies them. However, there is a common denominator that defines psychosocial burdens (stressors) as potential sources of stress that usually lead to psychological, physical, social harm. The most adequate definition of psychosocial burdens is that proposed by the WHO: "*...as a type of interaction between work content, work organization, management systems, environmental conditions and the competencies, needs and individual characteristics of the worker*" (7). Psychophysical load is a set of psychophysical demands to which an employee is subjected during the working day and is determined by the amount and type of information that a person has to deal with at work. Those that excessively affect employees cause various types of symptoms, including changes in personality such as sadness, anxiety, anger or devaluation, behavioral changes with deterioration in the quality of work, ineffective work performance and interpersonal conflicts (8, 9). The workload can also affect the quality of nursing care, through the significant strain of emotional demands, shift work and staff shortages (10, 11). This is one of the major concerns of nursing managers (9, 12–15).

The psychosocial work environment includes those factors that affect individuals and influence the health of employees, including both individual factors and the social work environment (16). They include the demands of the job: work organization, including influence, freedom, meaningful work and opportunities for growth; interpersonal relationships, such as leadership and co-workers, sense of community, role clarity, feedback and support; and individual health and personal factors, including coping ability and family support (17, 18).

Work environment is a well-known predictor of nurses' job satisfaction as an external factor, while personal initiative may play a role as an intrapersonal (internal) trait (19, 20). Several factors contribute to the negative work environment. Traditionally, these include low wages and working conditions and a lack of respect for nurses, which has led to high turnover and an increase in the number of nurses leaving the profession. Other factors include lack of support, lack of staff and increased workload (21). The work environment also relates to so-called organizational characteristics that either facilitate or limit nursing practice. Lack of time, inadequacy of staff, and lack of team dynamics are potential factors that affect job satisfaction (22).

Job satisfaction can be defined in many ways. The earliest definition of job satisfaction was proposed by Hoppock (23) and reads as follows: "*the combination of psychological, physiological and environmental circumstances that cause a person to say: I am satisfied with my job.*" Wilson, on the other hand, defined job satisfaction as "*the degree to which needs are currently being met at work.*" Nelson and Quick defined it as "*a pleasant or positive emotional state resulting from an appraisal of one's job or work experience*" (24). Job satisfaction is considered a global issue, but it is also necessary to improve the quality of care provided and cultivate an appropriate work environment in healthcare organizations, and a lack of job satisfaction among nurses can affect their practice, which in turn can directly or indirectly affect patient satisfaction (25, 26). A high level of job satisfaction can not only help medical personnel increase their self-confidence and professional identity, eliminate rationing of care, actively improve relationships with co-workers, but also effectively reduce the psychological stress that work brings (27, 28).

According to Brayer and Marcinowicz, the source of nurses' greatest satisfaction with their work is contact with patients and their families, indicating the need for belonging in this professional group. Participation in the treatment process and the gratitude of patients and their families are other determinants of satisfaction, and reflect satisfaction of the need for respect and recognition. The sense of fulfillment, professional development and challenges at work are part of the need for self-realization, which is the highest level of human aspiration. The organization and conditions at a nurse's workplace, relating to the satisfaction of the need for security, were the third most frequently cited reason for lack of job satisfaction after salary and lack of respect and recognition (29). Job satisfaction has been found to be related to the beliefs and emotions that individuals have about their jobs (26). The social prestige of the profession is also important, which, in addition to the desire to help others, may be a motive for choosing it (30).

The situation of nursing in Poland is difficult. It consists, in addition to those mentioned, of a low position among other medical professions, continuous improvement of qualifications and ethical requirements (31). In addition, the paternalistic model of patient care that functioned in health care for many years, where the nurse was perceived as subordinate to the doctor further influenced the low social status of this professional group. Research shows that improving nurses' job satisfaction should be a key goal in the face of the challenges of achieving and maintaining quality standards, ensuring patient satisfaction and staff retention (32).

The prestige and importance of the professional group of nurses for achieving professional job satisfaction is extremely important. Success is determined by communication skills, group relations, cooperation skills and the degree of identification of nurses with the professional group (33). Therefore, it is crucial to examine how specific areas of nurses' professional life, such as workload, control, rewards, community, a sense of justice and values, correlate with their perceived job satisfaction. Creating a friendly work environment in these areas may positively impact the level of satisfaction among nursing staff. Based on the main objective, the following research questions were formulated:

1. What is the level of job satisfaction of hospital nursing staff?
2. How do respondents rate the various areas of work life in their work environment?
3. What is the relationship between the various areas of nurses' work life: workload, control, rewards, community and sense of justice and job satisfaction?

2 Materials and methods

2.1 Research design

In the present study, after obtaining approval from the Bioethics Committee, a survey was conducted among nurses employed in a state hospital in Poland who were actively working during the survey period. The survey was conducted between September and October 2022. The survey questionnaires were left in the nursing rooms with a request to fill them out, then they were collected by the authors of the study.

2.2 Research tools

The research tool was a survey questionnaire containing questions on sociodemographic data and standardized questionnaires: *The Minnesota Satisfaction Questionnaire* (MSQ) and *The Areas of Worklife Survey* (AWS) developed by Maslach and Leiter.

2.2.1 The Minnesota Satisfaction Questionnaire

The Minnesota Satisfaction Questionnaire (MSQ) by Weiss et al. (34) is used to assess levels of job satisfaction and dissatisfaction. It assesses 20 job characteristics, such as achievement, independence, recognition, working conditions, among others. This abbreviated version of the MSQ questionnaire assessed intrinsic (i.e., what people think about their job duties) and extrinsic job satisfaction (i.e., what people think about aspects of work conditions that are external to the job itself). External, internal and overall job satisfaction scores are calculated by summing the corresponding subscale item scores. A five-point Likert scale is used in assessing satisfaction with the MSQ. The Cronbach's alpha coefficient for the variables making up the MSQ in Polish was 0.858, which is a satisfactory level (35).

2.2.2 The Areas of Worklife Survey

The Areas of Worklife Survey (AWS) is a tool constructed at the Canadian Centre for Organizational Research & Development at the University of Arcadia by Christina Maslach and Michael Leiter, who specialize in studying the phenomenon of burnout (36). Adaptation of the Polish version was carried out by Terlak and Izwantowska. All questions of the Polish version obtained a statistically significant correlation up to 0.05. As a measure of internal consistency of the test, Cronbach's alpha coefficient of 0.83 was calculated. The questionnaire is designed for subjective assessment of the work environment by employees and covers issues such as workload, perceived support from the organization, support from other people at work, compatibility of the value system of the employee and the organization, degree of job satisfaction before salary regulation, degree of job satisfaction after salary regulation, degree of job satisfaction with one's current nursing job, taking into account all aspects of work, including one's own values, ideals and goals.

It allows the assessment of the employee's functioning in the work environment and the incompatibility between the demands of the organization and the needs, aspirations and abilities of employees. The questionnaire consists of 29 statements grouped into six scales: workload, behavioral control, satisfaction with rewards, support from co-workers, sense of fairness and value scale (37).

2.3 Participants

The study group consisted of 509 nurses employed in hospital wards. Inclusion criteria were work as a nurse and consent to participate in the study. The signed statements are stored by the authors of this paper. Six hundred paper survey questionnaires were distributed with a request for completion, 518 were returned and, after final verification, 509 correctly completed ones were subjected to statistical analysis, accounting for 82.1%. The exclusion criterion was lack of consent to participate in the study.

2.4 Ethical procedure

The participation of nurses in the study was voluntary and anonymous. The study was conducted in accordance with the ethical standards set forth in the Declaration of Helsinki (64th WmA General Assembly, Fortaleza, Brazil, October 2013) and in accordance with Polish legal regulations. The application was favorably approved by the Bioethics Committee of the State Academy of Applied Sciences in Przemyśl (KBPANS 11/2022).

2.5 Statistical analysis

Correlations between ordinal or quantitative variables (when the conditions for using parametric tests were not met) were made using Spearman's rho coefficient, which indicates the intensity of the relationship and its direction – positive or negative. The calculations used stepwise linear regression analysis after checking certain assumptions beforehand, including checking the assumption of normality of residuals and the Durbin-Watson test. The analysis was performed using the IBM SPSS 26.0 package (IBM, New York City, NY, United States) with the Exact Tests module. All correlations and differences are statistically significant when $p < 0.05$.

3 Results

3.1 Characteristics of the study group

97.2% of female nurses and only 2.8% of male nurses participated in the survey, therefore this variable was not considered in the statistical analysis. The age and job seniority of the respondents varied significantly. Detailed data are presented in Table 1.

3.2 Results of the Minnesota Satisfaction Questionnaire

The mean score for the 20-item MSQ questionnaire ranged from 3.05 to 3.43 on a 5-point Likert scale. Respondents' level of satisfaction with their achievements at work averaged 3.05 ± 0.81 and their level of independence averaged 3.38 ± 0.66. Independence was 3.38 ± 0.66, recognition received the highest mean of 3.43 ± 0.87, and working conditions 3.19 ± 0.83. Considering all aspects of work, respondents rated their level of satisfaction at a mean of 3.58 ± 0.80 and satisfaction with their current life at 3.83 ± 0.77. In all sub-scales, the minimum

TABLE 1 Characteristics of the study group.

Variable		Frequency (n = 509)	
Gender	Female	495	97.2%
	Male	14	2.8%
Age (years)	<30	143	28.1%
	30–40	129	25.3%
	41–50	149	29.3%
	>50	88	17.3%
Job seniority (years)	<5	94	18.5%
	5–10	164	32.2%
	11–15	48	9.4%
	16–20	55	10.8%
	>20	148	29.1%

TABLE 2 Results of MSQ job satisfaction questionnaire (n = 509).

	Mean	Median	Standard deviation
MSQ Achievements (1–5)	3.05	3.00	0.81
MSQ Independence (1–5)	3.38	3.40	0.66
MSQ Recognition (1–5)	3.43	4.00	0.87
MSQ Work conditions (1–5)	3.19	3.00	0.83
Considering all aspects of your job, to what extent are you satisfied? (1–5)	3.58	4.00	0.80
Overall, how satisfied are you with your current life? (1–5)	3.83	4.00	0.77

number of points to be obtained was 1 point, and the maximum was 5 points. It can be inferred that the level of job satisfaction among the respondents was above average. The results are shown in Table 2.

3.3 Results of the Areas of Worklife Survey

The Areas of Worklife Survey questionnaire was used to assess specific areas of nurses' work environment: workload, level of control, rewards, community, sense of justice and values. The workload score of the nurses surveyed was 2.67 ± 0.72, slightly above the mean value (min. 1, max. 5). It can be assumed that the respondents are not overwhelmed by excessive workload. The ability to make independent decisions, to make choices on the job, the respondents rated a mean of 3.42 ± 0.79. This was one of the higher rated areas of work life, which also proved that nurses have a significant sense of control in their work. Another aspect was receiving both material rewards, opportunities for advancement, and social rewards such as recognition and respect from co-workers, superiors and clients. The mean score was 3.15 ± 0.66, indicating that nurses' work is increasingly appreciated.

Support from the interdisciplinary team, which concerned the assessment of the quality of the social environment in the workplace, cooperation and the display of positive feelings received the highest score among the respondents. The mean score was 3.51 ± 0.76. The employee's feeling of being treated fairly at his job averaged 3.26 ± 0.58. The final area was whether there was a conflict of values within the organization itself or between the employee's values and those professed by the organization. This aspect of their work was rated by respondents at a mean of 3.26 ± 0.65. The mean score for all areas of professional work in the surveyed group was 3.09 ± 0.45 (max. 5).

TABLE 3 Results of AWS questionnaire (n = 509).

	Mean	Median	Standard deviation
Workload (1–5)	2.67	2.67	0.72
Control (1–5)	3.42	3.33	0.79
Rewards (1–5)	3.15	3.00	0.66
Community (1–5)	3.51	3.60	0.76
Sense of justice (1–5)	2.82	2.83	0.58
Values (1–5)	3.26	3.20	0.65
Overall (1–5)	3.09	3.10	0.45
Level of job satisfaction before salary regulation	2.81	3.00	1.03
Level of job satisfaction after salary regulation	3.27	3.00	1.03
Degree of satisfaction with one's current nursing job, considering all aspects of the job, including one's own values, ideals and goals	5.93	6.00	1.91

Respondents also commented on salary regulation, which was in 2022 for the professional group of nurses. The level of job satisfaction before salary regulation averaged 2.81 ± 1.03 and after regulation 3.27 ± 1.03, a noticeable increase. The degree of satisfaction with one's current nursing job, taking into account all aspects of work, including one's own values, ideals and goals according to the respondents, averaged 5.93 ± 1.91 (max. 10) i.e. mean. The results are presented in Table 3.

The calculations used linear regression analysis using the stepwise method after checking certain assumptions beforehand, including checking the assumption of normality of the residuals. In the method described above, only those predictors whose values proved to be statistically significant are included in the model. The selected dependent variables were the four MSQ domains. The adjusted predictors in the stepwise linear regression method explain a total of about 30% of the variance in the dependent variable in each case. The lack of correlation of the residuals is evidenced by the results of the Durbin Watson statistic, while a good fit of each model to the data is indicated by the "p" values obtained during the analysis of variance ($p < 0.001$). In the first model, where the dependent variable is MSQ-achievement four predictors proved statistically significant. The standardized regression coefficients report that as satisfaction increases in areas of work life such as sense of justice, control, rewards and values, satisfaction in an aspect of work such as achievement increases, with sense of justice being the more pronounced predictor ($\beta = 0.257$, $p < 0.001$). In the second model, where the dependent variable is MSQ-Independence, the same predictors also proved to be statistically significant, but the control factor proved to be a particularly clear value ($\beta = 0.373$, $p < 0.001$) - as satisfaction with control increases, the sense of satisfaction with independence

TABLE 4 Stepwise linear regression analysis.

	Stepwise linear regression					
	Dependent variable	*R*	Adjusted *R*-squared	Durbin-Watson statistics	*F*	*p*
MODEL A	MSQ Achievements (1–5)	0.55	0.297	2.017	54.720	<0.001
	Predicates	*B*	Standard error	*β*	*t*	*p*
	Sense of justice (1–5)	0.359	0.061	0.257	5.884	<0.001
	Control (1–5)	0.187	0.045	0.181	4.173	<0.001
	Rewards (1–5)	0.196	0.052	0.160	3.759	<0.001
	Values (1–5)	0.176	0.057	0.141	3.068	0.002
MODEL B	MSQ Independence (1–5)	0.581	0.333	1.971	64.370	<0.001
	Predicates	*B*	Standard error	*β*	*t*	*p*
	Control (1–5)	0.312	0.035	0.373	8.822	<0.001
	Values (1–5)	0.183	0.045	0.180	4.041	<0.001
	Sense of justice (1–5)	0.110	0.048	0.097	2.278	0.023
	Rewards (1–5)	0.092	0.041	0.093	2.232	0.026
MODEL C	MSQ Recognition (1–5)	0.49	0.235	2.071	53.110	<0.001
	Predicates	*B*	Standard error	*β*	*t*	*p*
	Control (1–5)	0.359	0.049	0.325	7.335	<0.001
	Values (1–5)	0.233	0.063	0.174	3.685	<0.001
	Sense of justice (1–5)	0.158	0.066	0.106	2.393	0.017
MODEL D	MSQ Work conditions (1–5)	0.559	0.308	2.035	76.487	<0.001
	Predicates	*B*	Standard error	*β*	*t*	*p*
	Values (1–5)	0.375	0.054	0.294	6.966	<0.001
	Workload (1–5)	0.301	0.044	0.262	6.904	<0.001
	Control (1–5)	0.225	0.044	0.214	5.107	<0.001

F, mean of the within-group variance. *R*, coefficient, measure of the quality of the model fit. *B*, value of the regression coefficient.

increases. In the third model, where the dependent variable is recognition, the significant predictors turned out to be the above-mentioned variables in addition to rewards. Again, the most pronounced relationship is between control and recognition ($\beta = 0.325$, $p < 0.001$). With the last model, where the dependent variable is MSQ-work conditions, predictors such as values, workload and control turned out to be statistically significant. The higher the satisfaction in terms of these variables, the higher the level of satisfaction with working conditions. A slightly more pronounced coefficient value applies to $\beta = 0.294$ ($p < 0.001$). The results are presented in Table 4.

Age and length of service do not correlate statistically significantly with workload and degree of job satisfaction in the various aspects studied. Only four correlations were found to be statistically significant. Workload and working conditions (MSQ) correlate statistically significantly with seniority, while job satisfaction before wage regulation and achievement (MSQ) correlate statistically significantly with age.

The non-parametric Spearman's rho was used in the calculations because variables such as age and length of service were of an ordinal and categorized nature in the survey. Age and length of service do not correlate statistically significantly with workload and degree of job satisfaction in the various aspects studied. Only four correlations were found to be statistically significant. Workload and working conditions (MSQ) correlate statistically significantly with seniority, while job satisfaction before wage regulation and achievement (MSQ) correlate statistically significantly with age. The results are presented in Table 5.

4 Discussion

The aim of this paper was to research how the various areas of nurses' work life: workload, control, rewards, community, sense of justice and values correlate with their perceived job satisfaction.

The mean score for the 20 items on the 5-point Likert scale of the MSQ job satisfaction questionnaire that was obtained in the survey ranged from 3.05 to 3.43. Respondents rated the lowest level of their own satisfaction with their achievements at work averaged 3.05 ± 0.81 and the highest was appreciation, which scored a mean of 3.43 ± 0.87. Perhaps this was due to the structure of the work - the only current career advancement is a management position, of which there is one per ward. There is no division between levels of practice and higher education and specialization can be completed by any nurse. Kovner et al. in their study showed that factors related to the work environment were significantly related to job satisfaction. More than 40.0% of the variation in satisfaction was explained by various attitudes at work: supervisor support, workgroup cohesiveness, work diversity, autonomy, organizational constraints, promotion

TABLE 5 Correlations between age, job seniority, results of the Areas of Worklife Survey (AWS), and the Minnesota Satisfaction Questionnaire (MSQ).

			Age	Job seniority
Spearman's rho	Workload (1–5)	Correlation coefficient	−0.033	−0.088*
		Significance (two-tailed)	0.459	0.048
		Frequency (*n*)	509	509
	Control (1–5)	Correlation coefficient	0.024	0.004
		Significance (two-tailed)	0.591	0.933
		Frequency (*n*)	509	509
	Rewards (1–5)	Correlation coefficient	0.012	0.000
		Significance (two-tailed)	0.785	0.995
		Frequency (*n*)	509	509
	Community (1–5)	Correlation coefficient	−0.002	−0.032
		Significance (two-tailed)	0.961	0.470
		Frequency (*n*)	509	509
	Sense of justice (1–5)	Correlation coefficient	0.006	−0.015
		Significance (two-tailed)	0.894	0.732
		Frequency (*n*)	509	509
	Values (1–5)	Correlation coefficient	0.076	0.048
		Significance (two-tailed)	0.085	0.282
		Frequency (*n*)	509	509
	Total (1–5)	Correlation coefficient	0.026	−0.023
		Significance (two-tailed)	0.556	0.605
		Frequency (*n*)	509	509
	Summary: job satisfaction levels before salary regulation	Correlation coefficient	0.104*	0.053
		Significance (two-tailed)	0.019	0.233
		Frequency (*n*)	509	509
	Summary: level of job satisfaction after salary regulation	Correlation coefficient	0.032	0.020
		Significance (two-tailed)	0.472	0.645
		Frequency (*n*)	509	509
	MSQ achievements (1–5)	Correlation coefficient	0.106*	0.079
		Significance (two-tailed)	0.017	0.076
		Frequency (*n*)	509	509
	MSQ independence (1–5)	Correlation coefficient	0.031	0.030
		Significance (two-tailed)	0.489	0.502
		Frequency (*n*)	509	509
	MSQ Recognition (1–5)	Correlation coefficient	0.036	0.006
		Significance (two-tailed)	0.422	0.893
		Frequency (*n*)	509	509
	MSQ Work conditions (1–5)	Correlation coefficient	0.076	0.088*
		Significance (two-tailed)	0.089	0.048
		Frequency (*n*)	509	509
	Considering all aspects of your job, to what extent are you satisfied? (1–5)	Correlation coefficient	0.059	0.055
		Significance (two-tailed)	0.184	0.213
		Frequency (*n*)	509	509
	Overall, how satisfied are you with your current life? (1–5)	Correlation coefficient	0.048	0.049
		Significance (two-tailed)	0.281	0.271
		Frequency (*n*)	509	509

*Correlation significant at the 0.05 level (two-tailed).

opportunities, work and family conflict and fairness (38), which has been confirmed by other studies (28, 39, 40). In our study, the mean score of all areas of work life in the surveyed group was 3.09 ± 0.45 (max. 5) and the workload score of the surveyed nurses was 2.67 ± 0.72, which was slightly above the mean value, meaning that it was at a moderate level. Philips obtained different results in his study, showing that more than half of the respondents reported high workload and intention to leave their current position. Moderate to strong intercorrelations were found between perceptions of workload and intention to leave the nursing profession (41).

Other authors have shown that job satisfaction of nurses employed in hospitals is closely related to work environment, structural empowerment, organizational commitment, professional commitment, job stress, and patient satisfaction (20, 42–44). In the author's study, workload in each field correlates statistically significantly with all aspects of job satisfaction. All correlations are positive, so it can be concluded that higher levels of satisfaction in areas of work life are associated with higher levels of satisfaction in every aspect of MSQ work. Other researchers also consider the work environment and aspects of work when assessing job satisfaction (19, 45). The influence of environmental factors on job satisfaction is important in nurses' work. According to Albashayreh et al. increasing nurses' participation in the affairs of the organization and providing adequate resources are the main ways to create a healthy work environment, which is a successful, cost-effective strategy for job satisfaction and thus retention of nurses (46).

Respondents also commented on the salary regulation, which was in 2022 for the professional group of nurses. The level of job satisfaction before wage regulation averaged 2.81 ± 1.03 and after regulation 3.27 ± 1.03, a noticeable increase. According to the authors, the current salary of nurses in Poland is satisfactory. Putra et al. proved that job satisfaction positively correlated with nurses' work and four dimensions of job satisfaction, namely supervision, contingent rewards, coworkers, nature of work and communication dimensions, were positively correlated with nurses' work activities (47). Other studies have shown that the most commonly identified predictors of job satisfaction were salary, organizational leadership and training opportunities, but the overall prevalence of job satisfaction among nurses was found to be low compared to global data (48, 49). A study by Gurkova et al. found weak to moderate positive correlations between nurses' work environment and satisfaction with their nursing role, satisfaction with their current job, and satisfaction with teamwork. Nurses who considered leaving their current job or position rated their work environment significantly worse than nurses who did not intend to leave their jobs (50). Good relationships with co-workers in the Gawęda et al. study were the main source of satisfaction for respondents as were job security and a good work atmosphere. Most of the respondents were of the opinion that the work they were doing was rather satisfying (51). The authors of a cross-sectional study conducted among nurses in Poland and Norway came to important conclusions. It was shown that higher satisfaction with all the examined aspects of job satisfaction, except for satisfaction with salary, was characterized by nurses working in Norway. They showed higher overall satisfaction with life and work. Low and very low life satisfaction was declared by 75% of Polish nurses and only 16% from the Norwegian group, while very high life satisfaction was declared by almost one-fifth of nurses from Norway and only 1% from Poland (52). In the Bello et al. study, respondents expressed above-average satisfaction with only two aspects of their job, namely salary and creativity. Satisfaction was lowest for aspects of recognition, relationships and responsibility (53). In Walkowiak and Staszewski's study, the most important factors that adversely affect nurses' job satisfaction in the study group were salary, working conditions and hospital policies and practices. Factors positively affecting job satisfaction were job security, serving others and being active at work (54). The results of studies by other authors indicate that nurses' job satisfaction is significantly lower when they work overtime and nurses with fewer absences are more satisfied with their work Nurses with longer tenure are more satisfied than those with shorter tenure, and nurses' job satisfaction positively correlates with their intention to stay on the job which is a strong predictor of nursing turnover (55).

In our own study, the degree of satisfaction with one's current nursing job, taking into account all aspects of work, including one's own values, ideals and goals in the opinion of the respondents was at the mean of 5.93 ± 1.91 (max. 10). According to the authors, individual perceptions of the profession, empathy and a sense of professional identity, are important in this regard. A similar important conclusion was reached by Zdun et al. According to the authors, satisfaction with work builds self-esteem and knocks down the needs for self-realization. It is important that a satisfied employee shows more commitment, low absenteeism and his attitude to work and employer is more honest. Behavioral nurses surveyed were more satisfied with the opportunity for self-realization, pay and use of working time, and the ability to influence the course of work. Procedural nurses were most satisfied with freedom of action and subordination due to the nature of the work (56). Xu and Fan found that the impact of the work environment and the often limited level of patient trust in nurses influences the development of negative emotions in the nurse–patient relationship and significantly reduces job satisfaction (57), which has been confirmed by other studies (58, 59). In addition, the employment conditions of nursing staff can also affect their job satisfaction and emotional well-being. Safe working conditions can improve their job satisfaction and sense of commitment. Job satisfaction can be reduced by factors such as a lack of a sense of safe and healthy working conditions, failure to meet employees' workload needs and expectations, and lack of independence (60).

To sum up, increasing the level of job satisfaction among nurses is a very important aspect, as this can both improve the quality of care received by patients and ensure the retention of nursing staff. In a situation where human life and health are at risk (as the time of the pandemic showed us, among other things), nurses, without paying attention to wages and workload, carried out their professional tasks at the highest level. Indirect correlations related to the work environment, social recognition or salary play an important role in the individual assessment of job satisfaction in our professional group.

5 Conclusion

As respondents' contentment increases in such areas of work life as sense of justice, control, rewards and values, the level of satisfaction increases as well. A sense of fairness in the work aspect of achievement and recognition was meaningful to respondents. The higher the satisfaction in the area of control, the higher the sense of satisfaction with independence increases. Working conditions (MSQ) correlated statistically significantly with sense of value, workload, and control.

The higher the satisfaction on these variables, the higher the level of satisfaction with working conditions. Among the areas of professional work rated lowest by the nurses surveyed and which could be improved were workload and sense of justice.

The results of the study can guide managers of health care units in creating a friendly work environment that will positively affect the satisfaction level of nursing staff. Further multicenter longitudinal studies are needed to generalize the findings and gain better insight into the causal relationship between perceived workload and nurses' job satisfaction in order to make recommendations for healthcare managers.

6 Limitations of the study

Limitations characteristic of cross-sectional studies apply. The research was conducted in a single clinical hospital at a specific point in time. Additionally, during the survey, there was a possibility of exchanging opinions among nurses, which could influence response patterns.

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 humans were approved by Bioethics Committee of the State Academy of Applied Sciences in Przemyśl. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

KT: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. KKo: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Supervision, Validation, Writing – review & editing. BM: Conceptualization, Data curation, Formal analysis, Investigation, Resources, Validation, Writing – review & editing. AK: Formal analysis, Investigation, Methodology, Resources, Validation, Writing – review & editing. KKa: Data curation, Formal analysis, Methodology, Validation, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 05 April 2024
DOI 10.3389/fpubh.2024.1366612

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OPEN ACCESS

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RECEIVED 07 January 2024
ACCEPTED 13 March 2024
PUBLISHED 05 April 2024

CITATION
Nahas ARF, Elnaem MH, Mubarak N, Khatwa MA, Barakat M, Faller E, Kassem LM, Ramatillah DL, Jaber A, Akkawi ME, Al-Shami AM, Chandran S, Mohamed I, Jack I, Abouelhana A, Courtenay A and Elrggal ME (2024) Assessment of burnout, resilience, and thriving among academic health professionals: findings from an international study.
Front. Public Health 12:1366612.
doi: 10.3389/fpubh.2024.1366612

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Assessment of burnout, resilience, and thriving among academic health professionals: findings from an international study

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Introduction: Burnout, resilience, and thriving significantly impact academics, particularly in health professions, where responsibilities are extensive. This study aimed to explore these constructs among academic health professionals, examining sociodemographic and work-related factors influencing these outcomes.

Methods: A cross-sectional study was conducted among academic health professionals via web-based professional networks from August 2022 to February 2023. Validated tools were used, and descriptive and inferential statistics were applied.

Results: 505 participants were included, predominantly female (63%), with a mean age of 38.15 ± 9.6 years. High burnout was reported by 10.9%, 13.7% experienced exhaustion, and 6.3% were disengaged. Resilience and thriving were moderate at 59.2 and 51.9%, respectively. Age correlated negatively with burnout ($r = -0.131$, $p = 0.003$) but positively with resilience ($r = 0.178$, $p < 0.001$). Females reported higher exhaustion ($p = 0.014$), while males showed greater resilience ($p = 0.016$). Instructors exhibited lower resilience compared to assistant professors ($p < 0.001$) and associate professors ($p < 0.001$). Those at public universities reported higher exhaustion than those at private universities ($p < 0.001$).

Conclusion: Variable levels of burnout, resilience, and thriving were observed among academic health professionals, influenced by sociodemographic and work-related factors. Interventions targeting resilience and thriving may mitigate burnout risk and enhance engagement among academics in health professions.

KEYWORDS

burnout, resilience, thriving, academic, health professions

1 Introduction

In the era of globalization and the advancement of technologies, the work environment has become more competitive and demanding, with work overload and stress imposed on workers, and academics are no exception. The disparities between the enduring and demanding work requirements and the capacity of academicians to tackle these demands ultimately culminate in burnout and emotional distress (1). Professional burnout is a psychological state that negatively impacts one's relationship with one's work, resulting in emotional exhaustion, reduced job engagement, commitment, and inappropriate practice within the work environment (2). Worldwide, the prevalence of burnout and emotional distress among academicians is relatively high, affecting over one-third of the population (3, 4). Furthermore, a high proportion of burnout tends to be affected by work type, chronic disease, and gender, reflecting other dimensions of this issue in academia (5).

Health field academicians face burnout because of a lack of coping with and adapting to ongoing stressful challenges that are considered part of academic job portfolios. Coping can be apparent via a worker's ability to be resilient and thrive following stressful events. Resilience is the ability to rebound after facing adversity via effective adaptation or management of substantial stressful events (6). By contrast, thriving refers to a positive mindset in dealing with work-related stressors with a joint state of vitality and learning, resulting in a higher level of functioning (7). There is a clear distinction between resilience and thriving in the workplace, particularly in the aftermath. Resilience results in a return to a balanced state, while thriving leads to significant gains. Those who exhibit determination are more likely to foster thriving, resulting in improved stress resilience (6).

Several possible risk factors may predispose health field academics to burnout and stress, such as increased workload, a persistent requirement to secure research grants, reduced resources for self-development, and increased demands on building capacities to cope with the ongoing trend to maintain e-learning activities (3, 5). Burnout is attributed mainly to the work environment, demands, and struggle to achieve work-life balance (8). Previous research examined the relationship between coping styles and burnout among healthcare professionals and found that task-oriented and adaptive coping was associated with a decreased risk of burnout, potentially improving staff well-being (9, 10). Moreover, individual-level coping capacities and handling workplace dynamics have also been found to shape the risk of stress and burnout and affect mental well-being among academic individuals (1, 11). Several recent reports have highlighted the ongoing risk of burnout in academia, resulting in a quiet quitting phenomenon in some cases that might affect the long-term sustainability of high-quality education (12).

Although there is some country-specific data on burnout assessment among academicians (3, 13, 14), this issue was not commonly assessed together with other relevant traits, such as resilience and thriving, from international perspectives. Therefore, assessing academic burnout and coping abilities in the health field is crucial to determining the most effective ways to reinforce academic success and mental well-being. Considering this, this study aimed to investigate the phenomenon of academic burnout, resilience, and thriving among academic health professionals while examining various sociodemographic and work-related factors that may impact these outcomes.

2 Methods

This was a cross-sectional, survey-based study conducted among international academic health professionals. Data were collected from October 2022 to February 2023 based on convenience sampling. A self-administered online pre-validated survey was prepared in Google Forms and distributed via participants' email addresses and social and professional networks. Regular reminders were sent every 2 weeks to ensure adequate response rate.

2.1 Ethical approval

The Research and Ethics Committee at the International Islamic University Malaysia (IIUM) approved the study protocol (IREC 2022-391). All study participants provided their online consent before their participation. The consent form was placed on the introductory page of the study form with all relevant details about the study and voluntary participation. Participants were asked to read these details carefully and give their consent if they wanted to continue participating in the research and start answering the survey questions.

2.2 Sample size and sampling

In order to calculate the required sample size, the study follows the method suggested by Krejcie and Morgan (1970) where a minimum of 376 participants is needed to ensure acceptable statistical power. The inclusion criteria included all consented academic health professionals with verified professional identities on social networks like LinkedIn. Participants were eligible to participate if they were

employed on academic appointments in one of the accredited academic programs in health professions in any country. Participation was voluntary and not associated with any compensation or incentives.

2.3 Measures

The survey consisted of four main parts:

Part 1: Sociodemographic, such as country, age, gender, marital status, and having kids.

Part 2: Work-related factors, such as annual salary, employment status, academic rank, institution type, experience, and loads of teaching and research.

Part 3: Oldenburg Burnout Inventory (OLBI):

Oldenburg Burnout Inventory has been regarded as a reliable and robust tool to measure academic burnout (15–17). It effectively measures burnout by assessing all aspects of exhaustion, namely physical, affective, and cognitive. This suits those whose jobs involve thinking and mental functioning (18). OLBI consists of two subscales: Exhaustion (OLBI-E) and Disengagement (OLBI-D), each with eight questions. To interpret the OLBI scores for our sample, we divided the frequency distributions of the mean scores for OLBI-E and OLBI-D into quartiles. Accordingly, OLBI-E scores of more than 22 were considered high exhaustion, whereas, for disengagement, high disengagement was deemed if OLBI-D scores were more than 21. The scores were then categorized into "low," "average," and "high" scores. This yielded four groups, i.e., High burnout (participants with "high" scores for both OLBI-E and OLBI-D), Exhaustion and Disengagement, either Disengaged or Exhausted (participants who had a "high" score for that particular subscale combined with a "low" or "average" score on the other subscale), and a fourth group of low-burnout (participants with "low" or "average" scores for both subscales) (19). Table 1 details OLBI subscales score interpretation and grouping.

Part 4: Stress Adaptation Scale (SAS).

Stress Adaptation Scale is a valid and reliable scale to assess two critical individual capacities: resilience and thriving. It consists of two subscales: the Brief Resilience Scale (BRS) and the Brief Thriving Scale (BTS). Each subscale consisted of six statements. Answers are based on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Scores are interpreted by summing the total score of the subscale and dividing it by six (i.e., the number of statements) to get the mean value. Scores are then categorized into five groups based on mean values (6, 20). Table 2 details the interpretation and grouping of the BRS and BTS scores.

2.4 Reliability of the used scales

Cronbach's alpha (α) measures the internal consistency of an assessment instrument. A Cronbach's alpha value between 0.6 and 0.8 is considered acceptable (21). A pilot study was conducted among 35 participants representing our population to ensure the reliability of OLBI and SAS among our sample. The Cronbach's alpha values of OLBI and SAS subscales were greater than 0.6, with OLBI-E at 0.82, and OLBI-D at 0.64, BRS at 0.61, and BTS at 0.9. Therefore, both scales demonstrated adequate overall internal consistency.

2.5 Data analysis

The responses were downloaded into an Excel® spreadsheet. The data were then imported for analysis to the Statistical Package for Social Sciences (SPSS, IBM, United States), version 25.0. Descriptive and inferential analyses were performed whenever appropriate. A P value of ≤ .05 was considered significant.

TABLE 1 OLBI subscales score severity and burnout grouping.

	OLBI-exhaustion scores	OLBI-disengagement scores
High (top quartile)	>22	>21
Average	18–22	16–21
Low (bottom quartile)	<18	<16
High burnout group	High	High
Exhausted group	High	Low or Average
Disengaged group	Low or Average	High
Low-burnout group	Low or Average	Low or Average

TABLE 2 Grouping based on BRS and BTS score ranges.

	Score ranges (mean)	
	BRS	BTS
Very high	5.00–4.67	5.00–4.83
High	4.50–4.00	4.67–4.33
Medium	3.83–3.00	4.17–3.33
Low	2.83–2.17	3.17–2.50
Very low	2.00–1.00	2.33–1.00

3 Results

3.1 Sociodemographic and work-related characteristics of the study participants

A total of 505 participants were included in the study. Participants ranged in age from 22 to 80, with a mean of 38.15 ± 9.6 years. Most of our sample consisted of female participants (63%) who were married (65.1%) and had kids (62.4%). Most respondents were from Egypt (19.4%) and India (17%), and a considerable number were also collected from Pakistan (12.1%), Jordan (11.1%), and the Philippines (10.7%).

Regarding the work-related characteristics of the study participants, the majority had an annual salary of less than U$25,000 (66.3%) and were permanent lecturers (69.5%). 14.7% were professors, and only 5% were from public colleges; however, the majority were from pharmacy faculties (67.1%), and 42.6% had more than 10 years of working experience. Over one-third of the sample (38.8%) had no clinical-related work, 13.7% were not involved in research, and 17.4% were involved in a 6-h weekly postgraduate supervision. Although about half of the participants had no administration post (56.6%), only 26.9% stated they were not involved in administration work. Nearly half of the study sample (51.1%) were familiar with the remote learning software available in their institution. However, less than half of the sample (41.2%) considered the available remote learning resources sufficient. Table 3 shows the sociodemographic and work-related characteristics of our sample.

3.2 Burnout assessment based on OLBI score

Based on OLBI scoring and burnout grouping (Table 1), our analysis showed that 55 (10.9%) respondents had high burnout, 69 (13.7%) were exhausted, and 32 (6.3%) were disengaged (Figure 1). Our sample had an average exhaustion level (M = 20.0 ± 3.7) and an average disengagement level (M = 18.7 ± 3.4).

3.3 Resilience and thriving assessment based on BRS and BTS

The proportion of participants with BRS scores in the medium range was 59.2% ($n = 299$), translating into an overall medium resilience of our sample with a mean BRS score of 3.14 ± 0.6. Similarly, the proportion of participants with BTS scores in the range considered medium was 51.9% ($n = 262$), which also translates into an overall medium thriving of our sample with a mean BTS score of 3.44 ± 0.7. Figure 2 shows more details on the BRS and BTS analysis.

3.4 Inferential analysis of demographic and work-related characteristics, burnout, resilience, and thriving

3.4.1 Age and gender

Age was significantly and negatively correlated with OLBI-E scores ($r = -0.131$, $p = 0.003$) but positively with BRS scores ($r = 0.178$, $p = 0.001$). An independent-sample *t*-test showed that gender differs significantly in OLBI-E and BRS scores. Females were more exhausted (M = 20.35 ± 3.57) compared to males (M = 19.50 ± 3.96, $p = 0.014$), whereas males were more resilient (M = 3.22 ± 0.57) than females (M = 3.09 ± 0.58, $p = 0.016$).

3.4.2 Employment status, academic rank, and responsibilities

There was a significant difference in employment status, in which contract lecturers (Md [IQR] = 19.50 [4.00]) were less exhausted than permanent lecturers (Md [IQR] = 20.00 [5.00], $p = 0.028$). A significant difference in academic ranking was also revealed. Instructors were more exhausted (Md [IQR] = 21.00 [5.00]) than lecturers (Md [IQR] = 20.00 [3.00], $p < 0.001$) and assistant professors (Md [IQR] = 20.00 [4.00], $p = 0.043$), but less exhausted than associate professors (Md [IQR] = 19.00 [6.00], $p < 0.001$) and professors (Md [IQR] = 20.00 [6.00], $p = 0.044$). Instructors were also less resilient (Md [IQR] = 3.00 [0.67]) than assistant professors (Md [IQR] = 3.00 [0.83], $p < 0.001$) and associate professors (Md [IQR] = 3.25 [0.67], $p < 0.001$). Interestingly, participants with admin posts showed higher resilience (Md [IQR] = 3.17 [0.83]) compared to those who were not holding any admin post (Md [IQR] = 3.00 [0.50], $p < 0.001$). In addition, those who were involved in administration duties for more than 6 h a week were also more resilient (Md [IQR] = 3.17 [0.83]) compared to those with no involvement in any administration duties (Md [IQR] = 3.00 [0.67], $p < 0.013$).

3.4.3 Institution type and resources

In terms of institution type, those who were working in a public university were more exhausted (Md [IQR] = 21.00 [5.00], $p < 0.001$) than those who were working in a private college (Md [IQR] = 19.00 [5.00], $p < 0.001$) or private university (Md [IQR] = 19.00 [4.00], $p < 0.001$). Participants who believed that their institution had sufficient remote learning resources were less disengaged and less exhausted (OLBI-D: Md [IQR] = 18.00 [4.00]; OLBI-E: Md [IQR] = 20.00 [4.00]) compared to those who believed that remote learning resources were partially sufficient (OLBI-D: Md [IQR] = 19.00 [4.00], $p < 0.001$; OLBI-E: Md [IQR] = 21.00 [4.00], $p < 0.001$) or insufficient (OLBI-D: Md [IQR] = 19.00 [3.00], $p = 0.001$; OLBI-D: Md [IQR] = 20.00 [5.00], $p = 0.027$). More detailed results are presented in Table 4.

3.5 Correlations between burnout, resilience, and thriving

Spearman's rank-order correlation analysis revealed a significant positive correlation between the OLBI-D and OLBI-E scores and a significant negative correlation between OLBI-D and both the BRS and BTS scores. OLBI-E scores were also significantly and negatively correlated with both BRS and BTS. BRS and BTS scores were significantly and positively correlated (Figure 3).

4 Discussion

The present study assessed the prevalence of burnout, resilience, and thriving among a relatively large sample of health

TABLE 3 Participants' sociodemographic and work-related characteristics (*N* = 505).

	N	%
Gender		
Male	187	37.0
Female	318	63.0
Marital status		
Divorced/Separated	22	4.4
Married	329	65.1
Single	145	28.7
Widowed	9	1.8
Having kids		
No	190	37.6
Yes	315	62.4
Country		
Egypt	98	19.4
India	86	17.0
Pakistan	61	12.1
Jordan	56	11.1
Philippine	54	10.7
KSA	40	7.9
Indonesia	34	6.7
UAE	31	6.1
Malaysia	19	3.8
Syria	10	2.0
Others (Yemen, Sudan, Libya, Ethiopia, Iraq, Tunisia, and Afghanistan)	16	3.2
Annual salary		
< U$25 K	335	66.3
U$25 K to < U$50 K	79	15.6
U$50 K to < U$100 K	67	13.3
> U$100 K	24	4.8
Employment status		
Visiting lecturer	30	5.9
Permanent lecturer	351	69.5
Contract lecturer	124	24.6
Academic rank		
Instructor/Teaching assistant	108	21.4
Lecturer	116	23.0
Assist. Prof.	101	20.0
Assoc. Prof.	106	21.0
Prof.	74	14.7
Institution type		
Private college	155	30.7
Public college	28	5.5
Private Unit	160	31.7
Public Unit	162	32.1
Field/Faculty		

(Continued)

TABLE 3 (Continued)

	N	%
Allied Health/Medical Lab	31	6.1
Public health	11	2.2
Nursing/Midwifery	26	5.1
Pharmacy	339	67.1
Dentistry	28	5.5
Medicine	70	13.9
Working experience in years		
<2 years	66	13.1
2–5 years	95	18.8
>5–10 years	129	25.5
>10 years	215	42.6
How many working hours per week do you spend in the clinical setting?		
None	196	38.8
< 5 h	87	17.2
>5–10 h	112	22.2
> 10 h	110	21.8
How many hours do you usually spend on research in a week?		
None	69	13.7
< 10 h	265	52.5
>10–20 h	124	24.6
> 20 h	47	9.3
How many hours of postgraduate supervision (e.g., student meetings and discussions) do you usually spend in a week?		
None	167	33.1
<3 h	102	20.2
>3–6 h	148	29.3
>6 h	88	17.4
Do you currently hold an administrative post? (e.g., Dean, Deputy Dean, Head of Department, and Coordinator)		
No	286	56.6
Yes	219	43.4
How many hours of administrative work do you usually spend in a week?		
None	136	26.9
<3 h	89	17.6
>3–6 h	124	24.6
>6 h	156	30.9
How familiar are you with remote learning software?		
No	38	7.5
Not much	109	21.6
Familiar	258	51.1
Very	100	19.8
Does your institution provide sufficient remote learning resources (software, workshops, and equipment)		
Insufficient	95	18.8
Partially sufficient	202	40.0
Sufficient	208	41.2

sciences academicians from over 10 countries. Burnout, resilience, and thriving are all important concepts for academic health professionals and can impact the quality of health education delivered to future generations of healthcare practitioners. Burnout is a state of physical, emotional, and mental exhaustion caused by excessive and prolonged stress, a relatively increasing trend in academia (8). The present study's findings showed a prevalence of high burnout at approximately 11%, affected predominantly by exhaustion over disengagement domains. A study conducted in Brazil among university professors recruited a smaller sample and used a different burnout assessment tool, underpinning a relatively higher prevalence of 40% (3). Another systematic review summarized burnout data from 12 studies conducted between 2005 and 2020. It reported an overall burnout risk of 37%, which is always higher than ours, but different assessment tools have been used (4). Considering that high burnout in our study means an increased risk of exhaustion and disengagement, this could expose academic staff to a state of losing interest, passion, and the ability to guide the young generation of healthcare practitioners adequately.

There have been several factors contributing to burnout in workplaces such as universities; these could include mainly job demands and lack of job resources, whereas available job resources exclusively predict engagement (3); burnout is related to health problems as well as to turnover intention, whereas engagement is related only to the latter (4); burnout mediates the relationship between job demands and health problems, whereas engagement mediates the relationship between job resources and turnover intention.

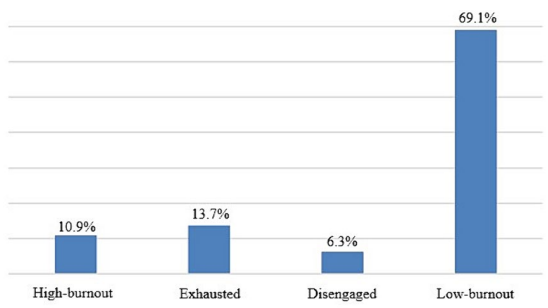

FIGURE 1
OLBI grouping of the study sample expressed in proportions.

Our study participants had a medium level of resilience and thriving attributes. Resilience is essential in preventing burnout, as resilient people can cope with stress and adversity, bounce back from setbacks, and maintain a positive outlook (22). Our study revealed an inverse correlation between resilience and burnout. Similarly, a recent meta-analysis involving 29 studies conducted among nurses highlighted the inverse correlation between resilience burnout and exhaustion (23). This could pave the way for interventions to boost resilience and decrease the burnout risk among healthcare providers in academia.

Concerning the correlation between age and gender with burnout and resilience levels, our study showed that the younger generation and the female gender were more likely to be exhausted. At the same time, relatively older males were more likely to have higher resilience levels. Similar to our findings, an Italian study among healthcare workers highlighted that burnout was predicted by lower age, female gender, and low resilience levels (24). In this context, a relatively large United States study conducted among physicians underpinned that the link between female gender and burnout can be less significant by assuring equal treatment regarding work environment diversity and inclusion and perceived appreciation (25). These could be considered modifiable factors to reduce the risk of burnout among female workers. On the other hand, a previous Turkish study assessed resilience levels among teachers but did not show a significant association with either gender or age (26).

Furthermore, a study among university teachers in the Philippines indicated a moderate level of burnout independent of age, gender, academic rank, and service length (27). However, our findings showed a difference in burnout and resilience based on employment status and academic rank, where contact-based academics tended to be less exhausted than their permanent counterparts. At the beginning of their academic careers,

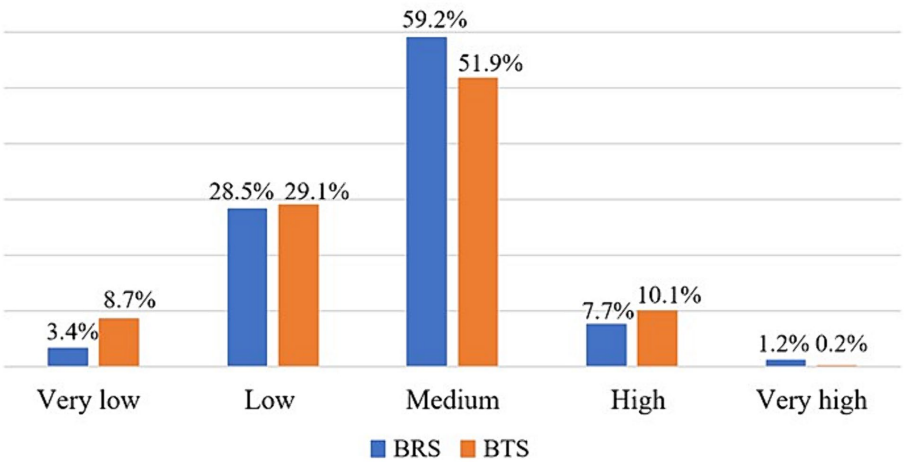

FIGURE 2
BRS and BTS grouping of the study sample expressed in proportions.

TABLE 4 Comparison of OLBI-D, OLBI-E, BRS, and BTS based on the sociodemographic and work-related factors of the participants (*N* = 505).

	Disengagement	Exhaustion	BRS	BTS
Age	0.119	**0.003**[a]	**<0.001**[a]	0.309
Gender	0.257	**0.014**[b]	**0.016**[b]	0.473
Marital status	0.780	0.356	0.334	0.954
Having kids	0.194	0.055	0.311	0.74
Annual salary	0.638	0.873	0.96	0.540
Employment status	0.417	**0.023**[d]	0.081	0.076
Academic rank	0.143	**<0.001**[d]	**<0.001**[d]	0.807
Institution type	0.143	**<0.001**[d]	0.638	0.486
Faculty	0.325	0.560	0.881	0.097
Length of service	0.500	0.539	0.138	0.154
Hours of clinical setting work	0.719	0.055	0.225	0.053
Hours spent on research in a week	0.679	0.055	0.292	0.598
Hours of postgraduate supervision	0.354	0.133	0.837	0.054
Administration post	0.374	0.411	**0.001**[c]	0.816
Hours involved in admin post	0.065	0.778	**0.024**[d]	0.320
Familiarity with remote learning	0.392	0.404	0.208	0.852
Remote learning availability	**<0.001**[d]	**<0.001**[d]	**<0.001**[d]	0.093

Significant *p* values are in bold. [a]Pearson correlation, [b]Independent-samples *t*-test, [c]Mann Whitney U-test, and [d]Kruskal Wallis test.

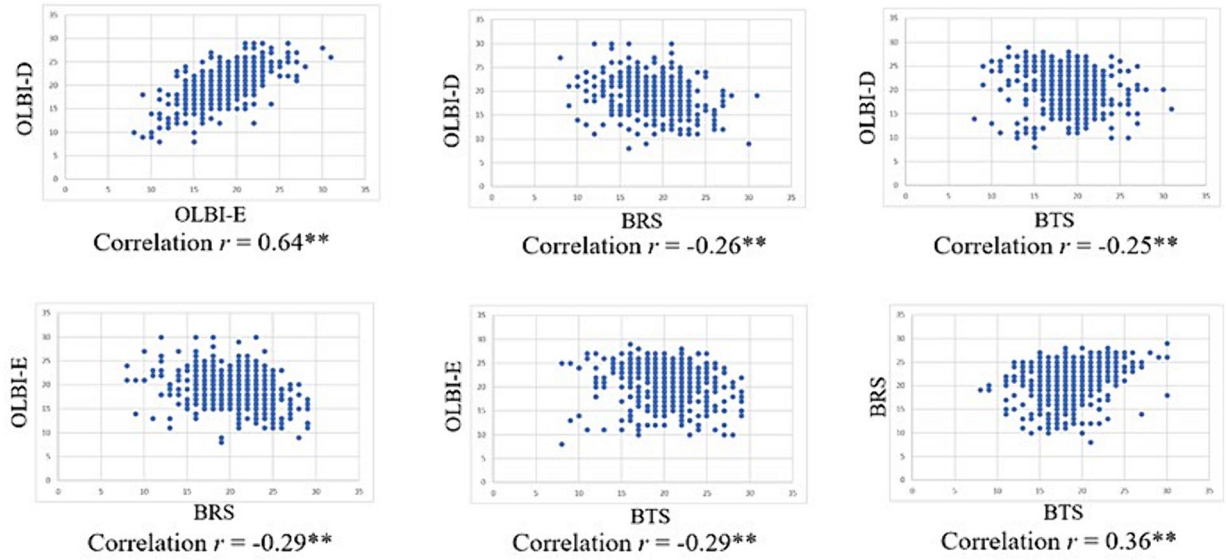

FIGURE 3
Correlation (Spearman's Rank-order) for burnout, resilience, and thriving scores.

instructors tend to be less resilient than their colleagues with higher academic ranks. This could imply the need for proper mentorship and advising programs for young academicians with proper support to set realistic expectations and goals while starting their academic careers. In addition, the present study showed that respondents from public universities tended to be more exhausted than those from private institutions. A previous large study among students highlighted that public university students tend to have lower odds of mental well-being (11). It is believed that the institution type could reflect the strategies followed to ensure staff well-being and allow them to adapt and grow professionally as successful, resilient teachers. In this domain, public universities in

the participating countries might consider revisiting their staff support and well-being agendas with a periodical assessment of burnout and resilience levels.

Measures to alleviate burnout among academics should consider several factors contributing to burnout, such as job demands and lack of job resources (28). These could entail a reduced workload, which might be accomplished by increasing faculty numbers, decreasing class sizes, or providing more equitable work-life arrangements (29). This point is critical to consider, given that ethical climate dimensions such as role overload and clarity directly affect burnout risk, particularly for relatively younger employees (30). Further evidence supported a relationship between ethical leadership focusing on role clarity and burnout, encouraging adopting more active leadership to mitigate burnout risk (31). In addition, it is important to develop and maintain a supportive environment that provides opportunities for professional development, mentoring, and peer support (32). Finally, clear policies should be implemented to achieve work-life balance, such as setting boundaries, taking breaks, and regular exercise (29). In addition, various interventions could be considered to boost resilience, such as encouraging individuals to have a positive outlook on overcoming obstacles and accomplishing their goals (33). In addition, they can establish reliable social support networks upon which they can rely in times of difficulty (29). Lastly, a recent meta-analysis showed that resilience could be developed through interventions based on cognitive behavioral therapy, mindfulness interventions, and a mix of both (34). Moreover, to achieve a thriving, which is a state of being successful and thriving, academics in the health sciences should find a work-life balance, set realistic goals, work toward them with the necessary determination for academic success (35), and give back to their community by volunteering their time and energy to help the community improve. The latter should help acquire a sense of self-actualisation and a belief that the benefits of academic expertise extend beyond typical academic pursuits by integrating these benefits into students' activities (36).

Finally, burnout, resilience, and thriving are all important concepts for health sciences academicians. By understanding these concepts and taking steps to prevent burnout, increase resilience, and thrive, health sciences academics can improve their physical and mental health, increase productivity, and achieve their goals. This could directly impact the quality and outcomes of higher education in the health sciences. We believe that the current study was able to present responses gathered from different international perspectives with a relatively large sample. In addition, it provided updated insights on the status of burnout, resilience, and thriving among a unique group of academic educators involved in health sciences programs. The findings of the present study could be used as a foundation for designing interventions and initiatives to support health sciences academics thriving and achieving their professional goals through resilience at minimal risk of burnout.

The present study has several limitations. First, there was a disproportionate distribution of responses among different countries, which did not enable cross-country comparison or country-specific recommendations. Second, the cross-sectional study has time-restricted limitations that do not allow for further investigation of potential causal relationships. Lastly, the online survey did not account for investigating the presence of any specific measures by academic institutions to assess or improve the well-being of their academic staff.

5 Conclusion

This study presents findings on the varying degrees of burnout, resilience, and thriving experienced by academic health professionals which are influenced by various sociodemographic and work-related factors. Interventions aimed at enhancing resilience and facilitating thriving may diminish the risk of burnout and enhance engagement among academic staff in the health professions field. Ultimately, this could directly impact the quality and outcomes of higher education in this field.

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 humans were approved by the Research and Ethics Committee at the International Islamic University Malaysia (IIUM) approved the study protocol (IREC 2022-391). The study was conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AN: Conceptualization, Data curation, Formal analysis, Methodology, Validation, Writing – original draft, Writing – review & editing. MoE: Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. NM: Investigation, Project administration, Writing – review & editing. MK: Investigation, Project administration, Validation, Writing – review & editing. MB: Investigation, Project administration, Validation, Writing – review & editing. EF: Investigation, Project administration, Writing – review & editing. LK: Investigation, Project administration, Validation, Writing – review & editing. DR: Data curation, Investigation, Project administration, Validation, Writing – review & editing. AJ: Investigation, Project administration, Writing – review & editing. MAk: Investigation, Writing – review & editing. AbA: Investigation, Writing – review & editing. SC: Investigation, Project administration, Writing – review & editing. IM: Investigation, Project administration, Writing – review & editing. IJ: Project administration, Resources, Writing – review & editing. AhA: Investigation, Project administration, Writing – review & editing. AC: Investigation, Project administration, Writing – review & editing. MaE: Investigation, Project administration, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. The authors extend their appreciation to the Deputyship for Research and Innovation of the Ministry of Education in Saudi Arabia for funding this research work through project number IFP22UQU4320605DSR246.

Acknowledgments

We thank all the academic staff who participated in this study. We are also grateful for the data collection support Nermin Osman provided. Finally, we thank the Ulster University networking ISPF call for supporting the dissemination of this work.

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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 10 April 2024
DOI 10.3389/fpubh.2024.1374941

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OPEN ACCESS

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RECEIVED 23 January 2024
ACCEPTED 28 March 2024
PUBLISHED 10 April 2024

CITATION
Zhang X, Chen S, Zheng Z, Zhao M, Song L, Zhao Y and Wang Z (2024) The relationship between psychological capital, burnout and perceived stress in junior nurses: a latent profile analysis.
Front. Public Health 12:1374941.
doi: 10.3389/fpubh.2024.1374941

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The relationship between psychological capital, burnout and perceived stress in junior nurses: a latent profile analysis

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Background: Psychological capital, an intrinsic personal asset, enhances junior nurses' ability to navigate transition and sustain superior job performance. This study aimed to classify junior nurses into distinct psychological capital profiles and examine their associations with burnout and perceived stress levels.

Methods: A cross-sectional study involving 480 junior nurses from three hospitals in Beijing assessed psychological capital, stress, and burnout using e-questionnaires, from July 2021 to August 2022. We employed exploratory latent profile analysis for psychological capital profiling and logistic regression with the best subset method to identify the influential factors.

Results: The results of the latent profile analysis supported the models of two latent profiles, which were defined as low psychological capital (224, 46.5%) and high psychological capital (256, 53.5%). Logistic regression revealed that introverted nurses and those experiencing moderate to high levels of burnout and stress were more likely to exhibit low psychological capital.

Conclusion: Nursing management should proactively identify and support junior nurses with low psychological capital, with a focus on introverted individuals, to mitigate the impact of stress and burnout.

KEYWORDS

junior nurses, psychological capital, burnout, perceived stress, latent profile analysis

1 Background

With the development of positive psychology and active organizational behavior, researchers have gradually shifted their focus from negative psychology to positive mental states and the behavioral attitudes of individuals. Initially, Luthans introduced psychological capital to explain the positive mental abilities of employees (1), which refers to a type of positive mental energy expressed in the growth and development of an individual, indicating an individual's motivational tendencies, and is a higher-order composite multidimensional structure generated through positive mental structures. Previous studies have demonstrated that nurses' psychological capital is positively correlated with desired work-related outcomes such as work engagement, job satisfaction, organizational commitment, and innovative behaviors (2). Higher psychological capital was also associated with lower undesirable work-related outcomes like burnout and turnover intentions. (3, 4). In addition, psychological

capital promotes nurses' mental health and relieves work stress; for example, previous research has confirmed that psychological capital improves depression and insomnia among nurses (5–7). Based on the above, in today's global background of nursing human resource shortage, improving nurses' psychological capital can help to further improve their physical and mental health, stabilize and develop the nursing workforce, and improve the performance of organizational management (8). Despite the benefits of psychological capital, a meta-analysis showed a downward trend in nurses' psychological capital levels starting in 2019 (9). In addition, it is worth noting that among the group of nurses, junior nurses, who are the mainstay of future nursing human resources, but have the lowest level of psychological capital, deserve more attention (10).

Nurses who have worked in the clinical setting for less than 3 years after graduating from the nursing profession are called junior nurses (11). By 2025, more than one million registered nurses are expected to retire, and these vacancies will be filled by junior nurses (12). The WHO reported on the State of the World's Nursing 2020 also notes that the nursing workforce is relatively young (13). As an important human resource pool for the nursing team, junior nurses are relevant to the continued health of the future nursing workforce (14). A scoping review noted that nurses with younger age and years of experience possess lower psychological capital, which is detrimental to the development of optimistic work attitudes and clinical thinking skills, reduces work satisfaction and adaptability, and contributes to increased turnover rates among junior nurses (15, 16). In 2023, registered nurses leaving within 2 years of employment account for 52.5% of all departing nurses, and the cost per registered nurse leaving a job average about $52,350 (17). The reason for such a high turnover rate may be that junior nurses have just gone through the transition from school to hospital, and are faced with the impact of the gap between theory and practice, which are vulnerable to maladaptation because of their lack of knowledge and work experience and their confusion about their future development (18, 19). It has been shown that newly graduated registered nurses are particularly vulnerable to emotional exhaustion, stress and burnout during their first 3 years on the job (20). Psychological capital, as an internal personal resource, can help junior nurses cope with transitions and effectively manage work stress (21, 22). Therefore, there is a need to focus on nurses' psychological capital and the factors that influence it in order to identify nurses with low psychological capital and lay the foundation for subsequent support and intervention.

There are no cut-off scores that distinguish between different levels of psychological capital and the complexity of factors influencing psychological capital may be subject to heterogeneity between groups. Most existing studies have adopted a variable-centered approach, which is limited to exploring the correlation between variables and ignoring the existence of heterogeneity among individuals. Thus, research on the differences in psychological capital of nurses with different characteristics is lacking, which is not conducive to identifying people with different characteristics and proposing targeted interventions accordingly (23). Furthermore, there are still no standardized criteria for categorizing psychological capital, and classifying it based only on the scores of the scales ignores the differences between individuals. However, individual-centered latent profiling analysis (LPA) avoids these problems. LPA is a person-centered approach that allows individuals with similar personal and professional characteristics, traits, or behavioral patterns to be combined into profiles based on their responses and has been applied to explore nurses' work engagement, moral courage, professional benefit, and burnout (24–27). Through LPA, different profiles of psychological capital of junior nurses were identified, and subgroups with heterogeneous characteristics and differences in influencing factors between groups were explored, thus providing new perspectives on targeted measures to prevent perceived stress, burnout, and psychological outcomes for nurses, improve their clinical performance, and reduce turnover rates.

Therefore, this study used LPA to explore the potential profiles of psychological capital of junior nurses from an "individual-centered" perspective and conducted an in-depth quantitative analysis of the factors affecting the potential profiles of psychological capital, with a view to providing a reference for the development of scientific and effective individualized interventions for the psychological capital of junior nurses to promote high-quality and sustainable development of the nursing workforce.

2 Materials and methods

2.1 Aims

This study aimed to explore subsets of psychological capital among junior nurses using person-centered latent profile analysis and to identify the factors associated with a certain psychological capital profile.

2.2 Design

This was a multicenter cross-sectional investigation. The study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (28).

2.3 Study participants and sample size

This study used an online recruitment method with junior nurses from three grade A tertiary hospitals in Beijing, China. The survey was conducted from July 2021 to August 2022. The study participants were required to meet the following criteria: (1) being 18 years of age or older, (2) having a maximum of 3 years of work experience, and (3) providing informed consent. To ensure the validity of the results, nurses with psychological diseases or those on a long leave of absence were excluded from the study.

The PASS2021 software was used for the sample size calculation. Based on a systematic evaluation of the level of nurses' psychological capital published in 2023 (9), we calculated the standard deviation of Asian nurses' psychological capital scores to be approximately 31.18. Setting $\alpha = 0.05$, the distance from the mean to the limit was 3.00, and the required sample size was calculated to be 418 (29). Considering the incorrectly filled in or non-response, the sample size was further augmented by 10%, which ultimately determined that the sample size to be surveyed for this study was 465.

2.4 Measures

2.4.1 Baseline characteristics of the participants

Designed by the research team, it collected the individual characteristics of the participants and work-related factors. The individual characteristics of the participants included age, gender, education level, salary income, and personality. Work-related factors included doctor-nurse relationships, night shifts, and turnover intention.

2.4.2 Psychological capital questionnaire (PCQ)

The scale was developed by Luthans et al. to measure the psychological capital of research participants (30). Luo et al. translated and revised the scale into a Chinese version through cross-cultural debugging in 2010 (31). The revised Chinese version of the scale has 20 items, including four dimensions: self-efficacy (1–6 items), hope (7–12 items), resilience (13–17 items), and optimism (18–20 items). A 6-point Likert scale was used, with a total score ranging from 20 to 120, with higher scores indicating higher levels of psychological capital. The McDonald's ω of the scale was 0.835 in this study.

2.4.3 Maslach burnout inventory (MBI)

The scale was developed by Maslach et al. to measure burnout among medical professionals (32). The Chinese version translated by Feng et al. was used in this study (33). It consists of 22 items and includes three dimensions: emotional exhaustion, depersonalization, and personal accomplishment. The scale is based on a 7-point Likert scale with a total score of 0–132, with higher scores indicating more severe burnout. To facilitate interpretation of the results, the dimension of personal achievement was reverse-graded in this study and named low personal accomplishment. The McDonald's ω of the scale was 0.770 in this study.

2.4.4 Perceived stress scale (PSS)

The scale was developed by Cohen et al. to measure the degree of perceived psychological stress in individuals and translated into Chinese by Yang (34, 35). The Chinese version of the PSS has a total of 14 entries and uses a 5-point Likert scale, with a total score ranging from 0 to 56. A score greater than 24 is considered to be perceived stress, with higher scores indicating greater perceived stress. The McDonald's ω of the scale was 0.725 in this study.

2.5 Data collection

The study team first established collaboration with the department of nursing at each study center, and the initial screening of potential study subjects who met the inclusion and exclusion criteria was conducted by reviewing the induction and attendance records of nurses in each hospital. Administrators of the Department of Nursing at each hospital were commissioned to send an invitation for study recruitment and an informed consent form to potential study participants. An electronic questionnaire was sent through the WeChat platform to nurses who volunteered to participate and signed an informed consent form. To avoid missing data, we set each question of the e-questionnaire as a mandatory field that could only be submitted if all answers were completed. All completed questionnaires were transmitted to the back-end management platform via the Internet to be checked by members of the research team, and participants were asked to refill in any questionnaires that were incorrectly filled in or clearly inconsistent with the actual situation.

2.6 Ethical consideration

The study adhered to the principles set forth in the Declaration of Helsinki and was thoroughly examined and endorsed by the Medical Ethics Committee of Peking University First Hospital (No: 2021–415). Prior to their inclusion in the study, all individuals willingly provided informed consent, and stringent measures were implemented to ensure the anonymity of all recorded and analyzed data.

2.7 Statistical analyzes

Data were statistically analyzed in this study using Mplus 8.3 and R software (version 4.3.1), and a two-sided test of $p < 0.05$ indicated a statistically significant difference. We used frequency/percentage (%) for the statistical description of count or rank information in participants' baseline data; continuous variables such as participants' age and scale scores were first plotted on Q-Q plots to test the normality of the data. The majority of the points of the above variables could be distributed on a straight line with a clear linear trend, so the continuous data could be considered to follow a normal distribution and were therefore described using Mean ± SD. Pearson's correlation was used to analyze the correlation coefficients between the total scores and dimensions of each scale.

An exploratory latent profile analysis was used to explore latent models of psychological capital in junior nurses. We fitted a total 1–5 profile models, after which the best model was screened by comparing each model index. The model indices used in this study included the Pearson chi-square test, likelihood ratio chi-square test, Akaike information criterion (AIC), Bayesian information criterion (BIC), and sample-corrected BIC (aBIC), to identify the goodness of fit of the model, with smaller values representing a better fit. The bootstrap likelihood ratio test (BLRT) and lo–mendell–rubin (LMR) were used to compare the differences in fit between the models, and *p*-values of both LMR and BLRT that reached a significant level indicated that the model with k categories was significantly better than the model with k-1 categories (36). An entropy value closer to 1 indicates a more accurate classification (37).

Finally, this study constructed a logistic regression model to analyze the effects of the above variables on psychological capital profiles, using the psychological capital profile category as the dependent variable and baseline information, burnout, and perceived stress of junior nurses as independent variables. In the process of model construction, the variance inflation factor was first used to test the multicollinearity of the model, and a VIF < 5 indicated that there was no multicollinearity problem in the model (38). Subsequently, all possible combinations of features were traversed through the best subset method to increase the accuracy of the analysis results, and the features affecting different profiles of psychological capital were determined (39).

3 Results

3.1 Participant characteristics

A total of 480 junior nurses completed the questionnaire, meeting the sample size requirements for this study. The age of the 480 participants was 24.2 ± 1.88 years, of which 88% were female and 12% were male. The number of those who received a bachelor's degree or a higher level of education was 296 (62%). When asked about an individual's personality, 48% gave feedback that they were extroverted, while 52% were introverted. The overall psychological capital score was 80.2 ± 12.84.75% reported moderate-to-high levels of burnout. Additionally, 56% of the participants were stressed. Table 1 presents information on the participants' general characteristics.

TABLE 1 Patient demographics and baseline characteristics.

Characteristic	N = 480[a]
Age	
Mean (SD)	24.2 (1.88)
Gender	
Female	420 (88%)
Male	60 (12%)
Education	
Junior college	184 (38%)
Undergraduate	247 (52%)
Postgraduate	49 (10%)
Monthly Salary (¥)	
5,000–10,000	156 (33%)
<5,000	280 (58%)
>10,000	44 (9%)
Work experience	
1 year	203 (42%)
2 year	164 (34%)
3 year	113 (24%)
Personality	
Extraversion	229 (48%)
Introverted	251 (52%)
Relationship between doctors and nurses	
Good	370 (77%)
Poor	110 (23%)
Rotating night shift work	
Yes	392 (82%)
No	88 (18%)
Turnover intention	
Yes	53 (11%)
No	427 (89%)
PCQ scores	
Mean (SD)	80.2 (12.84)
MBI scores	
Mean (SD)	76.8 (11.55)
PSS scores	
Mean (SD)	25.5 (6.45)
MBI category	
Low	122 (25%)
Medium	247 (52%)
High	111 (23%)
PSS category	
Normal	209 (44%)
Stressful	271 (56%)

[a]*n* (%); SD, standard deviation; PCQ, Psychological Capital Questionnaire; MBI, Maslach Burnout Inventory; PSS, Perceived stress scale.

3.2 Correlation analysis

The results of Pearson's correlation analyses indicated that there were low and medium levels of negative correlations between the total psychological capital scores and each of its dimensions and burnout (including all dimensions) and perceived stress among junior nurses ($r = -0.1$ to-0.55). However, there was a positive correlation between burnout and its dimensions, and perceived stress at medium and high levels ($r = 0.22$ to 0.62). All the results were statistically significant ($p < 0.05$). Figure 1 shows the correlation coefficient plot between psychological capital, burnout, and perceived stress among the junior nurses.

3.3 Latent profile analysis of psychological capital

This study conducted an individual-centred latent profile analysis of the psychological capital of 480 junior nurses. Four-dimensional scores of the psychological capital questionnaire were used as exogenous indicators, and a latent profile model ranging from 1 to 5 was obtained by gradually and sequentially fitting the baseline model from latent profile 1. Table 2 shows the model fit information. Although the 5-profile model had the lowest values of AIC, BIC, and aBIC and significant LMR and BLRT. However, the two groups in this model had participant proportions below 0.1% and the results were less interpretable. Among the other latent profiles, the 2-profile model had the largest entropy value above 0.8, indicating the highest classification accuracy and relatively good posterior probability. In addition, Supplementary Figure S1 shows a plot of the information criteria by the number of profiles. Profile 2 had the most pronounced slope of decline in fit, and from there, the improvement in each fit metric leveled off significantly. Therefore, the 2-profile model was selected as the final solution for this study.

According to the 2-profile results, 224 (46.5%) of the junior nurses belonged to Category 1 and 256 (53.5%) belonged to Category 2. Figure 2 plots the line graphs of the scores on the dimensions of psychological capital to facilitate the analysis of the characteristics of the two profiles of psychological capital of junior nurses. As shown in Figure 2, the fluctuations in the ratings of the dimensions of psychological capital of the two categories of junior nurses were broadly similar, but Category 1 was generally at a lower level than Category 2. The total psychological capital scores for categories 1 and 2 were 68.83 ± 7.59 and 90.14 ± 6.80, respectively. Therefore, this study labelled Category 1 as low psychological capital and Category 2 as high psychological capital.

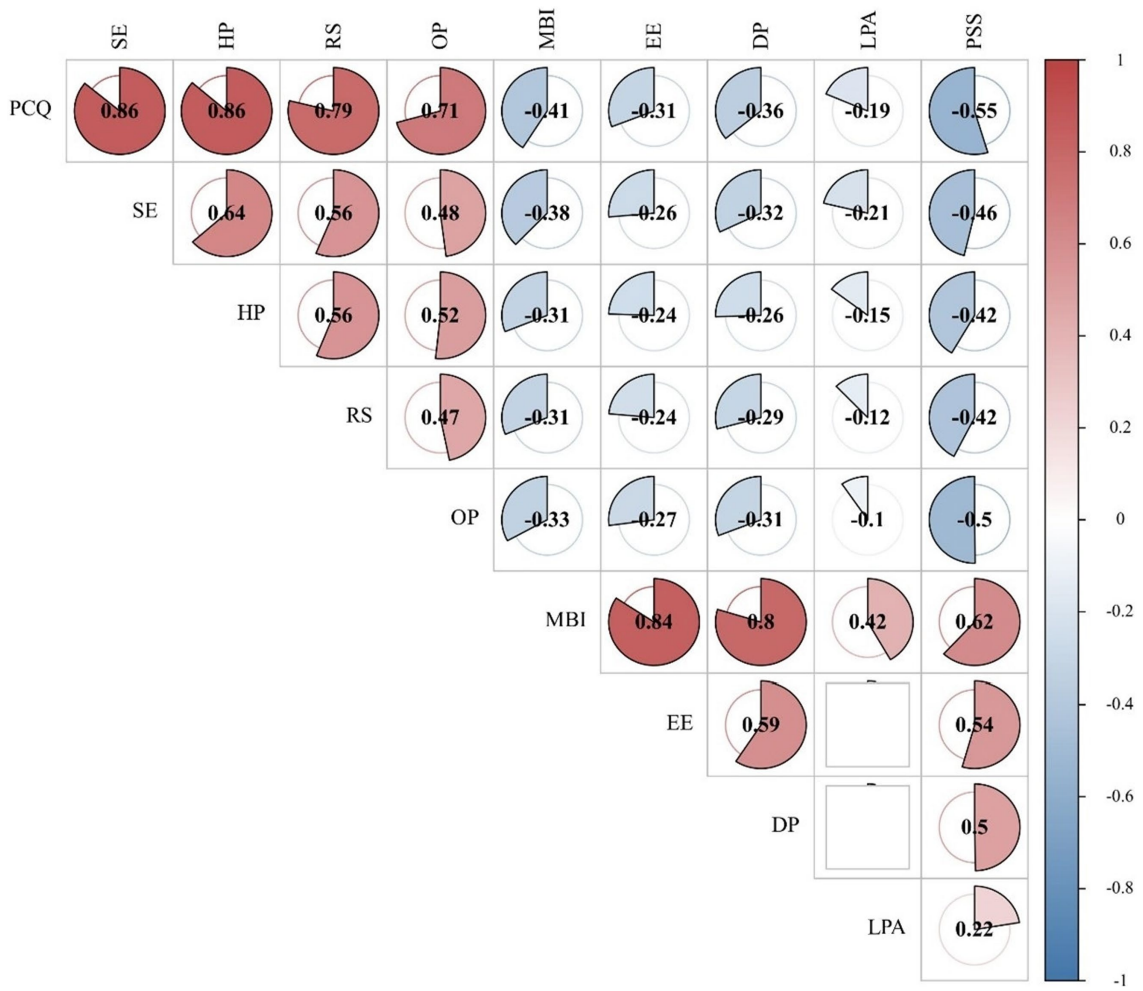

FIGURE 1
Correlations between psychological capital, burnout, and perceived stress in junior nurses. No statistical significance for white spaces. PCQ, Psychological Capital Questionnaire; SE, Self-Efficacy; OP, Optimism; HP, Hope; RS, Resilience; MBI, Maslach Burnout Inventory; EE, Emotional Exhaustion; LPA, Low Personal Accomplishment; DP, Depersonalization; PSS, Perceived stress scale.

TABLE 2 Fit indices for five models using latent profile analysis (N = 480).

Latent profile	AIC	BIC	aBIC	LMR(P)	BLRT(p)	Entropy	Group size for each profile	Proportion of each profile
1-profile	10651.45	10684.88	10659.49				480	
2-profile	**10109.84**	**10164.15**	**10122.89**	**<0.001**	**<0.001**	**0.811**	**224/256**	**0.465/0.535**
3-profile	10024.87	10100.07	10042.94	0.0052	<0.001	0.793	50/219/211	0.108/0.454/0.438
4-profile	9997.552	10093.65	10020.65	0.0423	<0.001	0.791	195/49/24/212	0.407/0.101/0.050/0.442
5-profile	9955.485	10072.47	9983.598	<0.001	<0.001	0.809	2/56/190/206/26	0.005/0.116/0.398/0.427/0.054

Numbers in bold indicate "best" fit. AIC, Akaike Information Criterion; BIC, Bayesian Information Criterion; aBIC, adjusted BIC; pLMR, p-value for Lo–Mendell–Rubin adjusted likelihood ratio test for K vs. K-1 profiles; pBLRT, p-value for Bootstrapped Likelihood Ratio Test.

3.4 Factors associated with belonging to a certain psychological capital profile

Supplementary Figure S2 exhibits the VIF values of all independent variables. The VIF values of the variables in this study were all less than five, indicating that there was no multicollinearity. The best subset method was used to screen the associated factors belonging to a certain psychological capital profile using the multiple logistic regression model (Supplementary Figures S3, S4). The findings suggest that self-reported introverted individuals are more likely to belong to the low psychological capital category than extroverted junior nurses (OR = 0.65, 95% CI: 0.43–0.98); junior nurses at moderate and high burnout levels were more likely to be in the low psychological capital category compared to low burnout (OR = 0.57,

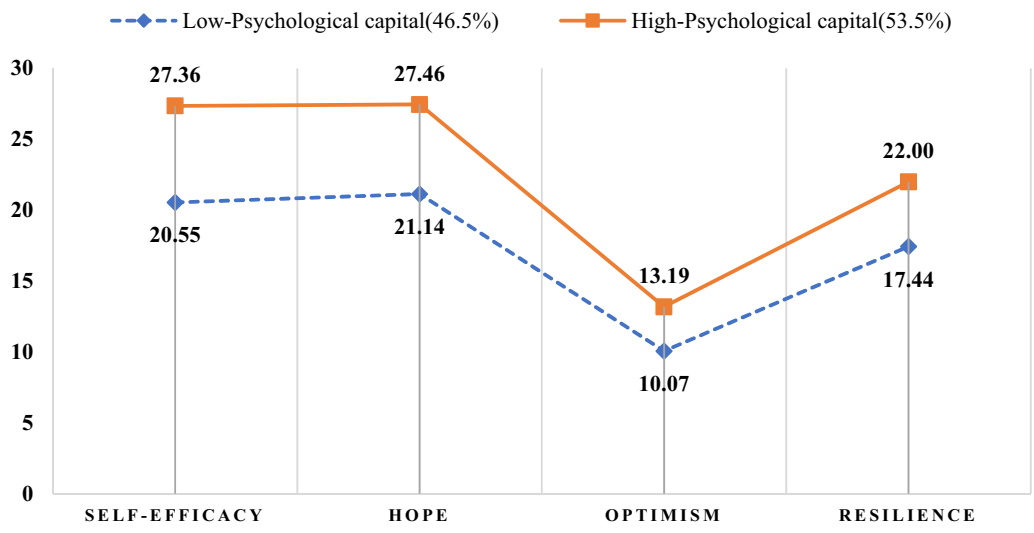

FIGURE 2
Two-profile model in the present study.

95% CI: 0.33–0.97; OR = 0.30, 95% CI: 0.15–0.59); nurses who perceived stress were also likely to be in the low psychological capital category (OR = 0.18, 95% CI: 0.11–0.29). Detailed results are presented in Table 3.

4 Discussion

The results of a meta-analysis showed that Asian nurses had lower levels of psychological capital than those in the Americas and Australia, which may be related to increased work stress and negative workplace experiences due to the shortage of human resources for nursing (9, 40). Therefore, more attention should be paid to the psychological capital of Asian nurses and interventions should be implemented. This study was the first to use LPA to categorize the psychological capital of junior nurses and to explore the factors that influence the level of psychological capital in different categories.

The study found that the psychological capital of junior nurses is at a moderate-high level, but still lower than the average for nurses (9) and the results of a previous study of junior nurses (21). This suggests that the psychological capital of junior nurses deserves attention. As the mainstay of the future nursing workforce, junior nurses should be prepared by their managers to take effective measures to prepare them for the transition from school to clinic (41). Lower than the study (21) may be due to the time of year the study was conducted and the differences between geographical areas. The time of data collection in this study was during COVID-19, and nurses faced the unpredictable development of COVID-19, decreased confidence in coping with and overcoming the outbreak, feared contracting the virus on the job and bringing it back to their families; they were skeptical of their ability to competently care for patients with COVID-19, possessed lower optimism and self-efficacy, and consequently, had lower psychological capital (42). This study used latent profiling analysis to identify two potential categories of psychological capital of junior nurses, namely the low-psychological capital group and the high-psychological capital group, with significant differences in scores between the two groups, and the number of people in each group was almost equal to half; therefore, managers should identify junior nurses with different levels of psychological capital before adopting more targeted and effective interventions to avoid wasting resources. On one hand, the focus is on the low psychological capital group of junior nurses, implementing psychological interventions to improve their psychological capital level. On the other hand, the aim is to sustain the psychological capital level of junior nurses in the high psychological capital group, ensuring they can pass through the early stage of their working life healthily and smoothly, and maintain this positive psychological resource in the long-term future of their working life.

Compared to extroverted junior nurses, nurses who self-reported as introverted had a greater probability of belonging to the low psychological capital category. A study of mental health workers also found that extroverted personality was positively correlated with psychological capital, meaning that extroverted people were more likely to have higher psychological capital (43). The reason may be that extroverts have better socialization, are active and enthusiastic, easily establish harmonious and stable relationships and effective communication with patients and colleagues at work, and obtain more social support (44). Social support, as an important external support for junior nurses, can enhance their self-confidence and expectation of future success, and also help junior nurses to strengthen their beliefs, positively cope with difficulties and challenges, and improve their resilience in the face of setbacks (45). At the same time, extroverts are usually more confident and optimistic and thus have higher levels of psychological capital.

The results of this study indicate that junior nurses who perceive stress are likely to belong to the low psychological capital category. Although every nurse faces a variety of stressors in their work scenario, the impact of these stressful events depends in part on how the individual perceives the stress generated by these events to be (46, 47). Junior nurses with low psychological capital are accustomed to characterizing stressful events with negative perceptions, thus perceiving more stress and being affected by it (48, 49). On the other hand, if junior nurses always perceive too much stress in their work,

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TABLE 3 Factors associated with belonging to a certain psychological capital profile (Logistic regression).

	Univariable					Multivariable		
Characteristic	*N*	Event N	OR[a]	95% CI[a]	*p*-value	OR[a]	95% CI[a]	*p*-value
Age	480	256	1.04	0.95, 1.15	0.409			
Gender								
Female	420	223	—	—				
Male	60	33	1.08	0.63, 1.87	0.782			
Personality								
Extraversion	229	135	—	—		—	—	
Introverted	251	121	0.65	0.45, 0.93	0.019	0.65	0.43, 0.98	0.041
Education								
Junior college	184	105	—	—				
Undergraduate	247	122	0.73	0.50, 1.08	0.115			
Postgraduate	49	29	1.09	0.58, 2.09	0.790			
Work experience								
1 year	203	90	—	—				
2 year	164	87	1.42	0.94, 2.15	0.097			
3 year	113	79	2.92	1.80, 4.79	<0.001			
Monthly Salary (¥)								
5,000–10,000	156	82	—	—				
<5,000	280	150	1.04	0.70, 1.54	0.840			
>10,000	44	24	1.08	0.55, 2.13	0.816			
Rotating night shift work								
Yes	392	206	—	—				
No	88	50	1.19	0.75, 1.90	0.469			
Relationship between doctors and nurses								
Good	370	211	—	—				
Poor	110	45	0.52	0.34, 0.80	0.003			
Turnover intention								
Yes	53	20	—	—				
No	427	236	2.04	1.14, 3.72	0.017			
MBI category								
Low	122	94	—	—		—	—	
Medium	247	133	0.35	0.21, 0.56	<0.001	0.57	0.33, 0.97	0.041
High	111	29	0.11	0.06, 0.19	<0.001	0.30	0.15, 0.59	<0.001
PSS category								
Normal	209	166	—	—		—	—	
Stressful	271	90	0.13	0.08, 0.19	<0.001	0.18	0.11, 0.29	<0.001

Reference, low psychological capital.[a]OR, Odds Ratio, CI, Confidence Interval Number in dataframe = 480, Number in model = 480, AIC = 549.5, C-statistic = 0.777, H&L = 2.18 ($p = 0.975$).

they may develop negative thinking, which in turn can reduce psychological capital (5). Therefore, in cases where some stressful events in the work process of junior nurses cannot be avoided, negative effects such as negative emotions, burnout, and other negative effects of perceived stress and stress can be reduced by improving the psychological capital of junior nurses (47). It has been shown that participation in psychological training is a protective factor for nurses' psychological capital, so managers can carry out mental health courses or lectures for junior nurses, such as positive stress reduction training, resilience training, and other more mature psychological interventions, in order to reduce the level of stress and improve the ability to withstand the face of setbacks, thus improving the level of psychological capital (50).

The results of this study indicated that the higher the burnout, the higher the probability that a junior nurse would be classified in the Low-psychological capital category, similar to the results of

previous studies (51). The four dimensions of self-efficacy, hope, optimism, and resilience contained in psychological capital are themselves burnout antagonists, reducing emotional exhaustion and inhibiting burnout, so psychological capital as a positive psychological resource directly affects burnout (52, 53). Furthermore, psychological capital indirectly affects burnout by influencing nurses' assessment and coping styles in response to stressful events (5). Junior nurses are confronted with more stressful events in the workplace due to their inexperience in the workplace, and junior nurses with high levels of psychological capital are more likely to assess such stress as normal pressures and challenges rather than burdens and injuries, and to adopt active coping styles to solve problems and enhance their competence (54). Positive emotions and behaviors that accompany this process lead to lower levels of emotional exhaustion and decreased personal accomplishment, thus avoiding burnout (55). A Korean study on burnout among clinical nurses also suggested that positive emotions were the strongest explanatory factor for burnout (51). From an organizational perspective, organizational commitment mediates the relationship between psychological capital and burnout; nurses with greater psychological capital are more willing to contribute to the organization and identify more strongly with the team and the various types of support they receive from the organization, resulting in higher levels of occupational well-being and lower levels of emotional exhaustion and cynicism, and lower levels of burnout (56). Previous studies have pointed out that the four dimensions of psychological capital can be approached to achieve the goal of improving psychological capital, and the researcher has developed a framework to improve HERO with specific measures including conducting "hope huddles" with teammates, practicing positive self-talk, reflecting on past successes and so on (57). Meanwhile, reliable lead teachers can be set up for junior nurses to provide them with supportive guidance and role modeling, to jointly set work goals, to discuss confusions encountered in their work, and to enhance positive emotions and professionalism to promote the improvement of psychological capital (58).

This study also has some limitations, such as the cross-sectional design of this study, which makes it difficult to explore the causal relationship between variables and needs to be followed up with a longitudinal study. The study was conducted only in Beijing, China, which is not representative of individuals from other countries or cultures, and a multicenter, large-sample study could be carried out in the future. The use of a convenience sampling method may lead to selection bias and the overrepresentation of certain groups, which restricts the results of the extrapolation.

4.1 Implications for nursing management

Psychological capital, as a positive psychological resource, has a favorable impact on nurses (59). In the context of the global shortage of nurses, junior nurses, as the mainstay of the future nursing workforce, experience role transitions and are prone to maladjustment and a variety of psychological problems that have not received the attention they deserve (60). This study provides managers with information about the psychological capital of junior nurses, explores the relationship between different categories of psychological capital and adverse outcomes, and suggests that managers should identify nurses with low psychological capital and target interventions, including special attention to introverted nurses, among others, to avoid the effects of high perceived stress and burnout.

5 Conclusion

The psychological capital of junior nurses is in the moderate to high level, but still lower than that of the nurses' group. The latent profile analysis confirms the existence of obvious classification characteristics of psychological capital of junior nurses, which not only provides a basis for classifying the level of psychological capital, but also suggests that managers should identify junior nurses with low psychological capital in a timely manner and take targeted interventions to reduce the level of perceived stress and burnout, to help junior nurses adapt to clinical work as soon as possible, and to maintain the stability and sustainable development of the nursing workforce.

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 humans were approved by Medical Ethics Committee of Peking University First Hospital (No: 2021–415). The participants provided their written informed consent to participate in this study.

Author contributions

XZ: Conceptualization, Formal analysis, Methodology, Software, Validation, Visualization, Writing – original draft. SC: Conceptualization, Formal analysis, Methodology, Software, Validation, Visualization, Writing – original draft. ZZ: Data curation, Investigation, Resources, Writing – original draft. MZ: Data curation, Investigation, Resources, Writing – original draft. LS: Data curation, Investigation, Resources, Writing – original draft. YZ: Conceptualization, Funding acquisition, Project administration, Supervision, Writing – review & editing. ZW: Conceptualization, Project administration, Supervision, Writing – review & editing.

Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. This work was supported by the National High Level Hospital Clinical Research Funding (Scientific Research Seed Fund of Peking University First Hospital, grant nos. 2022SF60 and 2022SF75).

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

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2024.1374941/full#supplementary-material

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TYPE Original Research
PUBLISHED 11 April 2024
DOI 10.3389/fpsyt.2024.1332900

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OPEN ACCESS

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RECEIVED 03 November 2023
ACCEPTED 26 March 2024
PUBLISHED 11 April 2024

CITATION
Riethof N and Bob P (2024) Traumatic stress symptoms, mental splitting and burnout in health care professionals: a cross-sectional study.
Front. Psychiatry 15:1332900.
doi: 10.3389/fpsyt.2024.1332900

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Traumatic stress symptoms, mental splitting and burnout in health care professionals: a cross-sectional study

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Background: Burnout syndrome usually begins with feelings of enthusiasm and idealized visualizations, and it is in contrast with subsequent disillusionment, disappointment, and symptoms which are related to chronic stress experienced later. This tendency to idealization is a parallel to the concept of "mental splitting" described by Kernberg with a pronounced "black and white" perceptual dichotomy between the early idealization and later disillusionment. This study intends examination of relationships between burnout syndrome, traumatic stress and Kernberg's concept of splitting.

Methods and participants: In this study we have assessed 90 health care professionals (50 women and 40 men) working with a population of diabetic patients utilizing Burnout Measure (BM), Splitting index (SI) and Traumatic Stress Checklist – 40 (TSC-40).

Results: Study results indicate significant Spearman correlations between burnout syndrome (BM) and traumatic stress (TSC-40) in population of men ($R=0.75$, $p<0.01$) and of women ($R=0.61$, $p<0.01$), as well as between burnout syndrome (BM) and splitting (SI) for both genders: men ($R=0.40$, $p<0.01$), women ($R=0.51$, $p<0.01$). These findings may have implications for prevention and treatment of burnout syndrome.

Conclusion: The current study findings provide implications that the defensive mechanisms of splitting and traumatic stress may allow for the prediction of burnout symptoms. This relation may potentially be of use in both the potential detection and prevention of burnout syndrome.

KEYWORDS

stress, traumatic stress, burnout, mental splitting, dissociation

Introduction

There is an ongoing debate what is the relationship between traumatic stress and burnout syndrome. Several research studies indicate the potential of stress as both predictor and accelerant of burnout making burnout syndrome potentially classified as mental disorder (1–5). It appears that the symptomatology of stress and burnout syndrome exhibit similar 'qualitative' characteristics, especially in the early stages of burnout (1, 2, 6, 7). These stress influences, and especially traumatic stress related to a traumatic event significantly affect mental stability and subjectively experienced meaning of life, which may accelerate burnout progression (2, 8).

In addition, stress influences on burnout may be combined with cognitive and affective predispositions manifesting as attitudes of enthusiasm and idealized visualizations in the afflicted individuals (6, 7). During the initial stages of burnout there is a tendency to overload and overcommitment reflecting unrealistic expectations about the given individual's capabilities, but at the same time neglecting personal needs, and experiencing the "all good", naïve enthusiasm in the early days of work which is in sharp contrast with disappointment and disillusionment later (6, 7, 9). The propensity toward idealization and a binary "black-and-white" conceptualization exists in parallel to Kernberg's concept of mental splitting (10) which is characterized by oscillating between contradictory perceptions toward the same object (based on painful-bad-punishing and pleasurable-good-rewarding experiences). In accordance with these tendencies, the experience of a given object's contradictory qualities ("all good" or "all bad") is associated with undifferentiated self-object representations (10, 11).

In recent research, there is rare evidence about the specific relationships of stress, mental splitting and symptoms of burnout syndrome. Within this context, the current study aims to examine the relationships between burnout symptoms, splitting and traumatic stress.

Methods and participants

Study participants included 90 members (diabetologists, medical nurses and other professionals who were regular full time workers in hospitals) of the Czech Diabetes Society, a non-profit organization representing health care professionals in the Czech Republic with an interest in diabetes and related topics. When recruiting for the participation in this research, the study purposes and guidelines were announced to all members of the Czech Diabetes Society (N=820). The potential participants had 2 months of a recruitment period (from October 1 to November 30, 2019) to send their answer if they were interested in participating in this study. Immediately after that a link to online questionnaires were sent to those who were interested to participate in this research. All questionnaires used in this research were administered by all participants via this online platform that was specifically prepared and designed for purposes of this study. In total, 90 participants responded the online questionnaires. This group of participants included 50 women and 40 men (mean age 48.99, SD 8.82, age range 31 – 60 years).

The study design has been arranged according to the STROBE criteria for cross-sectional studies. The subject's participation in the current study was approved by the Czech Diabetes Society and Charles University Medical psychology ethical board and all recruited participants provided written informed consent. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Psychometric measures

Burnout Measure (BM)

The study participant's level of burnout was assessed utilizing the Burnout Measure (BM) (12, 13). The original 21-item BM total-score was included for reasons of comparability with other studies and for more generic view on burnout as a mental disorder (rather than other instruments for measuring burnout e.g., MBI). BM-items were scored on a 7-point rating scale ranging from 1 "never" to 7 "always" (14).

Splitting Index (SI)

Symptoms of splitting were evaluated utilizing a self-reported Splitting index (SI) (11) which has been proposed to test defense mechanisms as described by Otto Kernberg (10). Splitting Index is 24-items self-reported questionnaire utilizing a 5-point Likert scale. Factor analysis differentiates three clusters of items which are identified to enable description of the splitting process. These three identified factor clusters represent the self-factor (splitting of the self-image), the family factor (splitting of images of family members), and the factor of others pertaining to people outside the family.

Trauma Symptoms Checklist (TSC-40)

Traumatic stress symptoms were evaluated utilizing the Trauma Symptoms Checklist (14). TSC-40 is a self-reported questionnaire with 40 items scored on a 4-point Likert scale (total score from 0 to 120). TSC-40 assesses stress symptoms in adult individuals associated with childhood or adult traumatic experiences and measures aspects of posttraumatic stress and other symptom clusters found in some traumatized individuals. The TSC-40 measure includes subscales for dissociation, anxiety, depression, sexual abuse trauma index, sleep disturbances and sexual problems. The Czech version of the TSC-40 has high reliability and internal consistency.

Statistical methods

Statistical evaluations of psychometric measures included means, standard deviations, Spearman correlation. All the

methods of statistical evaluation were performed using the software package Statistica version 6. Because the data did not have normal distribution, we have used non-parametric statistical analysis using Spearman correlations coefficients. The main advantage to use non-parametric analysis is its very conservative approach to outliers and leverage points which in the case of using parametric correlations or regression analysis may create false results and increase risk of inappropriate rejection of the null hypothesis (15). In addition, as previous research has indicated, this statistical analysis is appropriate for psychopathological data reflecting traumatic stress symptoms that usually does not have normal distribution (16).

Results

Results (Table 1) indicate significant Spearman correlations of burnout (BM) with traumatic stress symptoms (TSC-40) including subscales for dissociation, anxiety, depression, sexual abuse trauma index, sleep disturbances and sexual problems as well as with symptoms of splitting. With exception of the Spearman correlation of TSC-40 subscale for dissociation with burnout (BM) we did not find statistically significant differences between women and men.

Discussion

The results support the hypothesis assessed in this research study and indicate that symptoms of burnout are related to traumatic stress symptoms and unstable perceptual and emotional patterns related to "splitting" (10, 11). A continuing debate exists as to the relation between traumatic stress and burnout syndrome. Contention exists as to the possibility that both conceptualizations describe the same disorder, which would make burnout syndrome rightly classified as psychopathology (1, 2, 5, 7, 17).

Previous research suggests that the two characterizations burnout and stress are in fact disparate entities, noting as a primary differentiation an association of work or occupation in burnout (burnout syndrome as a work–related disorder), while stress reactions also exist outside the work-related context (3). However, the findings are mixed with some studies asserting that burnout and stress are not solely independent (4). Burnout might be considered as a stress disorder because stress is a central component of burnout syndrome. There is no burnout without stress (7). Stress from work-related activities seems to be present at least at the beginning of burnout syndrome development in each burnout case (1, 2, 6, 7). On the other hand, there are studies suggesting that stress is not the main cause of burnout, and that job stress alone does not cause burnout, although it can accelerate its evolution (2, 5, 8).

In this connection, results of this study indicate that burnout is statistically related to chronic stress symptoms reflecting individual ontogenesis which is significantly influenced by experienced traumatic events such as abuse or neglect and sexual violence and abuse (16, 18). In addition, results of this study indicate significant relationship of burnout with dissociative symptoms reflecting very serious stressful events which may influence disintegration of conscious experience (16, 19).

Furthermore, the results show significant relationship between burnout and symptoms of splitting. Experienced traumatic stress may also induce splitting as a specific form of dissociation which reflects shifts of mind related to a consciously experienced conflict of opposing mental forces (10, 11). This fragmentation of conscious experience represented by unexpected shifts between devaluation and idealization of other persons and the self is typically related to acute or long-term stressful experiences that also play a significant role in etiopathogenesis of stress disorder (20). In agreement with previous findings the present study indicates relationships of burnout with depression and anxiety (1, 2, 5, 21–26).

The relationship between traumatic stress and burnout symptoms is highly significant and for example according to Chirico (23) the current diagnostic tools are unable to clearly differentiate stress disorders from burnout, particularly in the early stages of the burnout syndrome process when the symptoms are very similar (5, 17).

TABLE 1 Spearman correlations of burnout (BM) manifestations with splitting, stress related symptoms (TSC-40) and its subscales for dissociative symptoms (Dis), anxiety (Anx), depression (Dep), Sexual Abuse Trauma Index (SATI), Sleep disturbances (Sleep) and Sexual Problems (Sex) in women (W) and men (M).

	SI		TSC-40 Total		TSC-40 Dis		TSC-40 Anx		TSC-40 Dep		TSC-40 SATI		TSC-40 Sleep		TSC-40 Sex	
	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M
BM	0.51	0.40	0.61	0.75	**0.39**	**0.70**	0.47	0.73	0.60	0.68	0.45	0.52	0.48	0.51	0.36	0.47
SI	–	–	0.62	0.38	0.43	0.32	0.44	0.42	0.49	0.31	0.56	0.32	0.35	0.17	0.54	0.31
TSC-40			–	–	0.78	0.93	0.80	0.85	0.90	0.87	0.83	0.83	0.78	0.79	0.73	0.65
TSC-Dis					–	–	0.59	0.83	0.64	0.79	0.74	0.82	0.59	0.77	0.49	0.56
TSC-Anx							–	–	0.66	0.66	0.61	0.62	0.54	0.60	0.57	0.41
TSC-Dep									–	–	0.68	0.76	0.81	0.83	0.62	0.46
TSC-SATI											–	–	0.53	0.63	0.75	0.70
TSC-Sleep													–	–	0.33	0.31

Main limitation of this study with respect to its conclusions and implications is the cross sectional design which does not allow to make statements about causality of the studied variables and using self-reported measures. Certain role may play unrecognized confounding factors represented by possible variables that were not assessed in this study such as specific work load differences and working conditions among the participants. Nevertheless further research involving larger sample is necessary for the generalizability of the current results.

Conclusion

Findings of this study suggest that the defense mechanism related to traumatic stress such as mental splitting, or dissociation might predict development of burnout and could be used in screening and prevention programs 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 humans were approved by Charles University, First Faculty of Medicine Ethical Board. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

NR: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft. PB: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This work was supported by Charles University grants (Cooperatio SVV).

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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TYPE Original Research
PUBLISHED 17 April 2024
DOI 10.3389/fpubh.2024.1352983

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RECEIVED 09 December 2023
ACCEPTED 04 April 2024
PUBLISHED 17 April 2024

CITATION
Chen Q, Liang C, Lu J and Jiang Z (2024) Translation and validation of the Chinese version of the Self-awareness Scale for Nurses.
Front. Public Health 12:1352983.
doi: 10.3389/fpubh.2024.1352983

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Translation and validation of the Chinese version of the Self-awareness Scale for Nurses

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Background: Levels of self-awareness may affect the decision-making ability of clinical nurses and may also be related to mental health. Therefore, it is crucial to develop tools to identify nurses' level of self-awareness. The purpose of this study was to investigate the reliability and validity of a short scale among Chinese nurses and to explore the factors associated with nurses' self-awareness.

Methods: A total of 957 participants were recruited, 549 participants were used for reliability tests and 408 subjects were used for impact factor studies. They completed the General Information Questionnaire, the Self-Awareness Scale for Nurses, and the Psychological Distress Scale. Exploratory factor analysis, confirmatory factor analysis, Cronbach's alpha, and retest reliability were used to investigate the psychometric properties of the Self-Awareness Scale for Nurses. Multiple regression analyses were used in this study to investigate the relationship between nurses' self-awareness and the independent variables.

Results: A 4-factor model of the Chinese version of the Self-Awareness Scale for Nurses was validated. The overall Cronbach's alpha value for the Chinese version of the Self-Awareness Scale for Nurses was 0.873. Cronbach's alpha values for each subscale ranged from 0.808 to 0.979. Significant predictors of each dimension of the Self-awareness and the total score of the scale were age and work experience.

Conclusion: The Chinese version of the Self-Awareness Scale for Nurses is a valid and reliable scale.

KEYWORDS

self-awareness, nurse, scale, reliability, validity

1 Introduction

Self-awareness constitutes a fundamental difference between humans and other living species (1). Self-awareness is often regarded as a distinguishing characteristic of human beings and it can be explained as this state in which a person can be aware of his or her own thinking and behavior (2). Self-awareness begins in infancy and continues into adulthood, and it develops through personal evaluation and reflection, and recollection of past events (3). Having self-awareness can help individuals better manage their business, work, and daily lives (4). Through a review of the relevant literature, we found that self-awareness among nurses is particularly critical.

Self-awareness is of extremely high importance for nurses, due to the fact that certain nursing associations view self-awareness as a core indicator of nursing competence (5, 6).

Self-awareness is not only a key competency in the nurse–patient relationship, but it also forms a foundational trait for nurses (7, 8). References state that self-awareness is an evolving process that involves the development of nurses in clinical thinking and decision-making skills (9, 10). However, a lack of self-awareness among nurses may hinder the development of a strong doctor-patient relationship, which ultimately affects the quality of care provided to patients (11). A recent descriptive study (12) highlighted the need for nurses to focus on self-awareness and the importance of how to appropriately respond to the various challenges that may arise. Self-awareness is of greater importance in assessing the nursing competence of caregivers, and it can also have a direct impact on patient prognosis.

Nowadays, measurement tools related to self-awareness are available both nationally and internationally. For example, American scholars Fenigstein et al. (13) developed and validated the Self-Consciousness Scale (SCS) in 1975, which includes public and private self-awareness. Later, the scale was widely used. In the absence of stable and efficient tools, Smeets and his team (14) point out that experts in the health professions can use them to assess various types (or levels) of self-awareness in various areas or domains of daily life. Thus Winkens et al. (15) developed and validated the Self-Awareness of Daily Life Scale (SADL-3), which was developed to assess self-awareness in the chronic period after acquired brain injury (ABI), including family relationships, friends and social interactions, intimacy and sexuality, leisure time, work and daytime activities, housing situation and living conditions, and health and appearance seven domains of daily living to assess patients. There is also the Emotional Self-awareness Questionnaire (ESQ) (16) developed by kill et al. which measures emotional intelligence and consists of 11 subscales: mood, self-reflection, empathy, emotion management, adaptability, motivation, self-esteem, self-efficacy, interpersonal relationships, affect and counseling. And the Self-Awareness Outcome Questionnaire (SAOQ) (17), which measures the impact of self-awareness on daily life and consists of four subscales: reflective self-development, acceptance of self and others, work initiative, and the emotional cost of self-awareness. In an academic editorial, Kuwano and McMaster (18) emphasized the need for more research to explore and assess self-awareness in care settings.

Rasheed and his team (19) first designed and validated an instrument called the Self-Awareness Scale for Nurses (SASN) in 2020, which combines qualitative and quantitative research methods and consists of 18 different items and four different dimensions. Nonetheless, this instrument has not yet been introduced to China, so more in-depth research is needed to confirm its applicability in this new cultural context. The aim of this study was to translate the original Self-Awareness Scale for Nurses (SASN) into a Chinese version and to validate the SASN.

2 Methods

2.1 Study design and participants

From April 2022 to August 2022, a cross-sectional study was conducted to validate the Self-Awareness Scale for Nurses. It consisted of two phases: (1) psychometric assessment of the scale; (2) analysis of factors influencing nurses' self-awareness.

In April 2022, the method of cross-sectional study was used. Nurses from four hospitals in Liaoning Province participated in the study. Inclusion criteria: Registered nurses working in healthcare facilities, volunteered for the study. Intern nurses were excluded.

The number of nurses required is based on 10 times the number of items, the scale has 18 items and the sample size should be at least 90–180 (20). The survey was anonymous, but we flagged 30 nurses who voluntarily participated in a second experiment for test–retest reliability 2 weeks later.

2.2 Data collection

The survey took place between April and June 2022. We invited the head nurses from each hospital to assist with the investigation. We first sent the questionnaire to the corresponding head nurses, and then they sent the questionnaire to the nurses in the department. In this study, participants were asked to fill in questionnaires according to the actual situation. Filling out the questionnaire is voluntary. A total of 554 nurses participated in this study and finally, 549 questionnaires were retained after data compilation.

In addition, to explore the influencing factors of nurses' self-awareness, collected another 430 data from six hospitals from July to August 2022.

2.3 Instruments

The study questionnaire consisted of demographic information and original scale, and Kessler 10 psychological distress scale (K10). The demographic information included age, gender, marital status, education levels, average monthly income (yuan), working experience (years), and job title.

The 18-SASN was developed by Rasheed et al. (19) and consists of four subscales: contextual, conscientious, personal, and professional awareness. Each item corresponds to a response ranging from 5 (always) to 0 (never). The overall Cronbach's alpha coefficient for the original scale was 0.87 and content validity was 0.94 (19).

The Kessler 10 psychological distress scale (K10), used by the World Health Organization in several countries around the world, assesses the level of non-specific psychological distress by asking about the frequency of non-specific psychological symptoms in the past 4 weeks. The K10 was first applied to China by Xu et al. (21), this scale consists of 10 items, including subscales measuring anxiety and depression. The internal consistency coefficient for this scale was 0.80. Each item was rated using a scale of 1 (hardly ever) to 5 (all the time). The total score is divided into four levels, the higher the level, the higher the risk of psychological disorders: 10–19 (low), 20–24 (low-moderate), 25–29 (moderate), and 30–50 (high).

2.4 Translation process

Following the consent of the original author, we conducted our translation process using the Brislin (22) principle, which involves ensuring the accuracy and cultural relevance of the translation without altering the meaning. First, it was translated into Chinese by two experts in English, forming two separate versions (A1 and A2). Next,

the two experts and researchers compared the Chinese translations of A1 and A2, discussed and corrected the inconsistencies, and obtained the first draft of the Chinese version (A12). Then, we invited two nursing experts who had no contact with SASN to back-translate the Chinese draft into English to form back-translated versions (B1 and B2). Finally, the experts compared and discussed the original scale, the first draft of the Chinese translation, and the back-translated English scale. Based on the experience, Chinese expression habits, and customary concepts, a tentative draft of the Chinese version was formed (T1).

A pre-test was conducted with 30 nurses, and the final Chinese version (T2) was obtained through a collaborative discussion between team members and translation experts.

2.5 Statistical analysis

Data were statistically analyzed using SPSS 25.0 and Amos 24.0 software. The reliability and validity of 18 items were tested. Quantitative data were represented by (mean, standard deviation), and classified data were represented by frequency and component ratio. Validity evaluation indicators include exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), content validity index (I-CVI), and the average value of all content validity indicators of the scale (S-CVI/Ave), and discriminant validity. Reliability was tested using Cronbach α coefficient and test–retest reliability coefficient. To investigate potential independent variables of the nurses' self-awareness, a multivariate linear regression analysis was utilized. For all analyses, $p < 0.05$ was considered statistically significant.

2.5.1 Item analysis

The total score of SASN was sorted from high to low, and the respective top 27% and bottom 27% were defined as high and low groups. Items in both groups were analyzed using independent samples *t*-test, and if the scores for each item in both groups were statistically significant ($p < 0.05$), the items were deemed to have better discriminatory power.

Correlation of items with total scores, correlation of corrected items with total scores, and Cronbach's coefficient of the scale after removal of items.

2.5.2 Content validity

The content validity evaluation indexes included the content validity index (I-CVI) and the mean value of all content validity indexes of the scale (S-CVI/Ave). I-CVI greater than 0.78 and S-CVI/Ave greater than 0.90 indicate an acceptable range (23, 24).

2.5.3 Construct validity

Factor analysis consists of two aspects: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The total sample was randomly divided into two parts, with EFA using the first data group ($n = 261$) and CFA using the second data group ($n = 288$). Exploratory factor analysis was mainly used for screening items and dimension division. Performed the Bartlett test (25) of sphericity on all items and calculated the Kaiser-Meyer-Olkin (KMO) index (26). The Bartlett test for sphericity was significant ($p < 0.05$), and the KMO >0.7 was considered suitable for factor analysis. Factor rotation was performed using the variance maximization method of rotated principal component analysis (PCA). In general, factor retention criteria were based on the following: (1) factor eigenvalue >1; (2) factor loading >0.4; (3) each factor is at least contained three items (25, 26).

Based on the results of the exploratory factor analysis, a confirmatory factor analysis ($n = 288$) was performed on the factor model. The following metrics were used to assess the fit of the structural model: squared degrees of freedom (χ^2/df), the root mean square error of approximation (RMSEA), the goodness of fit index (GFI), the standardized root mean square residuals (SRMR), the comparative fit index (CFI), and the Tucker Lewis Index (TLI). Fitting models should have the following characteristics: $\chi^2/df < 3$, RMSEA and SRMR <0.08, GFI, CFI, and TLI > 0.9 (27, 28).

2.5.4 Reliability analysis

The internal consistency reliability of the assessment scale was determined by the Cronbach alpha coefficient, the correction term-total correlation, and the test–retest reliability. The acceptable value of the Cronbach alpha coefficient is equal to or greater than 0.70 (29). The test–retest reliability of the scale was reflected by calculating the intraclass correlation coefficient (ICC). After 2 weeks, the 30 nurses who had been flagged in the prior trial were retested to determine the reproducibility of the results. Spearman correlations were used to analyze the correlations, with a correlation coefficient larger than 0.7 serving as the criterion (29).

2.5.5 Analysis of influencing factors

The independent variables age, gender, education level, average monthly income, work experience, job title, and psychological distress scores were included in this study, and the analysis method of multiple linear regression was used to explore the factors influencing nurses' self-awareness.

3 Ethics statement

In this study, all procedures were carried out in accordance with the 1964 Declaration of Helsinki, and the study protocol was approved by the Ethics Committee of Jinzhou Medical University (approval number: JZMULL2021009). Informed consent was obtained from all participants.

4 Results

4.1 Descriptive statistical

The demographic characteristics of the participants in the cultural adaptation phase of the study are shown in Supplementary materials. In the research phase of the influencing factors analysis, the majority of the nurses were female (91.7%), 48.5% had more than 11 years of work experience, 48.3% of the nurses had the title of Charge Nurse and above, and the other information is shown in Table 1.

4.2 Item analysis

Analyzed all items in the SASN (18 items). In this study, the top 27% of the high subgroup and the bottom 27% of the low subgroup

TABLE 1 Demographic characteristics ($N = 408$).

Variables		n (%)
Gender	Male	34 (8.3)
	Female	374 (91.7)
Age ($\bar{x} \pm s$)		33.77 ± 6.49
Education level	Technical secondary school	6 (1.5)
	Junior college	67 (16.4)
	Undergraduate	327 (80.1)
	Postgraduate and above	8 (2.0)
Average monthly salary (yuan)	<3,000	25 (6.1)
	3,000- <5,000	221 (54.2)
	5,000- <10,000	143 (35.0)
	≥10,000	19 (4.7)
Working experience (year)	1–5	113 (27.7)
	6–10	97 (23.8)
	≥11	198 (48.5)
Job title	Nurse	76 (18.6)
	Nurse practitioner	135 (33.7)
	Nurse practitioner in charge and above	197 (48.3)
Psychological distress (K10) score ($\bar{x} \pm s$)		26.20 ± 10.63

TABLE 2 Comparison of scores between high and low scores ($N = 309$).

Items	High-score Group ($n = 158$), mean (SD)	Low-score group ($n = 151$), mean (SD)	t-test (df)	p-value
V1	4.35 (0.881)	2.97 (0.770)	14.695 (304.571)	<0.001
V2	4.19 (0.965)	2.95 (0.715)	12.831 (289.221)	<0.001
V3	4.02 (0.913)	2.93 (0.780)	11.246 (303.260)	<0.001
V4	4.61 (0.756)	3.18 (1.144)	12.896 (258.345)	<0.001
V5	5.00 (0.000)	4.53 (0.764)	7.560 (150.000)	<0.001
V6	4.99 (0.080)	4.40 (0.818)	8.819 (152.713)	<0.001
V7	4.99 (0.080)	4.54 (0.710)	7.870 (153.603)	<0.001
V8	4.95 (0.247)	3.89 (1.074)	11.852 (165.165)	<0.001
V9	4.89 (0.356)	3.64 (1.036)	14.057 (183.623)	<0.001
V10	4.88 (0.345)	3.65 (1.078)	13.385 (179.192)	<0.001
V11	4.19 (1.253)	3.60 (1.120)	4.337 (307.000)	<0.001
V12	4.68 (0.609)	3.71 (0.914)	10.988 (259.647)	<0.001
V13	4.75 (0.436)	2.97 (0.816)	23.666 (226.936)	<0.001
V14	4.77 (0.421)	2.99 (0.848)	23.268 (217.336)	<0.001
V15	4.76 (0.429)	3.03 (0.864)	22.182 (217.450)	<0.001
V16	4.74 (0.454)	2.96 (0.791)	24.128 (236.956)	<0.001
V17	4.66 (0.550)	2.90 (0.772)	22.943 (270.085)	<0.001
V18	4.72 (0.464)	2.97 (0.791)	23.558 (239.920)	<0.001

cutoff values were 64.0 and 76.0. The results of the independent samples t-test showed statistically significant scores for each item in both groups ($p < 0.05$) (Table 2).

The item-total correlation coefficient after item correction was 0.250 except for item 11, and the remaining items were greater than a criterion of 0.3 ($r = 0.400–0.622$) (29, 30). Also conducted a correlation analysis between the items and the total score of the scale, and the results showed that, except for item 11, the remaining items were significantly and positively correlated with the total score and the correlation was high ($r = 0.469–0.712$, $p < 0.001$). Meanwhile, initially reliability analysis showed that the overall Cronbach α coefficient was 0.867 (95% CI: 0.851–0.883), by deleting item 11, the internal consistency of the scale can be improved to 0.873. Item 11 was therefore deleted after consideration by the experts. The results are shown in Table 3.

4.3 Content validity

The results of the content validity analysis showed that the I-CVI for item 11 was 0.571 (Table 4), indicating that item 11 was indeed inappropriate for Chinese nurses. The I-CVI values for the remaining items were from 0.857 to 1.000, and the S-CVI/Ave for the scale was 0.921.

4.4 Construct validity

The Bartlett's test (25) for sphericity of exploratory factor analysis (EFA) was significant ($\chi^2 = 3883.060$, $p < 0.001$) and the KMO index (26) was 0.889. The EFA results indicated that the factor loadings for the items ranged from 0.536 to 0.961 (Table 5). The 4-factor distribution was based on EFA, the CFA model was constructed using AMOS, and the model fit was analyzed. According to the Modification Index (MI), there was one modification to the original model: e17 and e18. Fit indices of the four-factor model (χ^2/df = 2.264, GFI =0.905, CFI = 0.970, TLI = 0.964, RMSEA = 0.066, SRMR = 0.040). The results indicated that the fit of the 4-factor model was statistically acceptable. The regression coefficients are shown in Figure 1.

4.5 Reliability analysis

The SASN overall Cronbach alpha coefficient was 0.873 (95% CI:0.857–0.888), and its four-factor Cronbach coefficients are 0.979, 0.808, 0.820, and 0.918, respectively. Two weeks later, the 30 nurses who participated in the first survey rejoined the survey, and the Spearman correlation coefficient between the retest scores was 0.834 ($p < 0.001$).

4.6 Analysis of influencing factors

The results of multiple regression analyses showed statistically significant correlations between overall scores on the nurses' self-awareness scale and gender, age, work experience, and job title (Table 6). The score of the "professional awareness" subscale was related to gender, age, working experience, job title, and psychological

TABLE 3 Item analysis for Chinese version of the SASN ($N = 549$).

Items	Mean (SD)	Corrected item total correlation	*r*	Cronbach alpha if the item was deleted
V1	3.64 (1.056)	0.446	0.528	0.862
V2	3.57 (1.034)	0.432	0.503	0.863
V3	3.45 (0.982)	0.400	0.470	0.864
V4	3.94 (1.166)	0.413	0.499	0.865
V5	4.84 (0.486)	0.430	0.469	0.864
V6	4.70 (0.550)	0.457	0.501	0.863
V7	4.84 (0.455)	0.452	0.484	0.864
V8	4.47 (0.903)	0.454	0.525	0.862
V9	4.35 (0.907)	0.493	0.562	0.860
V10	4.36 (0.920)	0.557	0.603	0.858
V11	3.93 (1.217)	0.250	0.250	0.873
V12	4.29 (0.896)	0.448	0.495	0.862
V13	3.86 (0.994)	0.620	0.712	0.855
V14	3.88 (1.006)	0.614	0.707	0.855
V15	3.91 (1.008)	0.595	0.692	0.856
V16	3.83 (0.993)	0.622	0.711	0.855
V17	3.81 (1.006)	0.595	0.692	0.856
V18	3.84 (0.988)	0.599	0.696	0.856

TABLE 4 Content validity analysis for Chinese version of the SASN ($N = 549$).

Item	Experts (score)							I-CVI
	1	2	3	4	5	6	7	
V1	1	1	1	1	1	0	1	0.857
V2	1	1	1	1	1	1	1	1.000
V3	1	1	1	1	0	1	1	0.857
V4	1	1	1	1	1	1	1	1
V5	1	1	1	1	1	1	1	1
V6	1	0	1	1	1	1	1	0.857
V7	1	1	1	1	1	0	1	0.857
V8	1	1	0	1	1	1	1	0.857
V9	1	1	1	1	1	1	1	1
V10	1	1	1	1	1	1	1	1
V11	0	1	0	1	0	1	1	0.571
V12	1	1	0	1	1	1	1	0.857
V13	1	1	1	1	1	1	1	1
V14	1	1	1	1	1	1	1	1
V15	1	1	1	1	0	1	1	0.857
V16	1	1	1	1	1	1	1	1
V17	1	1	1	1	1	1	1	1
V18	1	1	1	1	1	1	1	1

distress. While the score of the "contextual awareness" subscale was related to age, average monthly income, working experience, and psychological distress. Gender, age, working experience, and job title

TABLE 5 Factor loadings of the Chinese version of the SASN (items = 17, $n = 261$).

Item	F1	F2	F3	F4
V1		0.901		
V2		0.860		
V3		0.823		
V4		0.536		
V5				0.890
V6				0.869
V7				0.861
V8			0.750	
V9			0.741	
V10			0.811	
V12			0.664	
V13	0.946			
V14	0.931			
V15	0.961			
V16	0.937			
V17	0.938			
V18	0.910			
Eigenvalue	6.279	3.987	2.007	1.005
Explaining the variance	36.936	23.455	11.804	5.912

were all associated with scores on the "personal awareness" and "consciousness awareness" subscales.

In conclusion, the four subscales and the total score were correlated with age and working experience. However, only some subscales of the four subscales were correlated with age, gender, job title, and psychological distress.

5 Discussion

5.1 Chinese version of the self-awareness scale for nurses

To the best of our knowledge, this study is the first attempt to introduce the scale to measure nurses' level of self-awareness. After a rigorous cultural adaptation process, we translated the scale into Chinese and validated a scale with sufficient reliability and validity that is particularly suitable for assessing nurses' self-awareness. Finally, a 17-item Chinese version of the SASN with a four-factor structure was created.

The original scale was a four-factor model containing 18 items. Factor 1 - contextual awareness (including items 1–3), Factor 2 - conscientious awareness (including items 4–7), Factor 3 - personal awareness (including items 8–12), and Factor 4 - professional awareness (including items 13–18). The Chinese version of SASN supports a four-factor model consisting of 17 items. Factor 1-professional awareness (including items 13–18), Factor 2-contextual Awareness (including items 1–4), Factor 3-conscientious awareness (including items 8, 9, 10, 12), and Factor 4-personal awareness (including items 5–7) (Table 5; Figure 1). The number of dimensions

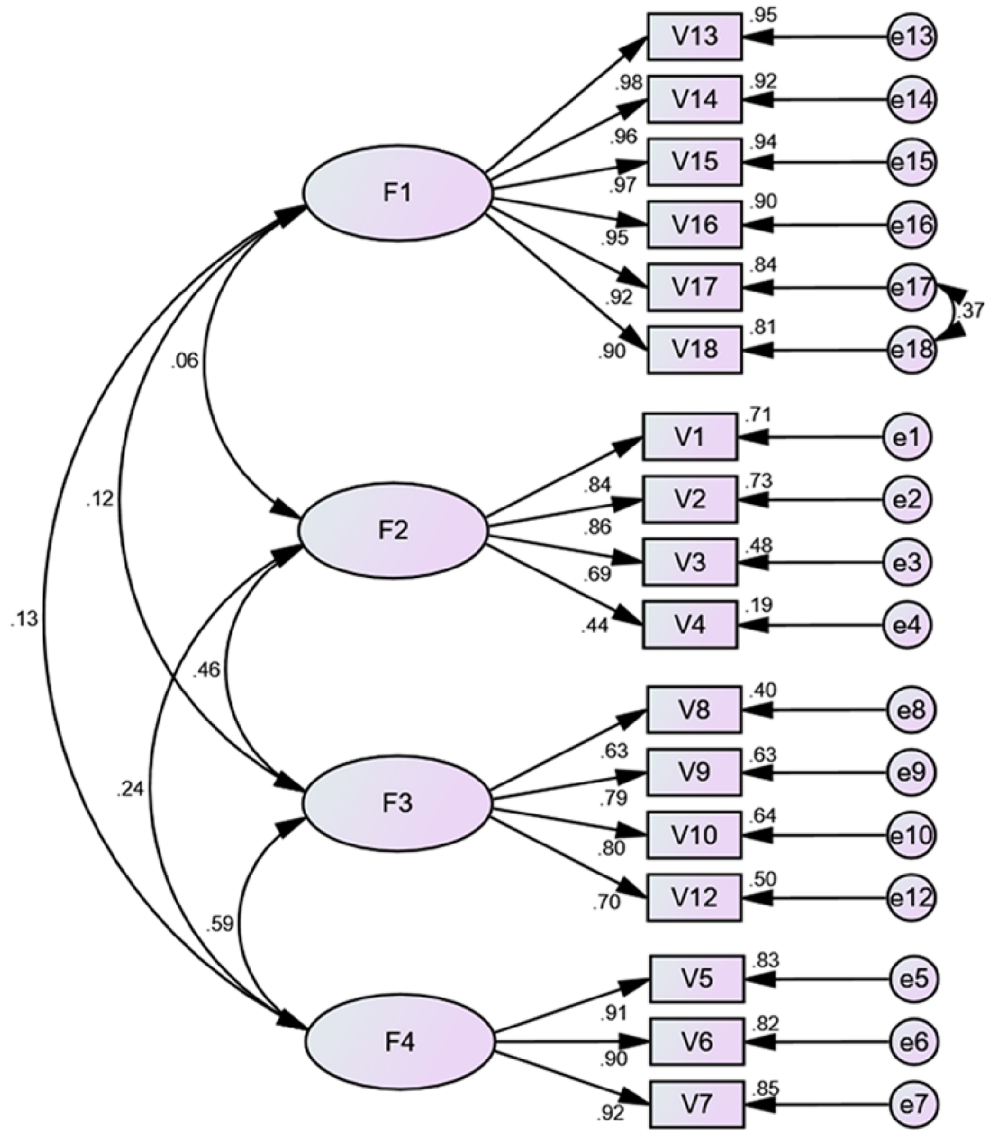

FIGURE 1
Standardized four-factor structural model of the Chinese version of the SASN (n = 288). F1 (professional awareness, six items), F2 (contextual awareness, four items), F3 (personal awareness, four items), F4 (conscientious awareness, three items).

is the same as the original scale, but the number of items and the factor attribution of the items are slightly different.

5.2 Reasonable explanations for differences from the original scale

First, this study translated and adapted the items according to the Chinese expressions, which may have affected the structure of the original scale to some extent. Second, self-awareness belongs not only to psychology, but it belongs to a multidisciplinary field of study. For example, in the field of cognition, a high degree of self-awareness may also protect attentional resources and counteract the deleterious effects of chronic stress on working memory (31). Furthermore, data from neuroimaging studies suggest that inducing self-awareness activates prefrontal cortex regions and helps regulate attention in that region related to working memory (32). In the field of psychology, an individual's self-awareness is a psychological expression based on his or her perceptions, emotions, and will about himself or herself and his or her relationship with the external world (33). Overall, self-awareness describes a person's understanding and perception of their environment (34). For nurses, Rasheed et al. (7) believe that self-awareness is essentially a subjective feeling like reflection and evaluation of one's nursing work. Therefore, the understanding of self-awareness may vary across domains and cultural contexts. Meanwhile, the results of this study showed that Cronbach's alpha coefficient increased significantly after the removal of item 11 (Table 3), and the content validity of the Chinese version of the SASN was assessed by experts, the I-CVI of item 11 was 0.571. Therefore, the expert group decided to remove item 11.

In addition, item 4 also changed the original dimension, probably because items 1–4 were patient-centered. Clinical care was

10.3389/fpubh.2024.1352983

TABLE 6 Effect of sociodemographic factors on SASN total and subscale scores: multiple regression analysis (*N* = 408).

Model	*B*	SD	Beta	*t*-test (df)	*p*-value
Total score					
Constant	71.074	5.732	—	12.399 (7)	<0.001
Gender	5.938	2.077	0.136	2.859 (7)	0.004
Age (years)	−0.654	0.124	−0.351	−5.271 (7)	<0.001
Education level	−0.940	1.308	−0.036	−0.718 (7)	0.473
Average monthly income (yuan)	1.400	0.887	0.078	1.579 (7)	0.115
Working experience (years)	7.458	0.933	0.524	7.991 (7)	<0.001
Job title	−2.147	1.013	−0.136	−2.119 (7)	0.035
Psychological distress	−0.010	0.053	−0.009	−0.193 (7)	0.847
Professional awareness					
Constant	25.452	2.186	—	11.644 (7)	<0.001
Gender	3.095	0.792	0.181	3.908 (7)	<0.001
Age (years)	−0.196	0.047	−0.269	−4.145 (7)	<0.001
Education level	−0.595	0.499	−0.058	−1.194 (7)	0.233
Average monthly income (yuan)	0.185	0.338	0.026	0.548 (7)	0.584
Working experience (years)	3.096	0.356	0.557	8.700 (7)	<0.001
Job title	−1.008	0.386	−0.163	−2.610 (7)	0.009
Psychological distress	−0.048	0.020	−0.107	−2.364 (7)	0.019
Contextual awareness					
Constant	18.134	2.718	—	6.671 (7)	<0.001
Gender	−0.998	0.985	−0.051	−1.013 (7)	0.312
Age (years)	−0.274	0.059	−0.330	−4.665 (7)	<0.001
Education level	−0.068	0.620	−0.006	−0.109 (7)	0.913
Average monthly income (yuan)	0.934	0.421	0.116	2.220 (7)	0.027
Working experience (years)	1.551	0.443	0.244	3.505 (7)	0.001
Job title	−0.182	0.480	−0.026	−0.379 (7)	0.705
Psychological distress	0.060	0.025	0.118	2.381 (7)	0.018
Personal awareness					
Constant	15.820	1.468	—	10.774 (7)	<0.001
Gender	1.908	0.532	0.171	3.586 (7)	<0.001
Age (years)	−0.115	0.032	−0.241	−3.614 (7)	<0.001
Education level	−0.326	0.335	−0.049	−0.974 (7)	0.330
Average monthly income (yuan)	0.177	0.227	0.039	0.781 (7)	0.435
Working experience (years)	1.834	0.239	0.505	7.672 (7)	<0.001
Job title	−0.548	0.259	−0.136	−2.111 (7)	0.035
Psychological distress	−0.007	0.014	−0.026	−0.547 (7)	0.585
Conscientious awareness					
Constant	11.668	0.900	—	12.97 (7)	<0.001
Gender	1.933	0.326	0.278	5.93 (7)	<0.001
Age (years)	−0.069	0.019	−0.231	−3.522 (7)	<0.001
Education level	0.050	0.205	0.012	0.242 (7)	0.809
Average monthly income (yuan)	0.103	0.139	0.036	0.742 (7)	0.459
Working experience (years)	0.976	0.146	0.431	6.666 (7)	<0.001
Job title	−0.409	0.159	−0.162	−2.570 (7)	0.011
Psychological distress	−0.015	0.008	−0.082	−1.788 (7)	0.075

patient-centered, so patient-centered situational awareness was essential. Finally, the nurses in our study had a high level of self-awareness. The possible reason for this is that a large percentage of nurses in this study had more than 11 years of professional experience (45.9%) and had undergraduate education (78.5%) (Supplementary materials). Similar studies have pointed out that the more experienced and educated nurses are the more significant the positive effect on their self-awareness (12, 19).

5.3 Explanation of the relevance of the four dimensions to self-awareness

Self-awareness is an important tool to measure the professional development of nurses [7]. Professional awareness is described as being related to the recognition of one's profession and the response to different nursing challenges (19). Nurses now assume many roles, which require them to continuously improve their professional knowledge and skills to ensure the safety of patients (35). As the largest group of nursing staff, nurses undertake important medical tasks such as patient assessment and 24-h nursing care (36). To a large extent, this requires nurses to have certain professional skills and expertise, such as being able to judge a patient's condition promptly based on vital signs, thereby promoting better care. To a certain extent, this reflects the professional awareness of nurses. Based on the available literature and results, we still named factor 1 "professional awareness" and explained 36.936% of the total variance, indicating that it was the most important part of nurses' self-awareness.

Contextual awareness involves an awareness of the personal and interpersonal factors that influence a situation (19). Meanwhile, results from a mixed study of nursing students suggest that being a good nurse is related to relationships and communication (37). Factor 2 has a patient-centered component, so we still name it "contextual awareness." In Rasheed's et al. (12) qualitative study, nurses considered contextualization to be part of self-awareness. Thomson et al. (36) interviewed six psychiatric nurses and concluded that situational awareness has an important role in contextualized care. If nurses are not aware of the underlying factors that affect them personally, interpersonally, this may hinder their ability to provide truly effective patient-centered care (38). Clinical nurses' workloads, work time constraints, and personal stressors may affect their ability to understand contextualization. For this reason, future research may place more emphasis on this aspect of contextualization (9, 12, 36, 38).

Self-awareness is also a tool to measure nurses' personal development and is described as the process of examining an individual's thoughts, feelings, and emotions, all of which can affect their overall health and relationships with others (12). Stovall (39) suggests that everyone should emphasize the role of professional self-awareness by understanding their role, and their career. Self-awareness is essential for personal and professional development and for the development of a genuine nurse–patient relationship (10, 40). It is important to experience self-awareness and then use it healthily. It is the first step to taking better care of yourself and helping you to be resilient (7). So the personal awareness was within the scope of self-awareness and was closely related to it.

As clinical workers, nurses need to have a sense of responsibility. A sense of responsibility helps them to know their role and responsibilities in a given situation and to be able to act accordingly in their care (8). Self-awareness requires an awareness of responsibilities as an individual, each of which requires a different potential to manage the situation (12). Therefore, factor 4 was still named "conscientiousness awareness."

5.4 Analysis of factors influencing self-awareness for nurses

In this study, nurses' self-awareness was related to gender (Table 6). According to a related article (41), gender differences in self-awareness are primarily brought on by differences in people's upbringing, social roles, and other factors due to cultural influences, rather than by biological differences between men and women. In traditional Chinese culture, women are frequently advised to be kind, avoid disagreement, demand cooperation, and maintain modesty when being socialized. The intention is for women to become more self-aware than men through maintaining healthy relationships, improving their capacity to comprehend others' emotions during the socialization process, and valuing self-expression in public. In this culture, women also need to exercise more restraint, stillness, and reflection (41).

This study is consistent with previous findings (9, 19) that nurses' self-awareness is affected by age, which may be since older clinical nurses tend to have more work and life experience, and greater self-awareness. Furthermore, this study found that self-awareness can have an impact on mental health. This may be attributed to the fact that self-awareness itself can help to understand and change one's mental state (42–44).

5.5 Limitations

Limitations that should be considered in this study include: (1) The study participants were part of the Northeast China nurses. Due to the differences between the north and south of China, these results are not fully representative of all nurses in China. (2) Measures of self-awareness can only reflect a subjective judgment of the participant at the time, so the results of the study should be interpreted with caution.

6 Conclusion

In summary, the Chinese version of the SASN consists of 17 items supporting a four-factor structure with good reliability and validity, and it can be utilized to measure the level of self-awareness among Chinese nurses. These findings were important because this was the first study to create a scale to assess the level of self-awareness among Chinese nurses. In this study, nurses' self-awareness was related to gender, age, and work experience. In future studies, the scale should be applied to different regions to explore the relevant factors affecting nurses' self-awareness and provide a theoretical basis for further research.

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 humans were approved by the Ethics Committee of Jinzhou Medical University (approval number: JZMULL2021009). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

QC: Conceptualization, Data curation, Formal analysis, Methodology, Validation, Writing – original draft, Writing – review & editing. CL: Conceptualization, Data curation, Funding acquisition, Methodology, Supervision, Writing – review & editing. JL: Data curation, Validation, Writing – review & editing. ZJ: Funding acquisition, Supervision, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This study was supported by the Liaoning Social Science Planning Fund (Grant No: L21CSH005).

Acknowledgments

We sincerely thank all nurses for their contributions to this study and the corresponding authors for the critically corrections to the article.

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

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2024.1352983/full#supplementary-material

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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 26 April 2024
DOI 10.3389/fpubh.2024.1396461

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OPEN ACCESS

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RECEIVED 05 March 2024
ACCEPTED 12 April 2024
PUBLISHED 26 April 2024

CITATION
Agyapong B, da Luz Dias R, Wei Y and Agyapong VIO (2024) Burnout among elementary and high school teachers in three Canadian provinces: prevalence and predictors.
Front. Public Health 12:1396461.
doi: 10.3389/fpubh.2024.1396461

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Burnout among elementary and high school teachers in three Canadian provinces: prevalence and predictors

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Background: Burnout is a longstanding issue among educators and has been associated with psychological and physical health problems such as depression, and insomnia.

Objective: To assess the prevalence and predictors of the three dimensions of burnout (emotional exhaustion, depersonalization and lack of professional accomplishment) among elementary and high school teachers.

Methods: This is a quantitative cross-sectional study with data collected via an online survey. The Maslach Burnout Inventory-Educator Survey (MBI-ES), the Brief Resilience Scale (BRS) and the Perceived Stress Scale were used, respectively, to assess burnout, resilience and stress among teachers. Data was collected between September 1st, 2022 and August 30th, 2023. SPSS (version 28, IBM Corp) was used for the data analysis.

Results: Overall, 1912 educators received a link to the online survey via a text message, and 780 completed the burnout survey questions, resulting in a response rate of 41%. The prevalence of emotional exhaustion, depersonalization, and lack of professional accomplishment were 76.9, 23.2, and 30.8%, respectively. Participants with high-stress symptoms were 6.88 times more likely to experience emotional exhaustion (OR=6.88; 95% CI: 3.31–14.29), 2.55 times (OR=2.55; 95% CI: 1.65–3.93) more likely to experience depersonalization and 2.34 times (OR=2.34; 95% CI: 1.64–3.35) more likely to experience lack of professional fulfilment. Additionally, respondents with low resilience were 3.26 times more likely to experience emotional exhaustion symptoms (OR=3.26; 95% CI: 2.00–5.31), than those with high resilience. Males were about 2.4 times more likely to present with depersonalization compared to female teachers, whilst those who indicated their marital status as partnered or cohabiting and those who selected "other" were 3.5 and 7.3 times, respectively, more likely to present with depersonalization compared with those who were single. Finally, Physical Education were 3.8 times more likely to present with depersonalization compared with English teachers.

Conclusion: The current study highlights the predictive effects of low resilience and high stress on the three dimensions of burnout among teachers in Canada. Interventions aimed at addressing systemic stress and fostering resilience are needed to reduce burnout among teachers.

KEYWORDS

burnout, depersonalization, emotional exhaustion, lack of accomplishment, resilience, stress, Wellness4Teachers, prevalence

1 Introduction

Burnout is a work-related dysphoria which occurs particularly among human service occupations where a high level of interpersonal engagements or human relationships may lead to chronic stress (1). Chronic stress has been associated with burnout, defined by three dimensions of overpowering exhaustion (emotional exhaustion), cynicism (feelings of cynicism and detachment from work), and inefficacy (a sense of ineffectiveness and lack of accomplishment) which conceptualize the individual stressful experience in a social context (1, 2). Burnout has also been defined as the state of exhaustion or loss of energy that occurs when individuals are incapable of meeting the high demands caused by their excessive workloads (3, 4). Burnout is a longstanding issue among educators, with a reported prevalence of moderate to severe burnout ranging from 25.12 to 74% (5). In a meta-analysis which included nine studies from eight different countries in Africa, Asia, Europe, and North and South America, the pooled prevalence of burnout among teachers during the COVID-19 pandemic was 52% (95% CI 33–71%), which is higher than burnout rates reported for health professionals (6). Chronic stress and burnout have been associated with poor physical and mental wellbeing and may lead to conditions such as depression, insomnia, diabetes, coronary heart disease, gastrointestinal issues, respiratory problems, and mortality below the age of 45 years (7). Burnout is a common phenomenon among teachers who often become vulnerable and succumb to the stressors they experience at work (8). In a recent cross-sectional study, 33.3% of teachers reported high burnout symptoms (9). In the lack of personal accomplishment dimension, one study reported a prevalence of 28.43% high burnout among teachers (10). Another study reported that 49.6% of teachers experience moderate or severe emotional exhaustion, 28.7% experience depersonalization, and 54.1% experience inefficacy (11). A systematic review and meta-analysis of studies assessing burnout among physical education teachers (12) reported a prevalence rate of 28.6% for high emotional exhaustion, 14.5% for depersonalization and 29.5% for low personal accomplishment. Another cross-sectional study (13) reported that emotional exhaustion had a significant direct effect on job satisfaction and turnover intentions.

With respect to teacher burnout, relationship quality has been cited to be a significant predictor of emotional exhaustion (14), and this highlights the importance of human relationships and collegiality among teachers as an important antidote for addressing the problem of stress and burnout. This was reiterated in a study which reported that educators' level of burnout was positively correlated with burnout among those in their support networks (15). Similarly, a study among nurses reported that burnout could be 'infectious, and for instance, in the dimension of depersonalization and emotional exhaustion, the complaints of perceived burnout among colleagues were the most significant predictor of burnout at the personal level and work environment (16). Both individual and environmental factors contribute to the development of burnout among teachers. A study reported that individual variables such as teaching efficacy, internal rewards and environmental features like support from principals and peers had a strong association with teacher reports of burnout (17). Another study reported that teachers' efficacy in their ability to perform their job effectively was accountable for 82% of changes in burnout (18). Work overload has also been reported to give rise to burnout by reducing the ability of individuals to meet job demands, rest, recuperate, and restore balance, particularly when it's chronic (1). This may lead to poor work performance, negative interaction with colleagues and students, low productivity, poor mental health, feelings of incompetence and poor quality of life (11). Resilience, characterized by one's ability to adapt positively to adversity and maintain psychological wellbeing in the face of challenges (5, 19), appears as a robust predictor across all dimensions of burnout. Individuals with high resilience have less tendency to be burnt out and have an increased ability to easily bounce back after stressful mishaps. The behavior patterns of students have been reported to contribute to predicting burnout among teachers, with male teachers' burnout primarily affected by students' inattentiveness, while students' disrespectful behavior mainly causes burnout among female teachers (20). Educational situations such as classroom conflict can have a negative impact on teachers' levels of stress and burnout. One study noted that Cultivating Awareness and Resilience in Education (CARE), a professional development program had a statistically significant positive effect on the emotional support domain of the class, promoted teachers' social and emotional competence and increased the quality of teachers' classroom interactions (21). A study among teachers in Canada noted that increased co-worker support was associated with the prediction of burnout, predominantly increased feelings of accomplishment and decreased depersonalization (22). Conflicting outcomes are reported in the literature with regards to the labor demands that affect each of the educational stages. One study during the pandemic that compare burnout syndrome indicators at different levels of teaching reported that basic education teachers had higher burnout rate scores than higher education teacher (23). Dealing with problematic students was perceived as the main stressor for majority of elementary school teachers in another study (24). This study also suggested that irrespective of school type, quantitative workload and long working hours were the most significant factors affecting teachers' stress responses.

Sociodemographic and professional factors such as age, sex, marital status, relationship quality, and teaching experience have also been associated with burnout in the literature (5, 25). A cross-sectional study also noted an association between years of teaching and increased burnout, with younger teachers with fewer years of experience reporting higher levels of emotional exhaustion and disengagement from the profession due to burnout (26). Another study among teachers reported higher scores on Emotional Exhaustion and Depersonalization among Canadian teachers than their Dutch peers and sex and type of school appeared significantly related to burnout across the two countries (27). Burnout has a significant positive predictive effect and correlation with turnover (28). Teachers leaving the profession due to burnout is problematic since teaching requires specific training and skill, and individuals with no previous teaching history will find it difficult to step into the role of teachers with long-term experience (29). To the best of our knowledge, there is no published literature on teachers stress and burnout specific to Alberta, Nova Scotia and Newfoundland and Labrador. Thus, this study provides a broader contextualization of the educational situation in Canada particularly the three provinces with respect to the prevalence of the three-burnout syndromes. This study therefore seeks to bridge the literature gap in this area.

Considering all the aforementioned, the current study aims to explore the prevalence and predictors of burnout (emotional

exhaustion, depersonalization and lack of accomplishment) in the Canadian context, focusing on three participating provinces: Alberta, Nova Scotia and Newfoundland and Labrador. The specific objectives of this study include:

- To estimate the prevalence of emotional exhaustion, depersonalization and lack of accomplishment as measured with the Maslach Burnout Inventory among educators in Alberta, Nova Scotia and Newfoundland and Labrador.
- To determine the predictors of emotional exhaustion, depersonalization and lack of accomplishment as measured among educators in Alberta, Nova Scotia and Newfoundland and Labrador.

Presently, it is unknown what the prevalence and correlates of burnout are among teachers in the three provinces. The current research will, therefore, add to the literature, encourage more research in this field and further develop appropriate interventions to support teachers' mental health and wellbeing. It is hypothesized that the prevalence of burnout among teachers in the three Canadian provinces would be comparable to those reported in a scoping review among teachers in other jurisdictions (5). It is also hypothesized that demographic characteristics such as age and gender, and professional related factors such as class size and years of teaching will predict each of the three burnout syndromes among the teachers as identified in the scoping review (5).

2 Methodology

2.1 Study design

This is a quantitative cross-sectional study design. Data was collected using web-based administered questionnaires with the University of Alberta REDCap platform (30). REDCap is a secure web application for the construction and management of surveys and data.

2.2 Ethics approval

Approval for the study was granted by the University of Alberta Ethics Review Board (Pro00117558) and the Dalhousie University Human Research Ethics Review Board (REB # 2023–6,840). Participants had access to the information leaflet accompanying the survey questions. Consent was obtained from all subjects.

2.3 Study settings

The study was conducted in the Canadian provinces of Alberta, Nova Scotia, Newfoundland and Labrador. Alberta, a Western Canada province, has an estimated population of 4,756,408 and approximately 32,523 full and part-time teachers (31, 32). Newfoundland and Labrador and Nova Scotia are both eastern provinces of Canada, with an estimated population of 540,418 and 1,066,416, respectively, (32). The English School District school board in Newfoundland and Labrador oversees all English-language primary and secondary education in the province, with more than 250 schools, approximately 63,000 students, and over 10,000 employees (33). The Nova Scotia Teachers Union represents more than 10,000 public school teachers, Community College faculty and professional support staff and teachers (34). The average secondary school class size in Canada is 26.4 which is slightly higher than the OECD average of 26.1 (35). The average class size is about 25 in Newfoundland and Labrador, 27 in Nova Scotia and 28.5 in Alberta (35). The salary range for elementary and high school teachers in the three provinces is as follows: Alberta- $59,488- $94,103, Nova Scotia- $56,268-$89,296, Newfoundland and Labrador- $55,932-$95,970 (36). The average number of years from starting a teaching career to reaching the top salary in Alberta, Nova Scotia and Newfoundland and Labrador are 10, 9, and 8 years respectively (36).

2.4 Data collection and outcome measures

2.5 Data collection

Data was collected between September 1st 2022, and August 30th 2023, via the Wellness4Teachers program. The Wellness4Teachers program (37) is a self-subscription, unidirectional program delivering daily supportive cognitive behavioral-based text messages to teachers. The program was launched and promoted among teachers in Alberta, Nova Scotia and Newfoundland and Labrador at the onset of the 2022/2023 academic year. Teachers in the three provinces could subscribe to the Wellness4Teachers program by texting "TeachWell" to a designated phone number. Teachers who subscribed were requested to complete the baseline surveys through a link delivered by text as part of the initial welcome message. Completing the baseline survey was voluntary and independent of receipt of the daily supportive text messages. The web-based questionnaires collected sociodemographic including sex, age, marital, ethnicity, housing status, professional (class size, number of years teaching, area of specialization, major role, major source of stress), and clinical (Burnout- emotional exhaustion, depersonalization and lack of accomplishment), stress and resilience variables. Typically, 5–10 min is required to complete the survey questionnaire.

2.6 Outcome measures

The Maslach Burnout Inventory-Educator Survey (MBI-ES) (38, 39) was used to collect data on burnout levels among teachers. The MBI-ES contains a 22-item instrument that measures emotional exhaustion, depersonalization, and personal accomplishment. A 7-point Likert scale is used to determine and indicate the frequency with which educators agree with the statements: 0 (never); 1 (a few times a year or less); 2 (once a month or less); 3 (a few times a month); 4 (once a week); 5 (a few times a week) 6 (every day). Questions on the MBI-ES include:

1 _____ I feel emotionally drained from my work.
2 _____ I feel used up at the end of the workday.
3 _____ I feel fatigued when I get up in the morning and have to face another day on the job.

4 _____ I can easily understand how my students feel about things.
5 _____ I feel I treat some students as if they were impersonal objects.
6 _____ Working with people all day is really a strain for me.
7 _____ I deal very effectively with the problems of my students.
8 _____ I feel burned out from my work.
9 _____ I feel I'm positively influencing other people's lives through my work.
10 _____ I've become more callous toward people since I took this job.
11 _____I worry that this job is hardening me emotionally.
12 _____I feel very energetic.
13 _____I feel frustrated by my job.
14 _____I feel I'm working too hard on my job.
15 _____I do not really care what happens to some students.
16 _____Working with people directly puts too much stress on me.
17 _____I can easily create a relaxed atmosphere with my students.
18 _____ I feel exhilarated after working closely with my students.
19 _____I have accomplished many worthwhile things in this job.
20 _____I feel like I'm at the end of my rope.
21 _____ In my work, I deal with emotional problems very calmly.
22 _____ I feel students blame me for some of their problems.

Emotional exhaustion is assessed by summing responses to items numbers 1, 2, 3, 6, 8, 13, 14, 16, and 20. Depersonalization is assessed by summing survey responses to items numbers 5, 10, 11, 15, and 22, and personal accomplishment is assessed by summing survey responses to item numbers 4, 7, 9, 12, 17, 18, 19, and 21. For each of the three dimensions, emotional exhaustion scores ≥27 were high, 17–26 were normal, and 0–16 was low. Similarly, for depersonalization scores, 13 and over was high, 7–12 was normal, and 0–6 was low. Finally, for personal accomplishment, 0–31 was high, 32–38 was normal, and 39 and over was low. An analysis for internal consistency of the MBI-ES questionnaire yielded a Cronbach's alpha of 0.785 for the full scale, which indicated scale reliability. The alpha coefficient for the emotional exhaustion subscale was 0.93 suggesting excellent reliability, while the alpha coefficient for the depersonalization subscale was 0.618 suggesting questionable reliability and the alpha coefficient for the personal accomplishment subscale was 0.776 indicating acceptable reliability (40). In a confirmatory factor analysis to test the data fit to the original three-factor structure proposed for the MBI using a sample of health professionals, the chi-square ratio by the degrees of freedom (χ^2/df) ranged between 1.86 and 2.16, the comparative fit index (CFI) ranged between 0.86 and 0.93, the goodness of fit index (GFI) ranged between 0.86 and 0.90, the Tucker Lewis index (TLI) ranged between 0.85 and 0.91 and the root mean square error of approximation (RMSEA) ranged between 0.06 and 0.07 (41). The model derived after removing items 9 and 15 and had indexes χ^2/df = 1.84; CFI = 0.93; GFI = 0.90; TLI = 0.91 and RMSEA = 0.06, was considered the best in relation to the three models.

The Brief Resilience Scale (BRS; mean scores of 1.00 to 2.99 suggests low resilience, 3.00 to 4.30 suggest normal resilience, and 4.31 to 5.00 suggest high resilience) (42), was used to assess resilience and stress was measured using the Perceived Stress Scale 10 (PSS-10; score of ≤26 indicates low stress, a score of ≥27 indicates likely high stress) (43). The BRS and the PSS-10 have Cronbach's α of 0.78 and 0.82 respectively, suggesting good internal consistency (44, 45). In a study (46) to investigate the two-factor structure of the Korean version of the BRS, the Chi-square statistic (χ^2 = 391.92, χ^2/df = 48.99) was significant. However, the SRMR (0.01), RMSEA (0.06), GFI (0.99), and CFI (0.99) were well within the limits that indicate model acceptability, demonstrating that the model with two first-order components for questions that were positively and negatively worded offered a good fit to the BRS scores. In a systematic review and meta-analytic confirmatory factor analysis of the PSS-10 (47), it was decided that the most appropriate factor structure of the PSS-10 was the correlated two-factor model with indexes: CFI = 0.998; TLI = 0.998; RMSEA = 0.013, 90% CI [0.012, 0.015]; standardized root mean square residual (SRMR) = 0.011.

The MBI-ES, BRS and PSS-10 scales were studied as categorical variables for the purpose of prevalence estimates. The primary outcome measures were the prevalence of high emotional exhaustion, high depersonalization and low personal accomplishment at baseline in subscribers of the Wellness4Teachers program. Secondary outcome measures included professional, sociodemographic, and clinical correlates of these three dimensions of burnout.

2.7 Statistical analysis

SPSS (version 28, IBM Corp.) (48) was used for the data analysis. Descriptive statistics were summarized for demographic, professional and clinical variables, as well as prevalence estimates based on the province in which the teachers are located. The Chi-square/Fisher's exact test was employed to determine the relationship between each of the demographic, clinical, and professional variables. Percentages and numbers were used to report the descriptive characteristics, and a 2-tailed $p \leq 0.05$ was used to determine statistical significance for all analyses. Three independent binary logistic regression analyses were used to identify variables that were independently predictive of likely high emotional exhaustion, high depersonalization and low personal accomplishment among participants. Only variables which had a significant ($p < 0.05$) or had a trend towards significant ($0.1 \geq p \geq 0.05$) relationship with likely high emotional exhaustion, high depersonalization and low personal accomplishment in the Chi-square/Fisher's exact tests were included in the regression models. Surveys with more than 50% missing responses were omitted from data analysis, and results are based only on completed survey data with no imputation of missing data (37).

3 Results

Table 1 below gives a summary of the distribution of demographic, work-related and professional variables based on participants' province of residence (Alberta, Nova Scotia, Newfoundland and Labrador). Overall, 1,912 participants enrolled in the Wellness4Teachers program and received the link and invitation to

TABLE 1 Frequency distribution of demographic, work-related and professional variables based on participants' province (Alberta, Nova Scotia or Newfoundland and Labrador).

Variables	Alberta *n* (%) *N*=547	Nova Scotia *n* (%) *N*=131	Newfoundland *n* (%) *N*=102	Chi²/Fishers Exact* Test Values	*p*-value	Total *n* (%) *N*=780
Sociodemographic characteristics						
Age (Years)						
18–25	20 (3.7%)	4 (3.1%)	2 (2.2%)	3.13	0.79	26 (3.3%)
26–40	206 (37.7%)	55 (42.0%)	33 (32.4%)			294 (37.7%)
41–60	306 (55.9%)	69 (52.7%)	64 (62.7%)			439 (56.3%)
61 and above	15 (2.7%)	3 (2.3%)	3 (2.9%)			21 (2.7%)
Sex at birth						
Male	66 (12.1%)	18 (13.7%)	12 (11.8%)	0.31	0.86	96 (12.3%)
Female	481 (87.9%)	113 (86.3%)	90 (88.2%)			684 (87.7%)
Relationship status						
Single	83 (15.5%)	21 (16.0%)	12 (11.8%)			116 (14.9%)
Married	361 (66.0%)	74 (56.5%)	65 (63.7%)	15.07	0.27	500 (64.1%)
Common- Law or Partnered	63 (11.5%)	29 (22.1%)	16 (15.7%)			108 (13.8%)
Separated or Divorced	35 (6.4%)	6 (4.6%)	6 (5.9%)			47 (6.0%)
Other	5 (0.9%)	1 (0.8%)	3 (2.9%)			9 (1.2%)
Number of children						
No child	175 (32.0%)	45 (34.4%)	23 (22.5%)			243 (31.2%)
One child	76 (13.6%)	17 (13.0%)	22 (21.6%)	10.35	0.24	115 (14.7%)
Two children	208 (38.0%)	48 (36.6%)	45 (44.1%)			301 (38.6%)
Three children	59 (10.8%)	16 (12.2%)	10 (9.8%)			85 (10.9%)
Four or more children	29 (5.3%)	5 (3.8%)	2 (2.0%)			36 (4.6%)
Ethnicity						
Indigenous	10 (1.8%)	5 (3.8%)	2 (2.0%)			17 (2.2%)
African Descendants	7 (1.3%)	0 (0.0%)	0 (0.0%)			7 (0.9%)
East Asian	12 (2.2%)	0 (0.0%)	0 (0.0%)			12 (1.5%)
Latino	8 (1.5%)	1 (0.8%)	0 (0.0%)			9 (1.2%)
Middle Eastern	5 (0.9%)	0 (0.0%)	0 (0.0%)	*12.38	0.45	5 (0.6%)
South Asian	8 (1.5%)	0 (0.0%)	0 (0.0%)			8 (1.0%)
Caucasian (European descent)	487 (89.0%)	123 (93.9%)	98 (96.1%)			708 (90.8%)
Other ethnicities	(10 1.8%)	2 (1.5%)	2 (2.0%)			14 (1.8%)
Housing status						
Own home	458 (83.7%)	104 (79.4%)	85 (83.3%)	*2.02	0.48	647 (82.9%)
Rented accommodation.	75 (13.7%)	20 (15.5%)	15 (14.7%)			110 (14.1%)
Live with family or friend	14 (2.6%)	7 (5.3%)	2 (2.0%)			23 (2.9%)
Professional variables						
Location of school						
Rural setting	168 (30.7%)	78 (59.5%)	55 (53.9%)	48.71	0.000	301 (38.6%)
Urban setting	379 (69.3%)	53 (40.5%)	47 (46.1%)			479 (61.4%)
Area of teaching specialization						
English	95 (17.4%)	19 (14.5%)	13 (12.7%)			127 (16.3%)
Mathematics	36 (6.6%)	13 (9.9%)	8 (7.8%)	*22.2	0.03	57 (7.3%)
Sciences (Physics, Chemistry, Biology)	35 (6.4%)	4 (3.1%)	15 (14.7%)			54 (6.9%)

(Continued)

TABLE 1 (Continued)

Variables	Alberta *n* (%) *N*=547	Nova Scotia *n* (%) *N*=131	Newfoundland *n* (%) *N*=102	Chi²/Fishers Exact* Test Values	*p*-value	Total *n* (%) *N*=780
Arts (History, Geography, Social Studies, etc.)	55 (10.1%)	8 (6.1%)	8 (7.8%)			71 (9.1%)
Music	18 (3.3%)	2 (1.5%)	(3 2.9%)			23 (2.9%)
Physical education	17 (3.1%)	4 (3.1%)	0 (0.0%)			21 (2.7%)
Other	291 (53.2%)	81 (61.8%)	55 (53.9%)			427 (54.7%)
Teach only in your area of specialization.						
No	338 (61.8%)	62 (42.3%)	48 (47.1)	14.2	**0.001**	448 (57.4%)
Yes	209 (38.2%)	69 (52.7%)	54 (52.9%)			332 (42.6%)
Number of years teaching						
5 years or less	78 (14.3%)	25 (19.1%)	8 (7.8%)			111 (14.2%)
10 years or less but more than 5 years	109 (19.9%)	14 (10.7%)	16 (15.7%)	16.61	**0.01**	139 (17.8%)
20 years or less but more than 10 years	206 (37.7%)	56 (42.7%)	36 (35.3%)			298 (38.2%)
More than 20 years.	154 (28.2%)	36 (27.5%)	42 (41.2%)			232 (29.7%)
Average number of students/pupils in the classes you teach						
20 or less	91 (16.6%)	33 (25.2%)	40 (39.2%)			164 (21.0%)
21–27	288 (52.7%)	79 (60.3%)	39 (38.2%)	38.79	**0.00**	406 (52.1%)
28 or more	168 (30.7%)	19 (14.5%)	23 (22.5%)			210 (26.9%)
School you teach						
Catholic School	141 (25.8%)	0 (0.0%)	1 (1.0%)	110.61	**0.000**	142 (18.2%)
Public School	398 (72.8%)	131 (100.0%)	93 (91.2)			622 (79.7%)
Other	8 (1.5%)	0 (0.0%)	8 (7.8%)			16 (2.1%)
Major Role						
Elementary school teacher	254 (46.4%)	64 (48.9%)	26 (25.5%)			344 (44.1%)
Junior high school teacher	94 (17.2%)	23 (17.6%)	24 (23.5%)	43.82	**0.000**	141 (18.1%)
Senior high school teacher	80 (14.6%)	22 (16.8%)	13 (12.7%)			115 (14.7%)
Support Staff	20 (3.7%)	10 (7.6%)	3 (2.9%)			33 (4.2%)
Administrator	54 (9.9%)	2 (1.5%)	14 (13.7%)			70 (9.0%)
Other	45 (8.2%)	10 (7.6%)	22 (21.6%)			77 (9.9%)
Source of stress						
Workload	314 (57.4%)	76 (58.0%)	45 (44.1%)			435 (55.8%)
Student Behavior	101 (18.5%)	33 (25.2%)	29 (28.4%)	21.12	**0.007**	163 (20.9%)
Class size	29 (5.5%)	2 (1.5%)	11 (10.8%)			42 (5.4%)
Lack of support from school administration	47 (8.6%)	9 (6.6%)	4 (3.9%)			60 (7.7%)
Other	56 (10.2%)	11 (8.4%)	13 (12.7%)			80 (10.3%)
Stress, resilience, and burnout variables						
High stress						
No	393 (71.8%)	97 (74.0%)	82 (80.4%)	3.25	0.2	572 (73.3%)
Yes	154 (28.2%)	34 (26.0%)	20 (19.6%)			208 (26.7%)
Low resilience						
No	309 (58.6%)	75 (59.5%)	66 (67.3%)	2.62	0.27	450 (59.9%)
Yes	201 (41.4%)	51 (40.5%)	32 (32.7%)			301 (40.1%)

(Continued)

TABLE 1 (Continued)

Variables	Alberta *n* (%) *N*=547	Nova Scotia *n* (%) *N*=131	Newfoundland *n* (%) *N*=102	Chi²/Fishers Exact* Test Values	*p*-value	Total *n* (%) *N*=780
Emotional Exhaustion						
No	123 (22.5%)	22 (16.9%)	35 (34.3%)	10.10	**0.006**	180 (23.1%)
Yes	423 (77.5%)	108 (83.1%)	67 (65.7%)			598 (76.9%)
Depersonalization						
No	425 (75.3%)	108 (82.4%)	79 (77.5%)	3.04	0.22	599 (76.8%)
Yes	135 (24.7%)	23 (17.6%)	23 (22.5%)			181 (23.2%)
Lack of Professional Accomplishment						
No	378 (69.1%)	85 (65.4%)	76 (74.5%)	2.24	0.34	539 (69.2%)
Yes	169 (30.9%)	45 (34.6%)	26 (25.5%)			240 (30.8%)

complete the baseline web-based survey. Out of this, 780 completed all the demographic and professional questions, the Maslach Burnout Inventory, the Perceived Stress Scale and the Brief Resilience Scale, resulting in a response rate of 40.79%. Of the 780 participants, 547 (70.1%) were in Alberta, 131 (16.8%) were residents in Nova Scotia, and 102 (13.1%) were residents in Newfoundland and Labrador.

The majority of the participants were aged between 41 and 60 (439, 56.3%); most were Caucasians (708, 90.8%), female (684, 87.7%), married (500, 64.1%), and less than half had two children (301, 38.6%). Significantly more participants live in the urban setting than rural setting (479, 61.4%), are elementary school teachers (344, 44.1%), teach in a public school (622 79.7%), teach in areas outside their specialization (448 57.4%), have been teaching for 20 years or less but more than 10 years (298, 38.2%), have an average of 21 to 27 students in the classes they teach (406, 52.1%), and 55.8% (435) identified workload as their source of stress. Regarding the clinical variables, the prevalence of high stress was 26.7% (208), low resilience was 40.1% (301), emotional exhaustion was 76.9% (598), depersonalization was 181 (23.2%), and lack of professional accomplishment was 30.8% (240).

3.1 Univariate analysis

Table 2 gives the results of Chi-square/Fisher's exact test of association between demographic, professional and clinical characteristics, and emotional exhaustion, depersonalization and personal fulfilment. Eleven variables had a statistically significant ($p<0.05$) or trend towards significant ($0.1\geq p\geq 0.05$) association with emotional exhaustion. These variables are age, province of teachers, number of children, ethnicity, housing status, where the school is situated, number of years teaching, kind of school teachers teach, major role, stress, and resilience. Participants aged 18–25 years who live in Nova Scotia, have no child, are of Middle Eastern origin, live with family or friends, teach in a school in an urban setting, junior high teachers with 10 years or less but more than 5 years teaching experience, teach in the public school, and have high stress and low resilience had emotional exhaustion relative to participants in their respective categories.

Similarly, 14 variables had a statistically significant ($p<0.05$) or near significant relationship ($0.1\geq p\geq 0.05$) with likely depersonalization, including age, sex at birth, relationship status, number of children, ethnicity, housing status, where school is situated, area of teaching specialization, number of years teaching, major role, average number of students/pupils in the classes, source of stress, stress, and resilience. Male participants 26–40 years, of East Asian origin, no child, renting, music teacher in an urban setting, with 5 years or less teaching experience and 28 or more students in the class, Junior high school teachers, with student behavior as a source of stress, experiencing high stress and have low resilience experience depersonalization compared to other participants in their respective categories.

Finally, five variables had a statistically significant ($p<0.05$) or near significant relationship ($0.1\geq p\geq 0.05$) with likely personal fulfilment. These are age, teaching experience, major role in the school, stress, and resilience. Participants aged 18–25 years who are elementary school teachers with 10 years or less but more than 5 years of teaching experience, with low resilience and high stress, experience a lack of professional fulfilment in comparison to other respondents in their corresponding categories.

3.2 Logistic regression to identify predictors of emotional exhaustion

The outline of the binary logistic regression analysis is shown in Table 3. Eleven predictors that had a significant association ($p<0.05$) or a trend towards significant association ($0.1\geq p\geq 0.05$) with emotional exhaustion in the univariate analysis were included in a binary logistic regression model. The regression model was statistically significant; X^2 (df = 31; $n=751$) = 157.24 $p=0.000<0.0005$, suggesting that the model could differentiate between participants who were emotionally exhausted and those who were not. Nonetheless, the model only explained between 18.9% (Cox and Snell R^2) and 28.7% (Nagelkerke R^2) of the variance and correctly classified 79.5% of cases.

Table 3 indicates that with a Wald of 26.68 and 22.37, respectively, stress and resilience as predictors of emotional exhaustion made the most significant unique contribution to the regression model. School location, stress and resilience independently predicted the presence of emotional exhaustion among participants. After controlling for all other variables in the regression model, participants who worked in the urban setting were 1.63 times more likely to experience emotional

TABLE 2 Chi-square test of association between demographic, work-related, clinical, and burnout characteristics.

Variables	Emotional exhaustion absent *n* (%)	Emotional exhaustion present *n* (%)	Chi²/ Fisher Exact	*P*-value	Depersonalization/ Cynicism absent *n* (%)	Depersonalization/ Cynicism present *n* (%)	Chi²/ Fisher Exact	*P*-value	Professional fulfilment present *n* (%)	Professional fulfillment absent *n* (%)	Chi²/ Fisher Exact	*P*-value
Sociodemographic characteristics												
Age (Years)												
18–25	4 (15.4%)	22 (84.6%)	21.90	**0.000**	19 (73.1%)	7 (26.9%)	15.57	**0.002**	13 (50.0%)	13 (50.0%)	8.43	**0.03**
26–40	51 (17.3%)	243 (82.7%)			204 (69.4%)	90 (30.6%)			194 (66.2%)	99 (33.8%)		
41–60	113 (25.9%)	324 (71.4%)			359 (81.8%)	80 (18.2%)			315 (71.8%)	124 (28.2%)		
61 and above	12 (57.1%)	9 (42.9%)			17 (81.0%)	4 (19.0%)			17 (81.0%)	4 (19.0%)		
Sex at birth												
Male	26 (27.1%)	70 (72.9%)	0.96	0.37	59 (61.5%)	37 (38.5%)	14.45	**0.000**	61 (63.5%)	35 (36.6%)	1.64	0.24
Female	154 (22.6%)	528 (77.4%)			540 (78.9%)	144 (21.1%)			478 (70.0%)	205 (30.0%)		
Provinces												
Alberta	123 (22.5%)	423 (77.5%)	10.10	**0.006**	412 (75.3%)	135 (24.7%)	3.04	0.22	378 (69.1%)	169 (30.9%)	2.24	0.33
Newfoundland	25 (34.3%)	67 (65.7%)			79 (77.5%)	23 (22.5%)			76 (74.5%)	26 (25.5%)		
Nova Scotia	22 (16.9%)	108 (83.1%)			108 (82.4%)	23 (17.6%)			85 (65.4%)	45 (34.6%)		
Relationship status												
Single	22 (19.0%)	94 (81.0%)			91 (78.4%)	25 (21.6%)			76 (66.1%)	39 (33.9%)		
Married	122 (24.4%)	377 (75.6%)	3.98	0.41	398 (79.6%)	102 (20.4%)	13.02	**0.009**	351 (70.2%)	149 (29.8%)	1.83*	0.76
Common Law/ Partnered	20 (18.7%)	87 (81.3%)			70 (64.8%)	38 (35.2%)			71 (65.7%)	37 (34.3%)		
Separated/Divorced	14 (29.8%)	33 (70.2%)			35 (74.5%)	12 (25.5%)			34 (72.3%)	13 (27.7%)		
Other	2 (22.2%)	7 (77.8%)			5 (55.6%)	4 (44.4%)			7 (77.8%)	2 (22.2%)		
# of children												
No child	37 (15.2%)	206 (84.8%)			166 (68.3%)	77 (31.7%)	18.31	**0.001**	164 (67.8%)	78 (32.3%)	4.21	0.38
One child	29 (25.2%)	86 (74.8%)	18.15	**0.001**	86 (74.8%)	29 (25.2%)			73 (63.5%)	42 (36.5%)		
Two children	72 (24.1%)	227 (75.9%)			251 (83.4%)	50 (16.6%)			218 (72.4%)	83 (27.6%)		
Three children	29 (34.1%)	56 (65.9%)			66 (77.6%)	19 (22.4%)			61 (71.8%)	24 (28.2%)		
Four or more children	13 (36.1%)	23 (63.9%)			30 (83.3%)	6 (16.7%)			23 (63.9%)	13 (36.1%)		
Ethnicity												
Indigenous	7 (42.1%)	10 (58.8%)			11 (64.7%)	6 (35.3%)	19.44	**0.003**	7 (41.2%)	10 (58.8%)	11.73	0.11
African Descendants	3 (42.9%)	4 (57.1%)	11.47*	**0.08**	4 (57.1%)	3 (42.9%)			5 (71.4%)	2 (28.6%)		

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TABLE 2 (Continued)

Variables	Emotional exhaustion absent *n* (%)	Emotional exhaustion present *n* (%)	Chi²/ Fisher Exact	*P*-value	Depersonalization/ Cynicism absent *n* (%)	Depersonalization/ Cynicism present *n* (%)	Chi²/ Fisher Exact	*P*-value	Professional fulfilment present *n* (%)	Professional fulfillment absent *n* (%)	Chi²/ Fisher Exact	*P*-value
East Asian	2 (16.7%)	10 (83.3%)			4 (33.3%)	8 (66.7%)			5 (41.7%)	7 (58.3%)		
Latino	5 (55.6%)	4 (44.4%)			8 (88.9%)	1 (11.1%)			6 (66.7%)	3 (33.3%)		
Middle Eastern	0 (0.0%)	5 (100%)			3 (60.0%)	2 (40.0%)			3 (60.0%)	2 (40.0%)		
South Asian	1 (12.5%)	7 (87.5%)			4 (50.0%)	4 (50.0%)			5 (62.5%)	3 (37.5%)		
Caucasian	158 (22.4%)	548 (77.6%)			553 (78.1%)	155 (21.9%)			499 (70.6%)	208 (29.4%)		
Other ethnicities	4 (28.6%)	10 (71.4%)			12 (85.7%)	2 (14.3%)			9 (64.3%)	5 (35.7%)		
Housing status												
Own home	159 (24.7%)	486 (75.3%)	4.99	**0.08**	510 (78.8%)	137 (21.2%)	9.54	**0.008**	456 (70.5%)	191 (29.5%)	3.04	0.22
Renting	18 (16.4%)	92 (83.6%)			72 (65.5%)	38 (34.5%)			68 (62.4%)	41 (37.6%)		
Live with family or friend	3 (13.0%)	20 (87.0%)			17 (73.9%)	6 (26.1%)			15 (65.2%)	8 (34.8%)		
School Situated												
Rural setting	80 (26.8%)	219 (73.2%)	3.58	**0.07**	245 (81.4%)	56 (18.6%)	5.82	**0.02**	206 (68.4%)	95 (31.6%)	0.13	0.75
Urban Setting	100 (20.9%)	379 (79.1%)			354 (73.9%)	125 (26.1%)			333 (69.7%)	145 (30.3%)		
Area of teaching specialization												
English	35 (19.7%)	102 (80.3%)	3.10	0.80	104 (81.9%)	23 (18.1%)	22.18	**0.001**	91 (71.4%)	36 (28.3%)	4.2	0.66
Mathematics	14 (24.6%)	43 (75.4%)			42 (73.7%)	15 (26.3%)			35 (61.4%)	22 (38.6%)		
Sciences (Physics, Chemistry, Biology)	15 (27.8%)	39 (72.2%)			35 (64.8%)	19 (35.2%)			37 (68.5%)	17 (31.5%)		
Arts (History, Geography, Social Studies etc.)	20 (28.2%)	51 (71.8%)			49 (69.0%)	22 (31.0%)			46 (64.8%)	25 (35.2%)		
Music	5 (21.7%)	18 (78.3%)			13 (56.5%)	10 (43.5%)			14 (60.9%)	9 (39.1%)		
Physical education	6 (28.6%)	15 (71.4%)			12 (57.1%)	9 (42.9%)			13 (65.0%)	7 (35.0%)		
Other	95 (22.4%)	330 (77.6%)			344 (80.6%)	83 (19.4%)			303 (71.0%)	124 (29.0%)		
Only teach in area of specialization												
No	99 (22.2%)	347 (77.8%)	0.52	0.49	344 (76.8%)	104 (23.2%)	0.00	1.0	314 (70.2%)	133 (29.8%)	0.55	0.47
Yes	81 (24.4%)	251 (75.6%)			255 (76.8%)	77 (23.2%)			225 (67.8%)	107 (32.2%)		
Number of years teaching												
5 years or less	19 (17.1%)	92 (82.3%)	9.47	**0.02**	76 (68.5%)	39 (31.5%)	13.26	**0.004**	69 (62.7%)	41 (37.3%)	12.77	**0.005**

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TABLE 2 (Continued)

Variables	Emotional exhaustion absent *n* (%)	Emotional exhaustion present *n* (%)	Chi²/ Fisher Exact	*P*-value	Depersonalization/ Cynicism absent *n* (%)	Depersonalization/ Cynicism present *n* (%)	Chi²/ Fisher Exact	*P*-value	Professional fulfilment present *n* (%)	Professional fulfillment absent *n* (%)	Chi²/ Fisher Exact	*P*-value
10 years or less but more than 5 years	22 (15.8%)	117 (84.2%)			96 (69.1%)	43 (30.9%)			84 (60.4%)	55 (39.6%)		
20 years or less but more than 10 years	78 (26.2%)	220 (73.8%)			239 (80.2%)	59 (19.8%)			209 (70.1%)	89 (29.9%)		
More than 20 years.	61 (26.5%)	169 (73.5%)			188 (81.0%)	44 (19.0%)			177 (76.3%)	55 (23.7%)		
Average number of students/pupils in the classes you teach.												
20 or less	47 (28.7%)	117 (71.3%)			132 (80.5%)	32 (19.5%)			115 (70.1%)	49 (29.9%)		
21–27	88 (21.8%)	316 (78.2%)	3.57	0.17	319 (78.6%)	87 (21.4%)	6.68	**0.04**	282 (69.5%)	124 (51.7%)	0.23	0.89
28 or more	45 (21.4%)	165 (78.6%)			148 (70.5%)	62 (29.5%)			142 (67.9%)	142 (67.8%)		
School you teach.												
Catholic School	37 (26.1%)	105 (73.9%)	7.82	**0.02**	110 (77.5%)	32 (22.5%)	0.14*	0.96	93 (65.5%)	49 (34.5%)	2.57	0.30
Public School	135 (21.8%)	485 (78.2%)			476 (76.5%)	146 (23.5%)			437 (70.4%)	184 (29.6%)		
Other	8 (50.0%)	8 (50.0%)			13 (81.3%)	3 (18.8%)			9 (56.3%)	7 (43.8%)		
Major Role												
Elementary teacher	69 (20.1%)	274 (79.9%)			274 (79.7%)	70 (20.3%)	19.7	**0.001**	227 (66.0%)	117 (34.0%)	10.85	**0.054**
Junior high teacher	26 (18.4%)	115 (81.6%)	15.11	**0.01**	95 (67.4%)	46 (32.6%)			96 (68.6%)	44 (31.4%)		
Senior high teacher	25 (21.7%)	90 (78.3%)			78 (67.8%)	37 (32.2%)			76 (66.1%)	39 (33.9%)		
Support Staff	12 (36.4%)	21 (63.6%)			28 (84.8%)	5 (15.2%)			22 (66.7%)	11 (33.3%)		
Administrator	21 (30.4%)	48 (69.9%)			59 (84.3%)	11 (15.7%)			57 (81.4%)	13 (18.6%)		
Other	27 (35.1%)	50 (64.9%)			65 (84.4%)	12 (15.6%)			61 (79.2%)	16 (20.8%)		
Source of stress												
Workload	99 (22.9%)	334 (77.1%)			348 (80.0%)	87 (20.0%)	8.79	**0.07**	313 (72.0%)	122 (28.0%)	7.26	0.12
Student Behavior	31 (19.0%)	132 (81.0%)	3.99	0.41	115 (70.6%)	48 (29.4%)			100 (61.7%)	62 (68.3%)		
Class size	13 (31.0%)	29 (69.0%)			35 (83.3%)	7 (16.7%)			32 (76.2%)	10 (23.8%)		
Limited management support	15 (25.0%)	45 (75.0%)			43 (71.7%)	17 (28.3%)			39 (65.0%)	21 (35.0%)		
Other	22 (27.5%)	58 (72.5%)			58 (71.5%)	22 (27.5%)			55 (68.8%)	25n (31.2%)		
Stress												
Mild to moderate stress	170 (29.8%)	400 (70.2%)	53.63	**0.000**	470 (82.2%)	102 (17.8%)	34.75	**0.000**	433 (75.7%)	139 (24.3%)	47.77	**0.00**

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TABLE 2 (Continued)

Variables	Emotional exhaustion absent *n* (%)	Emotional exhaustion present *n* (%)	Chi²/ Fisher Exact	*P*-value	Depersonalization/ Cynicism absent *n* (%)	Depersonalization/ Cynicism present *n* (%)	Chi²/ Fisher Exact	*P*-value	Professional fulfilment present *n* (%)	Professional fulfilment absent *n* (%)	Chi²/ Fisher Exact	*P*-value
High stress	10 (4.8%)	198 (95.2%)			129 (62.0%)	79 (38.0%)			106 (51.2%)	101 (48.8%)		
Resilience												
Normal to high resilience	142 (31.6%)	308 (68.4%)	49.29	0.000	366 (81.3%)	84 (18.7%)	14.98	**0.000**	341 (75.8%)	109 (24.2%)	26.10	**0.000**
Low resilience	29 (9.6%)	272 (90.4%)			208 (69.1%)	93 (30.9%)			175 (58.1%)	126 (41.9%)		

*Fisher Exact Value.

exhaustion than those in the rural setting (OR = 1.63; 95% CI: 1.08–2.47). Similarly, respondents with high stress symptoms were 6.88 times more likely to experience emotional exhaustion than those who did not (OR = 6.88; 95% CI: 3.31–14.29). Additionally, respondents with low resilience were 3.26 times more likely to experience emotional exhaustion symptoms than those who did not (OR = 3.26; 95% CI: 2.00–5.31).

Although the province in which the respondent resides as a variable made a unique statistically significant contribution to the model, respondents in Nova Scotia and Newfoundland and Labrador were not significantly different from respondents in Alberta in terms of the likelihood to experience emotional exhaustion. Number of children as a variable did not make a unique statistically significant contribution to the model. However, participants who had no children were 2.26 times (OR = 2.26; 95% CI: 1.10–4.61) more likely to experience emotional exhaustion than those with three children. Similarly, participants with no children were 3.53 times (OR = 3.53; 95% CI: 1.32–9.43) more likely to experience emotional exhaustion than those who had four or more children. Other demographic and professional variables, such as age, ethnicity, housing status, major role, the type of school, and number of years teaching, did not independently predict the presence of emotional exhaustion symptoms in the participants.

3.3 Logistic regression to identify predictors of depersonalization/cynicism

Table 4 gives an overview of the binary logistic regression analysis to determine predictors of depersonalization. Fourteen predictors that had a significant association ($p < 0.05$) or near significant association ($0.1 \geq p \geq 0.05$) with depersonalization in the univariate analysis were included in a binary logistic regression model. The regression model was statistically significant; X^2 (df = 44; $n = 751$) = 141.50 $p = 0.000 < 0.0005$, suggesting that the model distinguished between respondents who experienced depersonalization and those who did not. The model explained between 17.20% (Cox and Snell R^2) and 25.80% (Nagelkerke R^2) of the variance and accurately classified 80.80% of cases.

Sex at birth, relationship status, where the school is situated, area of specialization, stress, and resilience independently predicted the presence of depersonalization among participants. After controlling for all other variables in the regression model, male participants were 2.40 times (OR = 2.40; 95% CI: 1.36–4.22) more likely to experience cynicism than their female counterparts. Also, participants who described their marital status as common law/partnered and other were, respectively, 3.48 times (OR = 3.48; 95% CI: 1.69–7.16) and 7.32 times (OR = 7.32; 95% CI: 1.59–33.69) more likely to experience depersonalization than respondents who were single. Furthermore, participants who worked in the urban setting were 1.57 times more likely to experience depersonalization than those in the rural setting (OR = 1.57; 95% CI: 1.024–2.42). Similarly, respondents whose area of specialization was music were 4.92 times (OR = 4.92; 95% CI: 1.66–14.56) and those who selected physical education were 3.81 times (OR = 3.81; 95% CI: 1.23–11.74) to experience depersonalization than those whose area of specialization was English. In addition, participants who experienced high-stress symptoms were 2.55 times (OR = 2.55; 95% CI: 1.65–3.93) more likely to experience

depersonalization than those who did not. Furthermore, respondents with low resilience were 1.62 times (OR = 1.62; 95% CI: 1.07–2.45) more likely to experience depersonalization than those who did not.

Participants ethnicity as a variable did not make a unique statistically significant contribution to the model. However, participants who were Indigenous were, respectively, 3.80 times (OR = 3.80; 95% CI: 1.12–12.82) and 11.36 times (OR = 11.36; 95% CI: 1.43–90.91) more likely to present with depersonalization compared with Caucasians and those with "other" ethnic backgrounds when all other factors are controlled. Furthermore, the number of children as a variable did not make a unique statistically significant contribution to the model. However, participants who had no children were 1.97 times (OR = 1.97; 95% CI: 1.11–3.50) more likely to experience cynicism compared to those who had two children. Finally, the source of stress as a variable did not contribute significantly to the model, but respondents who reported student behavior as their source of stress were 1.83 times (OR = 1.83; 95% CI: 1.12–2.99) more likely to experience depersonalization than those who reported workload as source of stress.

Other demographic and professional variables, such as age, housing status, number of students in the class, and teaching experience, did not independently predict depersonalization or cynicism among participants.

3.4 Logistic regression to identify predictors of lack of professional fulfillment/accomplishment

Table 5 illustrates the binary logistic regression analysis for the predictors of lack of professional fulfilment or accomplishment. Five predictors that had a statistically significant association ($p < 0.05$) or near significant association ($0.1 \geq p \geq 0.05$) with lack of professional accomplishment on univariate analysis were included in a binary logistic regression model. The regression model was statistically significant; X^2 (df = 13; $n = 751$) = 62.70 $p = 0.000 < 0.0005$, suggesting that the model could differentiate between participants who lacked personal fulfilment and those who did not. The model only explained between 8.00% (Cox and Snell R^2) and 11.30% (Nagelkerke R^2) of the variance and correctly classified 69.40% of cases. Stress and resilience as predictors of lack of professional accomplishment made the most significant unique contribution to the regression model and independently predicted the presence of a lack of professional accomplishment among participants. After controlling for all other variables in the regression model, participants who experienced high-stress symptoms were 2.34 times (OR = 2.34; 95% CI: 1.64–3.35) more likely to experience a lack of professional fulfilment than those with low stress. Similarly, respondents with low resilience were 1.73 times more likely to experience lack of professional fulfilment than those with high resilience (OR = 1.73; 95% CI: 1.23–2.43). Other demographic and professional variables, such as age, major role, and a number of years teaching, did not independently predict the presence of a lack of professional fulfilment in the participants.

4 Discussion

The current study aimed to explore the prevalence and correlates of the three dimensions of burnout (emotional exhaustion, depersonalization, and lack of accomplishment) in the Canadian context, focusing on three participating provinces: Newfoundland and Labrador, Alberta, and Nova Scotia. Burnout has been presumed to start with the development of emotional exhaustion in response to overload and high demands, which then lead to detachment and negative reactions towards people and the job (Depersonalization or cynicism) and subsequently feelings of inadequacy and failure [reduced personal accomplishment or professional inefficacy if the status quo continues (1)]. The prevalence of emotional exhaustion, depersonalization, and lack of accomplishment among teachers in this study was 76.9, 23.2, and 30.8%, respectively, which are consistent with prevalence of burnout among teachers in other jurisdictions (ranging from 25.12 to 74%) reported in a scoping review (5). The prevalence reported in this study for all three burnout subscales was however higher than that reported in a systematic review and metanalysis of 12 studies which assessed burnout among [physical education teachers (12)]. The later review reported a prevalence of 28.6% for high emotional exhaustion, 14.5% for depersonalization and 29.5% low personal accomplishment among physical education teachers. A survey during the initial stages of the pandemic among Canadian teachers also reported increased emotional exhaustion and lack of accomplishment among school teachers (49). However, the prevalence rates reported in this study are higher than those reported in a study among nurses, which was 25% for high emotional exhaustion, 15% for depersonalization, and 22% for low personal accomplishment (50). The prevalence of emotional exhaustion reported in this study is also higher than what was reported in another study among teachers (11), where 49.6% of the teachers had moderate or severe emotional exhaustion. However, that study reported a comparatively higher prevalence of depersonalization, 28.7% and lack of accomplishment (54.1%) among the teachers than in this study. The high prevalence of emotional exhaustion in this study, compared to the prevalence of depersonalization and lack of professional accomplishment, highlights the need to curtail the high emotional exhaustion among the participants in the under-studied provinces, as burnout has been suggested to be initiated by emotional exhaustion (1). With respect to inter-provincial differences in prevalence for the dimensions of burnout, this study revealed statistical differences on chi square test only for emotional exhaustion among teachers in the three provinces, with Alberta recording the highest prevalence (83.1%), followed by Nova Scotia (77.5%) and Newfoundland and Labrador recorded the lowest prevalence (65.7%).These inter-provincial differences in prevalence for the burnout syndrome were however not statistically significant when other factors were controlled for in regression models. It is possible that other factors which were not assessed and included in the model, such as inter-provincial variations in conditions of service (annual salary ranges), and the number of years from the start of a teaching career before teachers reach the top salary (36) accounts for variations in prevalence that were noted on chi-square examination.

4.1 Predictors of emotional exhaustion

The challenges teachers face are diverse and teacher specific at different time points. Teachers' appraisal of the extent of this challenge and its impact is therefore the determinant of teachers' stress levels. In this case, resilience becomes an important element.

TABLE 3 Logistic regression model for emotional exhaustion.

Variables	*B*	S.E	Wald	df	Sig.	Odds Ratio	95% C.I. for odds ratio	
							Lower	Upper
Age (Years)								
18–25			3.888	3	0.274			
26–40	0.420	0.719	0.341	1	0.559	1.522	0.372	6.232
41–60	0.423	0.763	0.308	1	0.579	1.527	0.342	6.806
61 and above	−0.525	0.896	0.343	1	0.558	0.592	0.102	3.428
Provinces								
Alberta			7.459	2	**0.024**			
Newfoundland	−0.483	0.286	2.840	1	0.092	0.617	0.352	1.082
Nova Scotia	0.520	0.308	2.841	1	0.092	1.682	0.919	3.078
Ethnicity								
Indigenous	−0.694		9.859	7	0.197			
African Descendants	−0.288	1.219	0.324	1	0.569	0.500	0.046	5.452
East Asian	−1.215	1.060	0.074	1	0.786	0.750	0.094	5.985
Latino	20.256	0.998	1.481	1	0.224	0.297	0.042	2.100
Middle Eastern	0.916	16154.434	0.000	1	0.999	0.752	0.000	0.000
South Asian	0.620	1.267	0.523	1	0.470	2.499	0.209	29.927
Caucasian	−0.324	0.594	1.090	1	0.296	1.859	0.581	5.951
Other ethnicities		0.917	0.124	1	0.724	0.724	0.120	4.368
Housing status								
Own home			1.822	2	0.402			
Renting	0.370	0.371	0.993	1	0.319	1.448	0.699	2.997
Live with family or friend	0.870	0.837	1.080	1	0.299	2.387	0.463	12.315
# of children								
No child			9.377	4	0.052			
One child	−0.587	0.342	2.947	1	0.086	0.556	0.285	1.087
Two children	−0.360	0.289	1.549	1	0.213	0.698	0.396	1.230
Three children	−0.813	0.365	4.960	1	**0.026**	0.443	0.217	0.907
Four or more children	−1.263	0.503	6.311	1	**0.012**	0.283	0.106	0.758
School Situated								
Urban Setting	0.491	0.212	5.372	1	**0.020**	1.634	1.079	2.474
Number of years teaching								
5 years or less			1.977	3	0.577			
10 years or less but more than 5 years	−0.167	0.458	0.133	1	0.716	0.846	0.345	2.078
20 years or less but more than 10 years	−0.446	0.427	1.090	1	0.297	0.640	0.277	1.479
More than 20 years.	−0.215	0.471	0.209	1	0.648	0.806	0.320	2.030
Major Role								
Elementary teacher			0.934	5	0.968			
Junior high teacher	0.004	0.298	0.000	1	0.989	1.004	0.560	1.800
Senior high teacher	−0.079	0.300	0.070	1	0.792	0.924	0.513	1.663
Support Staff	−0.410	0.467	0.769	1	0.381	0.664	0.266	1.658
Administrator	−0.017	0.354	0.002	1	0.961	0.983	0.491	1.966
Other	−0.142	0.324	0.193	1	0.661	0.868	0.460	1.636

(Continued)

TABLE 3 (Continued)

Variables	*B*	S.E	Wald	df	Sig.	Odds Ratio	95% C.I. for odds ratio	
							Lower	Upper
School you teach.								
Catholic School			5.541	2	0.063			
Public School	0.284	0.269	1.117	1	0.291	1.328	0.785	2.249
Other	−1.139	0.687	2.748	1	0.097	0.320	0.083	1.231
Stress								
High stress	1.928	0.373	26.683	1	**0.000**	6.875	3.308	14.287
Resilience								
Low resilience	1.180	0.250	22.369	1	**0.000**	3.255	1.996	5.309
Constant	−0.176	0.932	0.036	1	0.850	0.839		

S.E, standard error; B, beta; df, degree of freedom; Sig, significance; C.I, confidence interval.

Teacher resilience is the degree to which they are able to uphold a set of positive attributes about the profession despite a variety of demands, pressures, and challenges inherent in the work (51). Our results show that respondents with low resilience were 3.26 times more likely to experience emotional exhaustion symptoms than those who did not. Similar result was reported in another study which found resilience as a predictor of emotional exhaustion (52). Respondents with high stress symptoms were about seven times more likely to experience emotional exhaustion than those who did not. This outcome was expected as stress has often been linked to teacher burnout comprising of three main elements; attitudinal, physical and emotional exhaustion (53). A systematic review which examined the impact of organizational context on teacher burnout, reported that classroom disruption, perceived collective exhaustion, and work climate which are all associated with high stress exhibited statistically significant detrimental effects on emotional exhaustion (54).

The current study indicates that participants who worked in the urban setting were 1.63 times more likely to experience emotional exhaustion than those in rural settings. The literature suggests that urban school teachers experience significantly more stress than rural school teachers, and this may lead to burnout (55). Another review (56) noted that teachers in rural settings tend to teach relatively smaller class sizes, report satisfaction with their work environments and have relatively few problems with discipline which may contribute to the absence of emotional exhaustion. Our finding corroborates with this review finding, suggesting that teachers in urban settings experience more emotional exhaustion compared to rural teachers. Our study finding, however, is contrary to the finding from another study (11), which reported that emotional exhaustion is independent of residence (rural–urban) of participants.

In our current study, participants who had no child were 2.26 times and 3.53 times more likely to experience emotional exhaustion than those with three children and those with four or more children, respectively. The possible explanation is that teachers with no child are likely younger and have less teaching experience in comparison with those with children who may be older and have more teaching experience. On the contrary teacher' school work is usually compounded by the demands at home of teachers and it would have been expected that teachers with three or more children would have experienced increased emotional exhaustion due to increased demand at school and home. Normally, the work of a teacher extends beyond the classroom to homes as teachers plan lessons, mark assessments, and perform other roles to progress the curriculum (57). Other demographic and professional variables, such as age, ethnicity, the school teachers teach and number of years teaching, did not independently predict the presence of emotional exhaustion symptoms in the participants. However, a study (14) has implicated age as a significant predictor of emotional exhaustion. This difference may be attributed to differences in the countries of research and other cultural differences not explored in the study. The number of years of teaching or teaching experience has normally been associated with educators' ability to manage the class effectively, make accurate assumptions, and deliver the curriculum with precision. Beginner teachers have been suggested to navigate and articulate issues with more difficulty, leading to increased burnout (2). Our study did not, however, provide evidence for this assumption.

4.2 Predictors of depersonalization

Sex at birth, relationship status, where the school is situated, area of specialization, stress, and resilience independently predicted the presence of depersonalization among participants. Our results contradict findings from another study, which suggested that depersonalization was independent of gender, marital status, or residence (rural–urban) (55).

Being married, in a relationship or lack of support have been considered to reduce the risk of mental health issues and serves as protective factor against the same (58). Respondents who were married or separated did not show any statistically significant likelihood of developing depersonalization compared to the single participants. However, participants who described their marital status as common law/partnered and others were three and half times and 7.32 times, respectively, more likely to experience depersonalization compared to those who were single. One possible explanation is that teachers tend to work extra hours outside of the classroom, and this may be affecting the nature of common law/partnered and other

TABLE 4 Logistic regression model for depersonalization/cynicism.

Variables	*B*	*S.E*	Wald	df	Sig.	Odds ratio	95% C.I. for odds ratio	
							Lower	Upper
Age (Years)								
18–25			1.768	3	0.622			
26–40	0.470	0.597	0.619	1	0.431	1.599	0.496	5.154
41–60	0.167	0.655	0.065	1	0.799	1.182	0.327	4.267
61 and above	0.391	0.894	0.191	1	0.662	1.478	0.256	8.530
Sex at birth								
Male								
Female	−0.875	0.288	9.206	1	**0.002**	0.417	0.237	0.734
Ethnicity								
Indigenous			12.940	7	0.074			
African Descendants	−0.186	1.232	0.023	1	0.880	0.831	0.074	9.288
East Asian	0.098	0.949	0.011	1	0.918	1.103	0.172	7.088
Latino	−2.396	1.296	3.418	1	0.064	0.091	0.007	1.155
Middle Eastern	−0.991	1.338	0.548	1	0.459	0.371	0.027	5.112
South Asian	−0.421	0.990	0.181	1	0.670	0.656	0.094	4.569
Caucasian	−1.334	0.622	4.599	1	**0.032**	0.263	0.078	0.892
Other ethnicities	−2.436	1.059	5.295	1	**0.021**	0.088	0.011	0.697
Housing status								
Own home			1.970	2	0.373			
Renting	0.444	0.324	1.875	1	0.171	1.559	0.826	2.946
Live with family or friend	0.035	0.646	0.003	1	0.957	1.035	0.292	3.672
Relationship status								
Single			14.904	4	**0.005**			
Married	0.648	0.350	3.421	1	0.064	1.911	0.962	3.796
Common Law/Partnered	1.248	0.368	11.497	1	**0.001**	3.482	1.693	7.161
Separated/Divorced	0.640	0.517	1.535	1	0.215	1.897	0.689	5.225
Other	1.990	0.779	6.528	1	**0.011**	7.318	1.590	33.693
# of children								
No child			8.545	4	0.074			
One child	−0.246	0.327	0.567	1	0.452	0.782	0.412	1.484
Two children	−0.677	0.294	5.315	1	**0.021**	0.508	0.286	0.904
Three children	−0.028	0.394	0.005	1	0.944	0.972	0.449	2.107
Four or more children	−0.951	0.567	2.815	1	0.093	0.386	0.127	1.173
School Situated								
Urban Setting	0.454	0.219	4.277	1	**0.039**	1.574	1.024	2.421
Number of years teaching								
5 years or less			0.940	3	0.816			
10 years or less but more than 5 years	0.210	0.374	0.316	1	0.574	1.234	0.593	2.566
20 years or less but more than 10 years	0.059	0.380	0.024	1	0.877	1.061	0.504	2.235
More than 20 years.	0.275	0.449	0.375	1	0.541	1.316	0.546	3.173
Major Role								
Elementary teacher			3.825	5	0.575			
Junior high teacher	0.367	0.291	1.600	1	0.206	1.444	0.817	2.552

(Continued)

TABLE 4 (Continued)

Variables	*B*	*S.E*	Wald	df	Sig.	Odds ratio	95% C.I. for odds ratio	
							Lower	Upper
Senior high teacher	0.386	0.326	1.404	1	0.236	1.471	0.777	2.787
Support Staff	−0.135	0.554	0.060	1	0.807	0.874	0.295	2.585
Administrator	−0.209	0.430	0.236	1	0.627	0.812	0.350	1.884
Other	−0.194	0.393	0.243	1	0.622	0.824	0.381	1.780
Average number of students/pupils in the classes you teach.								
20 or less			3.531	2	0.171			
21–27	−0.083	0.275	0.092	1	0.762	0.920	0.537	1.578
28 or more	0.392	0.325	1.457	1	0.227	1.48	0.783	2.799
Area of teaching specialization								
English			12.922	6	**0.044**			
Mathematics	0.460	0.442	1.085	1	0.298	1.585	0.666	3.768
Sciences (Physics, Chemistry, Biology)	0.754	0.442	2.918	1	0.088	2.126	0.895	5.053
Arts (History, Geography, Social Studies etc.)	0.268	0.413	0.420	1	0.517	1.307	0.582	2.937
Music	1.594	0.553	8.290	1	**0.004**	4.921	1.663	14.561
Physical education	1.337	0.575	5.406	1	**0.020**	3.806	1.234	11.743
Other	0.347	0.309	1.260	1	0.262	1.415	0.772	2.596
Source of stress								
Workload			7.475	4	0.113			
Student Behavior	0.605	0.249	5.890	1	**0.015**	1.832	1.124	2.987
Class size	−0.331	0.494	0.447	1	0.504	0.719	0.273	1.893
Limited management support	0.155	0.363	0.182	1	0.670	1.167	0.573	2.379
Other	0.446	0.332	1.800	1	0.180	1.561	0.814	2.994
Stress								
High stress	0.935	0.221	17.931	1	**0.000**	2.548	1.653	3.928
Resilience								
Low resilience	0.481	0.212	5.159	1	**0.023**	1.618	1.068	2.449
Constant	−1.578	0.962	2.692	1	0.101	0.206		

relationships as these may be less stable than marriages. In addition, most teachers in one study (59) reported that occupational stress significantly impacted their personal relationships, which may explain the increased likelihood of the presence of depersonalization in participants who identified their marital status as common law/partnered. This study found no significant difference between single individuals and those who were divorced. On the contrary, published literature indicates that individuals who are single tend to experience higher burnout levels (2). In contrast, a meta-analytic study among nurses reported a statistically significant relation between depersonalization and marital status and gender, with males who are single or divorced experiencing more burnout (60). Some aspects of this finding support our study, whilst others are contradictory. Our study indicates, for instance, that male participants were about two and a half times more likely to experience cynicism than their female counterparts. Similar findings were reported in another study which indicated that emotional exhaustion and depersonalization were significantly lower in female teachers than in male teachers (61). Additionally, in a meta-analysis it was reported that men experienced more depersonalization than women, whilst women experience more emotional exhaustion than men (62). Another study (63) theorized that men are more likely to experience depersonalization than females due to greater work stress and inadequate coping skills. On the contrary, another study (64) suggested that females are more likely to experience burnout than men as they navigate their professional roles. Future study may explore which particular sex and gender experience depersonalization associated with number of children as the current study did not explore this.

Although number of children as a variable did not make a unique statistically significant contribution to the regression model, participants who had no child were about two times more likely to experience cynicism than those with two children. The finding corroborates finding from another study which reported that educators' perceptions about burnout differed dependent on having a child or not. The study suggests that teachers who have children or have the responsibility of child rearing may be more tolerate with problems arising from work and life (3). Teachers with no child may also experience increased cynicism possibly because they are younger

TABLE 5 Logistic regression model for lack of professional fulfillment.

Variables	*B*	S.E	Wald	df	Sig.	Odds ratio	95% C.I. for odds ratio	
							Lower	Upper
Age (Years)								
18–25			2.086	3	0.555			
26–40	−0.539	0.480	1.261	1	0.261	0.583	0.228	1.494
41–60	−0.323	0.517	0.389	1	0.533	0.724	0.263	1.996
61 and above	−0.497	0.759	0.428	1	0.513	0.609	0.137	2.695
Number of years teaching								
5 years or less			5.296	3	0.151			
10 years or less but more than 5 years	0.119	0.303	0.156	1	0.693	1.127	0.622	2.040
20 years or less but more than 10 years	−0.246	0.297	0.686	1	0.408	0.782	0.437	1.400
More than 20 years.	−0.574	0.351	2.672	1	0.102	0.563	0.283	1.121
Major role								
Elementary teacher			2.854	5	0.723			
Junior high teacher	−0.133	0.229	0.337	1	0.562	0.875	0.559	1.372
Senior high teacher	0.143	0.241	0.355	1	0.552	1.154	0.720	1.850
Support Staff	0.026	0.423	0.004	1	0.950	1.027	0.448	2.353
Administrator	−0.339	0.349	0.944	1	0.331	0.713	0.360	1.412
Other	−0.315	0.321	0.967	1	0.325	0.730	0.389	1.368
Stress								
High stress	0.851	0.183	21.730	1	**0.000**	2.341	1.637	3.348
Resilience								
Low resilience	0.547	0.173	9.964	1	**0.002**	1.728	1.230	2.427
Constant	−0.598	0.430	1.931	1	0.165	0.550		

and inexperienced and could be struggling with the demands of the profession.

Our findings suggest that participants who worked in the urban setting were one and a half times more likely to experience depersonalization than those in rural settings. Our result is contrary to another study reporting that Depersonalization was independent of gender, marital status or school location (rural–urban) (55).

Similarly, respondents whose area of specialization was music and physical education were about five and four times, respectively, more likely to experience depersonalization than those whose area of specialization was English. It's possible that the academic demands and stressors associated with music and physical education specializations are more intense compared to English. For example, music programs may involve rigorous practice schedules or performance expectations, while physical education programs may have demanding physical requirements. The heightened stress associated with these specializations could contribute to a higher likelihood of depersonalization. Moreover, music teachers have been reported to be substantially more burnt out than mathematics teachers in another study (65). Additionally, physical education classes are largely dependent on equipment and facilities and are mainly conducted outdoors in tracks, courts, school yards or gyms, which may increase problems for sustaining class discipline, leading to likely burnout (Depersonalization) (66). This may probably be the reason for the surge in depersonalization among this group.

In addition, participants who experience high stress symptoms were two and a half times more likely to experience depersonalization than those who did not. Stress has generally been associated with burnout and has been reported to be a significant predictor of burnout, fatigue and exhaustion (67). Our study is also consistent with another study which reported that acute stress disorder was significantly and positively associated with emotional exhaustion and depersonalization dimensions of job burnout (61). Furthermore, respondents with low resilience were about one and a half times more likely to experience depersonalization than those who did not. Consistent with our study, another study reported a positive relationship between emotional exhaustion and depersonalization and low levels of resilience (68).

Participants' ethnicity as a variable did not make a unique statistically significant contribution to the model. However, participants who identified as indigenous were four and 11 times more likely to present with depersonalization compared with Caucasians and those who indicated other as their ethnicity, respectively. There may be likely cultural differences in the way individuals from different ethnic backgrounds perceive or cope with stressors, potentially influencing the likelihood of experiencing depersonalization. This is supported by a study outcome that reported both universal and culture-specific effects on burnout, signifying the need for a cross-cultural perspective to study burnout (69). However, other variables not included in the model could

be relevant to understanding the relationship between ethnicity and depersonalization.

Finally, the source of stress as a variable did not contribute significantly to the model, but respondents who reported student behavior as their source of stress were about two times more likely to experience cynicism than those who reported workload as source of stress. Student behavior patterns have been reported to be a source of stress among teachers (20), and this is reiterated in our current study. Other demographic and professional variables, such as age, housing status, number of students in the class, major role, and teaching experience did not independently predict depersonalization among participants. On the contrary, one study has associated age with depersonalization (70). There's a lack of literature in relation to number of students in the class and burnout. However, class size may have a direct relationship with class management and students' behavior. Related to this, class size has been reported to significantly predict anxiety among teachers (14), which may encompass anxiety about class management.

4.3 Predictors of lack of professional accomplishment

Participants who experienced high stress symptoms were about two times more likely to experience lack of professional fulfillment than those with low stress. Our study finding is consistent with other studies (67, 71) among teachers which reported that occupational stress was a significant predictor of burnout. Similarly, respondents with low resilience were almost two times more likely to experience a lack of professional fulfilment than those with high resilience. Similar findings were reported in another study indicating that resilience significantly predicts personal accomplishment (14). Other demographic and professional variables, such as age, major role and teaching experience, did not independently predict depersonalization among participants. The current outcome is contrary to another study (2), which reported that among younger employees, the level of burnout is higher than it is among those over 30 or 40 years old. The study noted that teachers with increased teaching experience are less prone to burnout. Conflicting results were also reported in another study in terms of age, which indicated that depersonalization and low professional accomplishment were significantly associated with age (70).

4.4 Implications for policy and practice, and future research

This study has established that the prevalence of the three burnout syndromes among the three Canadian provinces range from 23.2 to 76.9%, and stress and low resilience were the key predictors of the burnout syndromes. Disparities in the prevalence of emotional exhaustion, a burnout dimension among teachers in the three participating provinces, highlight the importance of considering other contextual factors which were not assessed in this study but may contribute to stress, such as regional economic conditions, organizational cultures, and social support systems, in understanding the prevalence and manifestations of burnout. Research is necessary to explore the underlying mechanisms driving these provincial disparities and to develop strategies to mitigate burnout and enhance occupational health across provinces. School location was also a significant predictor of emotional exhaustion which may warrant further research into aspects of rural and urban settings causing burnout. The current study also sheds light on the complex relationship between resilience, stress, and burnout and reveals compelling insights into the predictors of burnout across all the various burnout dimensions. This suggests that individuals with higher levels of resilience are better equipped to withstand the demands and pressures of their roles, mitigating the risk of burnout. The findings underscore the importance of resilience and the need to build resilience among teachers while aiming to reduce stress. Thus, teachers will be better able to bounce back from setbacks, cultivate effective coping strategies, and maintain a sense of purpose and optimism, which will serve as a protective buffer against the toxic effects of chronic stress, hence occupational burnout. Conversely, stress as a significant predictor of burnout underscores the detrimental impact of stress on individuals' physical, emotional, and cognitive wellbeing and highlights its role as a key precipitant of burnout. It is vital to address teacher's burnout thereby empowering teachers to thrive in their roles. This will inadvertently be a gain for the students they teach. Administrators, school boards, organizations and policymakers can implement targeted interventions aimed at addressing systemic stressors, fostering resilience, and promoting a supportive work environment conducive to educators' wellbeing.

4.5 Limitations

There are some limitations worth mentioning. First, the demographic variables in the study may not reflect the demographics of teachers in Canada, as only teachers in three provinces were involved in the study. Again, our study participants were predominantly females, 87.7%, and only 12.3% male participants thus, the study findings may not be generalizable. Secondly, the scales used to assess burnout although standardized are not meant to be diagnostic. Thirdly, the response rate for our study is low, although it is common for web-based survey completion rates, which typically yield lower response rates than paper-based surveys (72, 73). Despite these limitations, our study is the first to explore the prevalence and independent predictors of the three burnout dimensions in the three Canadian provinces, and our findings would be of interest to policy makers, particularly those working in the education sector.

5 Conclusion

There was a high prevalence of emotional exhaustion, depersonalization and lack of accomplishment among teachers in this study, with high stress and low resilience being key predictors of the three burnout syndromes. The cumulative burden of stress undermines individuals' resilience and erodes their capacity to sustain engagement and fulfillment in their professional roles. By identifying resilience and stress as central predictors of burnout across the three burnout dimensions, the study highlights the importance of schools deploying interventions aimed at enhancing resilience, mitigating stress, and fostering a supportive work environment conducive to employee wellbeing.

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 humans were approved by University of Alberta Ethics Review Board (Pro00117558) and the Dalhousie University Human Research Ethics Review Board (REB # 2023-6840). The studies were conducted in accordance with the local legislation and institutional requirements. The ethics committee/institutional review board waived the requirement of written informed consent for participation from the participants or the participants' legal guardians/next of kin because this is an anonymous online survey and so written informed consent will not have been possible. The ethics board approved implied consent when participants complete and return the online survey. All participants were provided with information leaflets about the study and were made aware that consent will be implied if they complete and return the survey.

Author contributions

BA: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Software, Validation, Writing – original draft, Writing – review & editing. RL: Software, Validation, Writing – review & editing. YW: Software, Supervision, Validation, Writing – review & editing. VA: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Validation, Writing – review & editing.

Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. Alberta Mental Health Foundation and RBC Foundation funded this research.

Acknowledgments

We are grateful to the Alberta Teachers Association, the Edmonton Catholic School Board, the Nova Scotia Teachers Union and the Newfoundland and Labrador Teachers Union for helping to promote the Wellness4Teachers program among their teachers. We also thank all the teachers who took time out of their busy schedule to complete the survey.

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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 02 May 2024
DOI 10.3389/fpubh.2024.1346583

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OPEN ACCESS

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RECEIVED 05 December 2023
ACCEPTED 22 April 2024
PUBLISHED 02 May 2024

CITATION
Zhao J and Zhang M (2024) Postpartum depression and risk factors among working women one year after delivery in Beijing, China: a cross-sectional study.
Front. Public Health 12:1346583.
doi: 10.3389/fpubh.2024.1346583

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Postpartum depression and risk factors among working women one year after delivery in Beijing, China: a cross-sectional study

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Background: Postpartum depression (PPD) is the most common mental illness affecting women after childbirth, and working mothers may be faced with unique challenges. This study aimed to examine the depression status among working postpartum women in 1 year of childbirth and explore the relationship between occupational factors and PPD in urban Beijing, China.

Methods: A cross-sectional survey of 554 postpartum women was conducted among ten community health service centers in six urban districts of Beijing, China. Sociodemographic, occupational, childbirth and postpartum information were collected. Depression status was obtained using the Edinburgh Postnatal Depression Scale. Prevalence of postpartum depression (PPD) was assessed in relation to occupational characteristics, and influencing factors were analyzed through logistic regression.

Results: Of the postpartum women, 29.42% met the criteria for depression. PPD prevalence was significantly higher among women employed in commercial enterprises (39.81%). The analysis of influencing factors showed that age, family or personal monthly income, maternity leave, feeding methods, and postpartum care affected the psychological health of occupational women after childbirth.

Conclusion: PPD prevalence is notably elevated among women employed in commercial enterprises, and specific risk factors contribute to its occurrence. These findings highlight the need for targeted interventions to address these risk factors and prevent PPD in this population.

KEYWORDS

working women, postpartum depression, risk factors, commercial enterprises, maternal mental health

1 Introduction

China has the largest number of female workers in the world, representing approximately 26% of the global female employment total (1). The female employment rate in China also ranks among the highest worldwide. According to data from the National Bureau of Statistics of China, in 2021, there were 320 million employed women in the country, constituting 43.1% of the total workforce (2). This proportion consistently surpasses that of Asia-Pacific nations such as South Korea (42.7%) and Singapore (41.2%), as well as the global average (39.3%). It is comparably aligned with that of Western developed countries such as the United States

(46.2%) and Sweden (47.4%) (1). The health of these female workers, particularly in terms of mental well-being, is a critical concern.

Postpartum depression (PPD) is the most common mental health issue affecting women after childbirth, with symptoms persisting for up to 1 or 2 years (3). PPD symptoms, such as sadness, irritability, anxiety, and poor appetite, can escalate to severe agitation and in extreme cases, self-harm or infanticide (3, 4). This condition not only affects the well-being of the mother but also poses significant risks to the newborn and affecting the socio-emotional dynamics of the family. This underscores the necessity for proactive attention and effective interventions.

Well-established risk factors associated with developing PPD include age, low education level, low socioeconomic status, limited social support, relationship difficulties, a history of depression and depression during the pregnancy (5, 6). Hormonal fluctuations, nutritional deficiencies, sleep disturbances are also contributing factors to PPD (7). While these risks are universal among all new mothers, working mothers are faced with unique challenges. Typically, most professional women return to work within the first year post-delivery, which largely depended on the duration and terms of maternity leave. The features of maternity leave, such as length, wage replacement and employment protection, significantly impact maternal mental health (8, 9). Moreover, workplace conditions, including work schedules, shift work, reward structures, and work–family conflict, can act as stressors, heightening the risk of depression (10). Due to the dual demands of infant care and employment, working mothers are particularly susceptible to workplace stress.

Maintaining good psychological and emotional health is essential for job performance and minimizing absenteeism. Studies reveal that PPD is associated with increased workplace absenteeism, reduced job performance, and higher disability costs for employers (11). Mothers who experience PPD often face heightened absenteeism, prolonged medical disability following childbirth, difficulties in re-adjusting to the work, and heightened relationship conflicts, including divorce (12).

Despite the importance of this issue, current research has insufficiently addressed the experiences of female workers, especially in China. While some studies have explored PPD among working mothers (13–15), they have not considered the specific characteristics of occupations and how these might impact PPD. Given the profound implications of PPD on maternal health, child development, and workplace dynamics, this study aims to analyze the prevalence of postpartum depression among women in different occupational categories in urban Beijing within 1 year of childbirth, and to explore the relationship between occupational factors and PPD. The research seeks to provide a comprehensive understanding of the factors influencing PPD in the context of working mothers, thereby guiding the development of targeted strategies to mitigate risks and support recovery.

2 Materials and methods

2.1 Study setting and design

This research was conducted in six urban districts of Beijing, the capital city of China. Postpartum women are required to establish maternal and child health records within 1 week of childbirth at community health service centers. Over the following 3 years, these centers provide health checkups for infants in every 6 months, and vaccination services. Data were collected when a mother accompanied her one-year-old baby to the health center for a physical examination or vaccination. If the mother was not present, we contacted them by phone and sent the survey questionnaire via WeChat or SMS to complete the data collection.

2.2 Participants and recruitment

Cluster sampling was used to conduct a cross-sectional survey. Inclusion criteria of Postpartum women: (a) those who established maternal and child health records from November 2017 to June 2018 in 10 community health service centers across the six urban districts of Beijing; (b) women who were in the 1 year postpartum, with normal communication and understanding abilities; (c) those who voluntarily participated in the survey and signed an informed consent form. Exclusion criteria: Those previously or during pregnancy diagnosed with organic brain disease; those with a history of psychiatric disorders; and those who refused to participate after explanation. This study was approved by the Ethics Review Committee of the Institute of Basic Medical Sciences, Chinese Academy of Medical Sciences (067-2021).

2.3 Data collection

Data on these women for 1 year postpartum were collected from November 2018 to June 2019. After the respondents signed the informed consent form, they were enrolled in the study. Data collection was initiated with a digital questionnaire. A total of 589 cases met the inclusion criteria for the study, with 554 cases ultimately providing valid data, with an effective response rate of 94.06%.

2.4 Measurements

One-year postpartum data were collected using a two-part questionnaire. Part 1 focused on sociodemographic profile (age, education level, family and personal monthly income), employment factors (the women's occupational status and maternity leave), and postpartum factors (baby's health status, baby's feeding methods, and the women's caregiving status). Perinatal information such as mode of delivery, parity, and complications were recorded from the maternal and child health records in the community health center.

Part 2 was the Edinburgh Postnatal Depression Scale (EPDS) for mental health status measurement. The Chinese version of EPDS was used to determine the occurrence of PPD. The EPDS has a sensitivity of 85%, specificity of 77%, positive predictive value of 83%, split-half reliability of 85%, and a Cronbach's α coefficient of 0.87 (16). The subjects used a self-assessment method, selecting corresponding scores (0-never, 1-sometimes, 2-often, 3-always) on 10 items (mood, pleasure, self-blame, anxiety, fear, insomnia, coping ability, sadness,

crying, and self-harm) (17). A total score of ≥13 points was diagnostic for PPD.

2.5 Classification of postpartum women's occupations

Referring to the occupational classification in socio-economic status studies (18–21), the occupational information collected from questionnaire was categorized into four groups: physical workers (PW, workers, agricultural/forestry/fishery/water conservancy production personnel, cleaning and sanitation workers, restaurant service personnel, retail salespersons, etc.), commercial enterprises (CE, state-owned enterprises, foreign-funded enterprises, and small and medium-sized enterprise workers, financial insurance and other commercial practitioners, etc.), professionals, government office & public institution employees (PGPE, medical staff, teachers, scientific and technical workers, cultural workers, professional and technical personnel, staff of state organs and institutions, etc.), and unemployed or self-employed (US).

2.6 Data analysis

All data were checked before entry and were double-entered, with statistical analysis performed using SPSS software version 27.0. Count data were described using frequency (percentage), analyzed using the χ^2 test, and post-hoc tests were conducted using the Bonferroni method for pairwise comparisons between groups; logistic regression analysis with forward stepwise was used to analyze factors related to PPD. The level of significance was $\alpha = 0.05$, with $p < 0.05$ considered statistically significant.

3 Results

3.1 General characteristics of postpartum women in four occupational categories

Among 554 postpartum women surveyed within 1 year after delivery, the majority were aged 30–34 years (35.56%). Among these, the unemployed or self-employment under the age of 25 were more prevalent (38.61%), while women working in commercial enterprises above the age of 35 were more common than in other groups (23.79%). The majority had received tertiary education, either at a college or undergraduate level (83.94%), with physical laborers and the unemployed or self-employed women more likely to have a high school education or less, compared to other occupations. The predominant range for family monthly income was between 10,000 and 30,000 RMB (54.69%), with women in commercial enterprises reporting higher family incomes than other categories (53.88%). Personal monthly income most commonly fell between 5,000 and 15,000 RMB (78.52%), with those in the commercial sector earning more than their counterparts in other categories. Additionally, women employed in commercial enterprises had a higher proportion of first childbirths, pregnancies that were well-prepared, mixed feeding practices, and hiring of nannies compared to other occupational categories. See Table 1 for details.

3.2 Prevalence of PPD among postpartum women of four occupational categories

Based on an Edinburgh Postnatal Depression Scale (EPDS) score of ≥13, the overall prevalence of PPD among the surveyed subjects was 29.42% (163/554 individuals). The prevalence of PPD in women employed in commercial enterprises was 39.81% (82/206 individuals), which was significantly higher than that of other occupational categories, with a statistically significant difference ($\chi^2 = 19.284$, $p < 0.01$). See Table 2 for details.

3.3 Univariate analysis of PPD among postpartum women

Univariate analysis revealed that women over the age of 35 have a significantly higher proportion of postpartum depression (PPD) at 41.90% compared to other age groups ($\chi^2 = 11.860$, $p = 0.008$). Families with an income between 10,000 to 30,000 RMB show a lower prevalence of PPD at 24.09% ($\chi^2 = 9.860$, $p = 0.007$). Women with unintended pregnancies show the highest rate of PPD at 47.06%, which is statistically significant ($\chi^2 = 14.899$, $p = 0.001$). Mothers of babies with health problems have a significantly higher rate of PPD compared to mothers of healthy babies ($\chi^2 = 20.567$, $p < 0.001$). Women who choose formula or mixed feeding have a higher proportion of PPD at 35.67% ($\chi^2 = 13.632$, $p = 0.001$). The prevalence of PPD among mothers who hire a nanny is significantly higher at 49.15%, compared to those who receive postpartum care solely from the couple themselves or with assistance from relatives ($\chi^2 = 25.873$, $p < 0.001$). See Table 3 for details.

3.4 Logistic regression analysis of occupational-related influencing factors of PPD in postpartum women

In the regression analysis, occupation was initially incorporated as an independent variable to explore whether any specific occupational group was associated with an increased risk of PPD in the sample. After adjusting for age, education level, and monthly family income, and further adjusting for pregnancy preparation, baby's health condition, breastfeeding method, and postpartum care, it was found that employees in commercial enterprises (OR = 4.184, 95% CI: 1.036–5.247, $p = 0.041$) were positively associated with an increased risk of PPD compared to the US group (Table 4).

Using PPD as the dependent variable, further logistic regression analysis was conducted with family monthly income, personal monthly income, length of maternity leave, care condition, and feeding method as independent variables. The results, after adjusting for age, educational level, and further adjusting for perinatal factors such as parity, whether the pregnancy was well-prepared, and baby's health status, indicated that factors significantly associated with PPD are presented in Table 5.

For physical workers, a family monthly income between 10,000 and 30,000 RMB was negatively correlated with the occurrence of PPD (OR = 0.035–0.851, 95%CI: 4.658, $p = 0.031$). For women employed in commercial enterprises, personal monthly incomes between 5,000 and 15,000 RMB (OR = 3.326, 95%CI: 1.021–10.839,

TABLE 1 Characteristics and univariate analysis among four occupational categories of postpartum women.

Characteristics	All		PW		CE		PGPE		US		χ^2	*p*
	(*N*, %)		(*N*, %)		(*N*, %)		(*N*, %)		(*N*, %)			
Age (year)											102.356	<0.001
<25	61	11.01	4	5.41	12	5.83	6	3.47	39	38.61		
25–29	191	34.48	29	39.19	73	35.44	70	40.46	19	18.81		
30–34	197	35.56	30	40.54	72	34.95	66	38.15	29	28.71		
>35	105	18.95	11	14.86	49	23.79	31	17.92	14	13.86		
Education level											61.603	<0.001
Senior school or less	37	6.68	15	20.27	7	3.4	2	1.16	13	12.87		
College or university	465	83.94	57	77.03	181	87.86	142	82.08	85	84.16		
Graduate	52	9.39	2	2.70	18	8.74	29	16.76	3	2.97		
Monthly family income (RMB)											107.630	<0.001
<10,000	89	16.06	20	27.03	20	9.71	32	18.50	17	16.83		
10,000–30,000	303	54.69	44	59.46	75	36.41	106	61.27	78	77.23		
>30,000	162	29.24	10	13.51	111	53.88	35	20.23	6	5.94		
Monthly personal income (RMB)											19.799	<0.001
<5,000	85	15.34	17	22.97	30	14.56	15	8.67	23	22.77		
5,000–15,000	435	78.52	54	72.97	157	76.21	148	85.55	76	75.25		
>15,000	34	6.14	3	4.05	19	9.22	10	5.78	2	1.98		
Parity											18.539	0.005
1	436	78.70	57	77.03	173	83.98	135	78.03	71	70.30		
≥2	118	21.30	17	22.97	33	16.02	38	21.97	30	29.70		
Pregnancy preparation											58.627	<0.001
Unintended pregnancy	68	12.27	14	18.92	11	5.34	26	15.03	17	16.83		
Planning for pregnancy but inadequate	215	38.81	20	27.03	68	33.01	63	36.42	64	63.37		
Fully preparation for pregnancy	271	48.92	40	54.05	127	61.65	84	48.55	20	19.80		
Mode of delivery											8.264	0.219
Natural labor	383	69.13	65	87.84	168	81.55	145	83.82	91	90.1		
Cesarean section or Vaginal assistant delivery	171	30.87	9	12.16	38	18.45	28	16.18	10	9.9		
Baby's health condition											6.664	0.353
Good	469	84.66	65	87.84	168	81.55	145	83.82	91	90.10		
Some problem in health	84	15.16	9	12.16	38	18.45	27	15.61	10	9.90		
Feeding method											36.839	<0.001
Exclusive breastfeeding	240	43.32	44	59.46	73	35.44	92	53.18	31	30.69		
Formula or mixed feeding	314	56.68	30	40.54	133	64.56	81	46.82	70	69.31		
Maternity leave											8.574	0.199
4 months or less	177	31.95	22	29.73	65	31.55	61	35.26	29	28.71		
4–6 months	313	56.50	39	52.70	118	57.28	90	52.02	66	65.35		
6 months or more	64	11.55	13	17.57	23	11.17	22	12.72	6	5.94		
Postpartum care											44.336	<0.001
Hiring a nanny	76	13.72	0	0.00	49	23.79	20	11.56	7	6.93		
Assistance from relatives	341	61.55	48	64.86	101	49.03	120	69.36	72	71.29		
Only the couple	137	24.73	26	35.14	56	27.18	33	19.08	22	21.78		

PW, physical workers; CE, commercial enterprises; PGPE, professionals, government office & public institution employees; US, unemployed or self-employed.

TABLE 2 The prevalence of PPD among four occupational categories of postpartum women.

Occupational groups	All (*N*, %)		PPD (*N*, %)		Non-PPD (*N*, %)		χ^2	*p*
							19.284	<0.001
PW	74	13.36	14	18.92	60	81.08		
CE	206	37.18	82	39.81	124	60.19		
PGPE	173	31.23	38	21.97	135	78.03		
US	101	18.23	29	28.71	72	71.29		
All	554		163	29.42	391	70.58		

PW, physical workers; CE, commercial enterprises; PGPE, professionals, government office & public institution employees; US, unemployed or self-employed.

$p = 0.046$), maternity leave of less than 4 months (OR = 4.851, 95%CI: 1.118–21.059, $p = 0.035$), maternity leave between 4 and 6 months (OR = 9.852, 95%CI: 2.352–41.263, $p = 0.002$), and mixed or formula feeding (OR = 2.411, 95%CI: 1.110–5.239, $p = 0.026$) were positively correlated with the occurrence of PPD; whereas having relatives to help with care (OR = 0.209–0.946, 95%CI: 4.426, $p = 0.035$) was negatively correlated with the occurrence of PPD. For women in professionals, government office & public institution, mixed or formula feeding (OR = 4.184, 95%CI: 1.036–5.247, $p = 0.041$) was positively related with PPD; and having relatives to help with care (OR = 0.135–0.836, 95%CI: 5.506, $p = 0.019$) was negatively correlated with the occurrence of PPD. For the unemployed and self-employed, mixed feeding (OR = 0.111–0.976, 95%CI: 4.014, $p = 0.045$) was negatively correlated with the occurrence of PPD.

4 Discussions

4.1 High prevalence of PPD in urban Beijing

This study reveals that the prevalence of PPD in women within 1 year postpartum in the urban areas of Beijing is 29.42%. Compared to the global prevalence of PPD, which ranges from 2.1 to 31.6% (22, 23), and recent surveys in China indicating a detection rate of PPD between 3.7 and 34.7%, this figure is notably high (6). The variance in reported PPD prevalence rates can be attributed to the use of different assessment tools and cut-off values (6, 22, 23), highlighting the need for standardized methods in future research. Meanwhile, this study included postpartum women living and working in the six urban districts of Beijing. The high incidence of PPD in urban Beijing may be attributed to the fast pace of life, intense competition, and significant work and economic pressures (24).

4.2 Occupational differences and PPD prevalence

In this study, the prevalence of PPD among women employed in commercial enterprises was found to be 39.81%, significantly higher than that of physical workers (18.92%), professionals, government office & public institution employees (21.97%), and the unemployed or self-employed (28.71%). This disparity underscores the substantial differences in the prevalence of PPD among postpartum women of various occupations, highlighting the necessity of focusing on PPD from an occupational perspective. Women working in commercial enterprises are often exposed to greater pressures of competition and unemployment, which might be associated with higher rates of PPD (25, 26), and their psychological state, particularly postpartum mental health, requires special attention. In this study, women in commercial enterprises tended to be older compared to other groups, which may be associated with the higher incidence of PPD. Research has found that older postpartum women have a higher incidence of post-pregnancy complications and poorer postpartum recovery; on the other hand, older mothers tend to have more concerns, which may lead to greater mental stress, resulting in anxiety, depression, and other adverse emotional states (27, 28). Furthermore, the proportion of first-time mothers was higher among those in commercial enterprises. As novice mothers, the lack of experience in childbirth and postpartum baby care can also lead to postpartum depression (29, 30).

4.3 Multiple factors influencing PPD among working women

Further multivariate analysis revealed that women working in commercial enterprises are affected by a wider range of factors contributing to PPD. Among these, personal monthly income of 5,000–15,000 RMB was identified as risk factors. Multiple studies have found that PPD is related to the family's economic status (5, 6, 27, 31, 32). Both higher and lower family incomes may increase the incidence of PPD. This is consistent with the findings in this study regarding women in physical labor occupations, where family monthly income affects PPD. In this study, although the family monthly income of women in commercial enterprises was significantly higher than that of other occupational categories, no correlation was found with the occurrence of PPD. In contrast, the personal monthly income of the women was related to PPD. This suggests that women in commercial enterprises may focus more on their career development, which could lead to increased stress.

This study also found that maternity leave of less than 6 months significantly increases the risk of PPD for women in commercial enterprises. This aligns with the findings of other studies (9, 10), which indicate that shorter maternity leave is associated with higher rates of postpartum depression. Adequate maternity leave is associated with improved recovery for the mother and potentially better care of the newborn. Therefore, ensuring sufficient maternity leave is an important way to protect the postpartum physical and mental health of working women (33). In China, maternity leave for mothers is divided into three parts: basic maternity leave, extended maternity leave, and local maternity leave. According to China's labor law regulations, female employees are entitled to 98 days of paid maternity

TABLE 3 Univariate analysis of PPD among postpartum women.

Characteristics	PPD (*N*, %)		No-PPD (*N*, %)		χ^2	*p*
Age (year)					11.860	0.008
<25	12	19.67	49	80.33		
25–29	56	29.32	135	70.68		
30–34	51	25.89	146	74.11		
>35	44	41.90	61	58.10		
Education level					5.297	0.071
Senior school or less	2	18.18	9	81.82		
College or university	28	22.05	99	77.95		
Graduate	133	31.97	283	68.03		
Monthly family income (RMB)					9.860	0.007
<10,000	29	32.58	60	67.42		
10,000–30,000	73	24.09	230	75.91		
>30,000	61	37.65	101	62.35		
Monthly personal income (RMB)					0.245	0.885
<5,000	24	28.24	61	71.76		
5,000–15,000	130	29.89	305	70.11		
>15,000	9	26.47	25	73.53		
Parity					2.050	0.153
1	122	27.98	314	72.02		
≥2	41	34.75	77	65.25		
Pregnancy preparation					14.899	0.001
Unintended pregnancy	32	47.06	36	52.94		
Planning for pregnancy but inadequate	67	31.16	148	68.84		
Fully preparation for pregnancy	64	23.62	207	76.38		
Mode of delivery					0.618	0.734
Natural labor	111	28.98	272	71.02		
Cesarean section or Vaginal assistant delivery	53	30.99	119	69.59		
Baby's health condition					20.567	<0.001
Good	121	25.80	348	74.20		
Some problem in health	41	48.81	43	51.19		
Feeding method					13.632	0.001
Exclusive breastfeeding	51	21.25	189	78.75		
Formula or mixed feeding	112	35.67	202	64.33		
Maternity leave					1.416	0.702
4 months or less	32	27.35	85	72.65		
4–6 months	95	30.35	218	69.65		
6 months or more	16	25.00	48	75.00		
Postpartum care					25.873	<0.001
Hiring a nanny	29	49.15	30	50.85		
Assistance from relatives	100	23.87	319	76.13		
Only the couple	34	44.74	42	55.26		

leave. In special circumstances, such as in cases of dystocia, the leave can be extended by an additional 15 days. And in Beijing, female employees also enjoy an additional local 60 days of maternity leave. However, in this study, maternity leaves shorter than 6 months were positively correlated with postpartum depression in women in commercial enterprises, indicating that current maternity leave

TABLE 4 Logistic regression analysis of occupational groups affecting PPD among postpartum women.

				Model 1[a]			Model 2[b]		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
US	1			1			1		
PW	0.998	0.422–2.365	0.997	0.704	0.322–1.537	0.378	0.921	0.365–2.325	0.862
CE	2.126	1.124–4.022	0.020	1.952	1.060–3.595	0.032	2.105	1.021–4.339	0.044
PGPE	1.271	0.646–2.501	0.488	0.700	0.371–1.322	0.272	1.036	0.488–2.197	0.927

[a]Model 1: Adjusted for age, education level and monthly family income.
[b]Model 2: Further adjusted for pregnancy preparation, baby's health condition, feeding method and postpartum care.PW, physical workers; CE, commercial enterprises; PGPE, professionals, government office & public institution employees; US, unemployed or self-employed.

TABLE 5 Logistic regression analysis of variables affecting PPD in four occupational groups of postpartum women.

Variables				Model 1[a]			Model 2[b]		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
PW									
Monthly family income (yuan)									
10,000–30,000 vs. <10,000	7.446	0.038–0.586	0.006	7.615	0.034–0.564	0.006	4.658	0.035–0.851	0.031
CE									
Monthly personal income (yuan)									
5,000–15,000 vs. <5,000	4.808	1.572–14.706	0.006	4.250	1.374–13.142	0.012	3.326	1.021–10.839	0.046
Maternity leave									
4 months or less vs. 6 months or more	2.189	0.568–8.437	0.255	2.395	0.610–9.405	0.211	4.851	1.118–21.059	0.035
4–6 months vs. 6 months or more	5.008	1.361–18.424	0.015	5.839	1.549–22.005	0.009	9.852	2.352–41.263	0.002
Postpartum care									
Assistance from relatives vs. Only the couple	5.248	0.231–0.892	0.022	5.754	0.202–0.851	0.016	4.426	0.209–0.946	0.035
Feeding method									
Formula or mixed feeding vs. Exclusive breastfeeding	2.479	1.210–5.079	0.013	2.322	1.118–4.821	0.024	2.411	1.110–5.239	0.026
PGPE									
Feeding method									
Formula or mixed feeding vs. Exclusive breastfeeding	6.481	1.260–5.909	0.011	6.082	1.225–5.908	0.014	4.184	1.036–5.247	0.041
Care of maternal and infant									
Assistance from relatives vs. Only the couple	4.188	0.179–0.964	0.041	3.989	0.174–0.984	0.046	5.506	0.135–0.836	0.019
US									
Feeding method									
Formula or mixed feeding vs. Exclusive breastfeeding	11.489	0.073–0.497	0.001	3.707	0.124–1.019	0.054	4.014	0.111–0.976	0.045

[a]Model 1: Adjusted for age and education level.
[b]Model 2: Further adjusted for parity, pregnancy preparation and baby's health condition.PW, physical workers; CE, commercial enterprises; PGPE, professionals, government office & public institution employees; US, unemployed or self-employed.

policies require reasonable adjustments based on the specific characteristics of the occupation, and from the perspective of postpartum mothers' mental health.

There is an association between the method of infant feeding and the psychological state of the mother. In this study, compared to exclusive breastfeeding, mixed or formula feeding resulted in a higher prevalence of PPD among women in commercial enterprises and in professionals, government office & public institution employees. Conversely, for unemployed and self-employed women, mixed or formula feeding resulted in a lower prevalence of PPD. This may be because mixed or formula feeding, being more complex and troublesome, can increase anxiety more easily in those working women facing greater occupational stress (7). In Chinese culture, breastfeeding often extends up to 1 year or more. For working women, this practice poses significant challenges. Once maternity leave concludes, lactating women are required to frequently travel between home and workplace to breastfeed, a process that is both time-consuming and physically draining, thereby exerting considerable

psychological pressure (34, 35). Alternatively, many postpartum mothers returning to work opt to express breast milk using pumps and temporarily store it at the workplace for later use. However, societal stigmas surrounding breastfeeding, coupled with unfriendly and inadequate facilities at work, exacerbate the mental stress experienced by professional women (36). This situation underscores the need for more supportive breastfeeding environments tailored to the needs of working women (37, 38).

The study also found that having relatives help with care is a protective factor against PPD. The presence of relatives to assist with care is associated with a lower prevalence of PPD among women in commercial enterprises and those in professionals, government office & public institution employees. The level of postpartum support is considered one of the most important influencing factors for PPD (39–41). This is particularly crucial for mothers returning to the workforce. Compared to hiring nannies, care and attention from family members provide the best psychological support for postpartum women. For Chinese parents, options for infant care are limited. Before the age of three, due to the lack of affordable public infant and toddler care facilities, caregiving predominantly takes place at home. Hiring a nanny entails additional financial burdens and concerns about the caregiver's qualifications. On the other hand, entrusting grandparents with childcare often leads to increased family conflicts. This scenario underscores the need for government bodies and workplaces to provide high-quality, trustworthy childcare services, which are particularly crucial for postpartum working women. The establishment of such services would alleviate the caregiving burden on families and support the mental and emotional well-being of working mothers.

4.4 Limitations

While this study provides valuable insights into the prevalence and factors associated with PPD in different occupational groups, it has its limitations. As a cross-sectional study, it cannot establish causality between identified risk factors and PPD. Future longitudinal studies are recommended to address this gap. Moreover, a more comprehensive analysis of occupational stress and its impact on PPD would enhance our understanding of the occupational-specific risks faced by these women. The reliance on self-reported data may introduce recall bias, suggesting the need for more objective measurement tools in future studies.

5 Conclusion

In conclusion, the higher prevalence of PPD in women employed in commercial enterprises, influenced by various occupational and personal factors, calls for further research and targeted intervention strategies. This study, with its focus on occupational factors, provides a novel perspective in analyzing the risk factors for PPD among working women in Beijing. The findings offer theoretical support for developing effective screening and intervention measures tailored to the needs of women in different occupations, aiming to promote their mental health and well-being postpartum.

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

JZ: Data curation, Investigation, Methodology, Software, Writing – original draft. MZ: Conceptualization, Supervision, Writing – review & editing.

Ethics statement

The studies involving humans were approved by the Ethics Review Committee of the Institute of Basic Medical Sciences, Chinese Academy of Medical Sciences. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This work was supported by an Innovation Fund for Medical Sciences of the Chinese Academy of Medical Sciences (2019-I2M-2-007).

Acknowledgments

The authors are extremely grateful to all the working women who participated in this study, as well as the data collection teams in every health center. We highly appreciate their full commitment during this study.

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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 03 May 2024
DOI 10.3389/fpubh.2024.1402422

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OPEN ACCESS

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RECEIVED 17 March 2024
ACCEPTED 22 April 2024
PUBLISHED 03 May 2024

CITATION
Yetkin Tekin A and Karadağ H (2024) Moderator role of Type D personality traits between depressive symptoms and job satisfaction among teachers.
Front. Public Health 12:1402422.
doi: 10.3389/fpubh.2024.1402422

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Moderator role of Type D personality traits between depressive symptoms and job satisfaction among teachers

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Background: Type D personality is characterized by negative affect (NA) and social suppression (SI). It has been indicated Type D personality is associated with depression, anxiety, and burnout. Depressive complaints and social inhibition negatively affect job satisfaction. The aim of this study is to investigate the moderating role of Type D personality structure between the severity of depressive complaints and job satisfaction in teachers.

Methods: 939 teachers, who constitute the sample of the study, completed the sociodemographic form, Type D personality scale (DS-14), Beck Depression Inventory (BDI) and Minnesota Satisfaction Scale Short Form with an online survey.

Results: While a negative relationship was found between teachers' NA scores and their intrinsic and extrinsic job satisfaction ($r = -0.28$ and $r = -0.19$, respectively), a negative relationship was detected between SI scores and intrinsic and extrinsic job satisfaction ($r = -0.22$ and $r = -0.21$, respectively). NA and SI had partial moderating roles in the relationship between BDI score and intrinsic job satisfaction. SI played a partial moderating role in the relationship between BDI and extrinsic job satisfaction.

Conclusion: It can be said Type D personality traits has a moderating role between the severity of teachers' depressive complaints and job satisfaction.

KEYWORDS

depressive symptoms, job satisfaction, negative affect, social inhibition, teachers, Type D personality

Introduction

Type D personality describes the personality characteristics of individuals prone to psychological stress and has two substructures: negative affect and social inhibition (1). While negative affect is characterized by the predominance and longer duration of unwanted negative emotions, social inhibition represents the reduction of social interaction and suppression of the expression of emotions (2). It has been reported that individuals with Type D personality may have a more depressed and dysphoric affect and have anxiety about rejection and disapproval from others (3, 4). Some studies have shown that individuals with Type D personality may be more prone to both stress-related physical problems such as cardiovascular diseases and psychological problems such as depression, burnout, and anxiety disorders (5–10).

Job satisfaction is defined as the individual's positive feelings about his or her profession or job, as well as his or her evaluation of how the profession or job meets the individual's needs, desires, and expectations (11). Job satisfaction can be affected by individual and job-related variables. Many studies have shown that job satisfaction can be affected by factors related to the job performed. For example, it is known that working hours, income, supervision, career goals, and relationships in the work environment have an impact on job satisfaction (12–15).

On the other hand, job satisfaction may also be affected by individual characteristics. For example, it has been reported that personality structure or characteristics may affect job satisfaction (16, 17). Personality-specific traits such as extraversion, introversion, and neuroticism have an impact on an individual's job satisfaction (18, 19). The hypothesis that the type D personality structure may negatively affect job satisfaction due to its main components (NA and SI) has been investigated in some employee groups other than teachers. It has been found that healthcare professionals with a Type D personality have lower job satisfaction than those without a Type D personality, and Type D personality may negatively affect the job satisfaction of nurses (20, 21).

One of the important factors affecting job satisfaction is the psychological problems of the individual. Many studies have shown that psychological factors such as depression, high-stress levels, anxiety disorders, burnout, and sleep problems can negatively affect an individual's job satisfaction (22–26). Depression is one of the most common mental problems in the world and one that causes the most disability (27). Depression, which is characterized by symptoms such as anhedonia, loss of interest, depressed mood, sleep-appetite problems, loss of energy, and beliefs of worthlessness or low self-esteem, suicidal ideations, has been reported as a factor that negatively affects job satisfaction in many professional groups (28–30). Research in different occupational groups has shown that core symptoms of depression, such as anhedonia, loss of interest, and depressed mood, can reduce job satisfaction (31). It is also known that depressive symptoms can negatively affect job satisfaction in teachers, who are one of the professional groups that work in direct interaction with people (32, 33).

Based on all the information highlighted above, it is clear that there is a relationship between depressive complaints and job satisfaction. On the other hand, it can be said that type D personality, which is characterized by negative affect and social suppression, increases the tendency to some psychological problems such as depressive symptoms, burnout, and anxiety. It can be said that the type D personality structure has components that can affect both the emergence of depressive symptoms and job satisfaction and thus may play a role in the relationship between depressive symptoms and job satisfaction. To our knowledge, there is no research examining the moderating role of Type D personality structure between depressive symptom severity and job satisfaction. The main hypothesis of this study is that the Type D personality structure may have a regulatory function between depressive complaints and job satisfaction due to its defining characteristics (NA and SI). The aim of this study is to investigate the moderating role of Type D personality structure between the severity of depressive symptoms and job satisfaction in teachers.

Materials and methods

Participants

The present study had a cross-sectional and descriptive nature. The sample of the research consisted of 939 teachers working in 73 public schools in Van Province and voluntarily filling out the online survey sent with the permission of the Directorate of National Education. 63 of the participants (6.7%) were preschool teachers, 544 were primary school teachers (57.9%), and 332 were high school teachers (35.4%). 761 of the teachers (81%) were working in schools in the city and district centers, and 178 (19%) were working in village schools. The inclusion criteria for the study were being an active teacher, not having a serious psychiatric disease (such as schizophrenia, bipolar disorder, or substance use disorder), and being a volunteer. All stages of the study were approved by the Van Education and Research Hospital Ethics Committee (2022/07–02), and permission was obtained from the National Education Directorates for the study (Permission Number: 49492119). It ensured that there was a research process in accordance with the Declaration of Helsinki and research in humans. The ethics committee legally monitored the online interview technique, data collection, and confidentiality of participants' data. The consent of the participants was obtained in the online survey application. The first screen of the online survey explained the purpose of the study and asked whether the participant would like to participate in the study voluntarily. The participants who wanted to participate in the research voluntarily could access the next forms only after pressing the approval button.

Material

Sociodemographic form

This form includes participants' characteristics such as age, gender, marital status, income level, working years, and weekly working hours.

Type D personality scale (DS-14)

It is a Likert-type self-report scale consisting of 14 items developed by Denollet (2). The scale consists of two subscales: negative affect and social inhibition. Each item is scored between 0 and 4. While the scores that can be calculated from the subscales (NA and SI) vary between 0 and 28 points, the total score of the scale varies between 0 and 56. Increasing scores from the subscales means that Type D personality traits also increase. Turkish validity and reliability study was conducted by Alçelik et al. (34). Internal consistency coefficients for the Turkish form of the scale are 0.82 for NA and 0.81 for SI.

Minnesota satisfaction scale short form (MSS-SF)

It is a Likert-type self-report scale consisting of 20 items developed by Weiss et al. (35). The scale consists of two subscales: intrinsic satisfaction and extrinsic satisfaction. Intrinsic satisfaction consists of factors related to satisfaction with the internal nature of the job, such as success, recognition or acceptance, job responsibility, and change of duties due to promotion. Extrinsic satisfaction consists of elements related to the business environment, such as business dynamics, control style, relations with the manager, work and subordinates, working conditions, and wages. Each item varies between 1 and 5 points. The scale has 12 items that evaluate intrinsic satisfaction and 8 items that evaluate extrinsic satisfaction. As the scores from the subscales increase, job satisfaction also increases. Turkish validity and reliability study was conducted by Baycan (36). In the Turkish validity and reliability study of the scale, the Cronbach's alpha value was found to be 0.77.

Statistical analysis

SPSS 25.0 package program and Jamovi 2.4.14 statistical program were used for statistical analysis of the data. Sociodemographic characteristics and the scale scores of the participants were calculated as mean, standard deviation, number and percentage. Normality distribution of continuous variables was examined with the Kolmogorov Smirnov test. Pearson's correlation test was used to evaluate the relationship between BDI, MSS-SF, and DS-14 scales scores. The role of NA and SI between BDI, and IS and ES was investigated by moderator analysis. Harman's single-factor test was used to evaluate common method variance bias, and all self-report scale scores used in the study were subjected to non-rotation factor analysis (When the number of factors is limited to 1, the total variance explained is 32.70%, and if the rate was lower than 50%, it was interpreted that there was no common method variance error in the study). Bonferroni's correction was used in multiple comparisons in order to minimize the risk of type I error. In all analyses, the significance level was accepted as $p < 0.05$.

Results

The mean age of the teachers was 39.8 ± 6.8 years (Range of age = 26–58 years). 55.6% (n = 522) of the teachers were male and 44.4% (n = 417) were female. The sociodemographic characteristics and scale scores of the participants were shown in Table 1.

According to the moderation relationship carried out for the intrinsic satisfaction sub-dimension of job satisfaction, the indirect effect is negative affect (β = 0.049, SE = 0.018, $p < 0.001$) and social inhibition (β = 0.021, SE = 0.007, $p < 0.001$). And total effect (β = 0.421, SE = 0.026, $p < 0.001$) results are significant. Although the direct effect result was significant (β = 0.350, SE = 0.032, $p < 0.001$), the effect level decreased when compared to the total effect when the moderator variable was included in the model. This result shows that negative affect and social inhibition have a partial moderating role in the relationship between depression and intrinsic job satisfaction. The results are in Figure 1 and Table 2.

According to the moderation relationship conducted for the extrinsic satisfaction sub-dimension of job satisfaction, social inhibition (β = 0.083, SE = 0.043, $p < 0.05$) and total effect (β = 0.298, SE = 0.022, $p < 0.001$) are the indirect effects. While the results were significant, negative affect (β = 0.009, SE = 0.005, $p > 0.05$) was found to have no significant effect. Although the direct effect result was significant (β = 0.283, SE = 0.022, $p < 0.001$), the effect level decreased when compared to the total effect when the moderator variable was included in the model. This result shows that social inhibition plays a partial moderating role in the relationship between depression and intrinsic job satisfaction, while negative affect has no role. The results are in Figure 2 and Table 3.

Discussion

The aim of this study is to investigate the moderating role of Type D personality traits (NA and SI) between the severity of depressive complaints and job satisfaction of teachers working in public schools in Turkey. To our knowledge, our study is the first to investigate the moderating role of Type D personality traits in the relationship between depressive symptoms severity and job satisfaction. According to the findings of the present study, NA and SI in the teachers have a partial moderator role between the severity of depressive complaints and intrinsic job satisfaction, and SI have a partial moderator role between the severity of depressive complaints and extrinsic satisfaction.

Many studies have reported that job satisfaction is negatively affected by psychological complaints such as depression. There are also publications showing that increasing severity of depressive complaints among teachers is associated with a decrease in job satisfaction. It is known that both the core symptoms of depression, such as anhedonia, depressed mood, and decreased self-esteem, and the vegetative symptoms (such as a decrease in sleep and energy) affect job satisfaction in teachers (32, 33, 37–40). The findings of the present study have shown that increased depressive symptom levels are correlated with lower intrinsic and extrinsic job satisfaction in the teachers. It can be said that the findings of our study are consistent with the findings of previous studies in this aspect. Of course, there may be other confounding factors that may affect the emergence of depressive complaints and job satisfaction in teachers. Therefore, future studies may help reinterpret other psychosocial factors that may cause depressive complaints in teachers and thus affect job satisfaction.

TABLE 1 Characteristics of the teachers.

Variable		Mean ± SD	*N* (%)	Range
Age		39.8 ± 6.8		26–58
Gender	Female		417 (44.4)	
	Male		522 (55.6)	
Marital status	Married		823 (87.6)	
	Single		94 (10)	
	Widow		22 (2.3)	
Income level	Low		83 (8.8)	
	Medium		783 (83.4)	
	High		73 (7.8)	
Job duration (year)		11.3 ± 5.9		2–30
Weekly working time (hour)		19.5 ± 4.7		12–32
BDI score		24.7 ± 13		0–56
Type-D personality	Negative affectivity	10 ± 6.8		0–28
	Social inhibition	12.1 ± 7.1		0–28
Job satisfaction	Internal satisfaction	30.4 ± 11.6		12–60
	External satisfaction	22.6 ± 9.6		8–41

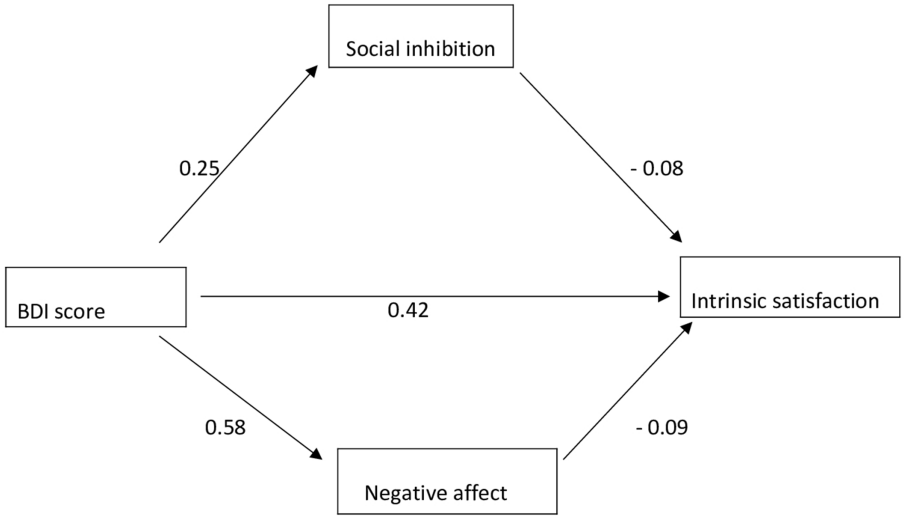

FIGURE 1
Moderator variable analysis for intrinsic satisfaction.

TABLE 2 Moderator variable analysis results for intrinsic satisfaction.

Effect	Estimate	SE	β	z	p
BDI ⇒ NA ⇒ IS	−0.0442	0.01870	−0.0498	−2.37	0.018
BDI ⇒ SI ⇒ IS	−0.0189	0.00731	−0.0213	−2.59	0.010
BDI ⇒ NA	0.3006	0.01392	0.5760	21.59	< 0.001
NA ⇒ IS	−0.1472	0.06184	−0.0864	−2.38	0.017
BD ⇒ SI	0.1386	0.01725	0.2537	8.04	< 0.001
SI ⇒ IS	−0.1366	0.04992	−0.0840	−2.74	0.006
BDI ⇒ IS	−0.3115	0.03222	−0.3503	−9.67	< 0.001
BDI ⇒ IS	−0.3747	0.02633	−0.4214	−14.23	< 0.001

BDI, Beck Depression Inventory; NA, Negative Affect; SI, Social Inhibition; IS, Intrinsic Satisfcation.

The findings of some studies have shown that personality traits are also one of the factors affecting job satisfaction. For example, there is evidence showing that job satisfaction is higher in teachers who are extroverted or have high self-efficacy (41, 42). On the other hand, it has been reported that job satisfaction is lower in teachers with predominant neurotic traits, who tend to express more negative affect (43, 44). The findings of this study showed that teachers with high negative affect and social suppression characteristics had lower job satisfaction.

Although there is no study in the literature investigating the role of type D personality structure between depression and job satisfaction, it is known that individuals with type D personality structure are more prone to depressive symptoms. For example, individuals with type D personality structure have been reported to have more suicidal thoughts along with depressive complaints (45). On the other hand, negative affect or introverted personality traits have been shown to be associated with low job satisfaction (18, 46, 47).

The findings of the present study have shown that NA and SI may have a partial moderating role between depressive symptoms and internal job satisfaction. In other words, it can be said that negative affect and social inhibition play a role between depressive symptom severity and intrinsic satisfaction elements such as perception of success and recognition-appreciation. We thought that teachers with predominant negative affect and social inhibition traits might have lower intrinsic job satisfaction, related to lower self-efficacy or a more severe perception of job stress. As a matter of fact, it has been shown that type D personality structure in nurses may reduce job satisfaction due to perceived high job stress and burnout (48). In another study, type D personality was found to be associated with low self-resilience and self-esteem in nursing students (49).

Another important finding of our study is that SI has a partial moderator role between the severity of teachers' depressive complaints and extrinsic job satisfaction. Accordingly, it can be said that social inhibition has a role between the severity of depressive complaints in teachers and extrinsic job satisfaction elements such as superior-subordinate relationship dynamics and adaptation to work conditions. In our opinion, SI characteristics of teachers who are introverts and have less social participation may be more dominant, and SI may be an important moderator between these teachers' extrinsic job satisfaction and the severity of depressive complaints. As a matter of fact, it has been reported that low social interaction is associated with low job satisfaction (49, 50).

Although it has strengths such as having a relatively large sample size and being the first study to investigate the relationship between the type D personality structure and the severity of depressive complaints and job satisfaction, our study has some limitations. First of all, the findings are not definitive due to the cross-sectional nature of the study. The fact that the sample of the study consisted of teachers in only one city did not allow interpreting the results that could be affected by possible sociocultural differences. Additionally, the fact that all data were obtained from self-report scales can be considered a limitation.

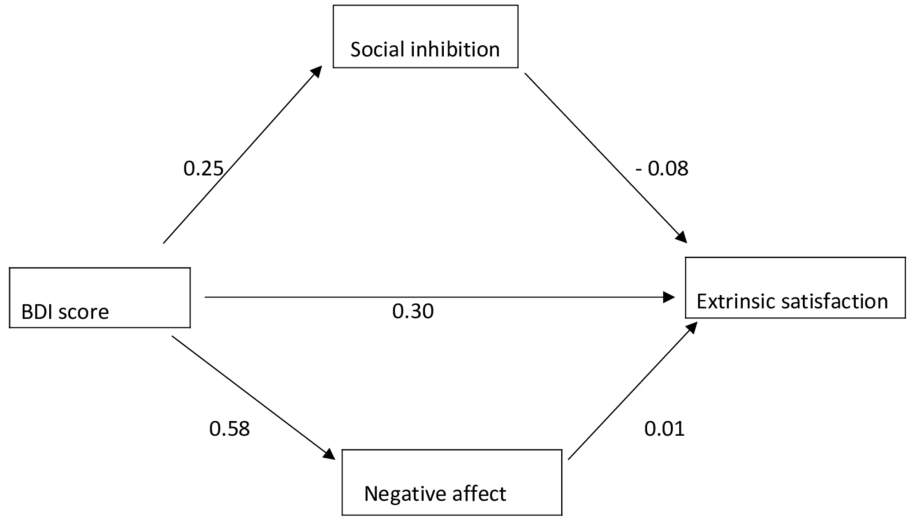

FIGURE 2
Moderator variable analysis for extrinsic satisfaction.

TABLE 3 Moderator variable analysis results for extrinsic satisfaction.

Effect	Estimate	SE	β	z	p
BDI⇒NA⇒ES	0.00406	0.01630	0.00550	0.249	0.803
BDI⇒SI⇒ES	−0.01558	0.00637	−0.02113	−2.446	0.014
BDI⇒NA	0.30058	0.01392	0.57597	21.590	< 0.001
NA⇒ES	0.01350	0.05423	0.00955	0.249	0.803
BDI⇒SI	0.13862	0.01725	0.25371	8.037	< 0.001
SI⇒ES	−0.11242	0.04377	−0.08327	−2.568	0.010
BDI⇒ES	−0.20889	0.02825	−0.28318	−7.394	< 0.001
BDI⇒ES	−0.22041	0.02298	−0.29880	−9.589	< 0.001

BDI, Beck Depression Inventory; NA, Negative Affect; SI, Social Inhibition; ES, Extrinsic Satisfcation.

Conclusion

In conclusion, our findings show that the negative affect and social inhibition traits of the Type D personality structure have a moderating role between the severity of depressive complaints and job satisfaction in teachers. Training and support programs to recognize personality traits in teachers and professional psychosocial intervention programs can help increase job satisfaction. Future studies may help to understand how recognition of personality traits in teachers and professional support programs may affect job satisfaction.

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 humans were approved by Van Education Research Hospital, Ethic Committee. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AY: Conceptualization, Formal analysis, Investigation, Methodology, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. HK: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Acknowledgments

The authors would like to thank Şeyma Sevgican, a lecturer in the Department of Psychology at Hasan Kalyoncu University, Gaziantep, Turkey for her support in statistical analysis.

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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 17 June 2024
DOI 10.3389/fpubh.2024.1363450

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OPEN ACCESS

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RECEIVED 30 December 2023
ACCEPTED 03 June 2024
PUBLISHED 17 June 2024

CITATION
Xie D, Zhu X, Zhang X, Jiang Z, Wang X and Liu T (2024) Research on the correlation between clinical nurses' self-efficacy, future time perspective, and occupational burnout. *Front. Public Health* 12:1363450.
doi: 10.3389/fpubh.2024.1363450

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Research on the correlation between clinical nurses' self-efficacy, future time perspective, and occupational burnout

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Background: The number of clinical nurses in China experiencing professional burnout is increasing yearly, posing a serious challenge to the public health sector. Implementing effective intervention strategies is key to reducing the level of occupational burnout. At present, training aimed at alleviating occupational burnout among clinical nurses is very limited, with common training programs focusing on addressing external factors of occupational burnout rather than the internal cognitive issues of clinical nurses. Self-efficacy and future time perspective are both aspects of an individual's internal self-cognition. Meanwhile, the relationship between clinical nurses' self-efficacy, future time perspective, and occupational burnout is not clear, and further research is needed to verify this.

Objective: This study aims to reveal the relationship between clinical nurses' self-efficacy, future time perspective, and occupational burnout, and to explore the mediating role of future time perspective between self-efficacy and occupational burnout among clinical nurses, providing a scientific reference for training directions to improve occupational burnout.

Methods: This study used a cross-sectional design, conducting a questionnaire survey with 529 practicing clinical nurses using the General Demographics Questionnaire (GDQ), the General Self-Efficacy Scale (GSES), the Zimbardo Time Perspective Inventory (ZTPI), and the Maslach Burnout Inventory-General Survey (MBI-GS). SPSS software version 26.0 was used to analyze the correlation between variables, and AMOS 26.0 was used to test the mediation effect.

Results: Clinical nurses' self-efficacy had a negative predictive effect on occupational burnout ($r = -0.503$, $p < 0.001$). Future time perspective showed significant differences in regression coefficients on both the paths of self-efficacy ($r = 0.615$, $p < 0.001$) and occupational burnout ($r = -0.374$, $p < 0.001$). Future time perspective played a partial mediating role between self-efficacy and occupational burnout, accounting for 33.8% of the total effect.

Conclusion: This study suggests a significant correlation between clinical nurses' self-efficacy, future time perspective, and occupational burnout. Self-efficacy can directly affect occupational burnout in clinical nurses and can also indirectly affect occupational burnout through the future time perspective.

KEYWORDS
future time perspective, job burnout, self-efficacy, mediating role, clinical nurses

1 Introduction

Occupational burnout is a state of physical and mental exhaustion caused by occupational stress. It was first proposed by Freudenberger (1), who saw it as a symptom of emotional depletion, particularly prevalent in the service industry. Occupational burnout comprises three dimensions: emotional exhaustion, depersonalization, and reduced personal accomplishment. Emotional exhaustion is the core dimension, manifesting as individuals gradually resisting work under stress, losing enthusiasm, and finding it difficult to engage fully in their jobs. Depersonalization reflects the dimension of interpersonal interaction; it refers to an individual's adoption of a negative attitude when facing work, consciously maintaining distance from work partners. Reduced personal accomplishment reflects the self-evaluation dimension, indicating that individuals tend to negatively evaluate themselves and experience a decline in work capability and achievement. These three dimensions mutually influence and promote each other (2–5). "In the 'Summary of General Secretary Xi Jinping's Important Expositions on Healthy China,' it is explained: Nursing personnel are an essential force in safeguarding human health and preventing the threat of diseases, and their role should not be overlooked (6). This demonstrates that the development of the nursing profession is increasingly being valued at the social service demand level. However, medical and nursing staff are among the groups most prone to occupational burnout (7). Existing research indicates that domestic nurses experience moderate to high levels of occupational burnout, with a detection rate of 69.21% (8). The incidence of occupational burnout in nurses at China's top-tier hospitals ranges from 55.4% to 70.05% (9). Once clinical nurses experience occupational burnout, if it is not identified and adjusted in time, various physical illnesses can be triggered, commonly including symptoms such as headaches, insomnia, and gastrointestinal disturbances. Prolonged occupational burnout, if unresolved, not only threatens the physical and mental health of nurses but can also affect their work attitude and engagement. Ultimately, it may impact the quality of nursing services and result in consequences such as talent attrition (10–12).

Self-efficacy is the core concept of the social cognitive theory by American Psychologist Bandura. It refers to an individual's confidence or belief in their capability to achieve behavioral goals in a specific domain (13). Nurse self-efficacy is the subjective judgment of nurses regarding their ability to competently perform nursing tasks. As a positive factor, self-efficacy plays a role in controlling and regulating behavior and is important in enhancing individual proactivity, adaptability, emotional experiences, and behavioral outcomes. However, when this positive factor fails to achieve the expected results, it can lead to feelings of burnout. Studies show that a strong sense of self-efficacy can enable clinical nurses to better fulfill their responsibilities, be confident in achieving career development goals, and reduce occupational burnout (14). Future time perspective is a personality trait that encompasses emotional, cognitive, and behavioral aspects, representing an individual's self-awareness of their developmental potential. It can influence an individual's present behavior and activities (15). People who often indulge in envisioning the future are more likely to adapt to their current professional environment (16). Self-efficacy can affect the coping abilities of newly hired nurses when faced with stress, thereby helping them to better grasp future development trends. Additionally, a positive future time perspective can encourage clinical nurses to set personal future goals and implement them according to plan, enhancing their sense of professional fulfillmentt (17–21).

The Job Demands-Resources model (JD-R) is a significant theory in the field of positive psychology applied to human resource management (22, 23). This model suggests a notable correlation between individual resources and occupational burnout, where the psychological aspects of individual resources can impact occupational burnout. Self-efficacy is a type of personal resource, and bolstering this resource can help guide nurses to view the future with the right attitude, alleviate negative emotions caused by job stress, and thus diminish the negative effects. Past studies have shown that self-efficacy can modulate and mitigate occupational burnout in teachers and predict their job performance, thereby enhancing work adaptability and career exploration attitudes (24–26). Self-efficacy can positively predict future time perspective, aiding individuals in better understanding future time arrangements and, as a result, reducing the incidence of depression. At the same time, future time perspective has a negative predictive effect on teachers' occupational burnout. However, there is currently a lack of research examining the relationship between self-efficacy, future time perspective, and occupational burnout simultaneously. Moreover, research in China on future time perspective predominantly revolves around the teaching profession, with very few studies focusing on the future time perspective of clinical nurses (27, 28). Therefore, the following hypothesis is proposed: there is a significant correlation between clinical nurses' self-efficacy, future time perspective, and occupational burnout, and future time perspective may serve as a mediator between self-efficacy and occupational burnout (29–34).

In summary, this study aims to explore the relationship between clinical nurses' self-efficacy, future time perspective, and occupational burnout, as well as the mediating role of future time perspective between self-efficacy and occupational burnout. This will enrich the body of research on future time perspective and investigate whether it is a predictive factor for the level of occupational burnout among clinical nurses. The goal is for nursing managers to take effective measures from the perspectives of self-efficacy and future time perspective to reduce the level of occupational burnout among clinical nurses, stabilize the nursing workforce, and improve the quality of nursing services.

2 Objects and methods

2.1 Participants and procedures

The survey was conducted using a questionnaire designed with Questionnaire Star. We contacted the nursing department of hospitals

to obtain approval for the research principles and objectives. In October 2023, the questionnaire was administered under the guidance of head nurses in various departments who instructed staff to fill it out diligently. Inclusion criteria included: (1) registered nurses with a valid nursing license; (2) nurses with ≥1 year of nursing work experience and the capability to perform independent nursing duties; (3) informed consent and willing participation in the study. Exclusion criteria included: (1) nurses who were not on duty for ≥6 months during the survey period due to illness, maternity leave, or other reasons; (2) nurses who had been administratively punished by the hospital or administrative authorities for various reasons. A total of 568 questionnaires were collected, with 39 excluded due to responses taking less than 60 s or featuring 10 consecutive identical answers. In the end, 529 valid questionnaires were received, representing a 93.13% effective response rate.

2.2 Ethical approval and participant consent

The Ethics Committee of Jinzhou Medical University approved this study (JZMULL2023152). Before the research commenced, participants received written information about the purpose and procedures of the study and completed an informed consent form.

2.3 Research instruments

2.3.1 General demographic questionnaire

Based on relevant literature, researchers designed a general information questionnaire to survey the demographic information of clinical nurses, including gender, education level, age, marital status, years of work, and professional title.

2.3.2 Maslach burnout inventory

The Maslach burnout inventory (MBI-GS), developed by Maslach and Jackson (35) and later revised for all professions, was adapted into a Chinese version suitable for the country's context by Li Chaoping et al. This instrument consists of 15 items across three dimensions: emotional exhaustion (5 items), depersonalization (4 items), and reduced personal accomplishment (6 items) (36). It uses a 7-point Likert scale ranging from 0 (never) to 6 (very frequently). Emotional exhaustion and depersonalization are scored positively, with higher scores indicating a higher level of burnout, while reduced personal accomplishment is scored negatively, with lower scores indicating a higher level of burnout. The total score ranges from 0–90, with <45 indicating a low level, 45–75 a moderate level, and >75 a high level of burnout. In this study, the questionnaire's Cronbach's alpha was 0.919, with the three dimensions having Cronbach's alpha values of 0.957, 0.813, and 0.941, respectively. The Kaiser-Meyer-Olkin (KMO) value was 0.931, and the Bartlett's Test of Sphericity yielded a chi-square value of 9271.187 ($p < 0.001$), indicating strong reliability and validity of the scale.

2.3.3 General self-efficacy scale

The General Self-Efficacy Scale (GSES), developed by Schwarzer (37) and adapted into Chinese by Wang Caikang (38), is a unidimensional scale consisting of 10 items. It includes statements such as "Whatever happens, I can manage." A 4-point Likert scale is used, from 1 (not at all true) to 4 (exactly true), with total scores ranging from 10 to 40 points. Higher scores indicate greater self-efficacy: 10–19 is considered low, 20–29 medium, and 30–40 high. In this study, the scale's Cronbach's alpha was 0.933, the KMO value was 0.942, and the Bartlett's Test of Sphericity yielded a chi-square value of 3,930.728 ($p < 0.001$), demonstrating good reliability and validity.

2.3.4 Zimbardo time perspective inventory

Zimbardo and Boyd (39) developed the ZTPI, which consists of 56 items across five subscales. This study focused on the future dimension, as it reflects the orientation toward achieving future goals and is characterized by planning, with a total of 13 items including "I complete tasks methodically and on time" and "I make a list of things to do." Using a 5-point Likert scale ranging from 1 (not at all true) to 5 (exactly true), the total score ranges from 13 to 65 points. Higher scores indicate a stronger insight into the future development of one's career. In this study, the Cronbach's alpha for the questionnaire was 0.895, the KMO value was 0.927, and the Bartlett's Test of Sphericity yielded a chi-square value of 3406.925 ($p < 0.001$), indicating good reliability and validity.

2.4 Statistical methods

Data were analyzed using SPSS 26.0 and AMOS 26.0 software for statistical analysis and structural equation modeling. Demographic data were presented as frequencies and percentages (%), while scores for occupational burnout, time perspective, and self-efficacy were expressed as means ± standard deviations (Mean ± SD). Pearson correlation analysis was used to examine relationships between variables, and the significance of the mediation model was tested with the Bootstrap method. The significance level was set at $\alpha = 0.05$, with $p < 0.05$ indicating statistically significant differences.

3 Results

3.1 General information and burnout status of study participants

A total of 529 clinical nurses participated in the study, including 493 female nurses (93.2%), 344 nurses aged 20–30 years (65.0%), 280 unmarried nurses (52.9%), 302 nurses with a bachelor's degree (57.1%), 284 nurses with 1–5 years of work experience (53.8%), and 280 nurses with moderate levels of occupational burnout (52.9%). For more details, see Table 1.

3.2 Scores on self-efficacy, future time perspective, and occupational burnout among clinical nurses

The average score for occupational burnout was 49.15 ± 16.35, for self-efficacy it was 25.97 ± 6.20, and the score for future time perspective was 43.46 ± 10.29. For more details, see Table 2.

TABLE 1 The demographics of participants ($n = 529$).

Factors	Group	N	%
Gender	Male	36	6.8
	Female	493	93.2
Age (years)	20–30	344	65.0
	31–40	139	26.3
	41–50	33	6.2
	>50	13	2.5
Marriage	Unmarried	280	52.9
	Married	241	45.6
	Divorce	8	1.5
Education	Junior college	217	41.0
	Undergraduate	302	57.1
	postgraduates	10	1.9
Working years	1–5	284	53.8
	5–10	83	15.7
	>10	162	30.6
Professional title	Nurse	258	48.8
	Primary nurse	128	24.2
	Nurse-in-charge	112	21.2
	Deputy chief nurse	26	4.9
	Chief Nurse	5	0.9
Burnout status	Gently	224	42.3
	Moderate	280	52.9
	Severe	25	4.7

TABLE 2 Total scores on self-efficacy, future time perspective, and occupational burnout scales ($n = 529$).

Variable	Min	Max	Mean ± SD
Job burnout	17	90	49.15 ± 16.35
Self-efficacy	10	40	25.97 ± 6.20
Future time perspective	14	65	43.46 ± 10.29

3.3 Correlation analysis of clinical nurses' self-efficacy, future time perspective and occupational burnout

There was a positive correlation between self-efficacy and future time perspective ($r = 0.615$, $p < 0.001$), a negative correlation between occupational burnout and self-efficacy ($r = -0.503$, $p < 0.001$), and a negative correlation between occupational burnout and future time perspective ($r = -0.374$, $p < 0.001$). For more details, see Table 3.

3.4 Mediating structural equation modeling

Parameters were estimated using the maximum likelihood estimation method, and the model fit was evaluated based on fit indices. The model structure was then tested and modified according to modification indices, resulting in a path diagram that describes the relationships between self-efficacy, future time perspective, and occupational burnout (Figure 1). The model fit met the ideal standards and showed good adaptability. See Table 4 for more details.

TABLE 3 Correlation analysis of clinical nurses' self-efficacy, future time perspective, and occupational burnout ($n = 529$).

Variable	Self-efficacy	Future time perspective	Job burnout
Self-efficacy	1		
Future time perspective	0.615**	1	
Job BURNOUT	−0.503**	−0.374**	1

**$p < 0.01$.

3.5 Mediation effect of future time perspective on self-efficacy and occupational burnout

The significance of the mediation effect was tested using the Bootstrap method with 2,000 resamples. The standardized estimate of the indirect effect was −0.262, with a confidence interval that did not include 0, indicating a significant mediation effect. This suggests that future time perspective plays a partial mediating role in the relationship between self-efficacy and occupational burnout, accounting for 33.8% of the total effect. For more details, see Table 5.

4 Discussion

4.1 Self-efficacy, future time perspective, and occupational burnout levels among clinical nurses

The results of this study indicate that the total score for self-efficacy among clinical nurses is (25.97 ± 6.20), which is considered moderate and similar to the findings of Ding et al. (40–43). This may be due to the fact that nurses aged 20–30 years old constitute 65% of the study subjects, and their relatively limited work experience could contribute to a lack of the necessary confidence in nursing tasks. The total score for future time perspective is (43.46 ± 10.29), with a scoring rate of 67.90%, considered a moderate level and in line with the research by Mao et al. (44, 45). This could be attributed to the relative job stability of nurses, who may not feel pressured or urgent in their lives, resulting in a lack of a clear purposeful consciousness toward the future. The total score for occupational burnout is (49.15 ± 16.35), also at a moderate level, echoing the findings of Zhang et al. (46–48). Nurses may experience burnout due to the high workload, frequent night shifts, and irregular work-rest schedules in an environment where resources are limited and responsibilities are increasingly demanding, leading to an imbalance between providing quality nursing services and coping with significant stress (49–51). These findings suggest that nurse managers should make reasonable work arrangements for clinical nurses based on the actual situation.

4.2 Correlation between nurses' self-efficacy, future time perspective and occupational burnout

This study reveals that there is a negative correlation between clinical nurses' self-efficacy and occupational burnout, which is consistent with the findings of Zhang et al. (52, 53). Nurses with high self-efficacy tend to adopt an optimistic attitude when facing difficulties, are willing to choose challenging tasks, and when facing failure, they analyze the reasons and continually learn from their experiences, thus experiencing a lower level of occupational burnout (54, 55). Nurses with low self-efficacy often doubt their abilities when confronted with complex clinical problems, exaggerate issues, and this mindset is not conducive to resolving clinical problems or improving their skills, leading to a loss of enthusiasm for work and an increased susceptibility to burnout (56, 57). Therefore, hospital administrators should recognize the impact of psychological factors such as self-efficacy on occupational burnout. There should be a focus on nurses' psychological well-being, with timely psychological counseling to help nurses address psychological issues, fostering confidence in their nursing work, and thereby reducing the degree of burnout. Furthermore, the study shows a positive correlation between self-efficacy and future time perspective, aligning with the research findings of Wang et al. (58). The development of an individual's self-efficacy is related to the accumulation of past experiences of success or failure and is an important influencing factor of future time perspective. Therefore, nurses with high self-efficacy actively confront the present and future, are full of hope and anticipation, have a clear understanding of the future, and set definitive goals and directions, committing actions to achieve them. Additionally, future time perspective has a negative correlation with occupational burnout, which is in agreement with the research by Detaille et al. (59, 60). As

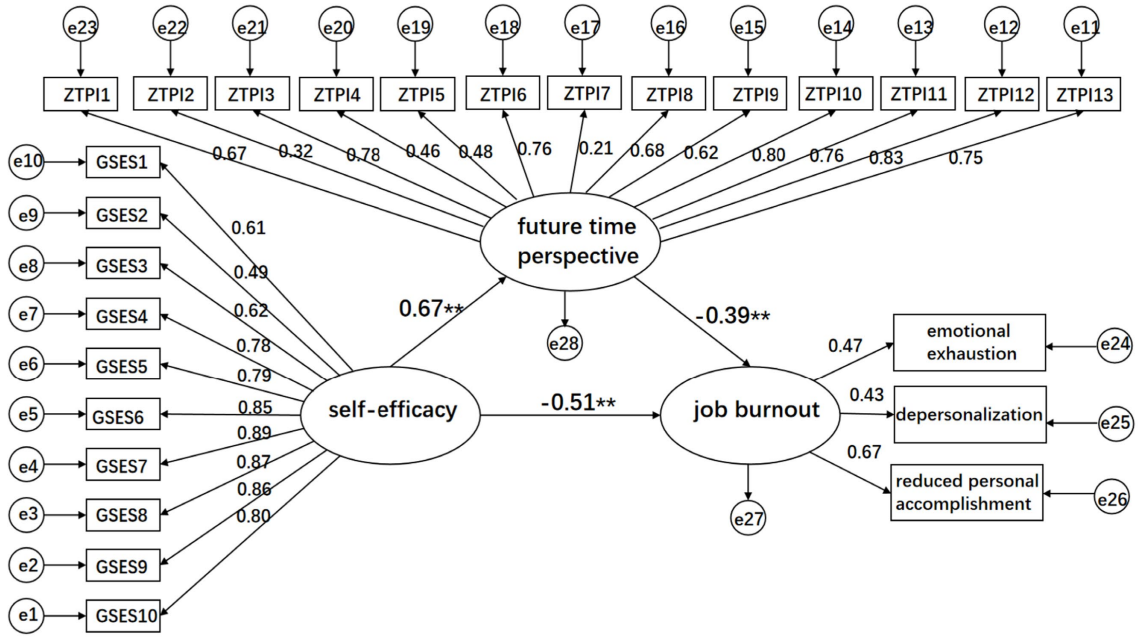

FIGURE 1
Structural equation modeling of future time perspective as a mediator between self-efficacy and occupational burnout.

TABLE 4 Structural equation model fitting index (n = 529).

Project	χ^2	χ^2/df	GFI	AGFI	NFI	IFI	TLI	CFI	RMSEA
Fitting index	770.370	2.970	0.891	0.852	0.914	0.941	0.926	0.941	0.061
Acceptable standards	-	<3	>0.8	>0.8	>0.9	>0.9	>0.9	>0.9	<0.08

TABLE 5 Decomposition table of total effect, direct effect, and mediation effect (n = 529).

Project	Path coefficient	SE	95% confidence interval	P-value	Relative effect value
Direct effect	−0.512	0.102	[−0.716,-0.314]	$p < 0.01$	66.2%
Indirect effect	−0.262	0.074	[−0.400,-0.115]	$P < 0.01$	33.8%
Total effect	−0.775	0.059	[−0.890,-0.658]	$P < 0.01$	100%

a psychological variable, a positive future time perspective can help individuals set personal goals and implement plans effectively. Goal-oriented individuals have persistent and stable motivation and a proper understanding of their objectives (61–63). They take an interest in their work and invest more energy, which directly improves occupational burnout. Nursing managers should value the establishment of nurses' personal goals, actively conduct training related to professional objectives, and encourage nurses to set short-term, medium-term, and long-term goals based on their actual situations. By striving to achieve these work goals, nurses can improve their future time perspective, thereby reducing the level of occupational burnout (64).

4.3 The mediating role of future time perspective between self-efficacy and occupational burnout

This study demonstrates that future time perspective plays a mediating role between clinical nurses' self-efficacy and occupational burnout, with the mediation effect accounting for 33.8% of the total effect. This means that self-efficacy can influence the level of occupational burnout in clinical nurses through their future time perspective. Nurses with a high level of self-efficacy have stronger judgment in their actions and decisions, stronger self-confidence in handling the pressures and challenges of clinical work and life, and a clearer understanding of the future (65–69). They set clear goals and directions, are full of hope for the future, and face the present and future with an optimistic attitude. This, in turn, helps them actively deal with the adverse effects of occupational burnout and reduce its level (43, 70–73).

Nursing management should take steps to motivate nurses to enhance their self-efficacy, such as through organizing career planning for clinical nurses and providing training in the latest clinical skills to adapt to the work environment. Such measures can help nurses face various clinical challenges, boost their confidence, foster more positive expectations for the future, and make correct plans. By fully leveraging the core role of future time perspective, nurses can better realize their potential, thus reducing the level of occupational burnout, improving the overall quality of nursing services, maintaining the stability of the nursing team, and promoting the development of the nursing profession.

5 Strengths and limitations

This study is cross-sectional and was limited by resources, such as manpower, materials, and time, and did not implement intervention measures on clinical nurses. The research method was singular; future research could employ longitudinal surveys or qualitative studies. Additionally, the subjects of this study were from tertiary hospitals in Yibin City, and the results are limited by regional factors. Future research could involve multi-province, large-scale samples.

6 Conclusion

This study has demonstrated a significant interaction between clinical nurses' self-efficacy, future time perspective, and occupational burnout. Future time perspective acts as a mediator between self-efficacy and occupational burnout, which is of great significance for in-depth research into the relationship between clinical nurses' self-efficacy and occupational burnout. It suggests that nursing managers should recognize the important role of self-efficacy in reducing nurses' occupational burnout. By enhancing comprehensive capabilities through further education and training, and by experiencing success, nurses can strengthen their self-efficacy. Intensifying professional training for nurses and continuously improving their professional qualifications and work skills can lead to a hopeful outlook for the future, thus reducing the level of occupational burnout and stabilizing the nursing workforce.

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 humans were approved by the Jinzhou Medical University Ethics Committee (JZMULL2023152). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

DX: Writing – original draft, Writing – review & editing. XZhu: Project administration, Formal analysis, Writing – review & editing. XZha: Data curation, Writing – review & editing. ZJ: Funding acquisition, Writing – review & editing. LT: Supervision, Validation, Writing – review & editing. XW: Writing – review & editing, Supervision, Validation.

Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. This research was supported by the Social Science Planning Foundation of Liaoning Province (L21CSH005).

Acknowledgments

The co-operation of all the participants who volunteered to participate in this study is gratefully acknowledged. The authors are grateful to the hard-working editors and reviewers for their valuable comments and suggestions.

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

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2024.1363450/full#supplementary-material

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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 20 June 2024
DOI 10.3389/fpubh.2024.1352646

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OPEN ACCESS

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RECEIVED 08 December 2023
ACCEPTED 29 May 2024
PUBLISHED 20 June 2024

CITATION
Charkhabi M, Firoozabadi A, Seidel L, Habibi Asgarabad M, De Paola F and Dutheil F (2024) Work addiction risk, stress and well-being at work: testing the mediating role of sleep quality.
Front. Public Health 12:1352646.
doi: 10.3389/fpubh.2024.1352646

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Work addiction risk, stress and well-being at work: testing the mediating role of sleep quality

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Introduction: Attention to work addiction risk is growing; however, more studies are needed to explore the possible impact of work addiction risk on various aspects of employees' work and life domains. Although several studies have considered the antecedents or consequences of work addiction risk, this study particularly focuses on sleep quality as a potential explanatory underlying mechanism in the relation between work addition risk and three outcome variables including stress at home, stress at work and well-being.

Method: The data was collected using an online platform and participants consisted of 188 French employees who were selected using simple random sampling method. Participants responded to the survey including the Work Addiction Risk Test (WART), stress at work, well-being, and sleep quality. The data was analyzed using JASP and SPSS-26 programs.

Results: The results revealed that there are significant positive relationships between work addiction risk and both stress at home and at work and negative relationships between work addiction risk and both sleep quality and well-being. In addition, the analyses of the mediation paths suggest the significant mediation role of sleep quality for the link between work addition risk and stress at work as well as the link between work addiction risk and well-being.

Discussion: Given the verified mediating role of sleep quality in the relationship between work addiction, stress and wellbeing, it is recommended that organizations and companies pay particular attention to their employees' sleep quality.

KEYWORDS

work addiction risk, sleep quality, stress at work, stress at home, mediation

Introduction

Nowadays the majority of individuals need to work to cover their basic needs. This has changed the traditional style of families where only men were recognized as the breadwinner of families (1). Currently it is broadly common to observe a family where both spouses work, and they are paid for their inputs in the workplace. One-step beyond this, is that working has changed its meaning from a solo financial source provider to a place or position where an individual can attend, learn, grow and influence an output. These attractive aspects of workplaces have created a competitive climate within workplaces in which individuals tend to

invest more inputs in terms of time and energy in their jobs than those required or expected to continue their job or to receive job promotions in their workplace. This phenomenon has been conceptualized as work addiction [(2), Chapter 9].

Work addiction known as work addiction risk (3, 4) is recognized as a public health concern (5, 6) that is accompanied by detrimental consequences for individuals who experience it [e.g., (7)]. Work addiction risk is a worldwide phenomenon that occurs when there is an unconstructive way of involvement with work (5, 6). Workaholic individuals show the tendency to ignore the experience of fatigue and to work hard for a long period until physical complaints appear and stop them from working effectively (8). It is based on the notion that workaholics perform a kind of self-neglect to their life to meet their working standards (9). Although the workaholic employees have the opportunity to choose between working enough and working hard, the majority choose the second option.

There are studies suggesting that work addiction can disrupt the balance between work and family domains, resulting in work–family conflicts (10–12). This occurs when an individual tries to meet the demands of both work and life domains, but a lack of sufficient resources may prevent him from achieving this goal, leading to work–family conflict [e.g., (13)]. According to the Job Demand-Control Theory (14), individuals with a high risk of work addiction are likely to set higher work standards for themselves in response to job uncertainty, competitiveness, economic insecurity, and in attempting to meet these standards, they may experience greater work stress (4, 15). These self-imposed standards may cause individuals to invest considerable time, energy, and effort into their work, leaving them with reduced energy and diminished emotional resources to cope/deal with their life demands (16, 17), leading to an increased feeling of stress at home as well.

Although studies suggest that the work addiction leads to favorable outcomes such as increased job performance (18) or improved career satisfaction (19), there have been a large body of research evidence suggesting that work addiction leads to unfavorable outcomes. For examples, research has shown that work addiction is associated with lower physical health (20), lower mental health (21), increased work–family conflicts (20), lower life satisfaction (22), higher depression rate (4), and higher risk of cardiovascular diseases and stroke (23).

Although majority of the current studies focused on the antecedents or the consequences of work addiction [e.g., (18, 24)], we first focus on the particular link between work addiction risk and the health status of employees. We will then focus on the mediating role of sleep quality as a potential mediator that may explain the influence of work addiction risk on health-related indicators. Sleep quality is defined as an individual's self-satisfaction with all aspects of the sleep experience (25).

Figure 1 illustrates a conceptual model of the relationships between the research variables. In this model, work addiction risk is considered as the predictor, sleep quality as the mediator and stress and well-being as the outcome variables.

A review on the work addiction risk and health-related outcomes

One of the models that can help to understand work addiction is Latent Deprivation Model (26). According to this model, besides the manifest function of earning money, work contains several latent

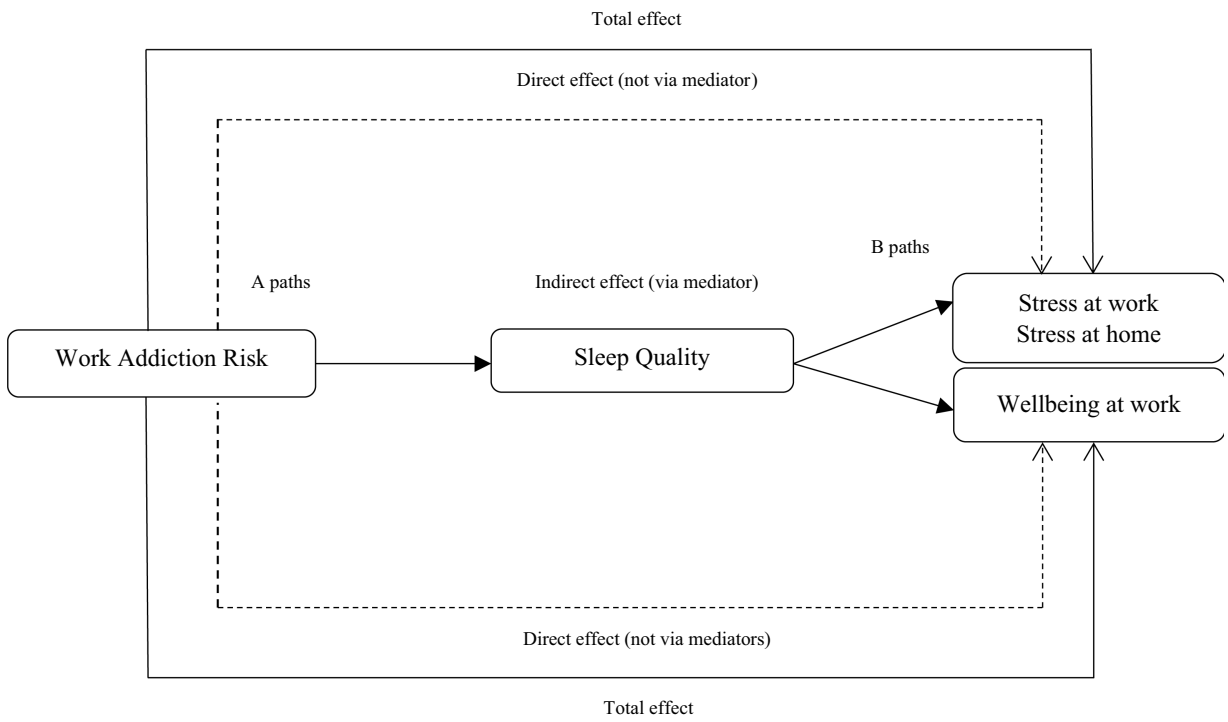

FIGURE 1
A proposed model of the direct and indirect paths.

functions that guarantee the satisfaction of other psychological needs of humans such as sense of purposefulness and being active, relatedness to others, and self-determination. Having access to the latent functions of work is essential for sustaining employees' mental health and well-being. Due to the increasing inter-organizational competitions and in order to reach the expected perspectives, organizations are driven to design jobs by which they maximize their employees' sense of involvement with their jobs. Additionally, the changes in the nature of jobs made during the last decades of the 21st century, such as communication technology advances and the development of organizational tools assessing labor productivity and job performance, has furthered entered work into the life of employees (27, 28).

Due to the important meaning that work plays in today's life as well as experiencing the more demanding nature of work, the employees may spend excessive time and put greater effort on their work-related tasks at work or even at home and be less willing to delegate their work-related activities [e.g., (1, 29)]. The prevalence of this workstyle may bind individuals to their occupations, a phenomenon known as work addiction risk. Work addiction has been described as one of the main addictions of the 21st century (30) that is defined as "the stable tendency of excessive and compulsive working" [(31), p. 1] beyond what is required or expected [(2), Chapter 9]. Work addicted individuals are described as those who spend a considerable amount of time in their work activities, are constantly preoccupied with work-related issues and work more than what is formally expected to meet their work requirements mainly due to an inner compulsion (18, 32). According to Taris et al. (33) and Burke and Cooper (2), the experience of work addiction risk is proposed to include two components. First is the behavioral component that comprises devoting exceptional time to work and working excessively hard (i.e., overwork). Second is the psychological component that comprises thinking obsessively about work and working compulsively.

Work addiction is proposed to share similarities with other behavioral addictions in terms of compulsive involvement with specific activities that might be perceived rewarding by employees as they serve to diminish the force of certain obsessions (31, 34). Moreover, unlike other behavioral addictions, employees who are addicted to work may engage in activities that are socially acceptable and even encouraged by their employers and organizations. Due to expending higher effort to attain work-related goals, employees are more likely to experience a sense of achievement and higher levels of job performance and satisfaction (18, 35). Work addiction might also act as a coping strategy that alleviates the degree of negative emotions that individuals experience in their personal life domain. Therefore, it can be associated with less preoccupation of employees with other areas of their lives (36).

In spite of the mentioned positive aspects, work addiction, as an excessive pattern of involvement and similar to other behavioral addictions, can be detrimental to the employees' health and well-being (20, 31, 37). According to World Health Organization (WHO) work stress is defined as 'the response people may have when presented with work demands and pressures that are not matched to their knowledge and abilities and which challenge their ability to cope (38). Given the compulsion aspect, work addiction can be associated with higher levels of job demands and workload (39, 40). In their research, Dutheil et al. (4) showed a five times more risk of work addiction among employees with high job demands compared to those with low job demands. Experiencing higher pressure of work under the demanding circumstances can be associated with higher levels of stress that people may experience during working time (41, 42). Dealing with high levels of workload and working for a longer period of time require higher expenditure of effort during working time that in turn will lead to psychological exhaustion (43) and impaired well-being (44) through the depletion of employees' energy resources (45). Moreover, workaholics are more likely to being mentally engaged with work-related issues even during their non-work time (46). Continued exposure to work demands during off-job time leads to the prolonged psychological activation spilling over from the work to the home domain that is detrimental for well-being over time. Research has shown that working under high workload condition is associated with high work-related ruminative thinking (47, 48) that itself will lead to health impairment (49) through impeding the recovery process (50). Work addiction risk may also influence the employees' psychological well-being through increasing work–family conflict (12, 20, 51, 52). It has been also proposed that workaholics can be poor performers as they are more likely to sacrifice the quality of their actions to successfully accomplish work-related tasks to the quantity of tasks, they can accomplish during a limited period of time at lower levels than required standards (53). Therefore, they may experience lower job performance (39), impaired social functioning and higher interpersonal conflicts at their workplace (54). Employees are then more likely to perceive work as being more stressful and experience negative health consequences.

Well-being is a multifaceted construct with different definitions. However, one of the well-known definitions of wellbeing is presented by World Health Organization (WHO). According to WHO (55) 'Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.' In this study the overall wellbeing was used. Previous research has shown the positive link between work addiction risk and health related outcomes such as exhaustion, depression, life dissatisfaction, and sleep difficulties [e.g., (4, 22, 53, 56, 57)]. Regarding the consequences of work addiction risk on employees' personal and work lives, the current study particularly examines the relationship between work addiction risk and three health-related outcomes including stress at home, stress at work and general well-being in a sample of French employees. We hypothesize that:

> *Hypothesis 1*: work addiction risk is positively associated with (a) stress at work and (b) stress at home of employees.
>
> *Hypothesis 2*: work addiction risk is negatively associated with well-being of employees.

Mediating role of sleep quality

Workaholics experience higher levels of workload and job strain not only during their working time but also during the time after work and during off-days including weekends and holidays. Research [e.g., (50, 58, 59)] has shown that the extent to which employees can unwind from work related issues and engage in activities that facilitate the process of replenishing depleted resources during their non-work time

(i.e., recovery from work) is crucial for employees' well-being. Addiction to work risk is associated with higher levels of being mentally exposed to work-related issues during non-work time (60–62). Research showed that employees with high levels of work-related ruminative thinking are more likely to experience sleep difficulties compared to employees with low levels (47, 49, 63). In a diary study, Syrek et al. (64) showed that unfinished tasks and work-related thinking are associated with sleep impairment.

Sleep quality has been established as an important factor for sufficient recovery and for preventing the long-term negative consequences of job strain on well-being. The brain needs a good quality of sleep to replenish the energy resources that a person has lost during the day (65). These energy resources are assumed to be depleted more in workaholic employees as the result of their daily overwork (4), experience of work-related thinking (66) and work–family conflicts (12, 52), compared to non-workaholic employees. Therefore, due to an impaired sleep, the depleted resources are not sufficiently replenished and people are more likely to experience negative affect (67), acute and chronic fatigue (63), and exhaustion (68). Once the energy resources are not successfully replenished due to the low quality of sleep (45), individuals' failure to regulate their unpleasant feelings such as stress and negative affect increases. According to Carver and Scheier (69), regulating affective states is an intense and effortful process that is directly depended on the available level of energy resources. The prolonged activation of unpleasant feelings then further drains resources and has negative consequences on well-being. Using a cross-sectional study, this study aims to shed light on the relation between work addiction risk and three health-related outcomes (i.e., stress at home, stress at work and well-being) by considering the mediation role of sleep quality. We hypothesize that:

> *Hypothesis 3:* sleep quality mediates the association between work addiction risk and (a) stress at work and (b) stress at home.
>
> *Hypothesis 4:* sleep quality mediates the association between work addiction risk and well-being.

Method

Procedure

Employees were selected through a French online platform known as WittyFit[1] and used by several French companies (4, 70). WittyFit initially was developed in collaboration with the University Hospital of Clermont-Ferrand in France and is a web-based platform to monitor, measure and enhance employees' well-being at work. Both National Commission for Data Protection and Liberties (CNIL), and the South-East VI ethics committee (clinicaltrials.gov identifying number NCT02596737) approved the content and instruments of this study. The nature of data collection in this platform is unanimous and there was no connection between researchers and participants. Employees received an e- questionnaire through the WittyFit platform and they were invited to read all research instructions and participate voluntarily in this study.

Participants

The HR department of those companies that were registered in the WittyFit platform[2] invited participants and they agreed to participate in this study. 188 out of 1,580 registered French employees in this platform were recruited based on a simple random sampling method. Of those, 47.1% were female and 39% were male. 13.9% of participants did not report their gender. Mean age of participants was 41.83. No intervention was performed, and no exclusion criteria were established to recruit the participants. Considering the nature of data collection, which was based on an online anonymous questionnaire, the ethics committee waived the requirement for participants' consent.

Measures

The work addiction risk test (WART)

This scale was developed by Robinson et al. (7, 71, 72) from the symptoms reported by clinicians caring for patients with work addiction risk (5, 72). The WART assesses 25 statements on a 4-point Likert scale from never true (1) to always true (4). The total score ranges from 25 to 100 which higher scores reflecting higher work addiction risk. Scores from 25 to 56 are defined as a low-risk of work addiction risk; from 57 to 66 as a medium-risk and from 67 to 100 as a high-risk (7, 73). An item example of this scale is "*I prefer to do most things myself rather than ask for help*." We previously validated the French version of the WART (74). In this study, the Cronbach's Alpha was 0.90.

Sleep quality

This construct was evaluated using visual analog scales (VAS), i.e., by moving a cursor on a horizontal, non-calibrated line of 10 cm, ranging from very low (0) on the left to very high (10) on the right (75, 76). It was measured by using the following item "*what is the quality of your sleep*." Higher values represent higher sleep quality.

Perceived stress at work

To measure perceived stress at work we used a visual analog scale (VAS), i.e., by moving a cursor on a horizontal, non-calibrated line of 10 cm, ranging from very low (0) on the left to very high (10) on the right (75, 76). It was measured by using the following item "*what is your stress level at work*." Higher values represent higher stress at work.

Perceived stress at home

It was assessed using visual analog scale (VAS), i.e., by moving a cursor on a horizontal, non-calibrated line of 10 cm, ranging from very low (0) on the left to very high (10) on the right (75, 76). It was measured by using the following item "*what is your stress level at home*." Higher values represent higher stress at home.

1 https://wittyfit.com/

2 https://wittyfit.com/en/

TABLE 1 Correlation matrix between the research variables in the present study ($n = 161$).

	Variable	*M*	*SD*	1	2	3	4	5	6	7
1	Gender	0.45	0.49	–						
2	Age	41.83	11.85	−0.16	–					
3	Education	4.52	0.92	−0.126	−0.147	–				
4	Work addiction risk	57.82	11.23	−0.250*	0.219**	0.219**	–			
5	Sleep quality	56.51	27.79	0.146	0.022	0.067	−0.332**			
6	Stress at work	56.17	24.77	−0.036	−0.062	0.109	0.413**	−0.312**		
7	Stress at home	35.39	25.23	−0.080	−0.161*	−0.008	0.400**	−0.188**	0.439**	
8	Well-being	62.61	21.85	0.139	0.052	0.110	−0.375**	0.542**	−0.311**	−0.384**

*$p < 0.05$, **$p < 0.01$.

TABLE 2 Results of independent samples T-Test of studied variables between male ($n = 73$) and female ($n = 88$) participants.

						95% CI for mean difference		
	t	*df*	*p*	Mean difference	SE difference	Lower	Upper	Cohen's d
Work addiction risk	3.262	159	0.001	5.551	1.702	2.190	8.912	0.516
Sleep quality	−1.842	156	0.067	−8.120	4.407	−16.825	0.586	−0.295
Stress at work	0.444	156	0.657	1.759	3.960	−6.063	9.581	0.071
Stress at home	1.000	156	0.319	3.956	3.958	−3.862	11.775	0.160
Well-being	−1.750	156	0.082	−6.138	3.508	−13.067	0.792	−0.280

Student's *t*-test.

Well-being

This construct is evaluated using visual analog scale (VAS), i.e., by moving a cursor on a horizontal, non-calibrated line of 10 cm, ranging from very low (0) on the left to very high (10) on the right (75, 76). It was measured by using the following item "*what is your level of wellbeing*." Higher values represent higher well-being.

The socio-demographic characteristics questionnaire

It assessed age, gender, height, weight, occupational group, education level, family situation, work characteristics, quantity of sleep, and physical activity.

Data analysis

To calculate the required number of participants of this study we used previous studies (77). The sample size also followed the recommendations of G*power statistical program[3] to meet minimum number of participants for data collection. Statistical analyses were performed using SPSS-26 program and JASP program. Correlation analysis and mediation analysis were used to investigate the direct and indirect association between the research variables.

3 https://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower

Results

Descriptive statistics

The descriptive statistics of the research instruments (means and standard deviations) and the Pearson correlations between the variables are displayed in Table 1. As the table shows, work addiction risk is negatively associated with sleep quality ($r = -0.332$, $p < 0.001$) and well-being ($r = -0.375$, $p < 0.001$) and is positively associated with stress at work ($r = 0.413$, $p < 0.001$) and stress at home ($r = 0.400$, $p < 0.001$). Sleep quality is negatively associated with stress at work ($r = -0.312$, $p < 0.001$) and stress at home ($r = -0.188$, $p < 0.001$) and is positively associated with well-being ($r = 0.542$, $p < 0.001$). There is also a negative association between both stress at work ($r = -0.311$, $p < 0.001$) and stress at home ($r = -0.384$, $p < 0.001$) and well-being.

The results of independent sample t-test suggested that there is no difference between male and female participants in predicting, mediator and outcome variables except for work addiction risk. The results are displayed in Table 2. According to this table, female participants reported higher work addiction risk than male participants and this difference was statistically significant ($t = 3.26$, $df = 159$, $p = 0.001$). Figure 2 displays the distribution of reported work addiction risk across gender.

Testing the mediating role of sleep quality

To test the mediating hypotheses, a regression model according to Figure 1 was constructed. We used JASP statistical program

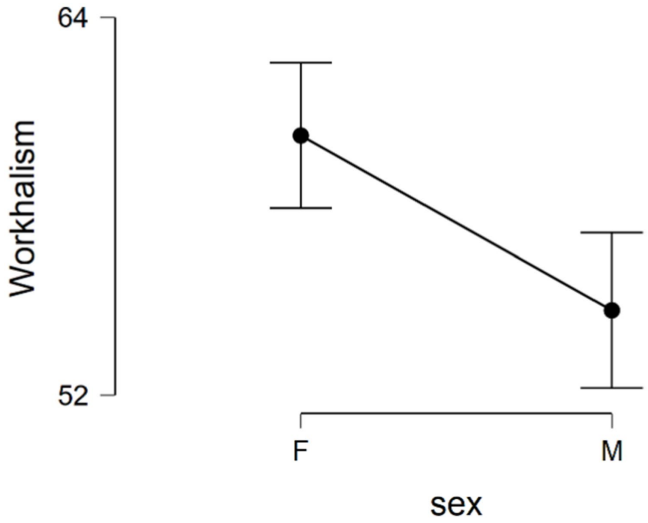

FIGURE 2
Distribution of reported work addiction risk across gender.

TABLE 3 Results of mediating role of sleep quality between work addiction risk and stress and well-being ($n = 161$).

					95% Confidence interval	
Effect	β	*SE*	*z-value*	*p*	*LLCI*	*ULCI*
Direct effect of work addiction risk on stress at work	0.031	0.0006	4.981	0.001	0.019	0.044
Indirect effect of number of work addiction risk on stress at work via sleep quality	0.006	0.002	2.421	0.015	0.001	0.011
Total effect of work addiction risk on stress at work	0.037	0.0006	6.140	0.001	0.025	0.049
Direct effect of work addiction risk on stress at home	0.034	0.0006	5.293	0.001	0.021	0.047
Indirect effect of number of work addiction risk on stress at home via sleep quality	0.002	0.002	0.854	0.393	−0.002	0.006
Total effect of work addiction risk on stress at home	0.036	0.006	5.905	0.001	0.024	0.048
Direct effect of work addiction risk on wellbeing	−0.020	0.0006	−3.425	0.001	−0.031	−0.008
Indirect effect of number of work addiction risk on wellbeing via sleep quality	−0.014	0.004	−3.997	0.001	−0.021	−0.007
Total effect of work addiction risk on wellbeing	−0.034	0.006	−5.465	0.001	−0.046	−0.022

Delta method standard errors, normal theory confidence intervals, ML estimator. $^{*}p < 0.05$, $^{**}p < 0.01$.

version 0.14.1.0[4] to construct this model. To test the mediation paths, we installed the SEM package on this program. The results are displayed in Table 3. As the table shows, work addiction risk positively predicted stress at work ($\beta = 0.031$, $p < 0.01$). In addition, sleep quality statistically mediated the indirect association between work addiction risk and stress at work ($\beta = 0.037$, $p < 0.001$). The results also suggested that the total effect of work addiction risk on stress at work is statistically significant ($\beta = 0.006$, $p < 0.01$). According to the table, work addiction risk also positively predicted stress at home ($\beta = 0.034$, $p < 0.001$). Although the total effect of work addiction risk on stress at home was significant ($\beta = 0.036$, $p < 0.001$), the sleep quality did not mediate the association between work addiction risk and stress at home ($\beta = 0.002$, $p = 0.393$).

4 https://jasp-stats.org/

The results in Table 3 also suggest that the work addiction risk negatively predicts well-being ($\beta = -0.020$, $p < 0.001$). The indirect path from work addiction risk to well-being through sleep quality was statistically significant ($\beta = -0.014$, $p < 0.001$), which means that the sleep quality acts as the mediator of the association between work addiction risk and well-being. Moreover, the total effect of the work addiction risk on well-being was found statistically significant ($\beta = -0.034$, $p < 0.001$).

Figure 3 displays the tested mediation model related to the direct and indirect paths between work addiction risk, stress and wellbeing.

Additionally, we attempted to demonstrate the extent to which the link between work addiction risk and various outcomes in different levels of sleep quality may vary across male and female individuals. This was performed due to the different work addiction rate we found in Table 2. To display this, we drew flexplots that demonstrate these situations. Figure 4 shows by increasing the work addiction risk, the stress at work also is increased. This increase, when sleep quality is low is higher than

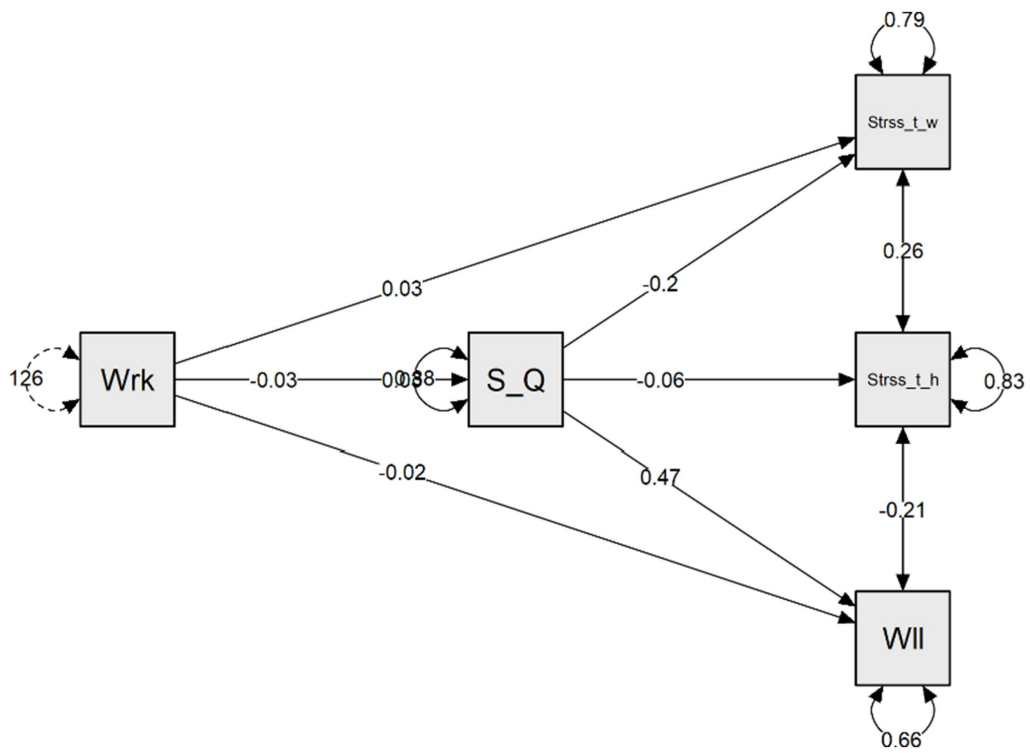

FIGURE 3
A mediation model of the relations between research variables. Wrk, work addiction risk; S_Q, sleep quality; Stress_t_w, Stress at work; Stress_t_w, Stress at home; Wll, wellbeing.

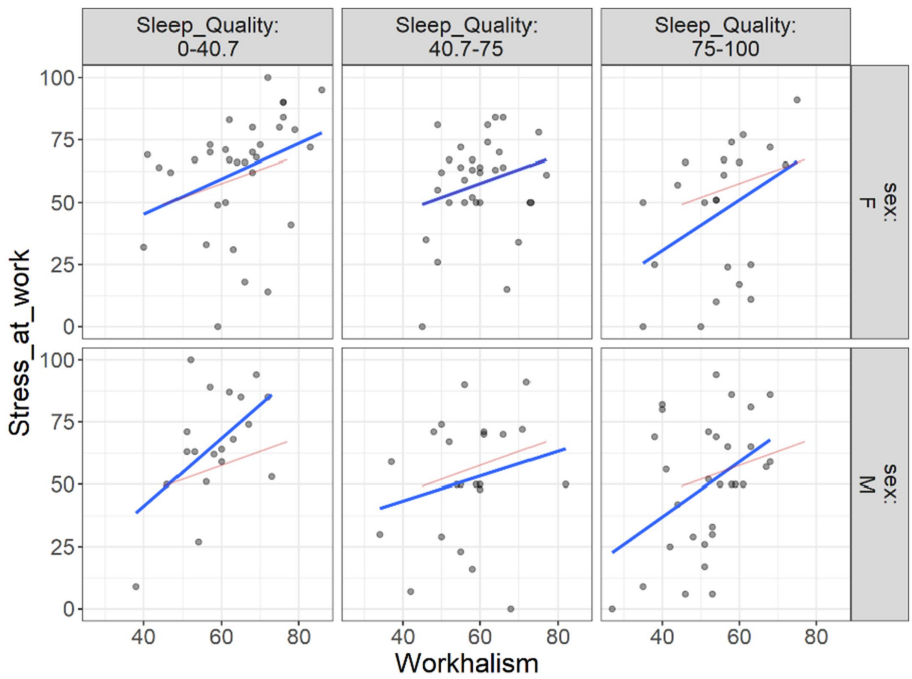

FIGURE 4
Flexplot of the relations between work addiction risk and stress at work at different levels of sleep quality across gender.

when the sleep quality is at highest level. Furthermore, this increase in lower level of sleep quality is seen higher among males than females.

Figure 5 shows a situation in which the link between work addiction risk and stress at home is more strongly influenced by the level of sleep quality in male and female participants. In doing

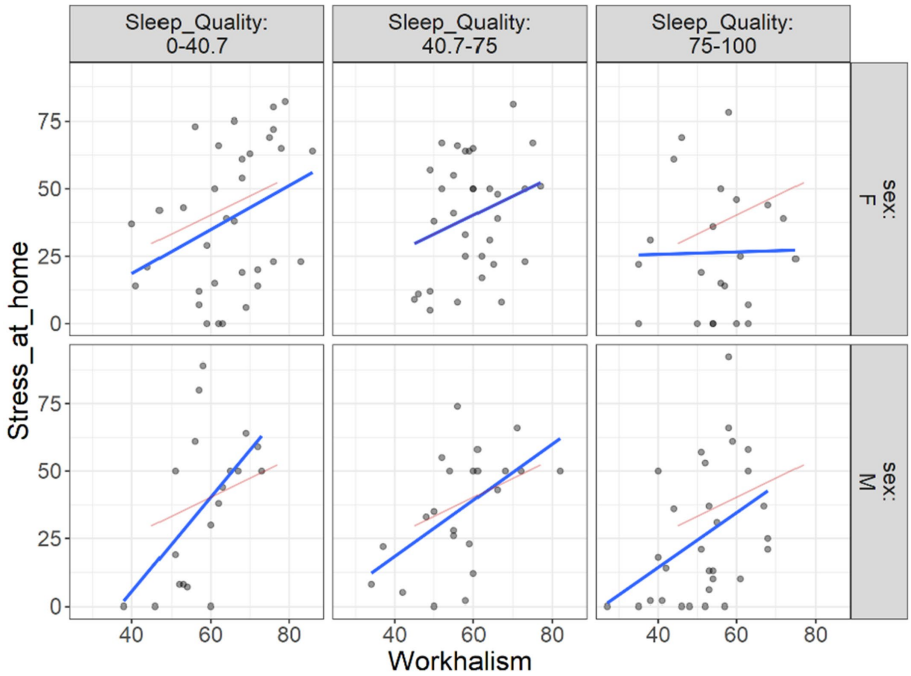

FIGURE 5
Flexplot of the relations between work addiction risk and stress at home at different levels of sleep quality across gender.

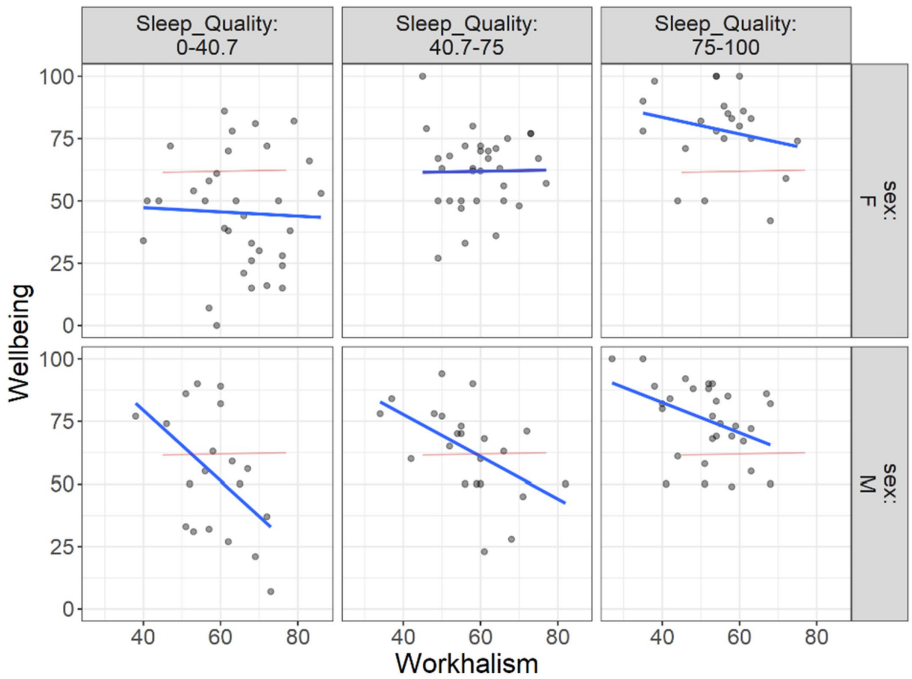

FIGURE 6
Flexplot of the relations between work addiction risk and well-being at different levels of sleep quality across gender.

so, this link is perceived more positively and higher for male than for female when the sleep quality of both is low but when the sleep quality is reported high the link still is strong for male and almost much lower for female participants.

As Figure 6 illustrates by increasing the work addiction risk, the well-being is reduced. This reduction is more tangible when sleep quality is reported at lowest level in males than in females. However, this link seems to be similar between male and females

when the sleep quality is reported at its highest level. Figure 6 demonstrates this result.

Discussion

The objective of this study was to reveal the type and strength of the relation between work addiction risk and health-related outcomes. Our primary point of attention was to test the influence of work addiction risk on well-being as well as on stress at home and work. In this regard, the findings supported and replicated some of the previous studies. More specifically, work addiction risk is negatively associated with well-being and positively is associated with both type of stress. This is consistent with previous studies indicating that employees that have higher work addiction risk also report greater stress at work and poorer well-being [e.g., (4, 20, 21)]. It should be noted that although work addition risk is significantly linked with both well-being and stress at work, hence the link between work addiction risk and stress at work is stronger.

As we considered sleep quality as the mediator of the link between work addiction risk and stress and well-being, thus we needed to check the Baron and Kenny (78) mediation condition before we ensure that it can be the mediator. In doing so, we found a negative association between work addiction risk and sleep quality. It is in line with previous studies that found individuals high on work addiction demonstrated significantly higher levels of daytime sleep dysfunction than individuals who rated low on work addiction (79). Sleep quality itself was also positively associated with well-being and negatively associated with stress at home and work. The results are consistent with previous studies that higher level of sleep quality is associated with higher level of well-being [e.g., (80, 81)] and higher level of sleep quality is associated with lower job stress (82, 83) and experience of insomnia (84). The link between sleep quality and well-being was found to be stronger than the link between sleep quality and stress at work, suggesting that if an employee's sleep quality is negatively impacted, we may expect to observe its proximal symptoms such as decreased well-being at first and vice versa.

According to mediating findings, it is suggested that the work addiction risk is more likely to influence well-being and stress at work through reduced sleep quality. However, sleep quality appeared to be a stronger mediator of work addiction risk and well-being. In addition, according to mediation paths, work addiction risk appears to be the stronger predictor of stress at work and sleep quality appears to be the stronger predictor of well-being. Thus, when there is a likelihood of work addiction risk, individuals with lower sleep quality are likely to experience well-being –related problems and demonstrate it in the form of stress at work. An individual with sleep dysfunction may not be able to do his/her job duties and may put her in a situation to feel stressed. In a rather similar cross-sectional study conducted by Spagnoli et al. (85) in Italy, they tested a mediation model of work addiction risk where sleep quality was set as the mediator of the link between work addition risk and daytime sleep. They found that sleep quality mediated the relationship between work addiction and daytime sleepiness. In another study, Cheng et al. (86) found that not workaholic's individuals but nurses with high work–family conflicts due to lower sleep quality experienced lower self-perceived heath. In this study sleep quality was the mediator of the link between work–family conflict and health status. An explanation for this finding could be that addicted employees to work have to sleep late and less than non-addicted employees do. The change in the quality of sleep may change the normal concentration level and consciousness at work resulting in not being able to finish their working tasks or increase the fear that their working duties may not be completed during working hours.

Suggestions and limitations

This study carries some limitations. First, we did not investigate the role of all demographic variables (i.e., education level, marriage status, work experience, type of work contract, etc.) in the extent to which work addiction can be perceived or can lead to health-related outcomes. Although it could be an interesting research idea to examine, it was out of the scope of this study. We suggest future studies take this gap into consideration. Second, we used self-administer scales to collect data. In doing so, we did not have a full control on the social desirability bias of participant that may influence their responses. Third, we collected data using a cross-sectional design in which we did not track our findings over time. We suggest future studies to use other research designs such as longitudinal designs to check the strength of the findings over time.

The results can be used to encourage employees to move toward enhancing the quality of their sleep as an efficient way to cope with occupational stressors. Moreover, employees at risk of work addiction can monitor and receive additional resources and support, such as counseling services or stress management educational workshops, to better manage work addiction risk. The findings also suggest workplaces offer flexible work plans that can promote a healthier work-life balance among employees. Also, workplaces may develop and conduct workshops and training classes to educate employees about prevention strategies against work addiction risk.

Conclusion

This study one step further completed what the previous studies have found on the detrimental impact of work addiction risk on well-being status of employees through highlighting the specific role of sleep quality of employees on the extent to which the strength of work addiction risk influence stress level and well-being of employees. This draws the attention of workplace managers to the way employees may develop and experience the negative outcomes of work addiction risk. This could be particularly important for those organizations that try to reduce or cut their expenses in terms of employees' insurances as well as absenteeism and presentism of employees. Moreover, researchers may use these findings to develop or implement interventions that can either reduce work addiction risk or enhance the sleep quality of employees. In addition, employees at risk of work addiction can be identified, monitored, and supported by interventional programs such as counseling services. Besides, prevention strategies to work addiction risk can also be viewed as an effective way and be examined by scientists to measure the extent to which they can contribute to reduction of work addiction risk among employees.

Author's Note

The abstract of this article was presented at the European Congress of Psychology (ECP), Slovenia, Ljubljana, as an oral presentation with interim findings. The oral's abstract was published in a special issue of *Horizons of Psychology*, 31, 59–447 (2022).

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 humans were approved by National Commission for Data Protection and Liberties (CNIL), and the South-East VI ethics committee (clinicaltrials.gov identifying number NCT02596737). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

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Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

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

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2024.1352646/full#supplementary-material

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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 21 June 2024
DOI 10.3389/fpubh.2024.1408006

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OPEN ACCESS

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RECEIVED 27 March 2024
ACCEPTED 12 June 2024
PUBLISHED 21 June 2024

CITATION
Fan J, Chang Y, Li L, Jiang N, Qu Z, Zhang J, Li M, Liang B and Qu D (2024) The relationship between medical staff burnout and subjective wellbeing: the chain mediating role of psychological capital and perceived social support.
Front. Public Health 12:1408006.
doi: 10.3389/fpubh.2024.1408006

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The relationship between medical staff burnout and subjective wellbeing: the chain mediating role of psychological capital and perceived social support

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Background: Medical staff play a crucial role in delivering healthcare services, especially during epidemics of infectious diseases such as coronavirus disease 2019 (COVID-19). However, there is a growing issue of burnout and low wellbeing among this group. While it is widely recognized that burnout has a negative impact on subjective wellbeing, the exact relationship between the two is not yet completely understood. The purpose of this study is to explore the chain mediating role of psychological capital and perceived social support between burnout and subjective wellbeing among medical staff.

Methods: Using the convenient sampling method, 604 medical staff were selected for a cross-sectional study. All participants completed a self-report questionnaire that collected demographic information, as well as data from the Maslach Burnout Inventory-Human Services Survey, General Wellbeing Schedule, Psychological Capital Questionnaire, and Perceived Social Support Scale. SPSS 27.0 and SPSS PROCESS macro were used for data analysis.

Results: There was a significant correlation between burnout, psychological capital, perceived social support, and subjective wellbeing ($p < 0.01$). Burnout not only has a direct negative impact on the subjective wellbeing of medical staff (effect: −0.2045; Bootstrap 95%CI: −0.2506, −0.1583), but also exerts an indirect influence on subjective wellbeing through three pathways: the independent mediating effect of psychological capital (effect: −0.0481; Bootstrap 95%CI: −0.0876, −0.0109), the independent mediating effect of perceived social support (effect: −0.0092; Bootstrap 95%CI: −0.0203, −0.0003), and the chained mediating effect of psychological capital and perceived social support (effect: −0.0092; Bootstrap 95%CI: −0.0183, −0.0019).

Conclusion: High burnout in medical staff can impair the level of psychological capital, leading to diminished perceived social support and ultimately reduced subjective wellbeing. The findings of this study contribute to understanding the potential pathways between burnout and subjective wellbeing and provide preliminary data support for developing strategies to improve the mental health of medical staff.

KEYWORDS

medical staff, burnout, subjective wellbeing, psychological capital, perceived social support

1 Background

With the sudden emergence of the coronavirus disease 2019 (COVID-19) pandemic and its continuously evolving variants posing significant challenges to the healthcare system, along with the advancements in the increasingly complex medical environment today, there are progressively higher demands placed on medical staff (1, 2). It is emphasized as a necessary condition to achieve universal health coverage to have a competent and qualified healthcare workforce to address epidemiological challenges and evolving health needs (3). However, there is a global shortage of medical staff (4, 5), leading to heavy workloads and decreased focus on the job. This can easily jeopardize physical and mental health, create burnout, and cause a decline in wellbeing.

Positive psychology is a pioneering method for dealing with burnout and enhancing wellbeing. It utilizes individuals' potential, strengths, and functions to foster personal thriver (6, 7). In the field of positive psychology, the construction of wellbeing is attributed to the first pillar (i.e., positive subjective experiences), and subjective (or "hedonic") wellbeing (SWB) is one of its important concepts (6). It pertains to how individuals assess the overall quality of their lives based on their criteria. It is widely used as a measure to evaluate mental health (8). This encompasses both reflective cognitive judgments (e.g., life satisfaction) and emotional reactions to one's present circumstances (i.e., pleasant and unpleasant emotions) (9). SWB has gradually been recognized as a symbol of national prosperity (10). Since the introduction of positive psychology, research on individuals' SWB has become increasingly popular, especially within specific organizational contexts (11). Medical staff are responsible for saving lives and caring for patients, serving as the backbone of healthcare services. Given the prominence of the healthcare system in social services, ensuring the quality of the work life of medical staff is an important factor in maintaining its stability. Medical staff's sense of achievement and satisfaction in their professional lives has been conceptualized as occupational wellbeing (12), which is closely related to broader psychological wellbeing or SWB (13). Therefore, exploring the factors influencing the SWB of medical staff is essential for improving their SWB and further enhancing the level of medical care. To date, a large number of studies at home and abroad have explored the influencing factors of SWB (14–16).

Among the many factors that influence SWB, burnout is an important variable. The World Health Organization (WHO) defines burnout as an "occupational phenomenon" in the International Classification of Diseases 11th revision (17, 18). It is a syndrome caused by chronic work stress that has not been successfully managed and is a serious health problem (17, 18). It has three characteristics: feelings of energy depletion or exhaustion; increased psychological distance from one's job, feelings of negativism or cynicism related to one's job; and feelings of ineffectiveness and lack of accomplishment (17, 18). Studies show that burnout is common among medical staff, and this is a global phenomenon (19–22). During the COVID-19 pandemic, studies show that around two-thirds of medical staff experience high levels of burnout, which has become a crucial issue to consider (23, 24). According to a nationwide cross-sectional survey, the prevalence of burnout among Chinese medical staff is 60.8% (25), far higher than the global prevalence (21). The high incidence of medical staff burnout is directly reflected in personal physical health (26) (e.g., alcohol abuse or alcohol dependence), and work level (27) (e.g., negative work attitude, turnover intention). This will directly lead to a decline in the quality of patient care and an increase in medical malpractice litigation, resulting in direct economic costs and indirect reputation costs (28, 29). Not only that, but burnout has become one of the important factors hindering SWB (11), and it has a significant negative predictive effect on SWB (30–32). However, the potential impact path between burnout and SWB is not yet completely clear. Some studies have found that burnout has a predictive effect on mental health, and positive mental health can reduce burnout (27, 33). Therefore, it is necessary to understand the mechanisms, whether internal and external factors such as psychological capital (PsyCap) and social support are involved as mediators, to take effective measures based on positive psychology to prevent and reduce burnout and increase SWB.

The second pillar of positive psychology (i.e., positive individual traits) proposes that character strengths can enrich and promote various aspects of wellbeing (6, 34). PsyCap, as an extension of positive psychology ideas in the field of organizational behavior, refers to the positive psychological state or mental energy of an individual in the process of development or growth and contains four core components: self-efficacy, optimism, hope, and resilience (35). Specifically, it fosters confidence to succeed in the face of challenging tasks (self-efficacy), optimism about current and future success (optimism), and adherence to a positive motivational state that can re-establish pathways to achieve goals when needed (hope) (36). In addition, PsyCap provides a flexible ability to recover from failure, adversity, uncertainty, or overwhelming change (resilience) (36). Theoretical and practical evidence demonstrates that the malleability of PsyCap implies that its four components are sustainable and can have a wide-ranging impact on individuals' attitudes and behaviors (37). For example, PsyCap can improve nursing burnout (38), alleviate depression (39), and influence wellbeing (40). Existing research has shown that PsyCap of medical staff has a significant negative impact on burnout (41–43). Furthermore, PsyCap plays a mediating role in the outcomes of nursing staff burnout, such as nursing performance (44). Medical staff's PsyCap positively predicts occupational wellbeing (40). However, few studies have considered how burnout, PsyCap, and SWB are interrelated and interacted with each other. Therefore, it suggests that PsyCap can not only directly negatively impact medical staff's burnout and positively predict SWB, but also serve as a mediating variable among relevant factors. Based on this, this study proposes Hypothesis 1 (H1): burnout can affect SWB through the mediating effect of PsyCap.

A positive social environment is the third pillar of positive psychology, manifested as positive groups and social institutions that are important for individual health (6). Social support as a powerful external factor refers to experiences valued, nurtured, and respected by those closest to the individual, who may receive support from various sources, including people and society. Perceived social support (PSS) refers to the degree to which individuals feel subjectively understood, respected, and supported by others in the social environment. It emphasizes individuals' subjective perception, experience, and understanding of different types of social support, and influences their psychological wellbeing more than the actual social support (45). Research has found that through the help and protection provided by others, medical staff can to some extent avoid the occurrence of burnout (46, 47). Higher PSS is associated with lower burnout (48), higher wellbeing (49), higher PsyCap (43), and lower

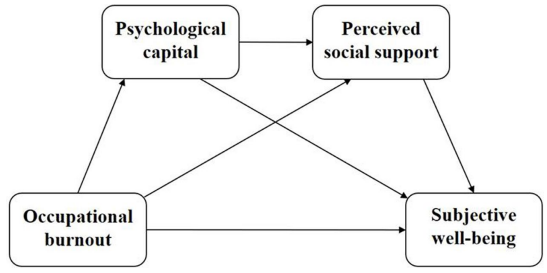

FIGURE 1
Hypothesis model.

psychological distress (50). A review conducted among workers during the COVID-19 pandemic found a correlation between organizational support and the mental health of this population (51). The investigation of female physicians in Yantai City, Shandong Province, China, indicates that perceived family support plays a moderating role between burnout and SWB (49). Although previous studies have suggested the connection between PSS, burnout, and SWB among medical staff, there is still a need for further exploration due to the limited sample size and narrow research focus. Therefore, we propose Hypothesis 2 (H2): burnout can affect SWB through the mediating effect of PSS. In addition, considering the significant correlation between PSS and PsyCap among medical staff (43), as well as the positive predictive role of PsyCap on PSS in volunteers (52). Our Hypothesis 3 (H3) is that among medical staff, burnout can affect SWB through the chain intermediary effect of PsyCap and PSS.

Previous research on medical staff burnout has focused on negative aspects (e.g., stress, depression), with less research on positive psychological emotion aspects. At the same time, despite previous research indicating the association between physician or nurse burnout, SWB, PsyCap, and PSS, in the actual clinical environment, physicians, technicians, and nurses in various departments do not exist independently but rather act as a unified whole in a division of labor and cooperation to play a therapeutic role. Currently, there is still a lack of in-depth exploration of the intrinsic structural relationships between these variables in the real clinical environment. Given the high prevalence of burnout among medical staff and the importance of SWB, exploring potential pathways between the two will contribute to a thriving medical workforce. In summary, this study has established a hypothetical model (Figure 1) aimed at clarifying the pathways and impact of the roles of medical staff burnout, SWB, PsyCap, and PSS, to provide a certain reference for future exploration of pathways to reduce medical staff burnout and enhance wellbeing.

2 Methods

2.1 Study design and participants

A cross-sectional study was conducted using a convenient sampling method from March to June 2022, involving 631 medical staff. The study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist (53) (Supplementary Table S1). Participants were involved in the treatment or support work of the largest designated hospital for epidemic prevention and control in Changchun, China. Their original working units were, respectively, the First Hospital of Jilin University, the Second Hospital of Jilin University, the China-Japan Union Hospital of Jilin University, the Jilin Province People's Hospital, the Affiliated Hospital of Changchun University of Traditional Chinese Medicine, and the Changchun Hospital of Traditional Chinese Medicine, a total of 6 tertiary medical institutions. They were invited to complete an online survey on the Questionnaire Star platform.[1] The survey included self-reported questionnaires on demographic information, burnout, SWB, PsyCap, and PSS. The inclusion criteria were: (1) Medical staff who have worked in designated hospitals for infectious diseases including COVID-19 and were involved in treatment or support work for a minimum of 1 month; (2) Medical staff with practicing qualifications recognized by the National Health Commission and currently employed at the investigated hospitals; (3) Individuals capable of reading and understanding Chinese. The exclusion criteria were: (1) Participants with a confirmed history of mental illness; (2) Individuals who refused to participate.

2.2 Measures

2.2.1 SWB

The revised version of the General Wellbeing Schedule (GWBS) developed by Fazio (54) and adapted by Duan et al. (55) was used to measure SWB. The scale is divided into 6 dimensions: satisfaction and interest in life, concerns about health, energy status, happy or depressed mood, control over emotions and behavior, and degree of tension or relaxation. The higher the total score on the scale, the stronger the SWB (55). A total score of ≤48 is considered "low SWB," 49–72 is "moderate SWB," and ≥73 is "high SWB" (56). The Cronbach's α was 0.856.

2.2.2 Burnout

The 22-item Maslach Burnout Inventory-Human Services Survey (MBI-HSS) (57) was used to measure burnout, which was divided into 3 dimensions: emotional exhaustion (EE), depersonalization (DP), and personal achievement (PA). The Chinese version was translated by Li et al. (58) and has good reliability and validity. The higher the score of EE and DP, the more serious the burnout; the higher the score of PA, the lower the degree of burnout. If the score of any dimension reaches or exceeds the threshold, the subject will detect burnout (59). The critical value of each dimension is defined as EE: low ≤16; moderate 17–26; high ≥27; DP: low ≤6; moderate 7–12; high ≥13; PA: low ≥39; moderate 32–38; high ≤31 (60). In this study, the Cronbach's α was 0.781.

2.2.3 PsyCap

PsyCap was measured using the Psychological Capital Questionnaire (PCQ-24) compiled by Luthans et al. (36). This questionnaire contains 4 dimensions of self-efficacy, hope, resilience, and optimism. Higher scores indicate higher levels of PsyCap. The Cronbach's α of the total scale was 0.933.

1 https://www.wjx.cn/

2.2.4 PSS

PSS was measured using the Perceived Social Support Scale (PSSS) developed by Zimet et al. (61) and revised by Qianjin (62). The scale includes perceived family, friends, and other support dimensions. The higher the score, the higher the PSS. The Cronbach's α was 0.957.

2.3 Data analysis

All data were exported from the Questionnaire Star platform to SPSS (version 27.0, IBM Corp) for statistical analysis. All analyses were based on complete data. Before data analysis, Harman univariate tests were used to test for biases in common methods. Descriptive analysis (e.g., median, interquartile range (IQR), frequency, percentage) was used to present sample characteristics. Due to the non-normality of the data, Spearman correlation analysis was used to assess the relationship between variables. The SPSS macro PROCESS program (version 4.1) designed by Hayes (63) was used for mediation analysis using Model 6 to explore the relationship between burnout, PsyCap, PSS, and SWB. The Bootstrap confidence interval (CI) was set at 95%, with a Bootstrap sample size of 5,000. If the interval of the 95% CI did not include zero, it indicated a significant mediation effect. Type I error for all statistical analyses was $p < 0.05$ (two-sided).

2.4 Ethical considerations

This study was approved by the Ethics Committee of the School of Nursing, Jilin University (approval number: 2020030201). The survey was anonymous, confidential, and voluntary. Written informed consent was obtained from the participants before the survey (electronically, e.g., by clicking "yes"), and participants could choose to terminate the survey at any time.

3 Results

3.1 Common method deviation test

The data collected in this study comes from self-reports of the participants, so common method bias may exist. To reduce the impact of this bias on the study results, the Harman one-factor model method was used to test the degree of method bias in the data (64). The results showed that there were 12 factors with eigenvalues (i.e., the variances of the data in the directions of the eigenvectors) greater than 1, with the first factor explaining 29.56% of the variance, which was less than the critical standard of 40%, indicating that there was no serious homoscedasticity bias in the variables in this study (i.e., there was no serious variance attributable to the measurement method rather than the constructs of the measures in this study).

3.2 Demographic characteristics of participants

In this study, a total of 631 questionnaires were distributed. After eliminating 5 questionnaires with one or more missing answers and 22 questionnaires with 10 or more consecutively repeated responses, a total of 604 valid questionnaires were collected, achieving an

TABLE 1 Descriptive statistics of sample demographics and key variables ($n = 604$).

Variables	*n*	%
Gender		
Male	67	11.1
Female	537	88.9
Age (years)		
18–34	281	46.5
35–44	272	45.0
≥45	51	8.4
Ethnicity		
Han	544	90.1
Non-Han	60	9.9
Education		
Junior college and below	41	6.8
Bachelor	461	76.3
Master or above	102	16.9
Marital status		
Unmarried	126	20.9
Married	467	77.3
Divorced	11	1.8
Children		
None	185	30.6
One	351	58.1
Two or more	68	11.3
Children's stage		
None	185	30.6
Infancy period	57	9.4
Pre-school age	134	22.2
School age	156	25.8
Puberty and above	72	11.9
Employment type		
Contract employment	335	55.5
Formal employment	269	44.5
Working years		
≤5	77	12.7
6–10	181	30.0
11–15	197	32.6
≥15	149	24.7
Department		
Surgery	88	14.6
Internal medicine	227	37.6
Emergency and ICU	115	19.0
Others	174	28.8
Occupation category		
Doctor	81	13.4
Nurse	514	85.1

(Continued)

TABLE 1 (Continued)

Variables	*n*	%
Medical technologist	9	1.5
Professional title		
Junior	267	44.2
Intermediate	265	43.9
Senior	72	11.9
Administrative position		
No	566	93.7
Yes	38	6.3

ICU, intensive care unit.

effective response rate of 95.7%. The age of participants ranged from 19 to 64; 3.4% were physicians, 85.1% were nurses, and 1.5% were medical technologists (Table 1).

3.3 Descriptive analysis of participants' scale scores

Among the surveyed medical staff, the GWBS total score had a median of 78.00 (IQR: 68.00–89.00), with 1.8% reporting low SWB, 34.9% reporting moderate SWB, and 63.2% reporting high SWB. The lowest scored dimensions were "Satisfaction and interest in life" with a score of 7.00 (IQR: 6.00–8.00) and "Concerns about health" with a score of 6.00 (IQR: 5.00–8.00). The MBI-HSS total score had a median of 56.00 (IQR: 47.00–67.00), with a burnout detection rate of 52.5%, including 35.8% experiencing low burnout, 12.9% experiencing moderate burnout, and 3.8% experiencing high burnout. The PCQ total score had a median of 90.00 (IQR: 81.25–94.00), and the PSSS total score had a median of 65.00 (IQR: 54.00–72.00). The dimension scores of the scale are detailed in Table 2.

3.4 Correlation analysis

The Spearman correlation analysis results indicated that burnout among medical staff was negatively correlated with SWB ($r = -0.330$, $p < 0.01$), PsyCap ($r = -0.139$, $p < 0.01$), and PSS ($r = -0.127$, $p < 0.01$); PsyCap was positively correlated with SWB ($r = 0.642$, $p < 0.01$) and PSS ($r = 0.570$, $p < 0.01$), thus meeting the requirements for intermediary effect analysis. Additionally, all correlation coefficients were below 0.700, indicating that there was no multicollinearity in the data (i.e., no high correlations between two or more variables) (see Table 3 for details).

3.5 Mediation effect analyses

As shown in Table 4 and Figure 2, firstly, burnout significantly negatively predicted the SWB of medical staff ($\beta = -0.3432$, $p < 0.001$, Model 1). Secondly, burnout had significant negative predictive effects on PsyCap ($\beta = -0.1223$, $p < 0.01$, Model 2) and PSS ($\beta = -0.0724$, $p < 0.05$, Model 3). Thirdly, PsyCap significantly positively predicted PSS ($\beta = 0.5967$, $p < 0.001$, Model 3). Fourthly, when burnout, PsyCap, and PSS simultaneously entered the regression equation (Model 4), the predictive effect of burnout remained significant ($\beta = -0.2590$, $p < 0.001$), and PsyCap ($\beta = 0.4980$, $p < 0.001$) and PSS ($\beta = 0.1602$, $p < 0.001$) both significantly positively predicted SWB.

Finally, we used the Bootstrap method with percentile bias correction to test the mediating effects of PsyCap and PSS on the relationship between burnout and SWB. The results indicated that the mediating effects of PsyCap and PSS were significant, with the total indirect effect of 0.0665, accounting for 24.55% of the total effect (0.2709). Specifically, the mediating effect consisted of three paths supporting H1, H2, and H3. Firstly, the path coefficient of the indirect effect of burnout on SWB through PsyCap was −0.0481 (Bootstrap 95%CI: −0.0876, −0.0109). Secondly, the path coefficient of the indirect effect of burnout on SWB through PSS was −0.0092 (Bootstrap 95%CI: −0.0203, −0.0003). Thirdly, the path coefficient of the indirect effect of burnout on SWB through PsyCap and PSS was −0.0092 (Bootstrap 95%CI: −0.0183, −0.0019). Detailed results are available in Table 5 and Figure 2.

4 Discussion

In this study, we examined the relationship between medical staff's burnout and SWB, as well as the mediating roles of PsyCap and PSS. Our findings indicate that PsyCap and PSS mediate the relationship between burnout and SWB. Therefore, the model suggests that burnout negatively influences PsyCap and PSS, leading to a decrease in SWB.

4.1 Current state of SWB of medical staff

In this study, the SWB of medical staff was slightly lower than that of the study results of Aggar et al. (65), indicating that the overall SWB of medical staff in China is slightly lower. The reason for this difference may be that their study participants were nurses in Australia, while China is a country with a large population base. With the opening of the two-child policy and the increasing aging population, the number of patients and the demand for medical care in tertiary public hospitals in China has reached an unprecedented level. There are only 6.94 professional public health personnel per 10,000 people, which is significantly lower than in other developed countries, causing each medical staff to provide services to more patients, requiring Chinese medical staff to work overtime frequently, with long working hours and heavy workloads (66). In addition, more than three-quarters of our research subjects are married, and the conflict between family and work may further lead to lower life satisfaction. Furthermore, the dimensions with the lowest scores are "Satisfaction and interest in life" and "Concerns about health," which is similar to several studies (67–69), indicating that our study sample may experience a decrease in satisfaction and interest in life due to frequent shift work, disrupted circadian rhythms, and unresolved physical fatigue. At the same time, this study was conducted during the COVID-19 pandemic, during which medical staff frequently come into contact with highly infectious and critically ill patients, which may exacerbate their concerns about their health. A meta-analysis of the SWB of medical staff in China showed that the SWB of medical staff declined more significantly compared to other populations (e.g., college students, and older adults) (70).

TABLE 2 Descriptive summary of subjective wellbeing, occupational burnout, psychological capital, and perceived social support ($n = 604$).

Scale/subscale	M	IQR	Degree		
			Low *n* (%)	Moderate *n* (%)	High *n* (%)
GWBS	78.00	68.00–89.00	11 (1.80)	211 (34.90)	382 (63.20)
Satisfaction and interest in life	7.00	6.00–8.00			
Concerns about health	6.00	5.00–8.00			
Energy status	19.00	16.00–22.00			
Happy or depressed mood	16.00	14.00–19.00			
Control over emotions and behavior	13.00	11.00–15.00			
Degree of tension or relaxation	16.00	14.00–20.00			
MBI-HSS	56.00	47.00–67.00	216 (35.80)	78 (12.90)	23 (3.80)
Emotional exhaustion	18.00	9.00–27.00	274 (45.40)	174 (28.80)	156 (25.80)
Depersonalization	3.00	0.00–6.00	484 (80.10)	62 (10.30)	58 (9.60)
Personal accomplishment	36.00	27.00–42.00	232 (38.40)	145 (24.00)	227 (37.60)
PCQ	90.00	81.25–94.00			
Self-efficacy	23.00	20.00–24.00			
Hope	23.00	20.00–24.00			
Resilience	22.00	20.00–24.00			
Optimism	21.00	19.00–23.00			
PSSS	65.00	54.00–72.00			
Family support	23.00	17.25–25.00			
Friend support	21.50	17.00–24.00			
Other support	21.00	17.00–24.00			

M, median; IQR, interquartile range; GWBS, General Wellbeing Schedule; MBI-HSS, Maslach Burnout Inventory-Human Services Survey; PCQ, Psychological Capital Questionnaire; PSSS, Perceived Social Support Scale.

TABLE 3 Correlation among variables (r, $n = 604$).

Variables	1	2	3	4
1. Subjective wellbeing	1.000			
2. Occupational burnout	−0.330**	1.000		
3. Psychological capital	0.642**	−0.139**	1.000	
4. Perceived social support	0.525**	−0.127**	0.570**	1.000

**$P < 0.01$ (two-tailed).

4.2 The direct effect of burnout on SWB of medical staff

Wellbeing is broader than wellness and mainly focuses on personal responsibility (71). At present, research mainly measures the level of wellbeing in terms of SWB. SWB fluctuates throughout life (72) and is influenced by life events (73). This suggests that exploring potential pathways to improve the level of SWB is valuable, and understanding the factors and pathways that affect the level of SWB of medical staff is crucial for targeted interventions. Multiple studies have shown that burnout among medical staff is closely related to decreased SWB (25, 30, 49, 74). This indicates to healthcare system managers that the SWB of medical staff is not high and that their burnout is closely linked. It is important to pay attention to the relationship between the two and understand the factors and pathways that affect the level of SWB of medical staff to carry out targeted interventions. This study found that burnout significantly predicts a decrease in SWB among medical staff. This is consistent with previous findings in populations such as physicians, athletic coaches, and police officers (11, 75, 76), and this phenomenon may be related to the following factors. The Conservation of resources theory (77) posits that individuals have a natural inclination to seek and preserve valuable resources, such as time, wealth, optimism, and support. Whether a resource has been lost or is at risk of loss, it can cause stress to the individual (77). In the workplace, when individuals become aware that their resources are at risk and struggle to adjust to their jobs, it leads to a cycle of resource loss. This cycle creates job stress and eventually results in burnout (78). The progression of burnout amplifies an individual's detrimental actions (e.g., heightened tobacco consumption, insufficient physical exercise, and lack of sleep), which subsequently results in various physiological manifestations; moreover, burnout tends to generate more frequent adverse emotions, giving rise to psychological symptoms like anxiety and depression (79). Burnout results in the exhaustion of both physical and mental resources. This exhaustion then makes it difficult for individuals to effectively allocate time and effort toward other responsibilities (e.g., family roles). It also creates conflicts and disruptions in their ability to balance their work and family life (80, 81). SWB is primarily comprised of cognitive and affective elements, which encompass evaluations of life satisfaction and positive/negative emotional reactions (9). Burnout can cause damage to

TABLE 4 Regression analysis of the relationship between variables in the mediation effect model (n = 604).

Predictive variables	Model 1 (dependent variable: Subjective wellbeing)		Model 2 (dependent variable: Psychological capital)		Model 3 (dependent variable: Perceived social support)		Model 4 (dependent variable: Subjective wellbeing)	
	β	t	β	t	β	t	β	t
Occupational burnout	−0.3432	−8.9642***	−0.1223	−3.0231**	−0.0724	−2.2235*	−0.2590	−8.7031***
Psychological capital					0.5967	18.3191***	0.4980	13.4605***
Perceived social support							0.1602	4.3170***
R^2	0.1178		0.0150		0.3719		0.4809	
F	80.3562***		9.1392**		177.9091***		185.3131***	

*P < 0.05, **P < 0.01, ***P < 0.001 (two-tailed).

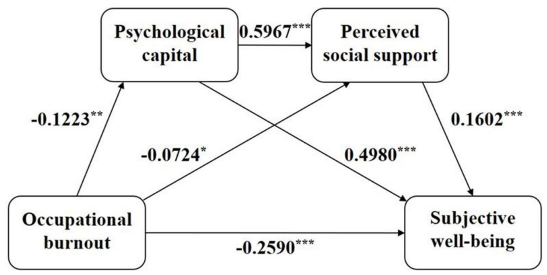

FIGURE 2
The chain mediating model of psychological capital and perceived social support on occupational burnout and subjective well-being. *P < 0.05, **P < 0.01, ***P < 0.001 (two-tailed).

physical and mental health, and work–family conflict can lead to a decrease in SWB. Current research provides supportive evidence for this hypothesis. The research results also inspire us to strengthen the improvement of burnout among medical staff, which is very necessary for enhancing SWB.

4.3 Mediation effects of PsyCap and PSS

This study demonstrates that PsyCap plays an important mediating role in the relationship between burnout and SWB among Chinese medical staff, confirming H1. This means that medical staff with high levels of burnout are more likely to have lower PsyCap, leading to a decrease in SWB. This is similar to previous findings in the nursing population (44, 82). The mechanisms may be related to the following factors: the Job Demands-Resources model (JD-R) suggests that the interaction between job demands and job resources affects the development of burnout (83). Job resources, which include a combination of internal and external resources, can reduce the impact of job demands on burnout (84). As an important internal positive psychological resource, individuals with high levels of PsyCap generally have a positive attitude and confidence in their work, and offer more positive interpretations of work events, making it easier for them to recover from setbacks and failures (85, 86). Additionally, the broaden hypothesis in the Broaden-and-Build theory proposes that positive emotions increase an individual's focus and awareness of their environment, allowing them to have a broader range of thoughts and perceptions than normal (87). This enhances wellbeing due to increased physical, psychological, and social resources (87). In this sense, PsyCap gives individuals the ability to innovate, etc. (88, 89), which improves the SWB in terms of individual psychological ability and strength. In addition, those with high levels of PsyCap are better able to overcome stress appropriately, feel more comfortable physically and mentally, and tend to have positive outcomes on SWB (90). This is similar to a cross-sectional study result conducted by Ravikumar among medical staff and police personnel during the COVID-19 pandemic (91). They found that positive PsyCap helps reduce occupational stress and improve mental health. This finding suggests that despite the negative impact of burnout on SWB, medical staff with sufficient PsyCap resources can mitigate this impact and reduce the damage to SWB.

This study also found that the PSS is an intermediate variable between burnout and SWB among Chinese medical staff, confirming H2. This is consistent with previous research findings (92). The underlying mechanism may be related to the following factors: firstly, the PSS as an important external resource may improve burnout by reducing job demands and supporting the JD-R model perspective from another angle (84). When individuals receive support from their work group, external work resources increase, effectively reducing the occurrence of burnout. Additionally, previous research has shown that work relationships characterized by lack of support and trust increase the risk of burnout (93). Conversely, when work relationships are positive and there is a high level of social support, employees are more likely to resolve conflicts effectively and be more engaged in their work. For medical staff, perceiving support from family, friends, or others can reduce negative emotions such as fatigue or indifference, increase personal achievement or confidence, and thereby reduce the occurrence and development of burnout. A narrative review highlighted that during the COVID-19 pandemic, peer support as one of the sources of social support, is a key factor in managing work stress (51). Furthermore, the theory of subjective wellbeing homeostasis indicates that SWB is maintained by stable forces such as adaptation and positive emotions (94). At the same time, the maintenance of SWB is influenced by emotional responses, and if internal stable resources are strong, SWB will remain within a normal range (94). As a positive social psychological resource for individuals, PSS can help buffer stress sources in the body's balancing system, thereby maintaining the relative stability of an individual's SWB. Therefore, for medical staff, PSS as a buffer for burnout can help individuals cope with burnout, reduce the negative effects of burnout on physical and mental health, and thus affect SWB.

TABLE 5 Direct, indirect, and total effects of occupational burnout on subjective wellbeing ($n = 604$).

Effects	Pathways	Effect value	Bootstrap SE	Bootstrap 95% CI
Direct effect	Occupational burnout → Subjective wellbeing	−0.2045	0.0235	−0.2506, −0.1583
Indirect effects	Occupational burnout → Psychological capital → Subjective wellbeing	−0.0481	0.0196	−0.0876, −0.0109
	Occupational burnout → Perceived social support → Subjective wellbeing	−0.0092	0.0052	−0.0203, −0.0003
	Occupational burnout → Psychological capital → Perceived social support → Subjective wellbeing	−0.0092	0.0042	−0.0183, −0.0019
Total indirect effect		−0.0665	0.0237	−0.1126, −0.0199
Total effect		−0.2709	0.0302	−0.3303, −0.2116

SE, standard error; 95% CI, 95% confidence interval.

In addition, this study provides small but significant support for the chain intermediary role of PsyCap and PSS between burnout and SWB among medical staff, which has not been explored in previous studies. In the mediation path of burnout and SWB, PsyCap plays a partial mediating role in the relationship between burnout and PSS, indicating that positive PsyCap can serve as an important buffer to prevent the impact of burnout on the PSS among medical staff. Positive emotions can lead individuals to a growth trajectory, enabling them to identify and build their resources, and these resources are enduring (87). As an inherent positive psychological resource within individuals, multiple studies (95, 96) have confirmed that individuals with high levels of PsyCap generally perceive more prominent material and emotional support between family members and peers, which provides support for the build hypothesis in the broaden-and-build theory. Furthermore, the burnout experienced by medical staff can lead to a decrease in positive psychological resources such as low hope levels and low self-efficacy. At the same time, psychological resources serve as an important mediator for PSS. Faced with the vast work system and personnel structure of tertiary hospitals, individuals with low psychological resources are more likely to show social detachment from colleagues and experience a decrease in PSS, which in turn leads to lower SWB. Therefore, burnout can affect the SWB among medical staff through the chain intermediary role of PsyCap and PSS.

Existing intervention research has found that positive psychology interventions can enhance the PsyCap level of primary care physicians, change work behavior (e.g., coping with work more effectively), improve work-related outcomes (e.g., burnout), and thus influence wellbeing (97). Moreover, interventions including a module that enhances PSS can improve certain components of wellbeing, particularly work stress (98). This result inspires us to develop positive psychology interventions or to develop psychological interventions that include enhancing PsyCap and PSS components, to improve medical staff's burnout and promote SWB.

4.4 Relevance to clinical practice

In China, even if they do not have serious illnesses, patients tend to prefer seeking medical treatment at large public hospitals (99). This results in a high outpatient volume and a large number of hospitalized patients at tertiary hospitals, which can easily lead to burnout among medical staff (100), but the clinical demand for healthcare services is increasing. Therefore, it has become particularly important to improve the SWB of medical staff who are the main body for saving lives. This study has certain theoretical significance and practical value for improving the SWB of medical staff. Given the important mediating role of PsyCap and PSS in the relationship between burnout and SWB, we propose the following suggestions to improve medical staff burnout and ultimately enhance their level of SWB. Firstly, it is important to focus on and enhance individuals' level of PsyCap. Luthans et al. (101) argue that PsyCap is a state-like individual resource that can be changed and improved. The methods proposed by Luthans et al. (35, 101) for developing PsyCap include: allowing employees to experience success to develop self-efficacy and confidence; accepting their past mistakes, failures, and setbacks; encouraging them to appreciate the present and be grateful for positive aspects of life, etc. Secondly, it is important to prioritize and enhance the individual's PSS as much as possible. This is closely related to the level of individual PsyCap and the harmonious organizational atmosphere. Therefore, we hope to strengthen the attention to burnout and wellbeing among medical staff at the policy-making level, create a positive work atmosphere at the organizational leadership level, and focus on enhancing positive psychological resources at the individual level.

4.5 Limitations

This study also has notable limitations. Firstly, it is a cross-sectional survey design, which cannot establish a causal model. Therefore, further investigation and validation should be conducted by combining longitudinal studies and *in vitro* and *in vivo* experiments to further uncover the specific mechanisms of the mediating effect in this study. Secondly, the data is sourced from a sample of medical staff in Changchun, Jilin Province, China, which limits the generalizability of the research findings. Lastly, the assessment of variables is based on self-reported results, which cannot exclude response bias.

5 Conclusion

Based on determining the current status of medical staff's burnout and SWB, this study constructed a mediation model to investigate the processes and mechanisms by which burnout affects medical staff's SWB. The research findings indicate that high levels of burnout not only lead to a decrease in the SWB of medical staff but also affect their

PsyCap and PSS. Additionally, burnout decreases the PsyCap and PSS among medical staff, thereby reducing their SWB. Furthermore, a novel contribution of this current study is the exploration of PsyCap and PSS as chain intermediary roles in burnout and SWB. This study provides initial data support for the design of intervention strategies targeting medical staff burnout and SWB. Enhancing PsyCap and PSS are potential strategies for reducing burnout and improving SWB. Hospital managers should take corresponding measures to enhance medical staff's PsyCap and PSS, thereby improving their SWB. This will play a certain role in promoting the quality and level of medical staff's services, while ensuring the vigorous and stable development of the national healthcare system. In addition, this will provide hospital administrators and medical staff with better reference for coping with potential sudden public health emergencies in the future.

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 humans were approved by Ethics Committee of the School of Nursing, Jilin University (approval number: 2020030201). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

JF: Conceptualization, Methodology, Writing – original draft. YC: Conceptualization, Formal analysis, Investigation, Writing – original draft. LL: Data curation, Investigation, Writing – original draft. NJ: Investigation, Resources, Writing – original draft. ZQ: Data curation, Resources, Writing – original draft. JZ: Formal analysis, Resources, Writing – original draft. ML: Formal analysis, Visualization, Writing – original draft. BL: Supervision, Writing – review & editing. DQ: Supervision, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Acknowledgments

The authors acknowledge the support and contributions of all the medical staff and researchers involved in this study.

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

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2024.1408006/full#supplementary-material

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frontiers | Frontiers in Public Health

TYPE Brief Research Report
PUBLISHED 03 July 2024
DOI 10.3389/fpubh.2024.1402428

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RECEIVED 17 March 2024
ACCEPTED 25 June 2024
PUBLISHED 03 July 2024

CITATION
Niu X, Li C and Xia Y (2024) How does working time impact perceived mental disorders? New insights into the U-shaped relationship.
Front. Public Health 12:1402428.
doi: 10.3389/fpubh.2024.1402428

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How does working time impact perceived mental disorders? New insights into the U-shaped relationship

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Based on a large-scale nationally representative survey in China, this paper uses the exogenous impact of automation on working hours as the instrumental variable to examine working time's impact on perceived mental disorders, on the basis of dealing with endogeneity. Different from existing literature, it is found that the impact of working time on perceived mental disorders is U-shaped, rather than linear. Mental disorders firstly decrease with working hours. After working more than 48.688 h per week, further increases in working time carry notable mental health costs, leading to a positive relationship between working hours and depression. The turning point of this U-shaped relationship is almost in line with the International Labor Organization's 48 working hours/week standard, justifying it from a mental health perspective. In addition, we further exclude the possibility of more complex nonlinear relationships between working time and perceived mental disorders. Furthermore, heterogeneities are found in the effects of working hours on mental disorders across different subgroups. Males are more depressed when working overtime. Older workers have a lower tolerance for overwork stress. The turning point is smaller for the highly educated group and they are more sensitive to working longer. Those with higher socioeconomic status are less depressed after exceeding the optimal hours of work. The increase in depression among rural workers faced with overwork is not prominent. Perceived mental disorders are lower among immigrants and those with higher health status. In addition, labor protection and social security help to weaken mental disorders caused by overtime work. In conclusion, this paper demonstrates that working time has a U-shaped impact on perceived mental disorders and highlights the vulnerability of certain groups, providing a reference for setting optimal working hours from a mental health perspective.

KEYWORDS

working time, perceived mental disorders, depression, U-shaped relationship, instrumental variable approach

1 Introduction

Most countries have statutory limits of weekly working hours of 48 h or less which is the standard established in International Labor Organization (ILO) conventions (1). The rationality of this criterion lies in the fact that most of the literature on the relationship between working hours and mental health indicates that the two factors are negatively related, that is, the increase in working hours leads to perceived mental disorders (2–4). Policies to reduce excessive working hours are found to help improve people's subjective welfare (5). For example, implementing policies that limit working hours can not only reduce chronic fatigue and burnout caused by overwork, but also enhance life satisfaction and happiness (6). Data can more intuitively reflect this relationship: compared with those who work 35–40 h per week, people working more than 55 h per week have a 1.74 times higher risk of depressive symptoms (7).

Existing research on work-life balance finds that excessively long working hours lead to health problems and reduce mental well-beings (8–11). Specifically, excessively long working hours reduce rest time, resulting in a heavier workload and increased work stress (12). This not only leads to various physical illnesses, such as stroke and coronary heart disease (13), but also increases the risk of anxiety and depression (14, 15). In addition, studies from the work arrangement perspective show that shift arrangements and night work increase depression, anxiety, cognitive impairment and even suicidal tendencies (16–19). This is because irregular working hours may disrupt social networks, leading to feelings of loneliness and isolation, which in turn increase mental stress (20). Moreover, the circadian rhythm disruption caused by night shifts could result in hormonal imbalances, decreased immunity, and other negative health consequences, exacerbating mental health issues (21, 22). Moreover, literature suggests that working hours moderate the relationship between life satisfaction and mental health, rather than exerting direct impacts (23). In addition, it is found that working time flexibility also plays a role and low flexibility is associated with worse mental health (24). More flexible working hours enable people to better balance work and life, thereby improving their overall mental health (25). For example, compared to traditional office settings, remote work offers greater flexibility and has been proven to significantly enhance job satisfaction (26, 27).

However, some studies indicate that the relationship between working time and mental disorders is not clear. A meta-analysis based on a sample of 21 studies finds a small but significant positive relationship between working time and mental health (28). There are also studies suggesting no significant correlation between working hours and mental health (29). Besides, mutual influence or reverse causality between the two factors is also assumed (30). For example, evidence indicates that mental health affects working hours through working motivation and absence (31). Specifically, individuals with poor mental health have reduced work motivation and increased absenteeism, leading to shorter working hours (32). Moreover, cultural backgrounds may influence the relationship between these two. For example, in some cultures that highly value work, long working hours may be considered normal and may not significantly affect mental health (33, 34).

Furthermore, heterogeneities in the relationship between working hours and mental health are documented in the literature. For example, studies have found that working overtime is more prominently associated with poor mental health in men, while less in women (35). This gender difference may be due to the social pressure on men to be the primary breadwinners, which causes them to bear greater financial responsibility and psychological stress when working long hours (36). Additionally, disparities are also reflected in groups with different socioeconomic statuses, educational levels and occupational skills. Those who are higher educated and more satisfied with living conditions are less negatively impacted on their mental health by overtime working (37, 38). For example, individuals with higher socioeconomic status are more likely to have access to superior resources and more effective social support to cope with the stress of long working hours (39). Nevertheless, another study shows that people with higher occupational skills experience greater perceived mental disorders due to long working hours (40). This means that when analyzing the relationship between working time and mental disorders, more attention needs to be paid to the heterogeneities among different subgroups.

From the above review, we find that existing research results support either a linear negative or positive correlation between working time and mental disorders. At the same time, some scholars believe that there is a problem of reverse causality in the relationship and thus it is difficult to determine the causality between working hours and mental health. The aim of this paper is to clarify the exact relationship between working time and mental disorders. Specifically, based on data from a large-scale, nationally representative survey in China, this paper investigates the effect of working hours on depression, using the exogenous impact of automation on working time as the instrumental variable. Additionally, we examine potential nonlinear relationships by including higher-order terms of working hours in the regressions and perform a series of robustness tests. Moreover, heterogeneities are investigated across various aspects, including gender, age, education, socioeconomic status, region, migration status, health condition, labor protection, and social security.

2 Materials and methods

2.1 Data source

Data used in this paper are from a large-scale nationally representative survey, Chinese General Social Survey (CGSS), conducted in 2017 and 2018 CGSS is one of the most important national, comprehensive and continuous academic survey projects in China, and is a member of the world General Social Survey (GSS) family. It collects extensive data at multiple levels and across various domains. CGSS aims to gather information on Chinese society to monitor and explain trends in work, behaviors, health and attitudes to examine the structure and functioning of society in general. CGSS sample covers 28 provinces/municipalities/autonomous regions in China and uses the multi-stage stratified Probability Proportionate to Size (PPS) sampling method, making it highly representative. Details of the study protocol are introduced in the Supplementary material and data files are available on http://cgss.ruc.edu.cn/English/Home.htm.

2.2 Measures

The explained variable in this paper is the depression degree, which is based on the classic Likert scale from 1 to 5 to characterize

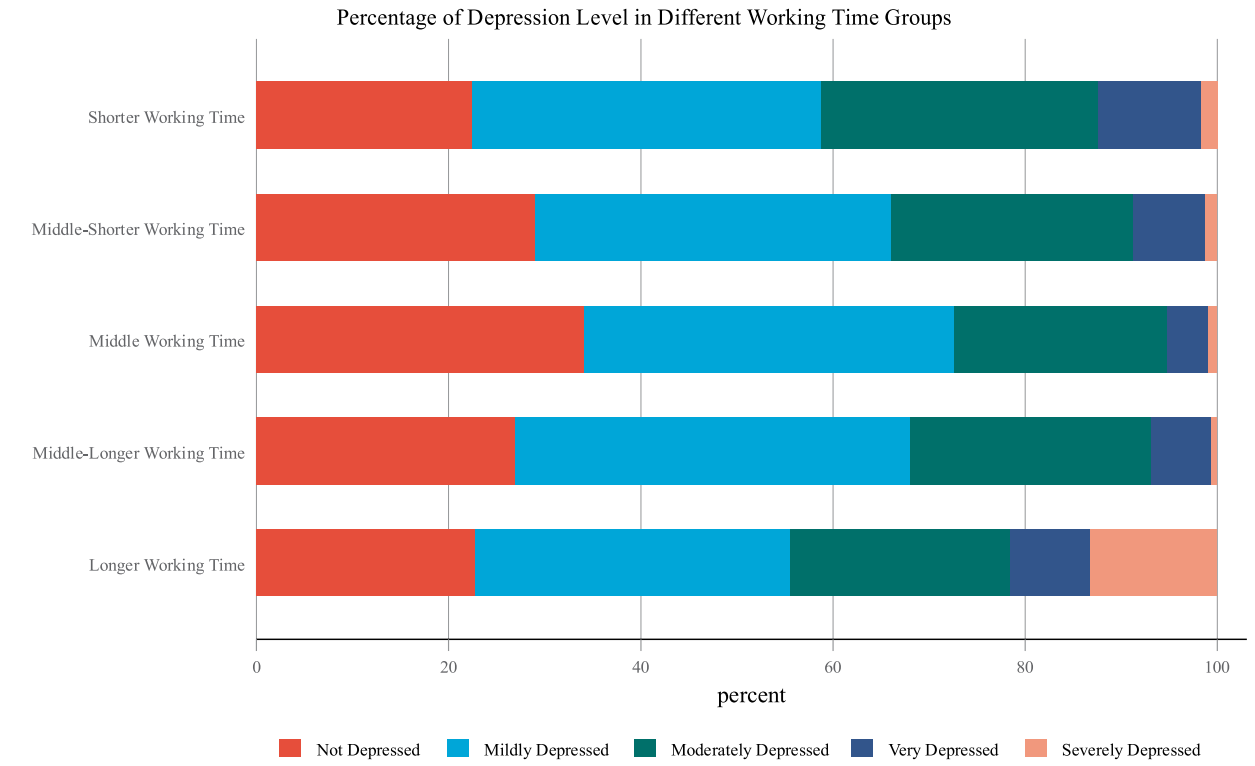

FIGURE 1
Relationship between working time and depression.

the level of depression. Specifically, respondents answer whether their current mental health status is not depressed, mildly depressed, moderately depressed, very depressed or severely depressed. This indicator is one of the most commonly used indexes to measure depression in the existing literature (41–44). The explanatory variable is the number of hours worked per week. We preliminarily analyze the relationship between depression and working time, by averagely dividing the sample according to the quantiles of working hours into five subsamples, including groups of shorter working time, middle-shorter working time, middle working time, middle-longer working time and longer working time. Figure 1 illustrates that the percentage of people who are not depressed and a little depressed in the middle working time group is significantly higher than that in other groups, while in this group very depressed and extremely depressed respondents account for the lowest percentage. The share of the very depressed and extremely depressed increases notably both at the upper and lower sides of the middle working time group. This pattern suggests that the middle working hours group experiences the lowest levels of depression and the relationship between working time and perceived mental disorders tends to be nonlinear.

Referring to the literature concerning depression (45–56), in order to avoid the omitted variables bias, we fully control factors affecting depression in the following five aspects. (1) Basic demographic characteristics include age, the quadratic term of age, gender, education level, health status and whether the respondent is a migrant. (2) Social characteristics include whether the respondent's Hukou is in urban,[1] and whether she/he belongs to ethnic minorities, is a religious believer and Communist Party of China (CPC) member. (3) Working characteristics include the logarithm of income, the respondent's overall socio-economic status and whether she/he has pension and medical insurance. (4) Family characteristics include whether the respondent is married, her/his number of children and number of houses. (5) Regional and year dummies. The descriptive statistics of above variables are shown in Supplementary Table S1.

2.3 Methods

It is almost impossible to conduct randomized controlled trials on working hours and to explore how the variations of working time affect depression. Therefore, it is very difficult to investigate the causal relationship between the two factors using observational data. The biggest challenge here is the reverse causality, where mental disorders also affect working hours (30, 31). To deal with this problem, we use the exogenous impact of automation on working time as the instrumental variable to examine the causal effect of working time on depression. In addition, to analyze the nonlinear relationship between

1 Hukou is a system of household registration used in mainland China, mainly identifying a person as a rural or urban resident.

the two factors, we include both working time and its quadratic term into regressions. Specifically, the following Two Stage Least Square (2SLS) statistical model is constructed.

$$Working_time_i = \alpha_0 + \alpha_1 Automation_i + \alpha_2 Automation_squared_i + \boldsymbol{x_i'\psi^1} + \lambda_t + \theta_p + \varepsilon_i$$

$$Working_time_squared_i = \beta_0 + \beta_1 Automation_i + \beta_2 Automation_squared_i + \boldsymbol{x_i'\psi^2} + \lambda_t + \theta_p + \epsilon_i$$

$$Depression_i = \gamma_0 + \gamma_1 \widehat{Working_time_i} + \gamma_2 \widehat{Working_time_squared_i} + \boldsymbol{x_i'\psi^3} + \lambda_t + \theta_p + \mu_i$$

In the model, $Working_time$ and $Working_time_squared$ represent working hour per week and its squared term, respectively. $Automation$ is an indicator of the extent to which the work performed by the respondent is affected by automation. $Automation_squared$ is the square of $Automation$. $Depression$ represents the degree of depression. x_i' is a vector of control variables introduced above. λ_t and θ_p are time and province fixed effects. We use the first two equations to perform first-stage estimations of working time and its square and obtain their fitted values. In the second stage, the third equation is regressed using estimates of working hours and its square to examine the nonlinear effect of working time on perceived mental disorders.

In this 2SLS model, the instrumental variables are Automation and its quadratic term. The automation index is constructed by Autor and Dorn (57), which is the most commonly used indicator to measure the degree of automation's impact on working time (58). Studies have confirmed that the larger the extent to which work is replaced by automation, the less working time is required (59). Therefore, this instrumental variable satisfies the correlation prerequisite. At the same time, owing to the following reasons, it also meets the exogeneity condition. First, the replacement of jobs by automation is caused by exogenous technological progress, independent of individual-level characteristics of workers. Second, the Automation index is measured utilizing the task traits of different occupations in the Dictionary of Occupational Titles by the United States Department of Labor in 1977 (57). Because the individual status of a current worker could not affect the characteristics of the occupation in 1977, this instrumental variable well satisfies the exogeneity requirement, especially in terms of avoiding reverse causality. In Table 1, we show the relevant statistical test results for the instrumental variables. Therefore, based on the above 2SLS model, we can use the exogenous changes brought about by automation to scientifically examine how working hours affect perceived mental disorders on the basis of tackling endogeneity.

The range of this indicator is from −6.190 to 4.235. According to this index, the *Automation* indicators of sales and service occupations, mining, construction, manufacturing, transportation workers, personal and protective service workers are equal to or close to 4.235. This means that people performing these occupations are more likely to be replaced by automation, thus their income is more negatively impacted by exogenous artificial intelligence technological progress. Conversely, the values for corporate managers, physical, mathematical, and engineering professionals, life sciences and health professionals, and others are equal to or close to the minimum of −6.190. This suggests that these occupations are complementary to automation applications, resulting in a positive impact on their income from automation technology. A detailed description of the index is provided in the Supplementary material.

3 Results

3.1 Benchmark results

Estimation results are shown in Table 1. Column (1) is the regression result without controlling any variables. It is shown that the estimates of both working time and its squared term are statistically significant. The estimated coefficient of working hours is significantly negative, while that of its square is positive. This means that working time's effect on depression is nonlinear. In the regressions from columns (2) to (6), we gradually add controls of the demographic characteristics, social characteristics, working characteristics, family background and regional and time dummies. With the inclusion of different types of controls, estimated coefficients of $Working_time$ and $Working_time_squared$ are all statistically significant at the 1% level. This means that the nonlinear relationship between working time and depression is very robust.

As shown in column (6), the estimates of working time and its squared term are −0.0736 and 0.0008. This means that when working hours are lower than 48.688 h per week (=0.0735557/(0.0007554*2)), depression reduces as working time increases. This is mainly due to the fact that when working time is low, income rises with longer working hours, which is conducive to reducing perceived mental disorders. Existing literature provides indirect explanations concerning why working longer during the lower working time interval could help reduce perceived mental disorders. A study from the United Kingdom found that for unemployed or economically inactive individuals, increasing their working time can improve their social participation and mental health (60). However, after working hours exceed the turning point of 48.688 h per week, depression increases with working longer. This turning point is almost in line with the International Labor Organization (ILO) standard of working no more than 48 h per week (61). Therefore, this research justifies the standard from a mental health perspective. Figure 2 intuitively illustrates that as working time increases, its effect on depression is firstly negative and then positive, meaning a U-shaped effect of working time on depression. In CGSS, 23.090% of the respondents work more than 48.688 h per week. This means that from the perspective of mental health, almost 1 in 4 people suffer from rising depression caused by overwork.

In addition, we further examine whether the relationship between working hours and depression is a U-shaped relationship or a more complex association with more turning points. We include working time and its quadratic and cubic terms into the instrumental variable model. Regression results are shown in column (7) of Table 1. It is demonstrated that all of the three variables are not significant. This means that the multicollinearity among them causes overfitting. Therefore, the cubic term of working time should not be included in the regression. This confirms that the relationship between working

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TABLE 1 Empirical results.

Model	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(6) 2SLS	(7) 2SLS
Variable	Depression	Depression	Depression	Depression	Depression	Depression	Depression
Working_time	−0.0648*** (0.0240)	−0.0631*** (0.0185)	−0.0652*** (0.0192)	−0.0843*** (0.0222)	−0.0852*** (0.0221)	−0.0736*** (0.0235)	−0.0498 (0.1581)
Working_time_squared	0.0007** (0.0003)	0.0007*** (0.0002)	0.0007*** (0.0002)	0.0009*** (0.0002)	0.0009*** (0.0002)	0.0008*** (0.0002)	0.0001 (0.0043)
Working_time_cubed							0.0000 (0.0000)
Age		0.0002 (0.0071)	0.0014 (0.0069)	0.0025 (0.0069)	0.0129* (0.0071)	0.0133* (0.0069)	0.0135** (0.0067)
Age_squared		−0.0001 (0.0001)	−0.0001 (0.0001)	−0.0001 (0.0001)	−0.0002** (0.0001)	−0.0002** (0.0001)	−0.0002** (0.0001)
Whether female		0.0557* (0.0299)	0.0491 (0.0310)	0.0686** (0.0304)	0.0757** (0.0301)	0.0800*** (0.0303)	0.0728 (0.0462)
Education level		0.0102 (0.0101)	0.0144* (0.0083)	0.0166** (0.0071)	0.0175** (0.0070)	0.0173*** (0.0066)	0.0147 (0.0166)
Health status		−0.3019*** (0.0147)	−0.2999*** (0.0147)	−0.2840*** (0.0150)	−0.2813*** (0.0149)	−0.2789*** (0.0151)	−0.2792*** (0.0154)
Whether migrants		0.0112 (0.0313)	0.0137 (0.0329)	0.0226 (0.0330)	0.0091 (0.0327)	0.0608* (0.0330)	0.0659 (0.0411)
Whether Hukou in urban			0.0004 (0.0348)	0.0026 (0.0318)	0.0009 (0.0311)	0.0307 (0.0300)	0.0258 (0.0423)
Whether ethnic minorities			−0.0554 (0.0400)	−0.0846* (0.0436)	−0.0876** (0.0434)	−0.1802*** (0.0483)	−0.1746*** (0.0616)
Whether religious believer			0.0486 (0.0322)	0.0487 (0.0351)	0.0441 (0.0355)	0.0463 (0.0355)	0.0423 (0.0427)
Whether CPC member			−0.0843*** (0.0312)	−0.0770** (0.0332)	−0.0649* (0.0336)	−0.0697** (0.0327)	−0.0771 (0.0564)
ln_Income				0.0359** (0.0150)	0.0362** (0.0147)	0.0339** (0.0152)	0.0311 (0.0259)
Socio-economic status				−0.1568*** (0.0213)	−0.1504*** (0.0215)	−0.1490*** (0.0207)	−0.1508*** (0.0224)
Whether having pension				−0.0137 (0.0261)	−0.0096 (0.0264)	−0.0180 (0.0257)	−0.0241 (0.0443)
Whether having medical insurance				0.0465 (0.0450)	0.0646 (0.0454)	0.0529 (0.0435)	0.0540 (0.0437)
Whether married					−0.1445*** (0.0302)	−0.1340*** (0.0289)	−0.1309*** (0.0336)
Family size					−0.0020 (0.0073)	−0.0070 (0.0073)	−0.0062 (0.0092)
Number of children					0.0126 (0.0121)	0.0053 (0.0112)	0.0061 (0.0119)
Number of houses					−0.0131 (0.0153)	−0.0055 (0.0155)	−0.0050 (0.0161)
Year dummy	No	No	No	No	No	Yes	Yes

(Continued)

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TABLE 1 (Continued)

Model	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(6) 2SLS	(7) 2SLS
Variable	Depression	Depression	Depression	Depression	Depression	Depression	Depression
Province dummies	No	No	No	No	No	Yes	Yes
Constant	3.3446*** (0.3634)	4.4161*** (0.2256)	4.4133*** (0.2555)	4.4720*** (0.2637)	4.3104*** (0.2743)	3.8939*** (0.3215)	3.7731*** (0.8921)
Observations	12,452	12,408	12,377	11,738	11,655	11,655	11,655

***, **, and * indicate significance at the levels of 1, 5, and 10%, respectively. The values in parentheses are standard errors robust to heteroskedasticity. Yes means the corresponding variables are controlled in the regression, while *N* means not controlled. The same for other tables in this paper and the Supplementary material.

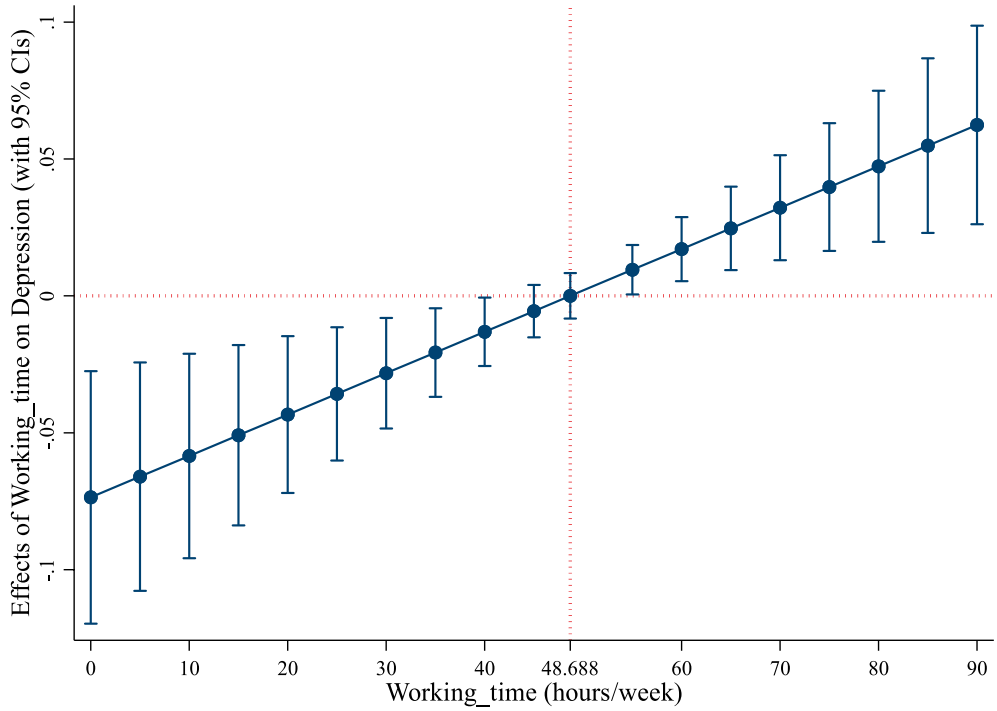

FIGURE 2
U-shaped effect of working time on depression.

hours and perceived mental disorders is not cubic or nonlinear with more turning points.

3.2 Heterogeneities

This paper further investigates the heterogeneities of working time's U-shaped effects on depression from multiple perspectives, illustrated in Figure 3. Here, we mainly focus on the turning points and the disparities in perceived mental disorders among different groups. In terms of gender, it is shown that the turning points for men and women are very close. However, men suffer more perceived mental disorders from overwork than women. With regard to age, older workers' turning point is much smaller than that of young workers (44.966 < 53.353). Additionally, older workers experience higher levels of depression when faced with overwork. In respect of educational heterogeneity, it is found that the turning point is smaller for the higher educated group with a college degree or above, meaning that they are more sensitive to working hours and less willing to work longer. Nevertheless, when working time does not exceed the turning point, their depression level is lower, which may be attributed to their better working environment.

As to socioeconomic status, the higher status group experiences lower levels of depression when working longer than the optimal hours. Regarding regional differences, the U-shaped curve of rural residents is flatter and especially after the turning point, the upward trend is not prominent. This is related to the relatively lower living standards of residents in rural areas under China's urban–rural dual economic structure, in which rural workers are more willing to work more hours for higher income. In addition, findings suggest that migrants and healthier people have a greater turning point in the U-shaped relationship between working hours and depression. When the optimal working time is exceeded, perceived mental disorders are also lower among them, meaning that migrants and those with healthier status are more tolerant to overwork.

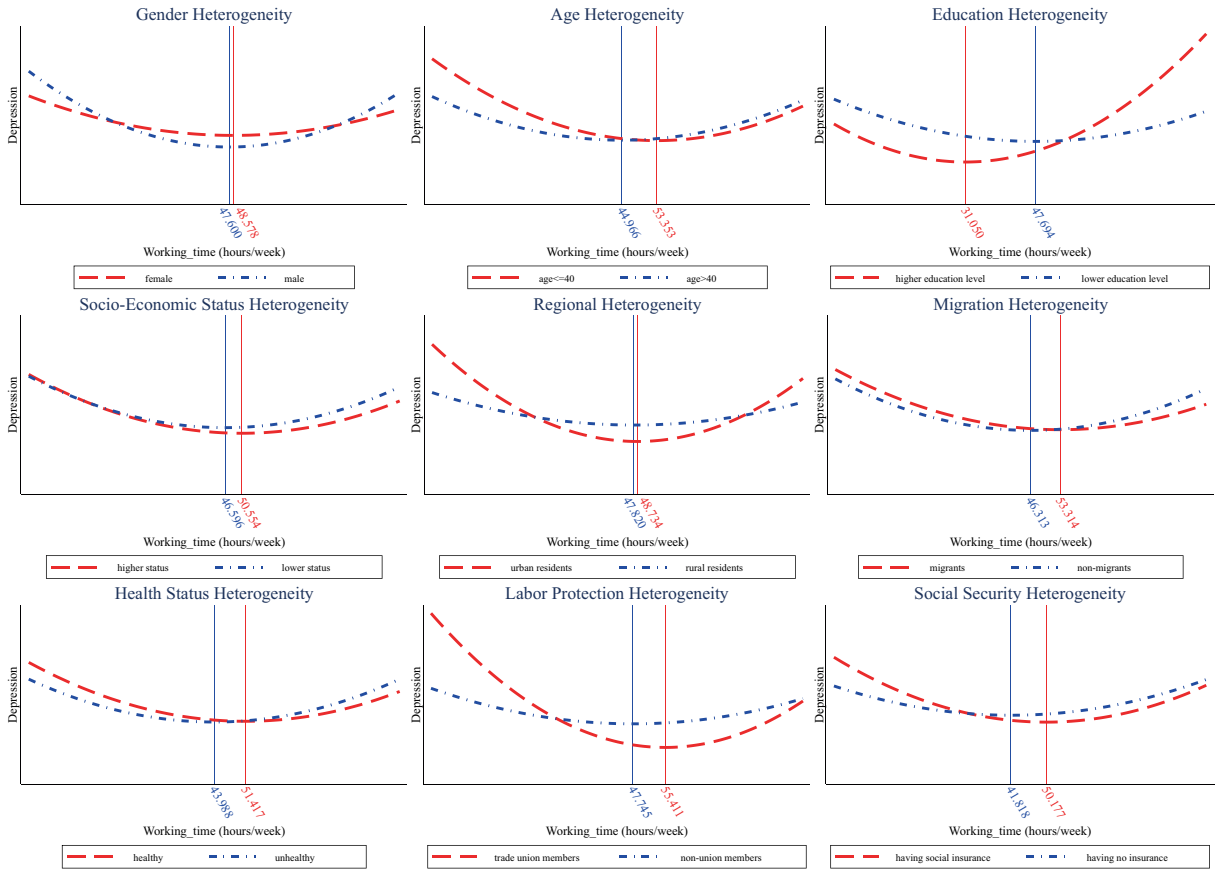

FIGURE 3
Heterogeneities in the U-shaped impact of working time on depression.

Furthermore, we also pay special attention to whether labor protection and social security can alleviate the adverse effects of overwork on depression. In terms of labor protection, we compare the difference between trade union members and nonunion members. It is found that union members have a larger turning point and they consistently experience lower depression than non-union members as working time increases. This suggests that labor protection from unions can help to mitigate the negative impact of overtime on mental health. Besides, we explore the heterogeneity in terms of social security and find similar results. Those with social insurance have a higher turning point and experience lower perceived mental disorders when working overtime, meaning that social security also helps to reduce its side effect on mental health.

3.3 Robustness checks

We conduct a series of robustness checks on the U-shaped relationship between working time and perceived mental disorders. First, the sample sizes are different from columns (1) to (6). This is because the number of observations for different control variables differs slightly. As more control variables are included in the regressions, the sample size decreases to some extent. Naturally, we are concerned about whether this affects the results of this paper. Therefore, we conduct a robustness test, with the results presented in Supplementary Table S2. Second, another indicator measuring the impact of automation is used as the instrumental variable in the 2SLS model. Details of this IV are explained in Supplementary Table S3, in which the statistical results are almost identical with the benchmark regressions, lending further credence to the robustness of the conclusion. Third, "whether feeling depressed" is regressed as the explained variable using the IV-Probit model. Results of Supplementary Table S4 show that both working time and its quadratic term have significant effects on this dependent variable, further confirming the U-shaped relationship between working hours and perceived mental disorders.

Fourth, we perform regressions using other types of instrumental variables models, including limited information maximum likelihood estimation (LIML), generalized method of moments (GMM) and efficient two-step GMM and iterative GMM. Supplementary Table S5 demonstrates that regardless of which instrumental variable estimation method is used, results are almost the same with benchmark estimations. Fifth, considering that the nonlinear relationship between working time and depression has not been paid attention to in the literature, we specifically examine whether the square of working time is an important factor for predicting depression. In this regard, we use machine learning methods such as Lasso, Ridge, and Elastic Net models to perform penalized regression. Supplementary Table S6 demonstrates that *working_time_squared* is one of the key predictors of perceived mental disorders in all these models. This further confirms the robustness of nonlinear relationship between working time and depression. Sixth, a placebo test of working hours is performed to check

the endogeneity after using the IV method. As illustrated and explained in Supplementary Figure S1, the U-shaped relationship between working hours and depression is not caused by other omitted factors.

4 Conclusion

Using a large-scale nationally representative survey in China, this paper examines the nonlinear impact of working hours on perceived mental disorders. Applying the exogenous impact of automation on working time as the instrumental variable, we investigate the causal relationship between working time and perceived mental disorders on the basis of dealing with endogeneity. It is found that the effect of working time on depression is U-shaped, rather than linear. When working less than 48.688 h per week, depression reduces as working hours increase. This may be because within this range, increased working hours could enhance an individual's sense of self-worth, maintain moderate social interactions, and usually lead to higher income (6). These factors contribute to improved mental health. However, after exceeding this threshold, the mental health costs outweigh the benefits aforementioned, resulting in a positive correlation between working hours and depression. Long working hours result in chronic fatigue and sleep deprivation, increase psychological stress, and weaken social support systems, thereby having a significant negative impact on physical and mental health (12, 14). These findings justify the ILO's working time standard of not working more than 48 h per week. This underscores the importance of reasonably arranging work hours to ensure workers' health and safety, avoiding both excessively long and short working hours. The nonlinear causal relationship is a contribution to the existing literature in which the linear correlation between working time and depression is assumed (62–66). Based on this, we further find that there are no more complex nonlinear relationships with more turning points between working hours and mental health. Moreover, various robustness tests are carried out, all of which support the above conclusions.

Heterogeneity analysis shows that when working hours exceed the turning point, men's depression level is higher. Older workers have a lower tolerance for overtime working stress. The turning point of the higher educated group is smaller and they are less willing to work longer. Those with higher socioeconomic status experience lower levels of depression after exceeding optimal working hours. The increasing levels of depression among rural residents are not pronounced, meaning that they are more willing to work more to raise income. After exceeding the turning point, perceived mental disorders are lower among migrants and those with better health conditions. In addition, it is also discovered that labor protection and social security can help to reduce mental disorders caused by overwork. Analytical results in this paper imply that the optimal working hours should be considered from a mental health perspective and different turning points of the U-shaped relationship among different groups should be noted. In addition, heterogeneities imply that some disadvantaged subgroups suffer from more perceived mental disorders due to excessive working and therefore need to be given more attention.

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 the Institutional Review Board, Renmin University of China. The participants provided their written informed consent to participate in the survey.

Author contributions

XN: Conceptualization, Formal analysis, Methodology, Software, Writing – original draft, Writing – review & editing. CL: Conceptualization, Data curation, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. YX: Formal analysis, Investigation, Software, Visualization, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This work was supported by National Natural Science Foundation of China [grant number 62203272], Guangdong Basic and Applied Basic Research Foundation [grant number 2024A1515012814], Natural Science Foundation of Shandong Province, China [grant number ZR2022QF034], National Social Science Fund of China [grant number 23CJL007], Humanities and Social Science Research Fund of Universities of Shandong Province, China [grant number 2024ZSMS018], the fourth Yan Kechengsizheng for Modernization project of Shandong University, and Centre for Quality of Life and Public Policy Research, Shandong University.

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

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2024.1402428/full#supplementary-material

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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 16 August 2024
DOI 10.3389/fpubh.2024.1433215

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OPEN ACCESS

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RECEIVED 15 May 2024
ACCEPTED 07 August 2024
PUBLISHED 16 August 2024

CITATION
Cheng S and Wang Y (2024) The impact of perceived environmental competitiveness on employee mental health: a moderated mediation model of job crafting and work–family conflict.
Front. Public Health 12:1433215.
doi: 10.3389/fpubh.2024.1433215

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The impact of perceived environmental competitiveness on employee mental health: a moderated mediation model of job crafting and work–family conflict

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Drawing from the conservation of resources theory, this study proposes that individuals who perceive environmental competitiveness may improve their mental health through their job crafting behaviors at work. Data were collected from 450 full-time Chinese employees using a three-wave time-lagged approach. The results showed that perceived environmental competitiveness is positively correlated with job crafting, and job crafting has a positive relationship with mental health. Moreover, the results indicated that job crafting mediates the relationship between perceived environmental competitiveness and mental health. Additionally, the present study found that work–family conflict plays a moderating role in the relationships among environmental competitiveness, job crafting and mental health. A moderated mediation model was proposed in this study. Finally, theoretical and practical implications of this study are also discussed.

KEYWORDS

perceived environmental competitiveness, job crafting, mental health, work–family conflict, moderated mediation model

1 Introduction

In recent years, occupational health and safety has garnered increasing attention from researchers (1, 2). It has been argued that organizations should not only care about employees' physical health and safety in the workplace but should also place equal importance on protecting and enhancing their psychological well-being at work and mental health beyond the workplace (3–6).

In the workplace, a competitive work environment is frequently regarded as a source of stress, which can not only have impacts on employees' work behaviors, outcomes in the workplace, but also can have effects on employees' mental health beyond the workplace. Previous studies have indicated that employees who perceive a competitive environment in the workplace may experiencing negative effects such as increased knowledge hiding behaviors (7), lower job satisfaction, and higher job stress (8). These influences can also extend beyond the workplace, continuing to influence employee mental health through spillover effects (9). However, a competitive work environment can also produce some positive outcomes. Previous study indicated that employees who perceive a competitive environment in the workplace may

lead to employees exhibit more proactive work behaviors, which in turn, increase employees' organizational commitment and organizational performance (10). Based on these arguments, the present study posits environmental competitiveness has a double-edged effect, understanding how to convert environmental competitiveness into motivation for employees thereby creating positive effects on employees, is a worth area of exploration. In other words, this research aims to addresses the gap in existing literature by using conservation of resources (COR) theory (11) to identifying the mechanisms through which employees' perception of environmental competitiveness can have positively impacts on employees' mental health.

Base on the resources acquisition perspective of COR theory, the present study hypothesizes that, in a resource-constrained society, competition is the swiftest and most effective way for individuals to acquire, master, and utilize diverse resources in their work, meeting their needs to achieve their goals (12). Therefore, when employees perceive environmental competitiveness in the work domain, they may realize there are additional opportunities and resources can be obtained through interpersonal competition, including promotion prospects, training resources, and project assignments. Being aware of these additional opportunities and resources may positively impact employees' motivation, driving them to seek further resources, challenges, and reduce job demands. These behaviors were called job crafting (13). Following this, when employees achieve success in crafting their jobs, the sense of accomplishment also improves their mental health in non-work domains through a spillover effect (5, 14). Specifically, the present study also hypothesizes that job crafting may mediate the relationship between perceived environmental competitiveness and mental health.

Furthermore, the present study proposes that resources in employees' non-work domains may also influence their work domain through a spillover effect. Therefore, this study examines the boundary conditions of the relationships among perceived environmental competitiveness, job crafting, and mental health within the context of work–family dynamics, specifically focusing on moderating role of work–family conflict. We expect that such a moderated mediation model can effectively explain the spillover mechanisms among employees' perception, work behaviors, and mental health in their work and non-work domains.

Finally, we also hope to identify effective interventions to leverage the positive impact of environmental competitiveness and mitigate its negative effects. Figure 1 shows the conceptual model of the present study.

2 Theory and hypotheses

2.1 Relationship between perceived environmental competitiveness and job crafting

Perceived environmental competitiveness refers to the degree to which individuals perceive the intensity and tension of competition in their current environment (15, 16). From the COR theory perspective, Hobfoll (11) suggested that individuals strive to obtain, retain, foster and protect the resources that they value the most. However, environmental competitiveness in the workplace can be interpreted as two separate social cues through social information processing (17): (1) limited resources in organization are distributed based on personal efforts and achievement; and (2) personal resources can be contested by others. These social cues motivate individuals to seek additional resources and avoid the threat of personal resource loss. Therefore, when individuals perceive competitiveness in their current environment, it suggests that the present resources of their organizations are limited and unevenly distributed. In such a scenario, individuals would proactively seek additional resources and try to protect their existing resources through their personal extra efforts or achievement that surpass others (12, 18). Previous studies have identified that both striving for additional resource gains and preventing resource from loss may motivate individuals to exhibit more positive attitudes and behaviors at work (19–22). Building on these previous findings, this study suggests that perceived environmental competitiveness within an organization does not impose burdens on individuals but can act as a driving force, motivating individuals to work harder, such as job crafting.

Job crafting refers to employees proactively modify the boundaries and conditions of job-related tasks and relationships to improve the meaning, engagement, and satisfaction they receive from their work domain (13, 20, 23). Based on COR theory, the perception of environmental competitiveness implies resources limitation within organization, and this motivates employees to proactively strive for resources they value. Therefore, they would maximize resource utilization through effective self-management and optimization (24–26). Specifically, employees may streamline or optimize their work processes to reduce demands (27), seek valuable suggestions to enhance efficiency (28), participate in training programs to improve competency (29), and embrace more challenges to achieve a sense of accomplishment (30). These proactive behaviors align with the concept of job crafting.

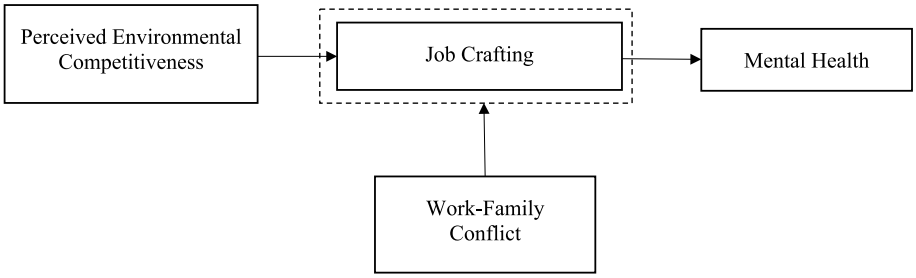

FIGURE 1
The proposed conceptual scheme.

Moreover, the perception of environmental competitiveness also implies the potential threat of losing existing resources. According to COR theory, when employees perceive threats to their existing resources, they are likely to adapt their working strategies to meet the demands of the changing work conditions (26, 31, 32). These adaptations may include employees proactively adjusting and redesigning their job tasks, responsibilities, and relationships to enhance their performance. For example, employees may actively improve their skills and capabilities to meet job demands and challenges effectively (33), enhance collaboration with team members to improve overall team performance (34), and expand their professional social networks to increase their social capitals (35). These behaviors also consistent with the concept of job crafting. Thus, we propose that perceived environmental competitiveness increases job crafting. The hypothesis is as follow:

> *H1:* Perceived environmental competitiveness is positively correlated with job crafting.

2.2 Relationship between job crafting and mental health

Mental health refers to the state of psychological well-being in which an individual can cope with the normal stresses of life (36). It is a psychological state characterized by individual resilience, self-esteem, and the capacity to enjoy life (37). Beyond uncontrollable factors like biological elements and family history, the most significant influence on mental health is life experiences (38). Therefore, we propose that employees' mental health is affected by job crafting in workplace through spillover effects.

Spillover refers to a cross-domain transmission of resources from one area of an individual's life to another (14). In this context, the present study posits that, through the spillover effect, employees leverage the resources acquired via job crafting to enhance their mental health. First, seeking resource of job crafting provides individual with additional personal resources, such energy, time and skills. Seeking resources is when an employee proactively seeks advice from colleagues and supervisors, actively acquires new skills or knowledge, and purposefully asks for help when facing difficulties (20, 23). These behaviors not only help individuals save time and energy at work but also enhance their positive psychological states or emotions by solving difficulties (13, 39, 40). Therefore, by increasing their efficiency and enhancing their positive affects at work, through the spillover effect, this also improves their mental health in non-work domains (41). Additionally, job crafting motivates employees to learn new skills and knowledge in the workplace, these acquired skills and knowledge also can help people to conquer life challenges not linked to their jobs, further enhancing their role acting in other non-work domain via spillover effect (14). Second, seeking challenges through job crafting can induce a sense of accomplishment. Seeking challenges refers to individuals proactively asking for more difficult tasks and increased responsibilities; the sense of accomplishment is produced through their successful completion (20, 23, 42, 43). This positive feeling further nurtures their mental health through the spillover effect (5). Finally, reducing demands through job crafting alleviates some of the mental and physical stress experienced at work. Reducing demands involves employees simplifying tasks to alleviate emotional, mental, and physical tensions (20, 23). By reducing demands, employees do not need to draw on additional resources from other domains to cope with work stress (44, 45). Moreover, the personal resources saved by reducing demands of job crafting, may also improve their mental health in non-work domains through the spillover effect. In this context, we present the following hypothesis:

> *H2:* Job crafting is positively correlated with mental health.

2.3 The mediating role of job crafting

This study further posits that job crafting plays a mediator role between perceived environmental competitiveness and mental health. According to COR theory, when individuals perceive environmental competitiveness, they interpret the phenomenon through social information processing as two distinct social cues (additional resource obtaining and existing resources protecting) (11). However, both types of social cues can motivate individuals to engage in job crafting. Following this, as individuals succeed in job crafting, the extra personal resources and positive affects produced further enhances their mental health through the spillover effect. Hence, we also hypothesize:

> *H3:* Job crafting mediates the relationship between perceived environmental competitiveness and mental health.

2.4 The moderating role of work–family conflict

The positive effect of perceived environmental competitiveness on job crafting can be increased by clearly identifying boundary conditions. Drawing on COR theory (11) and the spillover effect (41), the present study further suggests that work–family conflict is a potential moderating factor and impacts the relationship between perceived environmental competitiveness and job crafting.

Work–family conflict arises when an individual faces increased challenges in their family role due to concurrent engagement in the work role (46). This challenge is characterized by time-, strain-, and behavior-based conflicts (47–49). However, to resolve work–family conflict requires individual to spend additional personal resources on family domain (50, 51). Based on these foundations, this study posits that the interaction between work–family conflict and perceived environmental competitiveness has a moderating effect on job crafting from a resource perspective. Specifically, individuals with low work–family conflict have more personal resources with which to face environmental competitiveness and therefore exhibit more job crafting behaviors than those with high work–family conflict.

First, individuals with low work–family conflict have fewer time-based conflicts (50). Having more time-based resources provides them with greater time-based flexibility, and their time-based resources can be transferred to their work domain (9). Therefore, individuals with low work–family conflict have more time-based resources to engage in job crafting when facing the environmental competitiveness. In contrast, individuals with high work–family conflict have more time-based conflicts (46), leaving them with limited spare time-based

resources to transfer to the work domain (51). Hence, when confronted with environmental competitiveness, they are less likely to demonstrate additional job crafting behaviors.

Second, individuals with low work–family conflict have fewer strain-based conflicts, and have more positive resources, such as spousal support (46). The positive effects can spillover into individuals' work domain and generate positive emotions in their work (41). Therefore, individuals with higher emotional resources exhibit higher job crafting motivation. In contrast, individuals with high work–family conflict have more strain-based conflicts (50), meaning that they have fewer positive emotional resources (46). Therefore, the limited emotional resources can spillover into their work domain, consequently would not enhance their motivation for job crafting.

Finally, individuals with low work–family conflict may also have low behavior-based conflicts, so in their family relationships they can easily express warmth, emotional connection, and vulnerability (46). In other words, such individuals need fewer personal resources to fake their true psychological states and emotions (9). Therefore, because they have many personal resources that can be transferred to their work domain to exhibit many job crafting behaviors when in times of perceived environmental competitiveness. Conversely, individuals with high work–family conflict may have high behavior-based conflict, so they need a lot of personal resources to interact well with family members (46). In this situation, such individuals lack the flexibility of superfluous personal resources to bring into their work domain. Thus, individuals with high behavior-based conflict may present additional job crafting behaviors when facing environmental competitiveness.

Based on the above discussion, we present the following hypothesis:

> *H4:* Work–family conflict moderates the positive relationship between perceived environmental competitiveness and job crafting, such that the effect of perceived environmental competitiveness on job crafting is stronger when work–family conflict is low.

This study also posits that work–family conflict moderates the mediation relationship between perceived environmental competitiveness and mental health through job crafting. Specifically, individuals with low work–family conflict have more personal resources to transfer to their work domain through the spillover effect, leading to additional job crafting behaviors. This, in turn, ultimately enhances their mental health. In contrast, individuals with high work–family conflict have few additional personal resources to transfer to their work domain. Therefore, they would not present additional job crafting behaviors, and their mental health is also not improved via the spillover effect. Therefore, the present study hypothesizes:

> *H5:* Work–family conflict moderates the mediated effect of job crafting on the relationship between perceived environmental competitiveness and mental health, such that the mediated effect is stronger when work–family conflict is low.

3 Methods

To prevent common method biases (52) and to ensure the external validity of the present study, data was collected in three waves from a variety of organizations in China. The study also invited four bilingual scholars with backgrounds in psychology and management to monitor the back-translation process, based on Brislin (53). This approach was employed to reduce potential biases that could arise during the translation of the original English scales into Chinese. All scales used a six-point Likert-type scale, ranging from 1 (strongly disagree) to 6 (strongly agree).

3.1 Participants and procedures

In this study, we employed a convenience sampling method. We contacted human resources departments of organizations that had established collaborations with the researchers to distribute the questionnaires. The human resources departments confirmed that selected participants did not have a history of mental illness. In these samples, participants were from various industries (such as high-technology, manufacturing, education, healthcare, finance, retails, and information technology), different geographic locations in China, and different organizations sizes. Therefore, these diversities ensure the randomness and representativeness of the sample.

Moreover, to enhance questionnaire response rates among participants, we established a lottery mechanism. Participants who successfully completed all three waves of the questionnaire had the opportunity to win a $100 USD supermarket gift voucher. The lottery mechanism can increase response rates because it appeals to participants' interest in potentially winning a prize, which encourages more individuals to engage with the survey. Additionally, the mechanism may attract participants who might not otherwise have participated, thereby increasing the sample size and improving the statistical validity of the study. Additionally, the last six digits of participants' phone numbers were used as unique identification codes for each wave of online anonymous questionnaires. In Wave 1, we distributed nearly 900 questionnaires and collected 724 valid responses, giving a response rate of 80.44%. After 1 month, in Wave 2, we sent questionnaires to those participants who had completed the Wave 1 questionnaires, and received 573 valid responses. The response rate of wave two was 79.14% Finally, 1 month after Wave 2, we distributed the Wave 3 questionnaires to participants who had successfully completed both the questionnaires in Wave 1 and 2. In Wave 3, 450 valid responses were collected and the response rate was 78.53%.

The demographics of the participants were as follows: 172 were males (38.22%), 278 were females (61.78%); the majority were 31–40 years old (295, 65.56%), 106 were 18–30 years old (23.56%), and rest were over 41 years old (49, 10.88%); 267 had a bachelor's degree (59.33%), and 131 had postgraduate qualifications (29.11%); 200 were general staff (44.44%), 106 were junior management (23.56%), 97 were mid-level management (21.56%), and 47 were senior management (10.44%); 222 had 11–20 years of tenure (49.33%), 131 had 5–10 years of tenure (29.11%), 66 had 0–5 years of tenure (14.67%), and 31 had over 20 years of tenure (6.89%).

3.2 Measures

3.2.1 Perceived environmental competitiveness (wave 1)

Perceived environmental competitiveness was measured in Wave 1 with a four-item scale developed by Jansen et al. (18). A sample item

is "Competition in our organization is intense." The Cronbach's α of perceived environmental competitiveness measurement in this study is 0.90.

3.2.2 Job crafting (wave 2)

Job crafting was captured using a 13-item scale developed by Petrou et al. (20). A sample item of job crafting scale is "When I have difficulties or problems at my work, I discuss them with people from my work environment." The Cronbach's α of job crafting scale in this study is.86.

3.2.3 Mental health (wave 3)

The 12-item General Health Questionnaire (GHQ-12) developed by Goldberg and Williams (36) was employed to measure individual's mental health in Wave 3. In this measure, high scores indicate positive mental health. A sample item is "I am able to concentrate on what I am doing." The Cronbach's α of GHQ-12 in this study is 0.88.

3.2.4 Work–family conflict (wave 3)

Work–family conflict was also collected in Wave 3 by 5-item developed by Gutek et al. (54), a sample item of work–family conflict scale is "My family dislike how often I am preoccupied with my work while I am at home." The Cronbach's α of work–family scale in this study is 0.83.

3.2.5 Control variables (wave 1)

The present study collected demographic variables including gender, age, educational level, job position, and job tenure in Wave 1. These variables were chosen as common control variables because they can significantly impact individual perceptions, behaviors, and outcomes in the workplace.

4 Results

Table 1 demonstrates the means, standard deviations (SD), bivariate correlations, and Cronbach's α values of all assessed variables. In Table 1, the correlations shown indicate that perceived environmental competitiveness is positively associated with job crafting ($r = 0.26$, $p < 0.001$). There is also a positive correlation between job crafting and mental health ($r = 0.20$, $p < 0.001$). Therefore, Hypotheses 1 and 2 are supported based on the calculated correlation coefficients.

4.1 Model analyses

The model comparison results are presented in Table 2. Confirmatory factor analysis with parceling rules (55) was employed to test the model fit of our hypothesized model with collected data using AMOS 21 software. The overall results of the confirmatory factor analysis shown in Table 2 indicate that the four-factor hypothetical model demonstrated the best goodness-of-fit with the data [x^2 (59) = 225.84; comparative fit index (CFI) = 0.94; Incremental Fit Index (IFI) = 0.94; Tucker–Lewis index (TLI) = 0.93; root mean square error of approximation (RMSEA) = 0.08]. The present study also tested four other alternative-factors models. The models' goodness-of-fit statistical results (as shown in Table 2) indicate that the hypothetical model with four factors had the best model fit for data.

4.2 Hypothesis testing

To test the direct effects of Hypothesis 1 and Hypothesis 2, we employed the PROCESS macro for SPSS, developed by Hayes (56). The PROCESS macro is an analysis software includes hundreds of model syntaxes, allowing researchers to test complex relationships among variables. Hypothesis 1 states that there is a positive correlation between perceived environmental competitiveness and job crafting. After controlling for the demographic variables, the results of direct effect using linear regression in the PROCESS macro indicated that perceived environmental competitiveness was found to have a significant positive relationship with job crafting ($\beta = 0.13$, SE = 0.03, $p < 0.001$). Hence, Hypothesis 1 is supported. Similarly, Hypothesis 2 states that job crafting is positively related to mental health. The results of direct effect using linear regression in the PROCESS macro reveal that there is a strong positive correlation between job crafting and mental health ($\beta = 0.45$, SE = 0.06, $p < 0.001$). Therefore, Hypothesis 2 is statistical supported.

We also examined the indirect effect of Hypothesis 3 using the existing mediation model syntax and the Sobel test (57) in the PROCESS macro (56). Hypothesis 3 posits that job crafting mediates the relationship between perceived environmental competitiveness and mental health. The results of the Sobel test show that job crafting plays a mediator role between perceived environmental competitiveness and mental health (indirect effect = 0.06, SE = 0.01, $t = 4.28$, $p < 0.001$). Moreover, we further test the mediating effect using 50,000 bootstrap samples with both structural equation modeling in the AMOS 21 and the existing mediation model syntax in the PROCESS macro. The results indicate that the 95% confidence intervals (95% CI) of the mediating effect is [0.03, 0.09]. Thus, Hypothesis 3 is supported. Figure 2 shows the direct, indirect, and mediated effect of Hypotheses 1, 2, and 3.

Hypothesis 4 states that the positive relationship between perceived environmental competitiveness and job crafting is moderated by work–family conflict. The existing simple moderation model syntax in the PROCESS macro was employed to test the simple moderating effect of Hypothesis 4. As Table 3 shows, the interaction effect of work–family conflict and perceived environmental competitiveness was significant [$\beta = -0.07$, SE = 0.02, 95% CI = (−0.12, −0.03)]. Further, we explored the moderating effect by categorizing work–family conflict into three levels to represent moderator at low (−1 SD), mean, and high (+1 SD) levels. As shown in Table 3, the moderating effects of work–family conflict only had statistical significance at low [$\beta = 0.21$, SE = 0.03, 95% CI = (0.14, 0.28)] and mean [$\beta = 0.13$, SE = 0.03, 95% CI = (0.08, 18)] levels. Figure 3 shows the moderating effect of work–family conflict on the relationship between perceived environmental competitiveness and job crafting. Hence, Hypothesis 4 is supported.

Hypothesis 5 further predicted work–family conflict moderates the mediation effect of job crafting on the relationship between perceived environmental competitiveness and mental health. The moderated mediation effect was also tested by using the existing simple moderated mediation model syntax in the PROCESS macro, and the results were presented in Table 3. The index of moderated

TABLE 1 Variables means, standard deviations, reliabilities, and correlations (N = 450).

Variables	Mean	SD	1	2	3	4	5	6	7	8	9
1. Gender†	1.62	0.49									
2. Age†	2.85	0.68	−0.08								
3. Education†	5.15	0.69	−0.05	0.00							
4. Position†	1.98	1.04	−0.18***	0.37***	0.14**						
5. Organizational tenure†	3.46	0.87	−0.03	0.74***	−0.00	0.45***					
6. Perceived environmental competitiveness	3.76	1.13	−0.08	0.06	−0.02	0.10*	0.13**	(0.90)			
7. Job crafting	4.44	0.62	−0.08	0.08	0.04	0.17***	0.15**	0.26***	(0.86)		
8. Mental health	4.44	0.76	−0.01	0.11*	0.05	0.17***	0.13**	0.03	0.37***	(0.88)	
9. Work–family conflict	3.28	1.04	−0.12*	0.00	0.03	−0.01	0.01	0.20***	0.06	−0.40***	(0.83)

Internal consistency (Cronbach's alpha, α) are presented in the diagonal.
Gender (1 = male, 2 = female); Age (1 = 18–25 years old, 2 = 26–30 years old, 3 = 31–40 years old, 4 = 41–50 years old, 5 = 50–60 years old, 6 = 60 years old above); Education (1 = primary school or below, 2 = high school, 3 = (vocational) senior high school, 4 = junior college; 5 = bachelor's degree, 6 = postgraduate or above); Position (1 = staff, 2 = junior manager, 3 = mid-level manager, 4 = senior manager); Organizational tenure (1 = 0–1 years, 2 = 1–5 years, 3 = 6–10 years, 4 = 11–20 years, 5 = 20 years above).
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

TABLE 2 Results of confirmatory factor analyses of the measures (N = 450).

Model	Factors	χ^2	df	$\triangle\chi^2$/df	CFI	IFI	TLI	RMSEA
Hypothetical Model	4 factors	225.84	59		0.94	0.94	0.93	0.08
Model 1	3 factors	414.24	62	62.80	0.88	0.88	0.85	0.11
Model 2	3 factors	486.48	62	86.88	0.86	0.86	0.82	0.12
Model 3	2 factors	1086.69	64	172.17	0.66	0.66	0.58	0.19
Model 4	1 factor	1745.57	65	253.29	0.43	0.44	0.32	0.24

Bootstrap sample size = 50,000.
Hypothetical Model (4 factors, perceived environmental competitiveness; job crafting; mental health; work–family conflict).
Model 1 (3 factors: perceived environmental competitiveness; job crafting and mental health merged; work–family conflict).
Model 2 (3 factors: perceived environmental competitiveness and job crafting merged; mental health; work–family conflict).
Model 3 (2 factors: perceived environmental competitiveness, job crafting and work–family conflict merged; mental health).
Model 4 (1 factor: all variables are merged into one factor).

mediation received a significance in statistical analyses [$\beta = -0.03$, SE = 0.01, 95% CI = (−0.06, −0.01)]. Moreover, similar as simple moderating effect of Hypothesis 4, the moderated mediating role of conflict only received significances at the low level [$\beta = 0.10$, SE = 0.04, 95% CI = (0.06, 14)] and mean level [$\beta = 0.06$, SE = 0.03, 95% CI = (0.03, 09)]. Therefore, Hypothesis 5 is statistically supported.

5 Discussion

The present study employed the insights of COR theory and spillover effect to examine the relationships among perceived environmental competitiveness, job crafting, mental health, and work–family conflict. The results show that there is a positive correlation between perceived environmental competitiveness and job crating. Moreover, job crafting is positively correlated with mental health, and job crafting plays a mediating role between perceived environmental competitiveness and mental health. Finally, the confirmed the moderating role of work–family conflict; specifically, individuals with low work–family conflict exhibit more job crafting behaviors and have better overall mental health than those with high work–family conflict.

5.1 Theoretical implications

The present study makes four theoretical contributions to the literature. First, this study contributes to perceived environmental competitiveness literature by identifying its positive effect on job crafting. Moreover, this study applies COR theory to investigate how individuals interpret environmental competitiveness. We argued that in this context, employees use social cues to gain or protect resources from loss, and can transfer non-work domain resources to their work to be used in job crafting. Theoretically, this study is in line with previous studies that found that environmental competitiveness can not only be regarded as a stressor at work (8) via resource loss perspective (24) but also can be regarded as a motivator to obtain additional resources (58). Nevertheless, according to COR theory (11), whether viewed from the perspective of resource gain or loss, perceived

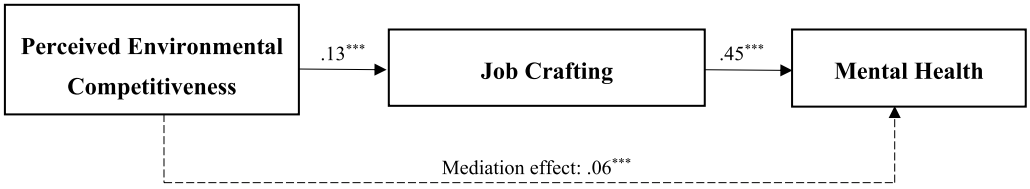

FIGURE 2
Results of the hypothetical mediation model. $N = 450$. Standardized regression coefficients are reported. Bootstrap sample size = 50,000. χ^2 (32) = 107.95; CFI = 0.97; TLI = 0.95; IFI = 0.97 RMSEA = 0.07. ***$p < 0.01$.

TABLE 3 Regression results for moderation ($N = 450$).

Values of work–family conflict in simple moderated effect for job crafting				
Work–family conflict	*b*	*SE*	Boot LL 95% CI	Boot UL 95% CI
−1 SD (2.24)	0.21	0.03	0.14	0.28
M (3.28)	0.13	0.03	0.08	0.18
+1 SD (4.32)	0.06	0.03	−0.01	0.12
Index of simple moderated	−0.07	0.02	−0.12	−0.03
Work–family conflict moderated mediation results for mental health				
−1 SD (2.24)	0.10	0.04	0.06	0.14
M (3.28)	0.06	0.03	0.03	0.09
+1 SD (4.32)	0.03	0.03	−0.01	0.06
Index of moderated mediation	−0.03	0.01	−0.06	−0.01

Unstandardized regression coefficients are reported.
Bootstrap sample size = 50,000.
LL = lower limit; CI = confidence interval; UL = upper limit.

environmental competitiveness motivates individuals to work harder to acquire additional resources or protect existing resources.

Second, the present study contributes to the literature on spillover effect, job craft, and mental health. Prior studies have mainly focused on the spillover effect within work and family domains (9, 41, 45), with limited research addressing the spillover effect between work and life domains. This study shows that the spillover effect can also occur within work and non-work domains and there is a positive correlation between job crafting and mental health. Taken together, prior findings and our results indicate that the personal resources generated by job crafting not only have positive effect on work performance (40), work engagement (28), and job satisfaction (39) but they also have positive impacts on an employee's non-work domain—thereby improving their mental health in other areas of life. Therefore, the current study moves the job crafting literature beyond its previous boundaries and into the research field of non-work domains.

Third, this study examined the underlying mechanism of the effect of perceived environmental competitiveness on mental health through job crafting. The results showed that job crafting plays a mediator role in the relationship between perceived environmental competitiveness and mental health. According to COR theory (11) and social information processing (59), when individuals perceive environmental competitiveness, they interpret it into two ways: a need to gain additional resources and to protect existing resources. However, these two social cues can motivate individuals to "fight" for resources by engaging in job crafting behaviors. Subsequently, the personal resources gained and the positive affect generated through job crafting not only assist individuals in better task completion but also positively enhance their mental health through the spillover effect. Therefore, our study reveals the process through which individuals transform the impact of workplace environment into work motivation and behaviors, ultimately promoting personal well-being. This provides new insights for future studies in the work–life interface.

Finally, the present study also contributes to the work–family conflict literature by exploring the moderating effects of work–family conflict. Previous studies mainly focused on the antecedents and consequences of work–family conflict (48, 60–62), little research has investigated the interaction between work–family interface and the work context. Thus, this study not only identified work–family conflict as a boundary condition of the relationship between perceived environmental competitiveness and job crafting, but it also provides a novel insight into how work–family conflict can serve as a moderator in the relationship between work-family interface and work context.

5.2 Practical implications

The present study also has several practical implications for managers. Firstly, creating a sense of appropriate competition intensity for employees is beneficial. Although such a work environment can increase work-related stress (8), employees tend to transform this pressure into motivation to complete tasks (7). However, the intensity of competition should not be excessive, as hyper-competition can lead to higher turnover intention (63). Previous research had provided several strategic interventions. For instance, organizations and managers should set clear and achievable performance expectations aligned with organizational goals (64). Moreover, organizations and managers should implement fair reward systems based on performance to stimulate healthy competition (7). Furthermore, fostering a culture of collaborative competition is also important, which could establish a win-win competitive environment (65). Therefore, managers may simultaneously increase healthy competition while fostering a collaborative and supportive work environment with clear guidelines on fair resource distribution.

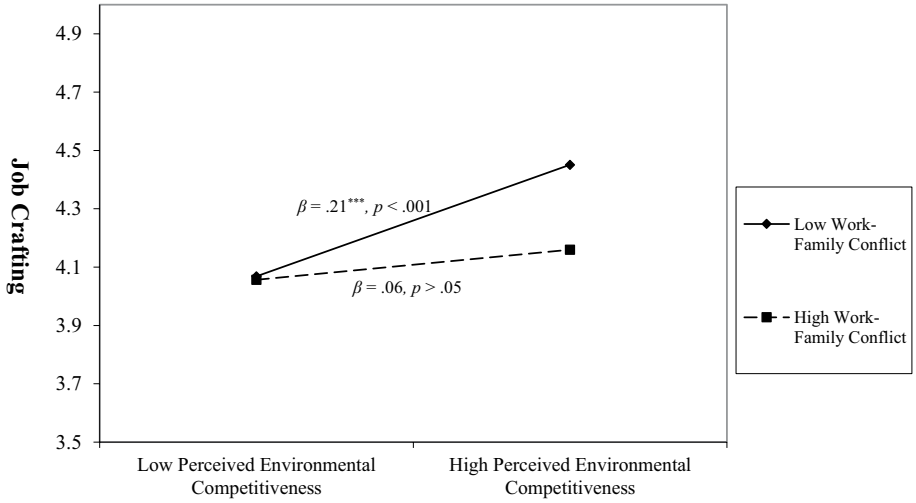

FIGURE 3
Moderating effect of work–family conflict on the relationship between perceived environmental competitiveness and job crafting.

Secondly, when a competitive atmosphere arises within an organization, managers should provide appropriate guidance to encourage employees to engage in job crafting. For example, organizations and managers can empower employees more autonomy to shape their roles and tasks (27, 66), provide support and opportunities for employees to acquire new skills and knowledges (20), and allow flexibility in work arrangements (67, 68). Moreover, conducting job crafting workshops and training are also effective strategies to educate employees on job design knowledges and skills (23). Additionally, organization and managers should establish regular feedback and reward system to acknowledge and reward employees who proactively redesign their jobs and roles to align with organizational goals (13). By doing so, employees not only improve their work performance (40), engagement (28) and satisfaction (39) through job crafting, but they also bring the personal resources and positive affects generated by job crafting into their personal lives through the spillover effect, ultimately enhancing their mental health.

Finally, emphasizing employees' work–family balance also acts as a catalyst to enhance employee work efficiency. Previous studies have provided several strategies to enhance employee work-family balance. For instance, organizations and managers should implement more flexible work policies, such as flexible workplace and work hours, to empower employees with greater control over their schedules and better fulfill family responsibilities (60). Moreover, Employee Assistance Programs (EAPs) can provide employee invaluable support through counseling and caregiving services in non-work domains (69). Additionally, offering training program on work-life balance and stress management are also helpful for employee to achieve work-life enhancement (70). Previous studies have also identified that promoting work–family enrichment can benefit both work and family domains. This may be a result of lower job exhaustion (71), better job performance (72), and increased home commitment (73) and family satisfaction (74). However, although improvement in work–family interface has several positive direct effects, the current study emphasizes the importance of managers not overlooking the interaction between the work and family domains. Specifically, some factors of the work–life interface may play a harmonizing role in organizational management. Therefore, managers could provide support and assistance to employees in family-related matters, which is one trait of benevolent leadership (5).

5.3 Limitations and future directions

This study has several limitations. First, environmental competitiveness was measured at the individual level by capturing employees' perception of environmental competitiveness. However, environmental competitiveness can be also assessed at the organizational level and have cross-level effects. Cross-level research offers a comprehensive understanding by integrating individual and organizational perspectives. It identifies how organizational competitive climate influence employees' outcomes, providing more effective organizational managerial interventions. Therefore, future studies may test the cross-level hypothesis model to investigate the effects of organizational competitive climate on individuals.

Second, due to crossover effect of crossover-spillover model (41) is emphasizing on the interpersonal emotional contagion, this study only explained the spillover effects of individual differences. However, Bakker and Demerouti (41) also highlights interpersonal emotional contagion within groups. By not addressing within-group crossover effects, this study may have overlooked important mechanisms of emotional contagion among group members. Therefore, the effects and mechanisms of within group crossovers should be examined further in future studies.

Thirdly, this study only controlled for demographic variables as common control variables. However, previous research has pointed out the importance of considering additional potential variables such as job stress and job satisfaction, which can also have significant effects on employee psychological perceptions and behaviors in the workplace (45). Thus, future studies could control for additional

potential variables that may influence employees' psychological perceptions and work outcomes.

Fourth, the present study only examined the mediating role of job crafting between perceived environmental competitiveness and mental health. Other potential mechanisms can be investigated in the future. For instance, Oubrich et al. (7) posit that a competitive work environment can lead to employee knowledge hiding behaviors. Moreover, Venz and Nesher Shoshan (75) found that knowledge hiding is negatively correlated with psychological strain. Therefore, future studies may explore the mediating role of knowledge hiding in the relationship between competitive work environment and psychological strain. These future directions could reveal potential mechanisms through which perceived environmental competitiveness impacts employee mental health.

Finally, more work–family interface moderators could be tested in the future. This study only tested the moderating effects of work–family conflict. Future studies could test other factors from domains of work–life or work–family, such as work–family enrichment, work–life balance, or family–work conflict. Specifically, female work–family role conflict (76) is a potential and valuable factor to be investigated, as it addresses the unique challenges faced by women in balancing work and family roles. These moderators could provide valuable insights into how these factors interact with perceived environmental competitiveness to influence employee outcomes across both work and non-work domains.

6 Conclusion

This study provides insights into perceived environmental competitiveness that can serve as motivation for employees to engage in job crafting, subsequently enhancing their mental health. We also emphasized how individuals with low work–family conflict can use the effects of perceived environmental competitiveness to improve their overall mental health via job crafting. Our study provides useful insights for managers who wish to foster a healthy, competitive work environment.

Data availability statement

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

Author contributions

SC: Writing – review & editing, Writing – original draft, Validation, Software, Resources, Formal analysis, Data curation. YW: Writing – review & editing, Writing – original draft, Project administration, Methodology, Conceptualization.

Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. This research was supported by the General Project of Philosophy and Social Science Research in Colleges and Universities in Jiangsu Province (no. 2024SJYB1030).

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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 22 August 2024
DOI 10.3389/fpubh.2024.1416215

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OPEN ACCESS

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RECEIVED 12 April 2024
ACCEPTED 18 July 2024
PUBLISHED 22 August 2024

CITATION
Ling C, Tao L, Wang X, Wu Y, Chai Y and Zhang L (2024) Analysis of turnover intention and influencing factors among female nurses with two children in Grade A tertiary public hospitals in Sichuan province: a cross-sectional study.
Front. Public Health 12:1416215.
doi: 10.3389/fpubh.2024.1416215

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Analysis of turnover intention and influencing factors among female nurses with two children in Grade A tertiary public hospitals in Sichuan province: a cross-sectional study

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Objective: This study aims to examine the current status of turnover intention among female nurses with two children and explore the factors influencing their decision to resign, ultimately providing a basis for reducing nurses' turnover intention and stabilizing the nursing workforce.

Methods: A convenience sampling method was used to select 1,370 in-service female nurses with two children from 65 Grade A tertiary public hospitals in Sichuan Province from September to December 2023. Data was collected through a general information questionnaire, work-family behavioral role conflict scale, regulatory emotional self-efficacy, and turnover intention scale.

Results: This study revealed that the average score for turnover intention among female nurses with two children was (13.11 ± 3.93). There was a positive correlation between work-family behavioral role conflict and turnover intention ($r = 0.485$, $p < 0.01$), while regulatory emotional self-efficacy showed a negative correlation with turnover intention ($r = -0.382$, $p < 0.01$). The main influencing factors for resignation among these nurses included age, number of night shifts per month, average monthly income, primary caregiver for children, work-to-family conflict and family-to-work conflict, and the ability to express positive emotions (POS), the capacity to regulate negative emotions such as despondency/distress (DES), and the skill to manage anger/irritation (ANG). Collectively, these factors explained 29.5% of the total variance in turnover intention scores.

Conclusion: Turnover intention among female nurses with two children is relatively high. To address this issue, hospital managers shall implement effective measures through various channels to settle work–family conflict, enhance nurses' regulatory emotional self-efficacy, and reduce turnover intention resulting from work–family conflict. Together, these efforts will reduce nurse turnover and foster a stable nursing workforce.

KEYWORDS

female nurses, second children, work–family conflict, regulatory emotional self-efficacy, turnover intention

1 Introduction

In recent years, public hospitals have experienced unprecedented transformations due to technological advancements and societal progress. However, the global shortage of nurses and the high turnover in the nursing industry are increasingly severe (1). In fact, the turnover intention among nursing personnel in China's tertiary public hospitals has reached a staggering 22.02% (2), which poses significant challenges to the thriving development of public hospitals. Turnover intention refers to the likelihood of individuals switching jobs within a specific timeframe and serves as a psychological state and a precursor to actual resignation, which provides valuable insights into future resignation behavior (3).

With the increasing number of families with two children, nurses in the role of "mothers of two children" have to bear the pressure of housework and childcare after raising a second child, as well as the special occupational pressure they have to endure in the current state of heavy nursing workload and relative shortage of personnel (4, 5). As a result, two-child female nurses may be more likely to leave their jobs out of consideration for their responsibilities to their families, their children, and their heavy nursing workloads. Paying attention to the willingness of female nurses with two children to leave their jobs and the factors affecting them, and preventing the wastage of female nurses with two children are of great significance in stabilizing the team of nurses in public hospitals and carrying out nursing work in an orderly manner. Turnover intention can be influenced by numerous factors, with research indicating that work–family conflict is a crucial contributing factor (6). Work–family conflict is a specific type of role conflict, which is based on role conflict theory (7). It refers to individuals who have temporarily uncoordinated roles in two very different domains, work and family, at the same time, and need to give up one of the roles in order to fulfil the other (8). In the long run, this will result in an imbalance of the role pressure and the formation of work–family conflict. It is characterized by specific events of behavioral conflicts, where work encroaches upon family life or family obligations interfere with work commitments. The presence and intensity of work-family behavioral role conflict reflect the degree of work–family conflict experienced by individuals (9).

Due to the high intensity and frequent night shifts associated with nursing work, it is more susceptible to work–family conflict and turnover intention, especially among nurses with children. Female nurses who have given birth to two children at different points in time, at the same time take care of the child and go out to work to earn economic income (10). In the current state of heavy nursing workload and relative shortage of personnel, female nurses who have had two children are experiencing higher levels of work–family conflict due to increased responsibility for family child care, and the conflict and overlap of time between the work and family spheres consumes more of the nurses' energy (5, 11), resulting in higher levels of work–family conflict among female nurses who have had two children (12). Specifically, female nurses who have given birth to and are raising two children face the challenge of balancing childcare responsibilities with the need to generate income through employment (13). As reported by international media (14), the turnover intention of married social workers is more subject to work–family conflict. Domestic research (15) in China has also found a positive correlation between the level of work–family conflict and turnover intention. As the healthcare service demands of the population continue to evolve, the development of nursing in China faces significant opportunities and challenges. Under such high pressure, nurses often experience negative occupational emotions such as low job satisfaction, reduced wellbeing, and occupational burnout (16).

Gender theory typically delves into the differences in roles, expectations, behaviors, and opportunities between men and women in society. As society evolves, the concept of gender equality has gradually gained widespread acceptance. However, in the workplace, particularly in the medical field, gender roles and societal expectations can still impact the turnover intentions of nurses, especially those who are second-time mothers (17). In traditional concepts, women are often expected to bear more family responsibilities, including taking care of children and household chores. Such societal expectations can create pressure on second-time mothers who are also nurses, as they need to cope with both heavy work and the demands of caring for multiple children. When this pressure reaches a certain level, it may lead to their intention to quit their jobs in order to better balance their family and work life.

Bandura proposed the concept of emotion regulation self-efficacy in 2003, which is the degree to which an individual is confident that he or she can effectively regulate his or her own emotional state, and is a sense of the individual's ability to manage his or her own emotional state (18). Research has shown (19) that individuals with high regulatory emotional self-efficacy are more likely to experience job satisfaction, thereby reducing their turnover intention. This study is based on the psychological stress theory proposed by Jiang (20). The theory suggests that life events can affect the mind and body by either directly causing stress or indirectly acting on the individual through mediating factors. The birth of a second child distracts nurses from their limited time and energy, adding to the conflicts and contradictions between roles in both the work and family spheres. Role conflict can lead to stress and negative emotions in individuals, and emotion regulation self-efficacy can help individuals to better cope with these negative effects, thus reducing the willingness to leave. In this study, the work-family role conflict brought about by the second child was used as a serious life event stressor (21), and emotion regulation self-efficacy, as a coping resource, can help individuals better cope with the stress and reduce the willingness to leave the job, which is a result of the psychological stress response (22).

Currently, most studies of nurses' willingness to leave have focused on populations such as emergency department nurses (23) and male nurses (24), and few studies have focused on the willingness to leave of the special group of two-child female nurses. In China, the researches on nurses' willingness to leave started late, and most of the studies on nurses' willingness to leave in China used self-designed questionnaires, and the results obtained lacked scientific validity. And researches on influencing factors has been limited by focusing on the field of demographics. Most of the studies on willingness to leave involve psychological and social aspects, and the level of nurses' willingness to leave is not exactly the same in different hospital grades in different geographic regions, and the factors affecting willingness to leave are also different. Female nurses with two children, who typically possess a certain amount of work experience and qualifications, constitute the core workforce responsible for ensuring clinical nursing quality and safety. They are the driving force behind the development of the nursing workforce, and it is crucial for every hospital manager to prioritize their physical and mental wellbeing and retain them in the workplace.

Therefore, this study aimed to understand the current situation of the willingness to leave among two-child female nurses in a tertiary-level public hospital in Sichuan Province, and to analyse the effects of work–family conflict and emotion regulation self-efficacy on the willingness to leave. It provides a theoretical basis and direction for early detection of their willingness to leave and the development of targeted career planning measures to further reduce the willingness of two-child female nurses to leave in tertiary kilometer hospitals and to stabilize the nursing workforce in public hospitals. Managers can take appropriate measures to rationalize the deployment of human resources and provide psychological interventions and positive stress reduction to reduce nurses' intention to leave, develop a stable nursing workforce, and promote the high-quality development of public hospitals.

2 Subjects and methods

2.1 Subjects

A convenience sampling method was employed to select 1,392 female nurses who had given birth to a second child and met the inclusion criteria from 65 Grade A tertiary public hospitals in 21 cities and prefectures in Sichuan Province, China from September to December 2023. The inclusion criteria were as follows: (1) Female registered nurses working in hospitals, (2) more than 1 year in clinical nursing, (3) two children, both alive, (4) informed consent and voluntary participation in research. Nurses with the following conditions were excluded from the study: (1) Regulatory nurses, (2) nurses for multiple pregnancies, (3) nurses whose marital status is divorced or widowed, (4) nurses in non-clinical nursing positions or nurses who have been out of clinical nursing for more than 6 months.

2.2 Research tools

2.2.1 General information questionnaire

The general information questionnaire was designed by the researchers based on the study objectives and a review of the literature. It included items such as the participant's hospital, age, professional title, educational degree, department, position, employment status, spouse's occupation, years of work experience, monthly income, number of night shifts per month, age and gender of the first child, age and gender of the second child, whether the second child was a planned pregnancy, primary caregiver for the children, and total family income.

2.2.2 Work-family behavioral role conflict scale

The scale in this study was developed by Clark (9). It is used to rate the level of role conflict between work and family behavior. Translated into Chinese by Sun et al. (25) and applied to a population of Chinese nurses (26). It consists of two dimensions: work-to-family conflict and family-to-work conflict. The scale consists of 30 items, each of which is rated on a 5-point Likert scale ranging from 1 to 5 on a scale from "completely disagree" to "completely agree," with a total score of 30–150. Higher total scores indicate higher levels of work–family conflict, while lower scores show lower levels of work–family conflict. The Cronbach's α coefficient for this scale in the current study was determined to be 0.952.

2.2.3 Regulation emotional self-efficacy scale

The regulatory emotional self-efficacy scale used in this study was originally developed by Caprara et al. (27). It was primarily used to assess nurses' emotional regulation self-efficacy. Translated and revised for localization by Wen et al. (28) and widely used in the Chinese nurse population (29–31). The scale measures three dimensions: the ability to express POS, the capacity to regulate negative emotions such as DES, and the skill to manage ANG. It comprises a total of 12 items, with responses ranging from "completely inconsistent" to "completely consistent," scored on a scale of 1–5, respectively. Higher scores indicate a stronger sense of regulatory emotional self-efficacy, while lower scores suggest lower levels of regulatory emotional self-efficacy for the subjects. The Cronbach's α coefficient for this scale in the current study was tested to be 0.967.

2.2.4 Turnover intention scale

The turnover intention scale was originally developed by Michaels and Spedtor (32) in 1982 to measure individuals' levels of intention to resign. Translated into Chinese by Li and Li (33) and widely used in the Chinese nurse population (34–36). The scale consists of three dimensions and six items: turnover intention I, turnover intention II, and turnover intention III, with each dimension comprising two items. Each item is scored on a scale of 1–4, with higher scores implying stronger intentions to resign. Specifically, scores of "≤ 1" show extremely low intentions, scores between ">1 and ≤ 2" note relatively low intentions, scores between ">2 and ≤ 3" signify relatively high intentions, and scores above "3" indicate very high intentions to resign. In this study, the Cronbach's α coefficient was examined to be 0.838.

2.3 Data collection process and ethical approval

The study was approved by the Ethics Committee of the Second People's Hospital of Yibin City (Approval number: 2023-225-01), and the ethical guidelines stipulated by the Ethics Committee were strictly followed.

For this study, a web-based questionnaire was selected as the data collection method. The research tool was integrated into the Wenjuanxing platform to generate QR codes and links for distribution. The researchers established contact with various hospitals, typically reaching out to individuals such as deputy directors, directors of nursing departments, and head nurses. They explained the study's purpose, methods, and significance and received support from these officials. Subsequently, a training session was conducted for a designated staff member (nursing department officer) at each participating hospital regarding instructions on questionnaire distribution and survey administration. The training content encompassed the survey's objectives, guidelines for completing the questionnaire, and important notes during the process. Prior to conducting the research study, nurses who met the inclusion criteria were provided with a statement explaining in detail the purpose, content and significance of the study. This statement is easy to

understand, and after obtaining the participant's consent, the participant signs an informed consent form informing and committing the nurse that the information obtained from this survey is limited to this study and will not be used for any other purpose. Participation in the survey was voluntary, confidential, and anonymous, with participants being encouraged to seek clarification from the researchers if needed. The data will be destroyed after this study.

There are 26 variables in the questionnaire in this study. According to the rough sample estimation method proposed by Kendall, the sample size can be 5–10 times of the variables. A sample size of 156–312 cases was derived, taking into account a 20% sample attrition and convenience sampling error. To ensure more comprehensive and valuable data, a larger sample size was used, with multiple centres included in the study, resulting in a final sample of 1,392 participants. After excluding 22 invalid questionnaires, a total of 1,392 questionnaires were collected. The final dataset consisted of 1,370 valid questionnaires with a response rate of 98.42%.

2.4 Statistical methods

SPSS 27.0 statistical software was used for data analysis. A significance level of $p < 0.05$ was set to determine statistical significance. Categorical data was described by frequency and percentage while scale scores were reported by mean ± standard deviation. Pearson correlation analysis was conducted to explore the relationship between work-family behavioral role conflict, regulatory emotional self-efficacy and turnover intentions. Independent sample *t*-tests and one-way ANOVA were performed to compare the differences in turnover intention scores among female nurses with two children of different demographic characteristics. Multiple linear regression analysis was employed to identify the factors influencing turnover intentions.

3 Results

3.1 Turnover intentions, work-family behavioral role conflict, and regulatory emotional self-efficacy among female nurses with two children

Among female nurses with two children, the mean item score for work-family behavioral role conflict was (2.77 ± 0.64). The average item score for work–family conflict was (3.38 ± 0.72). The average item score for family–work conflict was (2.16 ± 0.74). Overall, the level of work-family behavioral role conflict was moderately low (35). The mean item score for regulating emotional self-efficacy was (3.68 ± 0.65). The average item scores for the different dimensions were as follows: POS, 4.16 ± 0.71; DES, 3.51 ± 0.79, and ANG, 3.37 ± 0.85. Collectively, the level of regulatory emotional self-efficacy was moderately high (37). In addition, the average item score of turnover intention was (2.18 ± 0.66). The average item scores for the different dimensions of turnover intention were as follows: turnover intention I (1.94 ± 0.86), turnover intention II (2.33 ± 0.71), and turnover intention III (2.28 ± 0.65). Turnover intentions were relatively high (38). Please refer to Table 1 for more detailed information.

3.2 One-way ANOVA on turnover intentions among female nurses with two children

To examine the differences in turnover intentions among female nurses with two children of different demographic characteristics, independent sample *t*-tests and one-way ANOVA were conducted. The results, presented in Table 2, revealed statistically significant differences in turnover intention scores among nurses with varying ages, professional titles, years of work experience, night shifts per month, average monthly income, age of their first child, age of their second child, and primary caregiver for their children ($p < 0.05$). Only the items that exhibited statistically significant differences are reported in this study.

3.3 Correlation analysis of work-family behavioral role conflict, regulatory emotional self-efficacy, and turnover intentions among nurses with two children

The study discovered a positive correlation between work-family behavioral role conflict and turnover intentions among nurses with two children ($r = 0.485$, $p < 0.01$). Additionally, a negative correlation was observed between regulatory emotional self-efficacy and turnover intentions ($r = -0.382$, $p < 0.01$). Please refer to Table 3 for detailed information.

3.4 Multivariate linear regression analysis of factors influencing turnover intentions among nurses with two children

To further investigate the factors influencing turnover intentions among female nurses with two children, a multivariate linear regression analysis was performed. The analysis included variables that showed statistically significant differences in the one-way ANOVA, as well as the dimensions of the WFBRCS and the RESE, as independent variables. The total score of turnover intentions was used as the dependent variable. The significant variables identified in the one-way ANOVA were age, professional title, years of work experience, night shifts per month, average monthly income, age of the first child, age of the second child, and primary caregiver for the children. For categorical variables, dummy variables and numerical variables were set to directly incorporate into the multivariate linear regression analysis. Detailed information regarding variable assignments can be found in Table 4.

The results of a multiple linear regression analysis revealed that nine variables included the regression equation to explain the turnover intention score. These variables were age, night shifts per month, average monthly income, primary caregivers being the child's grandparents, family–work conflict, work–family conflict, POS, DES, and ANG. The regression model yielded an R^2 value of 0.299. After adjustment, $R^2 = 0.295$, $F = 64.579$, and $p < 0.001$. These variables accounted for 29.5% of the total variation in the score of turnover intention, as shown in Table 5.

TABLE 1 Scores for work-family behavioral role conflict, regulatory emotional self-efficacy, and turnover intention (n = 1,370).

Project	Number of items (items)	Theoretical maximum score	Score (score, mean ± SD)	Average item score (Score, mean ± SD)
Work-family behavioral role conflict	30	150	83.01 ± 19.29	2.77 ± 0.64
Work-to-family conflict	15	75	50.63 ± 10.81	3.38 ± 0.72
Family-to-work conflict	15	75	32.38 ± 11.17	2.16 ± 0.74
Regulatory emotional self-efficacy	12	60	44.18 ± 7.79	3.68 ± 0.65
POD dimension	4	20	16.63 ± 2.83	4.16 ± 0.71
DES dimension	4	20	14.05 ± 3.15	3.51 ± 0.79
ANG Dimension	4	20	13.5 ± 3.42	3.37 ± 0.85
Turnover intention	6	24	13.11 ± 3.93	2.18 ± 0.66
Turnover intention I dimension	2	8	3.88 ± 1.71	1.94 ± 0.86
Turnover intention II dimension	2	8	4.67 ± 1.41	2.33 ± 0.71
Turnover intention III dimension	2	8	4.56 ± 1.29	2.28 ± 0.65

4 Discussion

4.1 High level of turnover intention among female nurses with two children

In this study, female nurses with two children had a relatively high turnover intention, with an average score of 2.18 ± 0.66. This level of turnover intention was higher than the findings of general nurses in Chinathan (39). The reason for this disparity may be the added family and childcare responsibilities shouldered by female nurses with two children, which contribute to a greater possibility of considering leaving their current positions.

When examining the various dimensions of turnover intention, turnover intention II received the highest score (2.33 ± 0.71), this is consistent with an Italian study finding by Sasso et al. (40). This dimension relates to the motivation to seek alternative employment, implying that female nurses with two children have a greater inclination to explore other job opportunities. This could be attributed to the multiple roles they fulfill within their families, such as being a wife, daughter, daughter-in-law, and mother. The caring for aging parents and raising children require a significant investment of time and energy. Additionally, the demanding nature of nursing work, combined with frequent night shifts, poses challenges in maintaining a work-life balance, thereby strengthening their desire to pursue alternative job options. These findings underscore the importance for managers to effectively allocate human resources and enhance the personal sense of achievement among female nurses with two children, as a means to reduce turnover intention.

4.2 Factors influencing the turnover intention among female nurses with two children

4.2.1 The higher the work-family behavioral role conflict, the higher the turnover intention

In this study, it was observed that the turnover intention among female nurses with two children increased with higher levels of work-family behavioral role conflict. The dimensions of work-to-family conflict and family-to-work conflict were positively correlated with the overall turnover intention score, with coefficients of 0.412 and 0.440, respectively, this is similar to the findings of the other studies (37, 41). These findings suggest that work-family behavioral role conflict can affect the occurrence of turnover behavior among this group of nurses. The family acts as a solid foundation for an individual's career. However, the inability to strike a balance between family roles and the sacred role of being a nursing professional is a crucial factor driving these nurses to consider quitting their jobs. There is a study (38) also highlighted that healthcare professionals, owing to their heavy workloads, experience higher levels of work–family conflict, leading to increased levels of occupational burnout and, consequently, a higher turnover intention.

Work represents a vital source of income and personal fulfillment, while raising two children disperses their energy and focus, making it challenging for nurses to fully invest in demanding nursing tasks. Consequently, their decreased concentration and inability to meet work expectations may result in dissatisfaction from supervisors and biases from colleagues, which further amplify their intention to seek alternative employment. With social development, the prevalence of information technology and intensified market competition, the boundaries between work and family life have become increasingly blurred and the intrusion of work demands into the family domain has become more prominent (42). A meta-analysis examining the impact of work–family conflict on employees' work domain showed that work-to-family conflict increases employees' turnover intention (43). When confronted with work–family conflicts, employees weigh the costs of resolving these conflicts, and changing the work environment is often perceived as easier than altering the family environment.

Consequently, employees may opt to leave their jobs to mitigate the conflicts between work and family responsibilities. To address these challenges, hospital managers should consider the unique circumstances of each department and implement strategies such as flexible scheduling and dynamic allocation of human resources. These measures can alleviate work–family conflict among female nurses with two children, enhance support from their families regarding nursing work, minimize turnover, and retain talented nurses. By fostering an environment that supports work-life balance, healthcare organizations can retain exceptional nursing professionals and provide healthcare services to a wide range of patients.

TABLE 2 Comparison of turnover intention among female nurses with two children of different demographic characteristics (n = 1,370).

Project	Group	Score (score, mean ± SD)	*F*-value	*P*	LSD
Age	<30[a]	14.06 ± 4.01	7.176[F]	<0.001	a > b/c/d/e
	31 ~ 35[b]	13.44 ± 3.88			b > c/d/e
	36 ~ 40[c]	12.92 ± 4.06			c > d/e
	41 ~ 45[d]	12.17 ± 3.41			
	>45[e]	10.59 ± 3.29			
Professional title	Junior and below[a]	13.42 ± 4.14	4.444[F]	0.012	a/b > c
	Intermediate[b]	13.09 ± 3.86			
	Senior and above[c]	12.11 ± 3.55			
Years of work experience	Years<5[a]	13.00 ± 3.68	5.044[F]	<0.001	b > c/d/e
	5 ≤ years<10[b]	13.90 ± 3.8			c > e
	10 ≤ years<15[c]	13.25 ± 3.91			
	15 ≤ years<20[d]	12.79 ± 4.02			
	≥20[e]	12.11 ± 3.81			
Night shifts per month	No nights shifts[a]	12.39 ± 3.87	10.860[F]	<0.001	a < b/c/d
	1 ~ 5[b]	13.36 ± 3.93			b < d
	6 ~ 10[c]	13.39 ± 3.86			c < d
	>10[d]	14.79 ± 3.87			
Average monthly income (Yuan)	<3,500[a]	14.88 ± 4.03	5.951[F]	<0.001	a > b/c/d
	3,501 ~ 5,500[b]	13.55 ± 4.19			b > c/d
	5,501 ~ 10,000[c]	12.92 ± 3.83			
	>10,000[d]	12.5 ± 3.54			
Age of the first child	<3[a]	14.69 ± 4.42	9.359[F]	<0.001	a > d
	3 ~ <6[b]	14.18 ± 3.78			b > c/d
	6 ~ <10[c]	13.25 ± 3.92			c > d
	≥10[d]	12.59 ± 3.89			
Age of the second child	<3[a]	13.48 ± 3.93	5.577[F]	0.001	a > c/d
	3 ~ <6[b]	13.26 ± 3.91			b > c/d
	6 ~ <10[c]	12.7 ± 3.93			c > d
	≥10[d]	11.29 ± 3.64			
Primary caregiver for the children	Oneself[a]	13.24 ± 4.31	2.570[F]	0.025	b < e
	Oneself and spouse[b]	12.78 ± 3.74			d < e
	Hired nanny[c]	12.78 ± 4.1			
	Paternal grandparents[d]	12.9 ± 3.81			
	Maternal grandparents[e]	13.65 ± 4.09			
	Others[f]	14.08 ± 3.96			

The options for each group are assigned to sort a–f.

4.2.2 The higher the levels of regulatory emotional self-efficacy, the lower the turnover intention

In this study, it was discovered that female nurses with two children who had higher levels of regulatory emotional self-efficacy exhibited lower turnover intention. This finding is also supported by a study on registered nurses in New Zealand (44), which confirmed that higher levels of self-efficacy are associated with a reduced turnover intention. Female nurses with high regulatory emotional self-efficacy are likely to have the confidence and ability to effectively cope with the pressures arising from their work and family responsibilities, thereby reducing their inclination to quit due to stress-related factors. Furthermore, female nurses who exhibit greater regulatory emotional self-efficacy are proficient in adjusting their mindset and effectively managing conflicts and pressures in their work environment. This proficiency enables them to navigate the challenges of their profession more effectively and leads to a more positive attitude toward their work and a reduced turnover intention.

The impact of regulatory emotional self-efficacy on turnover intention can be ranked in the following order of significance: POS score, DES score, and ANG score. Importantly, all dimensions of regulatory emotional self-efficacy exert a negative influence, suggesting

TABLE 3 Correlation analysis of work-family behavioral role conflict, regulatory emotional self-efficacy, and turnover intentions among nurses with two children ($n = 1,370$, r-value).

Variables	Work-to-family conflict	Family-to-work conflict	WFBRCS score	POS	DES	ANG	RESE score	Total score of RIS
Work-to-family conflict	1	–	–	–	–	–	–	–
Family-to-work conflict	0.540**	1	–	–	–	–	–	–
Work-family behavioral role conflict	0.873**	0.882**	1	–	–	–	–	–
POS	−0.148**	−0.195**	−0.196**	1	–	–	–	–
DES	−0.346**	−0.294**	−0.364**	0.249**	1	–	–	–
ANG	−0.343**	−0.294**	−0.362**	0.263**	0.482**	1	–	–
Regulatory emotional self-efficacy	−0.381**	−0.352**	−0.418**	0.641**	0.82**	0.807**	1	–
Turnover intention	0.412**	0.440**	0.485**	−0.239**	−0.311**	−0.301**	−0.382**	1

*$P < 0.01$,**$P < 0.01$. POS, express positive affect; DES, regulate manage despondency/distress affects; ANG, regulate manage anger/irritation affects.

TABLE 4 Independent variables and variable assignments.

Independent variables	Variable assignments
Age	<30 years old = 1;31 ~ 35 = 2;36 ~ 40 = 3;41 ~ 45 = 4;>45 = 5
Professional title	Junior and below (X1 = 0, X2 = 0, X3 = 0); Intermediate (X1 = 0, X2 = 1, X3 = 0); Senior and above (X1 = 0, X2 = 0, X3 = 1)
Years of work experience	<5 Years = 1;5 ≤ Years<10 = 2;10 ≤ Years<15 = 3;15 ≤ Years<20 = 4;≥20 Years =5
Night shifts per month	0 = 1;1 ~ 5 = 2;6 ~ 10 = 3;>10 = 4
Average monthly income	<3, 500 Yuan = 1;3, 501 ~ 5, 500 Yuan =2;5, 501 ~ 10, 000 Yuan = 3;>10, 000 Yuan = 4
Age of the first child	<3 years old = 1;3 ~ <6 = 2;6 ~ <10 = 3;≥10 = 4
Age of the second child	<3 = 1;3 ~ <6 = 2;6 ~ <10 = 3;≥10 = 4
Primary caregiver for the children	Oneself (X1 = 0, X2 = 0, X3 = 0, X4 = 0, X5 = 0, X6 = 0); Oneself and spouse (X1 = 0, X2 = 1, X3 = 0, X4 = 0, X5 = 0, X6 = 0); Hired nanny (X1 = 0, X2 = 0, X3 = 1, X4 = 0, X5 = 0, X6 = 0); Paternal grandparents (X1 = 0, X2 = 0, X3 = 0, X4 = 1, X5 = 0, X6 = 0); Maternal grandparents (X1 = 0, X2 = 0, X3 = 0, X4 = 0, X5 = 1, X6 = 0); Others (X1 = 0, X2 = 0, X3 = 0, X4 = 0, X5 = 0, X6 = 1)
All dimensions in work-family behavioral role conflict scale and regulation emotional self-efficacy scale	Plugging in the original values

TABLE 5 Multivariate linear regression analysis of factors influencing turnover intentions among nurses with two children.

Variables	Regression coefficient	Standard deviation	Standardized coefficient	t	P
(Constants)	13.407	1.062		12.619	<0.001
Age	−0.379	0.117	−0.08	−3.247	0.001
Night shifts per month	0.295	0.107	0.066	2.766	0.006
Average monthly income	−0.296	0.146	−0.048	−2.03	0.043
Primary caregiver for the children are grandparents	0.641	0.21	0.069	3.047	0.002
Family-to-work conflict	0.091	0.01	0.258	9.369	<0.001
Work-to-family conflict	0.069	0.01	0.191	6.755	<0.001
POS	−0.156	0.033	−0.112	−4.681	<0.001
DES	−0.119	0.034	−0.095	−3.533	<0.001
ANG	−0.078	0.031	−0.068	−2.526	0.012

$R = 0.547$, $R^2 = 0.299$; after adjustment: $R^2 = 0.295$, $F = 64.579$, $P < 0.001$.

that higher scores on these dimensions are associated with a lower turnover intention. These findings are consistent with the existing study results (45, 46). It is plausible that female nurses with two children while juggling their family responsibilities and work commitments, may experience moments of sadness, discouragement, anxiety, anger, and frustration. Firstly, being proficient in expressing and utilizing positive

emotions can help individuals distance themselves from negative emotions such as anxiety and depression (47). Secondly, based on the theory of self-determination, when individuals find themselves in a prolonged state of being unable to regulate and manage negative emotions, their beliefs and decision-making tend to be negative, thus fostering negative choices like the turnover intention (48). There are also Chinese studies (29) pointed out highlighted the significance of focusing on the psychological wellbeing of nurses in training and cultivating their regulatory emotional self-efficacy to reduce their turnover intention. Furthermore, a study was also noted (49) that employing appropriate emotional therapy can enhance nurses' ability to manage their emotions effectively and enable them to approach challenges with optimism and seek appropriate ways to express their emotions. As a result, this can ameliorate professional burnout among nurses and reduce turnover. These insights inspire nursing managers to conduct timely mental health education and informative sessions to assist nurses in better managing their emotions, foster an optimistic work environment, and elevate their job satisfaction.

4.2.3 The older the age, the lower the turnover intention

This study revealed an inverse relationship between age and turnover intention among female nurses with two children. Specifically, these nurses aged 35 and below exhibited higher turnover intention scores compared to their older counterparts. Moreover, nurses aged 36 to 40 had higher turnover intention scores than those aged 41 and above. These results are consistent with the results of previous studies (50). Similar trends have also been observed in a study conducted in Turkey, where older nurses were more inclined to remain in the hospital, while younger nurses demonstrated a higher propensity to resign (51).

Remarkably, 81.3% of the survey participants were concentrated in the 31 to 40 age range, which aligns with the demographic composition of the 1980s and 1990s generations. As the mainstream workforce in China, younger individuals within this age range often possess a wealth of innovative ideas but may have lower resilience to stress. Consequently, they are more susceptible to contemplating resignation due to the demanding nature of nursing work and familial pressures (52). Conversely, older nurses, leveraging their extensive work experience and robust professional networks, tend to experience higher job satisfaction. In addition, nurses in this age group, burdened with the financial responsibilities of raising two children, rely heavily on their work income as the primary source of financial stability for their families. Moreover, due to factors such as age, they may encounter challenges in securing alternative employment, which further reduces their turnover intention.

4.2.4 Primary caregivers for children in families

This study found that female nurses with two children whose primary carers were the children's grandparents had a higher intention to leave than those whose primary carers were themselves and their spouses and those whose careers were the children's grandparents, which is different from the results of previous studies (53). Previous study (53) have shown that intergenerational care by elders can increase female employment. The possible reason for the findings of this study is that grandparents have become the mainstream in caring for their grandchildren in the Sichuan area. The role of being a daughter who believes that her parents (the child's grandparents) helping to look after the child is adding to the parents' problems. Guilt over time forced the nurse to develop the intention of offering to leave her job to care for the child herself.

As a response to this, some hospitals in China have taken proactive steps by organizing summer and winter vacation daycare programs for employees' children to address childcare needs during specific periods, which showcases a high level of care and consideration for employees. Such measures foster a sense of belonging and job security among nurses, lead to decreased turnover intention, and serve as valuable examples that medical institutions can learn from and implement.

4.2.5 Monthly night shifts

This study showed that female nurses with two children who do not have night shifts exhibit significantly lower scores in their turnover intention, compared to those who have night shifts. Moreover, among female nurses with monthly night shifts, those who work 1–10 shifts per month have lower turnover intention scores than those who work more than 10 shifts per month. Hence, it is evident that there is a correlation between the number of monthly night shifts and the turnover intention of female nurses with two children, which is in line with the research findings from other national studies (54).

The possible reason for this correlation is that frequent night shifts disrupt nurses' sleep patterns and lead to irregularities in their physical and mental wellbeing, the limited time available for childcare and family responsibilities gives rise to a higher turnover intention. Additionally, a Korean study (55) demonstrated that nurses who regularly work night shifts on rotation often experience various health issues, which subsequently leads to an increased turnover intention. Similarly, research from the United States (56) indicated that night shifts increase risks such as inadequate sleep, heightened family pressures, and emotional fluctuations. These findings enlighten nursing managers to prioritize the wellbeing of nurses working night shifts and provide them with adequate care and support.

4.2.6 Average monthly income

In this study, it was found that female nurses with two children who had an average monthly income of less than 3,500 yuan exhibited a higher turnover intention compared to those with an average monthly income of 3,500 yuan or higher. Additionally, among female nurses with two children, those with an average monthly income ranging from 3,501 to 5,500 yuan had higher turnover intention scores than those with a monthly income of 5,500 yuan or above. These findings align with multiple previous studies (57, 58). For example, a survey conducted by Wu Yino from the Chinese Academy of Medical Sciences (2) evaluating the current status of turnover intention among medical staff in 144 tertiary public hospitals also pointed out the low salary as one of the important contributing factors to nurses' turnover intention.

Salary and treatment play a crucial role in motivating employees and serve as the fundamental basis for fostering employee engagement and talent retention. Therefore, nursing managers should consider improving nurses' welfare benefits and compensation levels to increase job satisfaction and reduce turnover intention.

5 Limitations

It is crucial to recognize the limitations of this study, which primarily examined the impact of individual internal factors such as general information, work-family behavioral role conflict, and regulatory emotional self-efficacy on turnover intention. The multiple linear regression analysis, which explained only 29.5% of the overall variability in turnover intention scores, indicated the existence of

other factors that impact the turnover intention of female nurses with two children. This study is a cross-sectional survey with a single research method. In future investigations, incorporating interview methods and adopting a mixed-methods approach of both qualitative and quantitative measures can further enhance the depth of research in this field. Moreover, additional variables are expected to be included to broaden the scope of investigation.

6 Conclusion

The findings of this study revealed a relatively high level of turnover intention among female nurses with two children. There is a positive association between work-family behavioral role conflict and turnover intention, while regulatory emotional self-efficacy demonstrates a negative correlation with turnover intention. As public hospitals steadily progress toward high-quality development, hospital management departments can take initiatives such as organizing psychological workshops and conducting training sessions on emotional regulation and management. These interventions can enhance nurses' emotional management abilities and enable them to confidently navigate the conflicts between work and family. Consequently, this will help reduce their turnover intention and foster a stable and sustainable nursing workforce.

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 humans were approved by the Medical Ethics Committee of the Second People's Hospital of Yibin, Sichuan, China. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

CL: Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing. LT: Investigation, Methodology, Writing – review & editing. XW: Writing – review & editing, Supervision, Validation. YW: Writing – review & editing, Data curation. YC: Writing – review & editing, Data curation. LZ: Data curation, Methodology, Supervision, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Acknowledgments

The authors extend their thanks to the nurses who actively participated in this study and the hospital staff. Meanwhile, the authors also appreciates the diligent efforts of the editor and the valuable insights provided by the reviewers.

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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frontiers | Frontiers in Psychiatry

TYPE Original Research
PUBLISHED 12 September 2024
DOI 10.3389/fpsyt.2024.1399167

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OPEN ACCESS

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RECEIVED 11 March 2024
ACCEPTED 27 August 2024
PUBLISHED 12 September 2024

CITATION
Wu J, Dou J, Wang D, Wang L, Chen F, Lu G, Sun L and Liu J (2024) The empathy and stress mindset of healthcare workers: the chain mediating roles of self-disclosure and social support.
Front. Psychiatry 15:1399167.
doi: 10.3389/fpsyt.2024.1399167

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The empathy and stress mindset of healthcare workers: the chain mediating roles of self-disclosure and social support

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The hospital is a workplace full of stressful events for healthcare workers (HCWs) due to unpredictable changes in their daily routines. Perceptions of stressful events (stress mindset) have a significant impact on an individual's health and well-being. However, few studies have reported the factors and potential counter mechanisms influencing these perceptions. This study aimed to evaluate the relationship between empathy, self-disclosure, social support, and stress mindset of HCWs, and to explore the mechanism of empathy on stress mindset. Five hundred and eight HCWs (35.2% men and 64.8% women) completed the Interpersonal Reactivity Index (IRI), the Distress Disclosure Index (DDI), the Social Support Rating Scale (SSRS), the Stress Mindset Measure (SMM), and demographic questionnaires online in China. The results showed that empathy was positively linked with stress mindset and positively correlated with self-disclosure and social support. In the multiple mediating model, self-disclosure and social support mediated the association between empathy and stress mindset sequentially. The results imply that empathy, self-disclosure, and social support play a significant role in the formation of HCWs' stress mindset. These findings have substantial ramifications for reducing stress and creating successful government interventions to fortify stress mindset in healthcare.

KEYWORDS

empathy, self-disclosure, social support, stress mindset, healthcare workers

1 Introduction

1.1 Empathy and stress mindset

Due to unpredictable daily occurrences such as medical emergencies at hospitals, healthcare workers (HCWs) frequently encounter stressful situations, compounded by the lack of understanding of their field of work by patients and their families (1), workplace violence (2), and long working hours leading to overwork (3). Stress is described as the tension that develops when an individual believes an event they encounter will create more complications than they can handle, given available resources (4). Stress has a considerable influence on human health (5–7). Research statistics show that, on average, high job stress increases the risk of heart disease by up to 50 percent (8). However, stress also has beneficial effects on the body. New evidence suggests that holding a specific stress mindset has a beneficial effect on people's health and performance under stress (9, 10).

Crum, Salovey, and Anchor (11) refer to people's beliefs and impressions of stressful events as the "stress mindset," which is described as a continuum from "stress is enhancing" to "stress is debilitating." A high level of stress mindset is representative of a stress-is-enhancing mindset. It is characterized by a positive view of the stressful event and belief that the event will produce a better outcome. This mindset has been shown to boost energy and enhance work performance and life satisfaction (11). The stress -is-debilitating mindset is characterized by a belief that the stressful event will have a negative effect on oneself. Stress mindset has also been linked to increased disease and mortality (12); individuals who believe that "stress is debilitating" are over twice as likely as others to develop coronary heart disease (13). A negative stress mindset can lead to emotional disorders and affect the quality of care from HCWs (14, 15). Given China's limited healthcare resources and strained doctor–patient interaction, how HCWs view stress is particularly important.

The ability to appropriately experience others' feelings and comprehend the meaning of those feelings is known as empathy (16). Empathy comprises behavioral (17), cognitive (17), and emotional (18) components, and is directly correlated with one's personal mindset (19, 20). According to the Russian Doll Model, empathetic individuals utilize various empathy strategies to engage their cognition (e.g., perspective-taking) and emotions (e.g., emotional regulation). These empathy strategies can align with their environment and lead to beneficial outcomes (21). For example, empathy is linked to support for trauma recovery (22), greater emotional resilience (20), and stronger social ties (23). In the context of HCWs, empathy can promote a stress-is-enhancing mindset, and thus reduce burnout and their desire to quit (24–26). Nurses with high levels of empathy not only make patients feel understood and cared for, but higher empathy allows nurses to reconsider their perceptions of stress and find more meaning in their work, which improves their overall psychological state and a stress-is-enhancing mindset (27).

1.2 Mediating role of self-disclosure

Self-disclosure is also important in facilitating a stress-is-enhancing mindset in individuals with high levels of empathy (28). Self-disclosure is the sharing of personal information, which serves as a conduit for people to communicate their emotions and thoughts (29). Empathy enhances understanding and trust between people, facilitating deeper self-disclosure. "Compassionate care" and the ability to "think differently" among medical trainees are significantly associated with patient-centered communication variables, which contributes to the establishment of a good doctor–patient relationship and improves communication effectiveness (30). Self-disclosure can be used to reconstruct memories of stressful events. Moreover, it can be utilized to improve our understanding of stressful events through the sharing of inner thoughts with others and by seeing the positive effects of stress, which, in turn, promote a stress-is-enhancing mindset (31). Indeed, sharing stress experiences is linked to wellness (32) and reduced depression and anxiety symptoms (33–35). For instance, Hemenover (36) shows that, after self-disclosure, people with traumatic experiences are able to reduce their psychological stress, transform their self-perceptions, and develop ideas about being more resilient and upwardly mobile in the face of stressful and traumatic events.

1.3 Mediating role of social support

Social support describes the financial and emotional support people receive from their social networks, including their families, friends, and organizations (37). Empathy especially contributes to social support (38). Empathy is considered an essential part of a helpful relationship; high levels of empathy are associated with caring behaviors, better interpersonal relationships, and prosocial behaviors (39). It also improves intergroup relations (40), thus facilitating further social support.

According to the social debugging theory of cognitive processing, social support can help individuals change their perceptions of stressful events. Therefore, social support may help people develop a stress-is-enhancing mindset (41). Although this strain of research is at a nascent stage, studies have confirmed the supportive role of social support in generating positive personal results, such as greater enjoyment of life and a sense of hope (42). Individuals with high levels of social support are more likely to develop positive coping mechanisms in the face of stressful events owing to the availability of more social resources; such individuals display a stress-is-enhancing mindset (43).

1.4 Chain-mediated effects of self-disclosure and social support

This study also considers whether a relationship exists between the two mediators—self-disclosure and social support. We found that when people talk about their personal experiences, they disclose feelings and information about incidents, which can foster close ties and support (44).

Expressing oneself is essential for obtaining social support; social support is unavailable until others are aware of one's need for assistance. For instance, a study of self-disclosure in timely communication found that, after six months, users who engaged in self-disclosure received higher social support (45). Similarly, male homosexuals who are HIV-positive who self-report more will have more social support exchanges, and thus receive or provide better social support than those who self-report less (46).

1.5 Present study

While previous research has shown a link between empathy, stress mindset, self-disclosure, and social support, research on the influencing factors of stress mindset in HCWs and the internal mechanisms by which empathy affects stress mindset is still relatively limited. The aim of this study was to investigate the effect of empathy on stress mindset and the mediating role of self-disclosure and social support in HCWs. This study proposes four hypotheses based on these theoretical and empirical foundations (Figure 1).

Hypothesis 1. HCWs' empathy is positively related to their stress mindset.
Hypothesis 2: The association between empathy and stress mindset is mediated by HCWs' self-disclosure.
Hypothesis 3: The association between empathy and stress mindset is mediated by HCWs' social support.
Hypothesis 4: Self-disclosure and social support from HCWs mediate the relationship between empathy and stress mindset.

The results of this study will provide a theoretical basis for relevant departments to formulate effective policies and intervention programs to improve the stress mindset of HCWs.

2 Methods

2.1 Participants

The study was conducted from January to March 2023 and participants were recruited online by WeChat in China. Participants had to meet the following inclusion criteria: (1) be healthcare professionals aged 18 years or older; (2) be able to communicate in standard Chinese to read and understand the questionnaires; and (3) sign the consent form and voluntarily engage in this survey. The Shandong Second Medical University Ethics Committee reviewed and approved the use of human subjects in this study.

We first sent the questionnaire QR code to the leader of the relevant department of a hospital in Zaozhuang, Shandong Province, who then sent it to the WeChat group of healthcare workers. Subsequently, our trained and experienced professionals explained the purpose of this survey to the participants. A total of 622 healthcare professionals participated in the survey, which took approximately 15 minutes to complete. At the end of the questionnaire, we responded to them with a copy of the measurements, an explanation of what they meant, and suggestions or strategies for healthier psyches.

Only 508 of the 622 surveys had valid responses, with an effective recovery rate of 81.67%, of which 179 were male (35.2%) and 329 were female (64.8%) participants (Table 1). The respondents completed the Interpersonal Reactivity Index (IRI), the Distress Disclosure Index (DDI), the Social Support Rating Scale (SSRS), the Stress Mindset Measure (SMM), and demographic questionnaires. Each respondent was required to read and comprehend an informed consent form before answering the questionnaire. All participants provided online informed consent to participate in the study.

2.2 Measures

Empathy was measured by the IRI, compiled by Chrysikou (47). The most popular tool for measuring empathy in China is the Chinese version of the Interpersonal Reactivity Index (C-IRI), which was improved by Zhang (48). The internal consistency and reliability Cronbach's alpha for each factor was 0.60 to 0.77. Twenty-two items were included, and the respondents assessed each item on a 4-point Likert scale (0 = least favorable and 4 = most favorable). This tool has four dimensions: perspective-taking (perspective adjustment), personal pain, empathic care, and fantasy (referring to extended imaging of the events in a

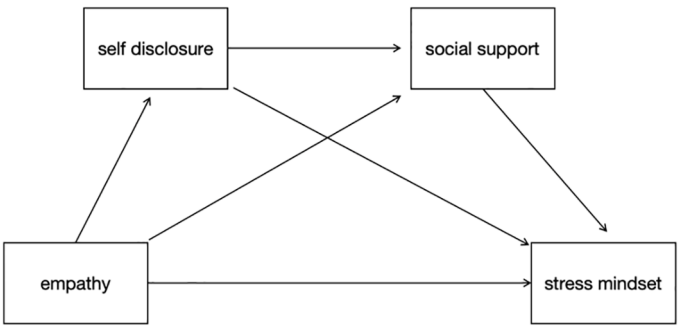

FIGURE 1
The multiple mediator model of empathy and stress mindset.

TABLE 1 Characteristics of participants and stress mindset (N = 508).

Variables	Frequency (percentage)	Stress mindset (M ± SD)	t/F	*p*
Age (years)			0.34	0.887
18–25	9 (1.8)	(17.44 ± 7.06)		
26–30	97 (19.1)	(19.96 ± 5.23)		
31–40	261 (51.4)	(20.49 ± 5.37)		
41–50	98 (19.3)	(20.40 ± 5.08)		
>51	42 (8.3)	(20.57 ± 4.98)		
Sex			0.96	0.327
Male	179 (35.2)	(20.57 ± 5.42)		
Female	329 (64.8)	(20.23 ± 5.28)		
Working years			0.35	0.883
1–5	49 (9.6)	(20.33 ± 5.45)		
6–10	173 (34.1)	(19.95 ± 5.97)		
11–15	132 (26.0)	(20.68 ± 5.04)		
16–20	51 (10.0)	(20.53 ± 5.72)		
21–25	30 (5.9)	(20.30 ± 5.19)		
>26	73 (14.4)	(20.63 ± 5.06)		

situation), with reverse scoring for items 2, 5, 10, 11, and 14. All program scores were added together for a total empathy score. The overall scores ranged from 0 to 88. In our sample, the standardized Cronbach's alpha value was 0.73, indicating acceptable reliability.

The participants' self-disclosure was evaluated using the DDI, created by Kahn and Hessling (49). Li of China localized the scale for college students while retaining the original dimensions and entries of the scale (50). The reliability of the revised scale was 0.92, reflecting a high degree of stability. The 12-item index measured distress using a 5-point Likert scale (1 = strong disagreement and 5 = strong agreement). The revised DDI retained the previous 12 items, and items 2, 4, 5, 8, and 10 were reverse-scored entries with a total score ranging from 12 to 60. The sum of the scores for each entry indicated the total self-representation score. Higher scores indicate higher levels of self-disclosure. The standardized Cronbach's alpha in this study was 0.88, indicating high reliability.

The SSRS was created by Xiao for the Chinese population and includes questions about subjective and objective support as well as their uses and utilization of support (51). The internal consistency and reliability Cronbach's alpha for each factor was 0.89 to 0.94. In China, the SSRS has been widely applied to numerous populations and has been found to have high reliability and validity. Ten items were included. Items 1, 2, 3, 4, 5, 8, 9, and 10 were scored on a range of 1 to 4 depending on the degree of support (none to some). Items 6 and 7 were scored based on the presence or absence of a support source; the score was determined based on the number of sources, with 0 indicating no support. All program scores were added together for a total social support score. Higher scores indicated more robust social support among the study participants. The total score was the sum of the components. The standardized Cronbach's alpha in this study was 0.85.

To gauge how people perceive the effects of stress (e.g., "the effects of stress are positive and should be utilized," "the effects of stress are negative and should be avoided"), Crum et al. created the SMM in 2013 (11). The Chinese He was localized to college students while retaining the original scale (52). The revised scale was more consistent with the localization study, with a Cronbach's alpha of 0.752–0.828. The scale comprised eight items, and participants were asked to rate each one on a 5-point scale (0 = strongly disagree and 4 = strongly agree). The items in the stress-negative effect dimension were rated in reverse, and then the overall average was determined. The total stress orientation score ranged from 0 to 32. The more points an individual receives, the more likely they are to view difficult situations favorably. The standardized Cronbach's alpha in this study was 0.80, indicating high reliability.

2.3 Data analysis strategy

The common method variance may be present when computerized self-reports are used to acquire data. Consequently, we used techniques during data collection to account for typical method discrepancies, such as screening and reversal questions. The Harman single-factor approach was also applied to all variables obtained from an online self-report method to check for common errors. The findings revealed 19 factors with eigenvalues greater than 1, and the variation described by the first component was 14.25%, falling short of the required value of 40.0%. Thus, the study's data contained no significant common method variance.

The study used IBM SPSS Statistics for IOS 26.0 for the descriptive statistical analysis. To prepare the data for parametric statistical analysis, the data's mean, standard deviation, skewness, and kurtosis were examined. The absolute values of skewness and kurtosis did not exceed 1.5 and 3.5, respectively, indicating that the variances of each variable were close to those of a normal distribution (53). In all regression analyses, we entered age, sex, and working years as control variables and conducted structural equation tests for our four hypotheses. Specifically, we examined the structural model using Mplus 8.6 (54).

3 Results

3.1 Descriptive statistics and correlation analysis

Descriptive statistics, including mean and standard deviation, were calculated for the raw scores of the corresponding questions related to each factor of the study variables.

To better control for measurement error, we utilized raw scores for each topic to estimate the correlation coefficients among the study's variables. The results confirmed significant positive correlation between empathy, self-disclosure, social support, and stress mindset, two by two (see Table 2).

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TABLE 2 Descriptive statistics and correlations among variants.

Variable	Empathy	Self-disclosure	Social support	Stress mindset
Empathy	1			
Self-disclosure	0.30**	1		
Social support	0.31**	0.35**	1	
Stress mindset	0.32**	0.31**	0.44**	1
M	67.94	40.74	45.06	20.35
SD	8.32	8.01	7.34	5.33
Skewness	0.46	0.03	1.21	1.12
Kurtosis	1.15	0.16	0.26	2.01

**p<0.01.

TABLE 3 Direct and indirect effects in the model (Bootstrap method).

	Effect	SE	BootLLCI	BootULCI
TOTAL	0.207	0.034	0.139	0.271
EM → SM	0.116	0.033	0.050	0.180
EM → SD → SM	0.026	0.010	0.009	0.046
EM → SS → SM	0.042	0.010	0.025	0.063
EM → SD → SS → SM	0.024	0.005	0.015	0.035

EM, empathy; SD, self-disclosure; SS, social support; SM, stress mindset.

3.2 Empathy and stress mindset in HCWs: test of chain multiple mediation model

With empathy as the independent variable; stress mindset as the dependent variable; self-disclosure and social support as mediating variables; and gender, age, and working years as controlling variables, a chain mediation model was established. After the examination using Mplus, the model fitting results confirmed model saturation ($\chi 2/df=0$, CFI=1.00, TLI=1.00). A Bootstrap method (5000 times) was used to examine the indirect effects of three mediation paths.

The 95% confidence intervals for the indirect effect values of the three mediating paths did not include 0, thereby indicating the significance of the indirect effects across all three paths. This suggests that both the individual mediating roles of self-disclosure and social support, as well as their chained mediating effect, were upheld. Specifically, empathy was strongly and positively related to self-disclosure ($\beta = 0.30$, $p<0.001$), whereas self-disclosure was strongly and positively related to stress mindset ($\beta = 0.09$, $p<0.01$). Further, self-disclosure significantly mediated the relationship between stress mindset and empathy ($\beta = 0.03$, $p<0.01$). As a result, Hypothesis 2 was confirmed. Empathy positively predicted social support ($\beta = 0.17$, $p<0.001$). Social support, in turn, positively predicted stress mindset ($\beta = 0.25$, $p<0.001$). The relationship between empathy and stress mindset was mediated by social support ($\beta = 0.04$, $p<0.001$). Significant social support had a mediating effect. As a result, Hypothesis 3 was confirmed. The mediating effects of self-disclosure and social support on empathy and stress mindset were significant (indirect effect = 0.02, $p<0.001$). Empathy had a substantial direct relationship with stress mindset ($r = 0.12$, $p<0.001$). Consequently, Hypothesis 4 was confirmed (see Table 3).

4 Discussion

Given the long-term nature of workplace stress and its effects on mental health (55), examining factors that influence stress mindset may contribute to the well-being of HCWs. However, previous studies have often neglected this topic. The present study examined the connection between empathy and stress mindset among Chinese HCWs to address identified research gaps in the literature.

In line with expectations, self-disclosure and social support simultaneously and sequentially mediated the relationship between empathy and stress mindset among HCWs. These findings advance our knowledge of the relationship between empathy and stress mindset.

Conditional on controlling for influencing variables, we identified the following links between the core variables. We found a positive correlation between empathy and stress mindset among HCWs. Therefore, Hypothesis 1 was supported. Thus, people with higher levels of empathy are more likely to have a stress-is-enhancing mindset. This finding is in line with earlier research; for instance, a study of community workers found a link between higher empathy and higher health mindset levels (15). This result may emerge from the stress incident taking on a new meaning for empathic people whose perceptions have changed. Empathic individuals can think differently and better regulate their emotions through perspective-taking emotional regulation, which allows them to better cope with stress and challenges. They are more likely to transcend the traumatic occurrence, resulting in greater appreciation and a stress-is-enhancing mindset. This conclusion adds to previous studies showing a link between empathy and stress mindset in HCWs.

We also discovered that empathy could affect stress mindset in HCWs through the mediating function of self-disclosure, a finding that lends support to Hypothesis 2. This result aligns with earlier research showing that empathy levels positively correlate with self-disclosure and that self-disclosure is a significant and favorable predictor of stress mindset (56). Empathy positively correlates with self-disclosure in the initial stage of the mediated process (i.e., empathy → self-disclosure). An empathetic person can increase understanding and trust between people and better understand the emotions of others, which improves communication between two people and promotes deeper self-disclosure. However, because of their diminished capacity for empathy, people with low levels of empathy are less likely to indulge in self-disclosure. This finding is consistent with earlier studies that found self-disclosure to be more common among empathic people (56). Self-disclosure and stress mindset positively connect during the second stage of the mediation process. This finding supports the social penetration theory, which contends that self-disclosure is crucial for personal development

and the emergence of pleasant emotions. A wealth of credible research supports the link between self-disclosure and stress mindset (57). Through self-disclosure, individuals can obtain feedback and different perspectives from others, which can help them reevaluate and cognitively reframe their perceptions of stressful events. Feedback from others can help individuals recognize the positive side of things or suggest new solutions to change negative perceptions of stress.

Our findings further show that empathy could affect HCWs' assessment of stress mindset through the mediating function of social support. Thus, Hypothesis 3 was supported. This result confirms earlier studies showing that social support significantly mediates the relationship between empathy and stress mindset (22, 23). According to our findings, those with high levels of empathy obtained higher social support in the initial stage of the mediated process (i.e., empathy → social support). Empathetic individuals tend to put themselves in the other person's shoes, are more understanding of others; they enjoy closer and stronger relationships and high levels of social support (23). Indeed, we found that greater levels of social support were positively correlated with higher levels of stress mindset for the second component of our mediation model (i.e., social support → stress mindset). This result lends credence to the social penetration hypothesis, which states that people are more likely to undergo personal growth when they have strong social networks. Social support includes objective forms such as material direct assistance as well as subjective forms of personal emotional experience and satisfaction with how they are respected, supported, and understood (58). Good social support contributes to the formation of better interpersonal networks, an improved ability to cope with stress, the avoidance of negative perceptions of stress, and the development of a stress-is-enhancing mindset.

Finally, self-disclosure and social support mediated the relationship between empathy and stress mindset not only in parallel but also in sequence. Therefore, Hypothesis 4 was supported. Individuals with high levels of empathy can cope more effectively with stress and challenges by facilitating stronger social connections and emotional support, which, in turn, creates a stress-is-enhancing mindset. Notably, self-disclosure and social support are positively correlated (44). Further, increased self-disclosure makes people more likely to communicate their needs to others, which increases their chances of receiving assistance and, consequently, their level of social support. However, few studies have combined their analysis of the impact of self-disclosure and social support on stress mindset, despite past research supporting the effects of both factors on stress mindset. By combining the Russian Doll Model theory of empathy and the social penetration hypothesis, we simultaneously accounted for the mediating functions of self-disclosure and social support. Consequently, this integral and paired-chain mediation model offers a more thorough assessment of the connection between empathy and stress mindset.

The findings of the study provide evidence and concrete recommendations for the government and the hospital sector to formulate effective policies and interventions. First, the relevant departments of the hospital should regularly provide psychological counseling to HCWs to help them correctly recognize and deal with empathic emotions and promote transpersonal thinking and emotional regulation. Second, hospitals should create an atmosphere conducive to good communication in order to promote self-disclosure among HCWs, which will further contribute to the formation of their stress-is-enhancing mindset. Finally, when the government formulates policies for HCWs, the content of the assessment and interventions should also pay attention to HCWs' well-being, since high levels of social support can help promote a stress-is-enhancing mindset.

4.1 Limitations

This study has various limitations that should be acknowledged. First, although the mediation model in our study was based on theoretical underpinnings and empirical research, we could not determine causation due to cross-sectional design limitations. Future longitudinal studies are required to validate this model. Second, although the self-report method used in this study can accurately capture participants' feelings, it invariably produces biased results owing to recall. Finally, the study did not examine additional variables that could affect stress mindset levels, such as active rumination and appreciation. Therefore, further research on the effects of other factors on stress mindset levels is required.

5 Conclusions

In summary, this study has significantly advanced the testing of several mediation models related to empathy and stress mindset in a sample of Chinese HCWs. These findings imply that self-disclosure and social support play concurrent and sequential mediating roles in the relationship between empathy and stress mindset. The results of this study will help attenuate stress mindset among HCWs and provide a better understanding of the connection between empathy and stress mindset.

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 Ethics Committee of Weifang Medical College. Written informed consent to participate in this study was provided by the patient/participants or patient/participants' legal guardian/next of kin.

Author contributions

JW: Project administration, Formal analysis, Supervision, Data curation, Conceptualization, Writing – review & editing, Writing – original draft, Software, Investigation. JD: Writing – review & editing, Software, Investigation, Conceptualization. DW: Writing – review & editing, Supervision, Methodology, Data curation. LW: Writing – review & editing, Supervision, Methodology, Data curation. FC: Writing – review & editing, Validation, Supervision, Project administration, Methodology. GL: Writing – review & editing, Project administration, Formal Analysis. LS: Writing – review & editing, Visualization, Validation. JL: Writing – review & editing, Resources, Funding acquisition.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This work was supported by The Education and Teaching Reform Project of the Psychology and Education Reference Committee of the Ministry of Education (Grant Number 20221013), the Medical Education Research project of the Chinese Medical Association (Grant Number 2020A-N12063), the National Natural Science Foundation of China (NSFC) (Grant Number 82101588), the Surface project of the Natural Science Foundation of Shandong Province (Grant Number ZR2020MC218), the Institute of Psychology, Chinese Academy of Sciences (Grant Number GJ202002), the study on Social Science Planning in Shandong Province (Grant Number 19CYMJ06), the Shandong Province school ideological and political teaching reform project key project (Grant Number SDS2020B19), the Ministry of Education industry-school cooperative education project (Grant Number 201902195007), and the Department of Social Sciences, Ministry of Education (Grant Number 18JD710082).

Acknowledgments

We appreciate the participants' contribution of their time and the hospital's help with data collection. Thank you very much.

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

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyt.2024.1399167/full#supplementary-material

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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 23 September 2024
DOI 10.3389/fpubh.2024.1420384

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OPEN ACCESS

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RECEIVED 20 April 2024
ACCEPTED 03 September 2024
PUBLISHED 23 September 2024

CITATION
Yang Y, Chang H, Guo S, Gao XL, Wang L and Ma A (2024) Self-compassion and work engagement among Chinese nurses: exploring mediating effects of depression, anxiety, and stress.
Front. Public Health 12:1420384.
doi: 10.3389/fpubh.2024.1420384

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Self-compassion and work engagement among Chinese nurses: exploring mediating effects of depression, anxiety, and stress

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Objective: Work engagement significantly influences both the quality of nursing care and nurses' job performance. In this study, we aimed to explore the mediating effects of negative emotions on the relationship between self-compassion and work engagement among Chinese nurses.

Method: A cross-sectional study was performed on nurses in a tertiary A hospital located in Henan province from September, 2023 to December, 2023. Custom-designed digital surveys were disseminated to gather pertinent data. Structural Equation Modelling (SEM) were utilised to analyse the data and determine relationships among self-compassion, negative emotions and work engagement.

Results: A total of 1,201 nurses were included. According to the statistical model, self-compassion ($\beta = 0.116$, CI: -0.036 to -0.008, $p < 0.001$) and negative emotions ($\beta = -0.372$, CI: -0.053 to -0.033, $p < 0.001$) were correlated with work engagement. Furthermore, our analysis revealed that negative emotions partially mediated the relationship between self-compassion and work engagement ($\beta = 0.174$, CI: -0.066 to -0.020, $p < 0.01$).

Conclusion: These findings indicate that incorporating self-compassion and negative emotion regulation in interventions targeting work engagement may enhance the overall level of work engagement among nurses, thereby improving job satisfaction and the quality of patient care.

KEYWORDS

self-compassion, negative emotions, work engagement, nurses, structural equation modelling

Introduction

Work engagement is characterised by a positive, affective-motivational state marked by elevated energy levels, unwavering dedication and a profound focus on professional responsibilities (1). In the past two decades, there has been a notable escalation in the number of studies dedicated to the exploration of work engagement. The current landscape of work

engagement research reveals several notable trends. One particularly significant development involves the exploration of engagement as a dynamic phenomenon, subject to fluctuations within individuals across various temporal and situational contexts (2). This includes investigations into daily work engagement, as well as the examination of weekly and episodic variations in an individual's engagement levels. Furthermore, there is a growing body of research exploring the intersection between engagement and human resource management (HRM) systems and practices, with a specific focus on their impact on employee work experiences (3). Another noteworthy trend centres around the intricate relationship between leadership and engagement, as evidenced by studies such as those conducted by Prochazka et al. (4) and Decuypere and Schaufeli (5). These highlight a heightened interest in understanding how different leadership styles, behaviors and approaches influence the engagement levels of employees. Khusanova et al. (6) investigated diverse workplaces to confirm the associations among job meaningfulness, work engagement and performance. The findings indicated a positive relationship between job meaningfulness and work engagement, highlighting the interconnectedness between work engagement and performance.

Although some studies revealed the relationship between work engagement and individual places, practices and leaders, whether psychological flexibility affects work engagement remained unclear. Therefore, this study proposed to test the relationship between self-compassion and work engagement, and the role of depression, anxiety and stress (DASS) among Chinese nurses. The relationships between the variables mentioned above are described in the following sections.

Work engagement is a critical construct as it is intricately linked to the well-being of staff and the overall performance of their roles (37). Work engagement encompasses three key dimensions: vigor, dedication and absorption (38). The attribute of vigor at the workplace signifies the mental fortitude and dynamic energy that professionals bring to their daily tasks. Dedication, on the other hand, reflects an unwavering devotion to one's job, accompanied by a deep sense of purpose, the willingness to tackle challenges, a state of inspiration, and an emotional investment of pride and eagerness in one's work. Additionally, being engrossed in one's work signifies a level of complete concentration and profound involvement in job-related activities. Employees who benefit from positive workplace environments, characterized by just compensation, employment continuity, and opportunities for advancement, tend to report increased job satisfaction and a stronger sense of job security. Existing studies have shown that the level of engagement among nursing staff is significantly linked to the quality of nursing care and can foresee the dynamics of nurse–patient interactions (39), as well as the intentions of nurses to leave their positions (40). A research conducted by Babenko et al. (7) revealed that physicians who practice self-compassion exhibit higher levels of work engagement and report lower levels of fatigue due to job demands, leading to greater overall satisfaction with their professional lives. Additionally, another study observed a positive association between self-compassion and work engagement among employees in the Netherlands (41). The Self-Determination Theory (SDT) and its associated psychological constructs are utilized to hypothesize the impact of self-compassion on employee engagement in the workplace, SDT categorizes motivation into extrinsic, intrinsic, and amotivation types (41). Evidence from select research indicates that intrinsic motivation plays a pivotal role in fostering a heightened level of engagement among employees.

Self-compassion, the act of extending understanding and kindness towards one's own internal struggles, proves to be a constructive method for navigating challenging thoughts and emotions, fostering both mental and physical well-being (8). Self-compassion revolves around preserving inner balance when confronted with unfavourable situations, embracing the current moment of life as it unfolds. Self-compassion can be directed inward when one undergoes suffering that is not attributable to personal fault instances where external life circumstances are inherently painful or challenging to endure. Additionally, it serves as a vital internal asset, enabling individuals to discover optimism and inner resilience in the face of life's challenges. The primary advantages of self-compassion are associated with the effective coping mechanisms and stress management strategies employed by individuals who possess high levels of self-compassion. Additionally, these individuals demonstrate proficiency in self-regulation, enabling them to navigate and maintain a harmonious spectrum of both positive and negative emotions (9). Drawing from the research findings, it is evident that incorporating self-compassion education serves as a highly effective approach to enhance positive emotions and mitigate negative emotions among nursing students (10).

The positive outcomes of emotional experiences can include enhanced self-efficacy and a sense of empowerment, both of which are essential for work engagement. These elements have been validated through empirical research within the frameworks of social cognitive theory and cognitive motivation theories (42). In the present study, the negative emotions included the depression, the anxiety and stress. Chen et al. (11) discovered a pronounced link between experiencing negative emotions and the practice of self-compassion. This implies that nurturing a deep sense of self-compassion can be beneficial for people facing adversity. By doing so, it can help to lower the degree of self-blame one might experience and alleviate the constant reflection on negative events, which in sum, can lead to improved mental health and well-being (12). Self-compassion plays a pivotal role in alleviating negative emotional responses within the occupational sphere (43). Conversely, emotions, being interconnected with job performance, can function as a mediator in the workplace (39). Additionally, a strong correlation seems to exist between the extent of engagement in one's work and the ability to manage negative emotions effectively. However, the current research tends to concentrate on physicians and patients, often overlooking nurses in such investigative studies.

Hence, our study aims to elucidate the interplay among Chinese nurses' work engagement, negative emotions and self-compassion. We hypothesised that self-compassion is positively correlated with degree of work engagement. Negative emotion plays the role of partially mediated between self-compassion and work engagement. We constructed a hypothetical model, which is depicted in Figure 1.

Methods

Participants and procedure

To explore the levels of work engagement, self-compassion, and negative emotions among nursing professionals, our study employed a structured assessment through an online, confidential questionnaire.

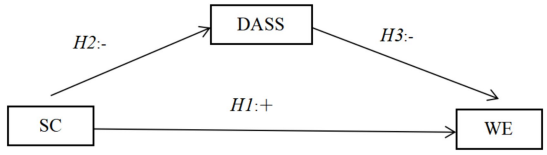

FIGURE 1
Hypothesized model of relationships among self-compassion, negative emotions and work engagement.

The cross-sectional study, conducted in Henan province, involved a convenience sampling method applied at a tertiary A hospital.

Our research utilized a digital recruitment strategy, active between September 1st and December 1st, 2023. To qualify for the study, the participants consisted of nurses that had to meet the following criteria: (1) to be a licensed registered nurse; (2) actively working during the survey period; (3) with at least 6 months of experience in their current healthcare facility. Additionally, our research did not encompass the participation of additional healthcare specialists.

The web-based survey, facilitated by a digital platform (https://www.wjx.cn, accessed from September 1, 2023 to December 1, 2023). The Nursing Department distributed information to the nurses and offered guidance on engaging with the social media application. All participants are informed and consent to the research and have the right to withdraw at any time. Upon survey completion, participants received messages of gratitude in digital form for their contribution to the research endeavour. The study bolstered its credibility by incorporating a robust sample size of 1,300 eligible registered nurses from the hospital, thereby mitigating potential non-response biases.

Measurements

Utrecht work engagement scale

The Chinese version of Schaufeli and Bakker's (13) Utrecht Work Engagement Scale (UWES) was employed for evaluating work engagement (14). It comprises three subscale dimensions—vigor, dedication, and absorption—across sixteen items. Each item is scored on a scale ranging from 0 to 4. A Cronbach's alpha coefficient of 0.90 was obtained. In our study, the Cronbach's alpha for the UWES was 0.866.

Self-compassion scale

The Self-Compassion Scale (SC), originally developed by Neff (15), was employed in its Chinese version to assess self-compassion. Chen et al. (11) reported a retest reliability of 0.89 and a Cronbach's alpha of 0.84. The scale consists of 26 items across six categories: self-judgment, self-kindness, isolation, mindfulness, and over-identification. Participants rated each item on a 5-point Likert scale. Higher scores indicate lower levels of negative emotions and higher levels of self-compassion. In our study, the Cronbach's alpha for the SC was 0.875.

Depression-anxiety-stress scale

To measure unpleasant feelings, the Depression, Anxiety, and Stress Scale – 21 Items (DASS-21) (16) was utilized. Each dimension comprises seven questions, scored from 0 to 3, with higher scores indicating stronger negative emotions. The Chinese version of the DASS-21 has demonstrated reliability and validity (17, 18). Li et al. (19) reported a test–retest reliability of 0.751 and a Cronbach's alpha of 0.912. In our investigation, the questionnaire's Cronbach's alpha was 0.916.

Demographic information

Demographic variables, as outlined by Yang et al. (20), included gender, age, education, marital status, years of work experience, sleep quality, and physical exercise.

Statistical analysis

Descriptive statistics, including means and standard deviations, were computed for participants' demographic details and variable levels. Pearson's correlation analysis examined relationships between variables. Structural equation modeling (SEM) assessed the mediation model, with self-compassion as the independent variable, UWES as the dependent variable, the DASS-21 as the mediating factor, and working years as the regulatory variable. The validity assessment relied on a suite of fit indices, including the chi-square statistic adjusted for degrees of freedom, the Comparative Fit Index (CFI), the Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). Acceptable model fit is suggested by SRMR values under 0.07, RMSEA values under 0.08, and CFI, GFI, and AGFI values exceeding 0.95 (22). Additionally, convergent validity was gauged by examining the Average Variance Extracted (AVE) and composite reliability metrics, adhering to the benchmark where AVE exceeds 0.50 and reliability surpasses 0.70. AMOS 23.0 and SPSS 25.0 were utilized for the analysis.

Results

Demographics

A total of 1,300 nurses participants in this study, 1,201 (92.38%) wrote a response to the questionnaire question (Table 1). These respondents were 1,151 (96.10%) being female and 47 being male. The average age of participants is 32.65 (±6.90) years. 75.40% of participants are married, 85.10% hold a bachelor's degree, 70.50% have at least one child, and 31.50% have worked for six to ten years.

Measurement model

The effectiveness of the proposed model was assessed through confirmatory factor analysis involving all variables. Due to low factor loadings (below 0.6), two items were excluded from the Self-Compassion (SC) scale, consistent with prior research methodologies (21). Following these adjustments, the model demonstrated satisfactory fit (22).

Moreover, Tables 2, 3 present discriminant and convergent validity results, respectively (23, 24). The Average Variance Extracted (AVE) values ranged from 0.523 to 0.759, and Composite Reliability (CR) values ranged from 0.654 to 0.904, meeting the criteria for convergent validity (Table 2) (24). Table 3 exhibits the correlation matrix for the variables under investigation.

10.3389/fpubh.2024.1420384

TABLE 1 Demographic characteristics of the sample used in this study.

Characteristics	Total sample (*N* = 1,569)
Female, *n* (%)	1,154 (96.10)
Age, mean (SD) [range]	32.65 (6.90) [21–55]
Education, *n* (%)	
Some college	179 (14.90)
Undergraduate	1,013 (84.35)
Postgraduate	9 (0.75)
Marital status, *n* (%)	
Unmarried	278 (23.10)
Married	905 (75.40)
Divorced	15 (1.2)
Widowed	3 (0.20)
Number of children, *n* (%)	
0	355 (29.50)
1	516 (43.00)
2	328 (27.30)
≥3	2 (0.20)
Years of work experience, *n* (%)	
≤5	326 (27.20)
6–10	378 (31.50)
11–15	292 (24.30)
≥16	205 (17.00)
Sleep quality, *n* (%)	
Excellent	20 (1.70)
Good	206 (17.20)
Fair	655 (54.50)
Poor	262 (21.80)
Very poor	58 (4.80)
Physical exercise, *n* (%)	
Usually	80 (6.70)
Sometimes	207 (17.20)
Occasionally	562 (46.80)
Never	352 (29.30)
Participate in emotion management training, *n* (%)	
Usually	7 (0.60)
Sometimes	114 (9.50)
Occasionally	321 (6.70)
Never	756 (63.20)
Attend nurse self-compassion training, *n* (%)	
Usually	18 (1.50)
Sometimes	158 (13.20)
Occasionally	445 (37.10)
Never	580 (48.30)
WE, mean (SD) [range]	53.28 (5.66) [16–80]
SC, mean (SD) [range]	73.09 (6.87) [26–130]
DASS, mean (SD) [range]	32.44 (7.30) [21–84]

Psychological Flex Work Engagement Score, WE; Self-compassion, SC; Depression, Anxiety, and Stress, DASS.

TABLE 2 Construct validity.

Construct	Dimension number	Estimate	AVE	CR
SC	Over-identified	0.690	0.589	0.654
	Isolation	0.844		
	Common Humanity	−0.365		
	Self-Judgment	0.796		
DASS	Stress	0.879	0.759	0.904
	Anxiety	0.865		
	Depression	0.870		
WE	Vigour	0.629	0.523	0.765
	Dedication	0.800		
	Absorption	0.729		

TABLE 3 Discriminatory validity.

	SC	DASS	WE
SC			
DASS	−0.456***		
WE	0.119***	−0.308***	
Skewness	−0.058	0.146	−0.241
Kurtosis	−0.240	−1.170	−0.707
AVE-square root	0.699	0.871	0.723

***$p < 0.001$: the diagonal line represents the amount of variance variation extracted for AVE evaluation.

The kurtosis values, ranging from −1.170 to −0.240 (below an absolute value of 8), and skewness values, ranging from −0.241 to 0.146 (below an absolute value of 3), indicate a normal distribution for all variables. All relationships were found to be statistically significant ($p < 0.01$), with a notably positive correlation ($p < 0.001$) observed between work engagement and self-compassion, and a negative correlation with negative emotions.

Furthermore, discriminant validity was confirmed as the square roots of the AVE exceeded the correlations between corresponding variables in Table 2. The variance inflation factor values ranged from 1.263 to 1.433, indicating the absence of multicollinearity issues.

Structural model

The mediating role of DASS-21 in the relationship between SC (Social Capital) and WE (Work Engagement) was examined using Structural Equation Modeling, as depicted in Figure 2. The mediation analysis met satisfactory criteria based on the SEM fit indices: Chi-square/df = 2.724, CFI = 0.989, GFI = 0.986, AGFI = 0.972, RMSEA = 0.038, and SRMR = 0.030.

Figure 2 illustrates our findings that SC has a direct impact on DASS, which subsequently influences work engagement. There is a statistically significant correlation ($\beta = 0.116$, $p < 0.05$) between SC and WE. Additionally, there is a significant positive correlation between WE and years of work experience ($\beta = 0.09$, $p < 0.01$).

Importantly, Table 4 demonstrates that DASS serves as a mediator in the relationship between SC and WE, with a mediating effect of 0.174. The findings in Table 4 present 95% confidence intervals, indicating the significance of the indirect path coefficient.

Discussion

In this study, we sought to explore the mediating effects of negative emotions on the relationship between self-compassion and work engagement among Chinese nurses. Our findings provide valuable insights into how these psychological factors interact and influence work engagement, which is critical for enhancing job performance and overall well-being in nursing professionals. First, our results indicate that self-compassion is positively associated with work engagement. Nurses with higher levels of self-compassion may be better equipped to manage the emotional and physical stresses of their job, leading to greater work engagement (26). Given the high-stress environment of nursing, it is not surprising that negative emotions significantly impact work engagement. Importantly, our analysis shows that negative emotions partially mediate the relationship between self-compassion and work engagement. The self-compassion group demonstrated increased work engagement attributed to a reduction in negative affect, as reported by Dreisoerner et al. (25). This suggests that while self-compassion directly enhances work engagement, it also does so indirectly by reducing negative emotions (26). Nurses who cultivate self-compassion may experience fewer negative emotions, thereby maintaining higher levels of engagement. This partial mediation indicates that interventions aimed at boosting self-compassion could be a promising strategy for not only improving nurses' emotional well-being but also enhancing their engagement at work.

With the increasing pressure on employment and intensifying competition, work engagement is gaining more attention from employers and leaders as a valuable human resource. Numerous research endeavors have shown substantial interest in the realm of WE. This encompasses the examination of authentic leadership (AL) and its impact on work engagement, as well as the intricate relationships between task performance and organizational outcomes (27, 28). Currently, there is a limited body of research exploring the correlation between Self-compassion and Work Engagement among Chinese nurses. To address this gap, this research investigated the impact of Self-Compassion, Depression, Anxiety, and Stress on the Work Engagement of Chinese nurses through a comprehensive survey. The findings indicated a direct and adverse impact of Self-Compassion on Work Engagement among Chinese nurses. On the basis of Acceptance and Commitment Therapy (ACT) (29), self-compassion is a vital component of mental health, cultivating self-compassion can lead to improvements in various domains of psychological well-being, including reduced anxiety and depression, increased resilience, and enhanced quality of life. Self-Compassion was associated with higher levels of work engagement. Moreover, a longitudinal increase in psychological flexibility corresponded to a subsequent rise in work engagement levels (26).

This research revealed that DASS play intermediary roles in Self-Compassion and work engagement in Chinese nurses. The findings align with earlier research, corroborating the established conclusions. Mental health serves as a mediator between self-compassion and work engagement in influencing the job performance of ICU nurses (26). Cultivating self-compassion could serve as an effective strategy for

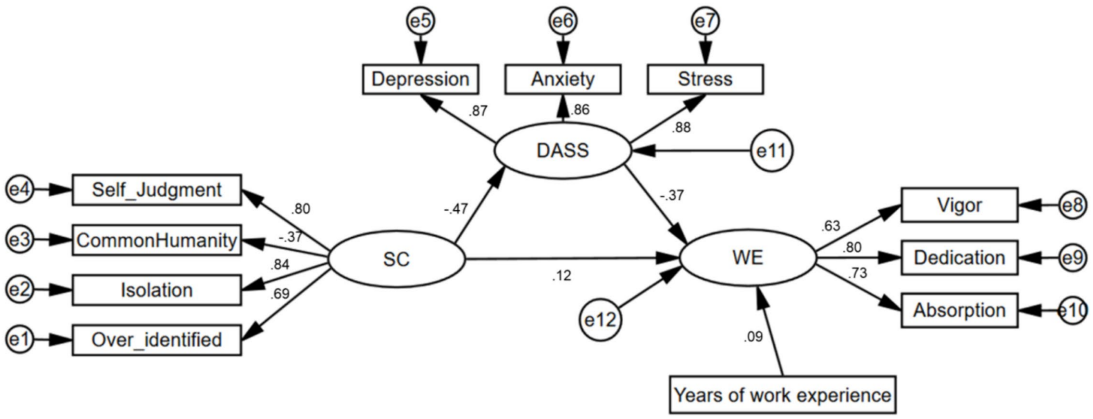

FIGURE 2
Model diagram describing that negative emotions mediate the correlation between work engagement and self-compassion.

TABLE 4 Direct and indirect effects of the final model.

Effect	Path	Estimate	*p*-value	95% Bias-corrected CI	
Direct	SC→WE	0.116	0.000	−0.036	−0.008
	DASS→WE	−0.372	0.000	−0.053	−0.033
Indirect	SC→DASS→WE	0.174	0.001	−0.067	−0.021
Total direct		0.059	0.002	−0.286	−0.068

safeguarding the mental well-being of employees in nations where mental health issues are inversely linked to work engagement and intrinsic motivation (30). The findings validated that physicians who practiced self-compassion demonstrated heightened levels of positive work engagement, reduced feelings of emotional, physical, and cognitive exhaustion resulting from work demands, and reported greater satisfaction with their professional lives compared to their counterparts who displayed lower levels of self-compassion amidst uncertain and challenging circumstances (7). The correlations between emotional disorders and work engagement were found to be consistently significant. Moreover, emotional disorders were identified as partial mediators in the links between conflict management styles and work engagement (31). The study conducted by Nordin et al. (32) discovered a positive relationship between psychological capital and work engagement. There was a notable correlation observed between emotional disorders and work engagement, emotional disorders were found to play a partial mediating role in the connections between conflict management styles and work engagement (31). According to Perepelkin and Wilson (33), a distinct perspective emerged indicating that burnout serves as a complete mediator in the relationship between anxiety and employee engagement. This implies that anxiety by itself does not suffice to diminish employee engagement. This outcome aligned with conclusions drawn from various other research investigations. These results imply that cultivating a strong sense of self-compassion and mental health could enhance one's level of work engagement. Furthermore, it was found in this study that years of work experience play a moderating role in work engagement, which is consistent with previous research. According to Wang et al. (34), the proportion of nurses with five or more years of experience, known as skill mix, had a significant impact on engagement. It was found that participants with less than five years of nursing experience contributed significantly to the variation in work engagement (35). In comparison to those employed for fewer than five years, individuals with five to nine years of experience experienced a notably higher level of burnout, which was negatively associated with health (36).

Limitations

There are several restrictions on the current investigation. First, our investigation, while built upon the findings of existing research, was inherently limited by its cross-sectional approach, which precluded the determination of causal linkages between the variables in question. Second, the application of a non-probability sampling technique, specifically convenience sampling, has confined the scope of our results' generalizability. Third, our research indicates that years of work experience have a moderating effect on job engagement and positively influence it in the structural equation model in the current investigation. However, we did not conduct a stratified analysis based on years of work experience to explore the impact of varying tenure levels on job engagement. Future research in this area is warranted.

Conclusions and implications to practice

Based on our analysis of a substantial sample of Chinese nurses, this study illuminates the relationship between negative emotions, self-compassion, and work engagement. It also offers insights into intervention strategies based on Acceptance and Commitment Therapy (ACT) aimed at enhancing nurses' work engagement.

Our research reveals a significant positive correlation between work engagement and self-compassion. Additionally, years of work experience exert influence on work engagement, while negative emotions serve as a mediator between self-compassion and work engagement.

Our findings suggest that high levels of self-compassion, a supportive work environment, and emotional regulation can enhance work engagement and increase productivity. Therefore, nursing managers should prioritize the physical and emotional well-being of their staff. This can be achieved by implementing policies that safeguard their health and cultivate a positive work environment, ultimately boosting employee engagement and productivity.

The insights from this study provide hospital administrators and nurses with a solid framework for enhancing work engagement among their colleagues.

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 humans were approved by Ethics Committee of Xinxiang Medical University (Ethics Committee approval number: 20230279). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

YY: Methodology, Writing – original draft. HC: Investigation, Conceptualization, Writing – review & editing. SG: Writing – review & editing. XG: Data curation, Investigation, Writing – review & editing. LW: Project administration, Writing – review & editing. AM: Conceptualization, Writing – original draft, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This work was supported by the Research Project of Humanities and Social Sciences, Department of Education of Henan Province (grant number: 2024-ZZJH-300), (grant number: 2021-ZZJH-303); Henan Province Key Research Project Plan for Higher Education Institutions (grant number: 23A630010); Henan Province Soft Science (grant number: 232400410294) (2022); Educational Teaching Research Practice Project at Xinxiang Medical University (grant number: 2024-XYJG-25); Henan Province Teaching Reform Project (grant number: 2024JKZD18); Xinxiang Social Science Federation (grant number: SKL-2024-384); and Henan Province Natural Science Foundation (grant number: 242300420113).

Acknowledgments

Many thanks to Professors Hongjuan Chang from Wuhan University of Science and Technology and Anna Ma from Xinxiang Medical University for their assistance in data collection and scientific guidance. We are grateful to all the nurses who took part in this study.

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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TYPE Original Research
PUBLISHED 25 September 2024
DOI 10.3389/fpubh.2024.1393743

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RECEIVED 29 February 2024
ACCEPTED 12 September 2024
PUBLISHED 25 September 2024

CITATION
Li N, Wang Y, Dong Y, Chen X, Zhang B, Chen X, Wang K and Sun Y (2024) The impact of psychological stress on physiological indicators in healthcare workers: a cross-sectional study.
Front. Public Health 12:1393743.
doi: 10.3389/fpubh.2024.1393743

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The impact of psychological stress on physiological indicators in healthcare workers: a cross-sectional study

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Background: Medical health workers play an essential role in the healthcare system and face unique workplace stressors. However, the impact of psychological stress on their physical health has received less attention compared to the general population.

Methods: We retrospectively analyzed the Self-rating Depression Scale (SDS) questionnaires and blood testing results from 1963 medical health workers. Multivariate linear regression analysis using a backward stepwise selection strategy to identify physical examination indicators that were significantly affected by depression.

Results: Depression severity, as measured by SDS index score, was positively correlated with the levels of hemoglobin (coefficient 0.0027, $p = 0.0412$), platelet count (coefficient 0.0005, $p = 0.0198$), and uric acid (coefficient 0.0004, $p = 0.0492$), while negatively correlated with red blood cell count (coefficient-0.0895, $p = 0.0406$). Similar results were observed in the subgroup analysis stratified by age and sex.

Conclusion: Our study found a significant association between higher levels of depression and specific physiological indicators in healthcare professionals, including elevated hemoglobin, platelet counts, and uric acid levels, as well as decreased red blood cell counts. These changes in blood parameters may reflect underlying physiological stress and inflammation, potentially increasing overall health risks for healthcare workers. Addressing these physiological changes may be crucial for mitigating the health risks associated with depression. To validate our findings and develop targeted interventions, larger multi-center studies are needed to further explore the relationship between depression severity and blood parameters in healthcare professionals.

KEYWORDS

psychological stress, medical health workers, cross-sectional study, self-rating depression scale (SDS), physiological indicators

1 Introduction

In the healthcare system, medical health workers play an essential role, yet they are subject to unique factors and multifaceted stressors that increase their susceptibility to psychological pressure (1, 2). These stressors are not only related to the high patient loads and complex, high-stakes medical decisions they must make but also include prolonged work hours, inadequate rest, and the emotional strain from regularly confronting patients' suffering and mortality (3). The pressure to maintain precision in fast-paced environments, coupled with the ethical and legal responsibilities inherent in patients' care, exacerbates these challenges (4). Moreover, healthcare workers often lack sufficient institutional support, further compounding their stress and potentially leading to burnout (5).

Given the intensity and persistence of these stressors, healthcare workers are at significant risk of chronic stress, which is increasingly recognized as a contributor to a range of physical health problems, such as cardiovascular disease, hypertension, and sleep disorders (6, 7). This chronic stress not only affects their well-being but also has implications for patient care quality, as stressed healthcare workers may experience decreased job performance and increased error rates (8). Therefore, investigating the psychological and physiological impact of stress on healthcare workers is crucial for both their health and the overall efficacy of healthcare systems.

Previous research has primarily focused on the psychological effects of stress, such as burnout, depression, and anxiety (9–11). However, the connection between psychological stress and physiological changes in healthcare workers remains underexplored, despite emerging evidence suggesting that chronic stress can lead to significant physiological alterations (12). For instance, psychological stress has been linked to changes in cardiovascular function, immune response, and metabolic processes, which could predispose individuals to long-term health issues (13–15). This gap in the literature highlights the need for further investigation into how stress affects specific physiological indicators in healthcare workers. For instance, Carpenter et al. found evidence that acute psychological stress and early-life adversity can impact the immune system by affecting the response of interleukin-6 (IL-6) in white blood cells (16). Another study reviewed the impact of psychological factors, such as stress, depression, social support, and optimism, on immune function and health (17). Although the effects of psychological stress on physical health have been extensively studied in the general population, relatively limited attention has been paid to its impact on medical staff, who are exposed to a unique set of stressors in the workplace.

Therefore, the objective of this study is to identify the key physiological indicators that are significantly affected by psychological stress among healthcare workers. Understanding the physiological manifestations of stress in healthcare workers is essential for developing comprehensive interventions that address both mental and physical health. By identifying specific physical examination indicators affected by psychological stress, we can gain insight into the broader health implications of stress in this population. These indicators can serve as objective measures to complement psychological assessments, offering a more holistic approach to evaluating and managing stress.

2 Methods

2.1 Participants

A retrospective study was performed by enrolling 1963 medical health workers, were from the Affiliated Hospital of Qingdao University, China. Participants' sociodemographic information, including gender, age, educational level, marital status, and income, was collected through hospital records and direct interviews. Psychological and physical characteristics were assessed using standardized tools as described below. The data collection process was carried out by trained medical personnel to ensure consistency and reliability. The sample size was determined based on the total number of employees undergoing routine health check-ups at the hospital during the study period. The final sample size of 1963 was obtained after excluding individuals not suitable for inclusion. Participants meeting the following criteria were included in the subsequent data extraction and analysis: (1) aged over 18 years; (2) completed the health examination for employees at hospital, including blood tests and demographic information collection; (3) independently and voluntarily completed relevant psychological self-assessment questionnaires. To ensure the integrity and validity of the data collected for investigation, the exclusion criteria were as follows: (1) individuals with severe liver or kidney dysfunction; (2) individuals with hyperthyroidism or hypothyroidism; (3) those who declined to participate in the study or failed to complete the stress self-assessment questionnaire.

2.2 Psychological stress questionnaires

The study questionnaire was composed of two main components. The first part recorded the following information: sociodemographic characteristics such as age, gender, marital status, education level. The second part involved the Self-rating Depression Scale (SDS), which was a 20-item self-assessment scale based on the emotional, psychological and physical symptoms related to depression (18). Each item was scored from 1 to 4 on a 4-level scale. SDS index scores (ranging from 0 to 100) are classified as normal (< 50), mild depression (50 to 59), moderate to marked major depression (60 to 69), and severe to extreme major depression.

2.3 Blood test data

Hematological parameters, including white blood cell count, neutrophil count, neutrophil ratio, lymphocyte count, lymphocyte ratio, monocyte count, monocyte ratio, red blood cell count, hemoglobin, eosinophil count, eosinophil ratio, basophil count, basophil ratio, and platelet count were measured using the Sysmex XT-2000iV multiple automated hematology analyzer. Biochemical parameters, including glucose, uric acid, urea, creatinine, and calcium were determined by Hitachi 7,600 Automatic Biochemical Analyzer.

All examinees are required to fast overnight before undergoing blood testing in the early morning.

2.4 Statistical analysis

The statistical analysis was conducted using SPSS (version 24.0, SPSS Inc., Chicago, IL) and R software (version 4.3.1, https://www.r-project.org/). Continuous variables were presented as mean ± standard deviation, while categorical variables were reported as numbers and percentages. The variability of demographic characteristics was compared using chi-square test and ANOVA. Multivariate regression analysis was performed to identify independent variables significantly associated with depression severity. A backward elimination procedure was carried out to iteratively removing the least significant variables until the lowest Akaike Information Criterion (AIC) was achieved. A p-value less than 0.05 was considered as the threshold for statistical significance.

3 Results

3.1 Basic characteristics of study subjects

In this study, a total of 1963 medical health workers were included, of whom 79.8% were female, with an average age of 34.74 years. Based on the SDS index scores (see Materials and Methods), participants were categorized into four groups according to the severity of depression (Table 1). Significant differences ($p < 0.05$) were observed in the proportion of female subjects, education level, income, systolic blood pressure, and red blood cell count among the individual SDS groups. Conversely, no notable inter-group differences were observed in age, marital status, BMI, diastolic blood pressure, and various blood test indicators ($p > 0.05$).

3.2 Multivariate regression analysis

Regarding the four levels of SDS index score, multivariate regression was conducted with physical examination indictors utilized as independent variables and sociodemographic characteristics included as covariates. By employing the backward elimination procedure (see Materials and Methods), nonsignificant independent variables were iteratively removed that led to an optimal regression model (Table 2). Upon obtaining the final output, it was observed that levels of hemoglobin (Coefficient: 0.0027, 95% CI: [0.0001,0.0054], $p = 0.0412$), platelet count (Coefficient: 0.0005, 95% CI: [0.0001,0.0009], $p = 0.0198$), and uric acid (Coefficient: 0.0004, 95% CI: [0.0000,0.0007], $p = 0.0492$) demonstrated positive correlations with depression severity. Conversely, red blood cell count exhibited a negative correlation (Coefficient: -0.0895, 95% CI: [−0.1750, −0.0039], $p = 0.0406$). Our results indicate that higher levels of hemoglobin, platelet count, and uric acid are significantly associated with increased depression severity. Conversely, a lower red blood cell count is significantly associated with reduced depression severity. Meanwhile, we found that covariates, such as education category (Coefficient: -0.0469, 95% CI: [−0.0809, −0.0130], $p = 0.0068$) and income category (Coefficient: -0.0420, 95% CI: [−0.0641, −0.0198], $p = 0.0002$), are negatively correlated with depression severity.

3.3 Subgroup analysis

We conducted further subgroup analyses on the same cohort, dividing participants based on age and sex. The age subgroup analysis involved categorizing participants into three groups: young (below 30 years), middle-aged (30 to 40 years), and older (over 40 years) individuals. Similarly, the sex subgroup analysis involved segregating participants into male and female categories. In multivariate regression analysis on each subgroup, we observed consistent positive or negative correlations between depression severity and physical examination indictors (Figure 1). In females, SBP is negatively correlated with depression severity, while platelet count is positively correlated with depression severity. In males, RBC Count is negatively correlated with depression severity. In the age group of 20–40 years, uric acid is positively correlated with depression severity. However, due to the smaller sample size of subgroups, some of the observed correlations did not reach statistical significance ($p > 0.05$).

4 Discussion

This study sought to bridge the existing research gap by investigating the impact of depressive symptoms on the physical health of medical staff, a topic that has received relatively limited attention. While prior studies have extensively examined the association between psychological distress and physical health within the general population, the unique experiences of medical staff, who encounter distinct stressors in their work environment, remain understudied. The observed associations between depressive symptoms and specific physical health indicators, such as elevated uric acid and platelet levels, underscore the potential physiological consequences of psychological stress in healthcare workers. This highlights the need for more nuanced approaches to mental health assessments, where physical health indicators could serve as complementary markers of psychological distress. For instance, the interplay between oxidative stress and depression, as evidenced by the elevated uric acid levels, may offer novel insights into how chronic stress affects metabolic pathways.

In our study, we observed a significant positive correlation between depression severity and uric acid levels in the blood of healthcare workers. This finding is consistent with previous research that highlights elevated serum uric acid levels in individuals with depression (19–21). Specifically, studies have demonstrated that psychological distress is often associated with increased oxidative stress and lipid peroxidation, which can elevate uric acid levels (22). This aligns with our results, reinforcing the notion that uric acid may serve as a biomarker for psychological conditions. The convergence of our findings with the existing literature suggests that uric acid's role in depression could be a reflection of its involvement in oxidative stress pathways.

From a biological perspective, depression-induced low mood may facilitate lipid peroxidation, contributing to increased oxidative damage. This oxidative stress can enhance nucleic acid degradation, subsequently elevating serum uric acid levels (23). These mechanisms underscore the importance of considering uric acid as a potential biomarker for psychological stress among healthcare workers. Furthermore, integrating our findings with research on the interplay

TABLE 1 Basic characteristics of the study participants.

	Total	SDS normal	SDS mild	SDS moderate	SDS severe	*p*-value
	n = 1963	*n* = 1,682	*n* = 208	*n* = 58	*n* = 15	
Age	34.74 (8.17)	34.84 (8.23)	34.57 (8.30)	32.93 (6.32)	32.93 (4.11)	0.271
Male (%)	397 (20.2)	359 (21.3)	33 (15.9)	5 (8.6)	0 (0.0)	0.006
Female (%)	1,566 (79.8)	1,323 (78.7)	175 (84.1)	53 (91.4)	15 (100.0)	
Marital status (%)						0.584
Married	1,478 (75.3)	1,274 (75.7)	152 (73.1)	39 (67.2)	13 (86.7)	
Unmarried	470 (23.9)	395 (23.5)	54 (26.0)	19 (32.8)	2 (13.3)	
Other	15 (0.8)	13 (0.8)	2 (1.0)	0 (0.0)	0 (0.0)	
Education (%)						<0.001
Middle school	10 (0.5)	8 (0.5)	2 (1.0)	0 (0.0)	0 (0.0)	
High school	4 (0.2)	2 (0.1)	2 (1.0)	0 (0.0)	0 (0.0)	
Junior college	153 (7.8)	116 (6.9)	31 (14.9)	4 (6.9)	2 (13.3)	
Undergraduate	1,256 (64.0)	1,062 (63.1)	136 (65.4)	46 (79.3)	12 (80.0)	
Master	349 (17.8)	316 (18.8)	28 (13.5)	5 (8.6)	0 (0.0)	
PhD	191 (9.7)	178 (10.6)	9 (4.3)	3 (5.2)	1 (6.7)	
Income by RMB (%)						<0.001
<1,000	20 (1.0)	17 (1.0)	0 (0.0)	2 (3.4)	1 (6.7)	
1,000–2000	25 (1.3)	18 (1.1)	5 (2.4)	1 (1.7)	1 (6.7)	
2,000–3,000	18 (0.9)	11 (0.7)	7 (3.4)	0 (0.0)	0 (0.0)	
3,000–5,000	169 (8.6)	129 (7.7)	28 (13.5)	12 (20.7)	0 (0.0)	
5,000–10,000	950 (48.4)	809 (48.1)	102 (49.0)	29 (50.0)	10 (66.7)	
10,000–15,000	594 (30.3)	525 (31.2)	53 (25.5)	13 (22.4)	3 (20.0)	
15,000–20,000	64 (3.3)	57 (3.4)	6 (2.9)	1 (1.7)	0 (0.0)	
>20,000	123 (6.3)	116 (6.9)	7 (3.4)	0 (0.0)	0 (0.0)	
BMI	23.29 (3.59)	23.35 (3.62)	22.75 (3.25)	23.43 (3.77)	22.94 (2.45)	0.141
SBP	119.94 (12.32)	120.19 (12.18)	118.95 (13.38)	118.34 (11.41)	111.93 (12.67)	0.025
DBP	73.33 (9.47)	73.46 (9.50)	72.84 (9.50)	72.07 (8.38)	69.53 (8.01)	0.226
WBC count	6.07 (1.59)	6.07 (1.61)	6.00 (1.52)	6.26 (1.56)	6.20 (1.01)	0.727
Neutrophil count	3.36 (1.24)	3.36 (1.25)	3.33 (1.20)	3.50 (1.21)	3.47 (0.80)	0.804
Neutrophil percentage	54.50 (8.41)	54.46 (8.48)	54.62 (7.96)	55.08 (8.23)	55.95 (8.44)	0.847
Lymphocyte count	2.16 (0.59)	2.16 (0.60)	2.13 (0.55)	2.21 (0.57)	2.19 (0.60)	0.793
Lymphocyte percentage	36.41 (7.84)	36.44 (7.90)	36.32 (7.53)	35.97 (7.23)	35.33 (8.10)	0.915
Monocyte count	0.39 (0.12)	0.39 (0.12)	0.39 (0.12)	0.39 (0.10)	0.39 (0.11)	0.969
Monocyte percentage	6.53 (1.65)	6.53 (1.67)	6.61 (1.50)	6.50 (1.73)	6.31 (1.02)	0.854
RBC count	4.61 (0.44)	4.63 (0.44)	4.52 (0.40)	4.56 (0.33)	4.59 (0.32)	0.011
Hemoglobin	135.43 (14.30)	135.63 (14.53)	134.19 (13.17)	133.79 (11.30)	136.53 (12.67)	0.433
Eosinophil count	0.12 (0.10)	0.12 (0.10)	0.11 (0.08)	0.12 (0.07)	0.12 (0.09)	0.734
Eosinophil percentage	1.99 (1.54)	2.01 (1.58)	1.88 (1.32)	1.90 (1.10)	1.89 (1.31)	0.682
Basophil count	0.03 (0.02)	0.03 (0.02)	0.03 (0.02)	0.03 (0.01)	0.03 (0.02)	0.906
Basophil percentage	0.57 (0.29)	0.57 (0.29)	0.57 (0.28)	0.54 (0.17)	0.52 (0.32)	0.846
Platelet count	256.90 (56.89)	256.17 (57.41)	257.92 (52.69)	273.47 (48.72)	260.33 (76.62)	0.15
Glucose	4.95 (0.66)	4.95 (0.65)	4.96 (0.77)	4.90 (0.48)	4.74 (0.46)	0.596
Uric acid	295.71 (80.27)	296.14 (80.54)	292.71 (79.06)	285.15 (73.51)	329.13 (89.09)	0.268
Urea	4.77 (1.53)	4.78 (1.59)	4.66 (1.14)	4.85 (1.03)	4.47 (0.75)	0.617

(Continued)

TABLE 1 (Continued)

	Total	SDS normal	SDS mild	SDS moderate	SDS severe	*p*-value
	n = 1963	*n* = 1,682	*n* = 208	*n* = 58	*n* = 15	
Creatinine	81.27 (24.53)	81.52 (26.10)	80.21 (12.05)	77.89 (8.53)	80.71 (5.37)	0.642
Calcium	2.40 (0.09)	2.40 (0.09)	2.40 (0.10)	2.40 (0.09)	2.39 (0.12)	0.867

SBP, systolic blood pressure; DBP, diastolic blood pressure; WBC, white blood cell; RBC, red blood cell.

TABLE 2 Significant variables associated with depression severity in multivariate regression.

		Coefficient	(95% CI)	*P*-value
Independent variables	SBP	−0.0021	(−0.0041, −0.0001)	0.0374
	RBC Count	−0.0895	(−0.175, −0.0039)	0.0406
	Hemoglobin	0.0027	(0.0001, 0.0054)	0.0412
	Platelet count	0.0005	(0.0001, 0.0009)	0.0198
	Uric acid	0.0004	(0.0000, 0.0007)	0.0492
Covariates	Age category	0.0254	(−0.0145, 0.0653)	0.2121
	Sex	0.0744	(−0.0081, 0.1569)	0.0772
	Marital Status	0.0016	(−0.0584, 0.0617)	0.9573
	Education category	−0.0469	(−0.0809, −0.0130)	0.0068
	Income category	−0.0420	(−0.0641, −0.0198)	0.0002

between psychological disorders and metabolic pathways highlights the necessity for further interdisciplinary studies to explore these associations in depth (24, 25).

Our study also found a positive correlation between depression severity and platelet levels. This observation is supported by existing research, which suggests that depression and anxiety can activate the sympathetic nervous system, influencing platelet activity and production (26). Furthermore, the role of the immune system in both depression and platelet regulation warrants investigation, particularly in light of emerging research on the interactions between depressive symptoms and immune function (27, 28). Additionally, these findings hold significant clinical implications. Monitoring platelet levels may offer valuable insights into the physiological manifestations of depression (29, 30), potentially aiding in the early identification and management of depression-related issues among medical health workers.

We identified a positive correlation between higher depression severity and increased hemoglobin levels, as well as a negative correlation with red blood cell count. This seemingly contradictory discovery may have rational explanations, which include the following three possibilities: (1) Depression may lead to the breakdown of red blood cells, resulting in the release of hemoglobin into the bloodstream. This could cause an elevation in hemoglobin levels while decreasing the overall count of intact red blood cells. (2) Depression may cause a transfer of red blood cells from peripheral circulation to specific organs or tissues, thereby reducing their total count, but increasing the levels of hemoglobin. (3) The body may respond to depression by compensating for the decreased red blood cell count through increased production of hemoglobin. (4) The relationship between hemoglobin levels and depression severity may be influenced by other unmeasured factors, such as nutritional status, hydration levels, or the presence of chronic inflammatory conditions. Additionally, the observed correlations might be confounded by external stressors unrelated to occupational factors, suggesting the need for more comprehensive assessments that account for these variables in future research. These explanations align with existing research on the physiological responses to depression and provide insight into the complex interactions between depression and hematological parameters (31).

Our study has important implications and contributions in the field of healthcare (32). Firstly, we have identified specific physical examination indicators that may be influenced by depressive symptoms among medical staff, thereby contributing to their overall health and welfare (33). The integration of these biomarkers into routine health evaluations can potentially transform how depression is managed among healthcare professionals. Early identification through these indicators allows for timely, targeted interventions that not only address mental health symptoms but also prevent the potential downstream physiological consequences. This approach could reduce the burden of disease associated with untreated depression and improve overall workforce health and productivity. Secondly, the recognition of these impacts enhances patient care, as appropriate measures can be implemented to effectively address and manage depression, leading to improved health outcomes. Offering access to counseling services, stress management programs, and mental health resources not only addresses current mental health concerns but also helps prevent the escalation of depressive symptoms. Thirdly, the findings of our study can inform the development of preventive strategies aimed at reducing depression levels among medical staff (34). By taking proactive measures to assist medical professionals in managing depression before it adversely affects their health, we can promote their well-being. Additionally, our study provides a valuable foundation for future research in this area, which can explore the underlying mechanisms and evaluate targeted interventions to enhance the well-being of medical professionals.

An important advantage of studying medical staff with less occupational heterogeneity is the increased precision and validity of

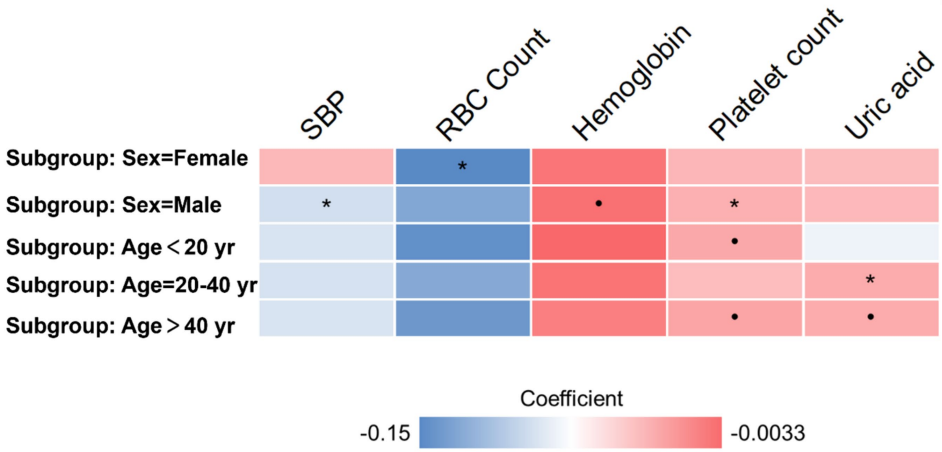

FIGURE 1
Subgroup analyses based on age and sex. Heatmap presents the coefficient in multivariate regression. The • mark indicates $p < 0.1$. The * mark indicates $p < 0.05$.

assessing the impact of specific occupational factors on health outcomes. As medical staff share similar occupational exposures and work-related risks, the homogeneity of this population allows for more accurate evaluations of the effects of occupational factors on health. This unique advantage enhances the internal validity of the study findings, providing robust evidence for the associations between occupational factors and health outcomes. By minimizing the confounding effects of diverse occupations, research on medical staff can provide valuable insights into targeted interventions and policies in the field of occupational health.

This study also has several limitations that need to be acknowledged. Firstly, the retrospective study design imposes inherent constraints that make it difficult to completely avoid selection bias, potentially distorting our findings. This design also restricts our ability to establish temporality, making it difficult to determine whether the observed correlations are causal or simply associative. For example, while we found significant correlations between depression severity and certain physical examination indicators, we cannot definitively conclude that depression caused these changes, as the retrospective nature of the study does not allow us to rule out the possibility of reverse causation or other underlying factors. Secondly, since the study was conducted solely within a single medical center, caution is advised when generalizing and applying our results to broader populations or settings. The specific work environment, stressors, and population characteristics of this medical center might not fully represent those of other healthcare settings, thereby cautioning against broadly applying these findings to all medical staff. Thirdly, as the study is cross-sectional, it captures data at a single point in time, which precludes us from assessing the longitudinal effects of depression on physical health indicators. Without follow-up data, we cannot confirm whether the associations we observed persist over time or if they are influenced by transient factors. Fourthly, our exclusion criteria are not sufficient since there are other factors that might change blood indicator, such as unbalanced diabetes, history of psychiatric and neurological disorders, trauma, etc. Besides, measuring stress should be done through assessing the cortisol level in the appropriate day time. To address these limitations, future research should incorporate the measurement of cortisol levels at appropriate times of the day to more accurately assess physiological stress and consider prospective cohort studies that follow medical staff over time to better understand the directionality of these relationships and the potential causal pathways. Additionally, expanding the study to include multiple centers with diverse populations would enhance the generalizability of the findings and provide more robust evidence for the observed associations.

In summary, our study revealed a significant association between depression level and several physiological indicators in healthcare professionals, highlighting the need for targeted mental health strategies. Healthcare institutions should incorporate regular mental health evaluations, develop personalized support programs, and implement preventive health monitoring of relevant biomarkers. In order to enhance the health and overall well-being of medical personnel, it is imperative to conduct multi-center and prospective investigations with larger cohorts to validate the veracity of our findings. Future studies should expand on our findings by conducting longitudinal research to establish causal relationships between depression and physiological changes. This could include exploring the temporal dynamics of depression and physical health indicators over time, as well as investigating the potential mediating roles of lifestyle factors, such as diet, physical activity, and sleep. Moreover, examining the efficacy of targeted interventions, such as antioxidant therapy or stress reduction programs, in modulating these physiological markers could provide actionable strategies to mitigate the impact of depression in healthcare settings. Finally, future research should aim to explore the heterogeneity in responses to depression among healthcare workers, possibly considering genetic, environmental, and occupational differences that might influence these outcomes.

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 humans were approved by Ethics Committee of the Affiliated Hospital of Qingdao University. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

NL: Methodology, Writing – original draft. YW: Investigation, Writing – original draft. YD: Data curation, Methodology, Writing – original draft. XiaoC: Methodology, Project administration, Supervision, Writing – review & editing. BZ: Data curation, Methodology, Writing – review & editing. XianC: Funding acquisition, Methodology, Writing – review & editing. KW: Writing – review & editing, Investigation, Methodology. YS: Writing – original draft, Writing – review & editing, Data curation, Investigation, Methodology.

Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. This work was funded by Major Social Science Planning Projects in Shandong Province (Grant Number: 20AWTJ08) and Qingdao University.

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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 11 December 2024
DOI 10.3389/fpubh.2024.1433018

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OPEN ACCESS

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RECEIVED 15 May 2024
ACCEPTED 18 November 2024
PUBLISHED 11 December 2024

CITATION
Zhao Y, Yang B and Chu J (2024) Latent class analysis for health-related quality of life in nurses in China.
Front. Public Health 12:1433018.
doi: 10.3389/fpubh.2024.1433018

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Latent class analysis for health-related quality of life in nurses in China

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Background: This study aimed to identify the types of quality of life (QoL) based on the five dimensions of the EQ-5D and predict factors affecting QoL.

Methods: A multistage stratified cluster sampling survey was conducted among the staff of 12 general hospitals, 1,965 nurses completed the survey, and the data were analyzed using SPSS 26.0 and Mplus 8.3 for latent analysis.

Results: Three latent classes of QoL were identified: low-level (2.8%), pain and discomfort (7.6%), medium-level (47.1%), and high-level (42.5%). The types and characteristics of QoL differed among these latent classes. The low-level group had the lowest EQ visual analog scale (EQ-VAS) score ($F = 75.217$, $P < 0.001$) and the highest K10 score ($F = 61.90$, $P < 0.001$). Moreover, increased age (*OR* = 0.819, 95% *CI*: 0.817–0.973), never having drunk alcohol (OR = 0.107, 95% CI: 0.023, 0.488), and increased EQ-VAS scores (*OR* = 0.935, 95% *CI*: 0.919, 0.952) were protective factors for quality of life, while working in obstetrics and gynecology (*OR* = 6.457, 95% *CI*:1.852, 22.512) and higher K10 scores (*OR* = 1.153, 95% *CI*: 1.100, 1.209) were risk factors for quality of life.

Conclusion: The results indicated significant heterogeneity in the types of QoL and identified predictors of QoL. These findings provide basic information for the development of nursing interventions to improve quality of life and identified specific characteristics that should be considered during intervention development.

KEYWORDS

nursing staff, quality of life, EQ-5D, latent class analysis, psychological distress

1 Background

Health-related quality of life refers to the experience of individuals in different cultures and value systems regarding their goals, expectations, standards, and living conditions related to things they care about as a subjective perception and expression of health; it reflects individuals' physical, psychological, social, spiritual, and personal roles (1). The complete state of experience in aspects such as psychology, society, spirit, and personal role function is a comprehensive reflection of an individual's health status (2).

There are several factors influencing health-related quality of life, which are not only related to individual health status, health behavior, economic, and cultural factors (2–5), but also closely related to occupational characteristics (6). Nursing staff play an important functional role in medical and health services, and the health-related quality of life of clinical nurses is affected by the high risk and pressure of nursing work and the insufficiency of family and social resources (7). Studies have shown that nurses' quality of life is at the middle to lower levels (6). Nurses' quality of life is important as it is closely related to the quality of nursing work (8).

The Latent Class Model (LCM) is a statistical analysis method in which the model fit is determined by the data, which can capture the inequalities of the population, thereby objectively identifying mutually exclusive subtype categories (9). From the group heterogeneity perspective, this study explored the latent categories of nurses' quality of life based on the LCM and identified the performance characteristics of different latent categories regarding demographic sociology, physical health, mental health, etc. Through population characteristics, low-level QoL groups can quickly be identified, effective targeted intervention strategies can be formulated, and a theoretical basis for improving nurses' QoL can be provided.

2 Methods

2.1 Study population

The study sample consisted of 1,965 nurses employed at general hospitals in Shandong Province. A multi-stage stratified whole-group sampling method was applied from November 2020 to January 2021. First, all prefecture-level cities in Shandong Province were ranked according to their 2018 GDP per capita levels and were divided into three categories: good, medium, and poor. Subsequently, one prefecture-level city was selected from each category via simple random sampling (Qingdao City, Zaozhuang City, and Dezhou City). Second, a district city with only one municipal general hospital was surveyed. In cases of more than one hospital being present within a district city, one general hospital was selected via simple random sampling. Following this, three counties (districts/county-level cities) in each prefecture-level city were randomly selected. In each county (district/county-level city), one (district/county-level city) general hospital was randomly selected via the same sampling method used for city-owned hospitals. As such, this study surveyed 12 general hospitals, including three city-affiliated and nine county-affiliated hospitals. Among these, three wards were randomly selected for each discipline according to the discipline classification (all wards were surveyed in cases where fewer than three wards existed). Further, the surveyed wards' night nursing staff members were asked to complete the questionnaire.

This study was reviewed and approved by the Ethics Committee of the School of Public Health, Shandong University (approval number: 20181219). The fieldwork was initiated after approval was obtained. All participants signed an informed consent form before participating in the survey.

2.2 Quality of life

The EQ-5D-3L was used to assess QoL in this study. The scale includes two parts: the EQ-5D descriptive system and EQ-VAS (10). The health description system includes five dimensions: mobility, self-care, daily activities, pain/discomfort, and anxiety/depression, with three levels in each dimension: difficulty/problem, moderate difficulty/problem, and severe difficulty/problem; the EQ-VAS section is a vertical visual scale with 100 at the top representing "best health" and 0 at the bottom representing "worst health." This study calculated the utility value of the EQ-5D using the Chinese version of the TTO (11).

2.3 Psychological distress

Kessler Psychological Distress Scale (K10) is a 10-item screening tool designed for non-specific psychological distress (12). In our survey, it was measured by the Chinese version of the K10 (13). Each item adopts a 5-level score of 1 (almost never) to 5 (all the time), with a total score of 50. A score of >15 indicates psychological distress, 10–15 indicates mild distress, 16–21 indicates moderate distress, 22–29 indicates severe distress, and 30–50 indicates severe psychological distress. The Cronbach's alpha coefficient in this study was 0.930.

2.4 Statistical analyses

SPSS 25.0 and Mplus 8.3 statistical software were used for data entry and statistical analysis. Enumeration data were expressed as frequency (percentage), measurement data were normally distributed, and expressed as mean ± standard deviation. Latent class analysis was used to classify participants' quality of life responses. When performing latent class analysis, the evaluation indicators of model adaptation include (1) Akaike Information Criteria (AIC), Bayesian Information Criteria (BIC), and sample size-adjusted BIC (saBIC). The smaller the value, the better the fit and the higher the performance of the model. (2) Entropy index: the higher the entropy value, the higher the accuracy of classification; when entropy = 0.6, the classification accuracy exceeds 80%, and when entropy = 0.8, the classification accuracy exceeds 90%. (3) The likelihood ratio test (Lo-Mendell-Rubin, LMR) and Bootstrap-based likelihood ratio test (BLRT). When the P value reaches a level of significance, it indicates that the model of k categories is significant due to k-1 class models (14, 15). When the models of the evaluation indicators were inconsistent, this study comprehensively considered the results of measuring each indicator and combined the "best explanation model" to determine the best model. Multivariate logistic regression was used to analyse the factors influencing each category. All statistical tests were two-sided with a test level of $\alpha = 0.05$.

3 Results

3.1 The current status of the quality of life of nurses

According to the EQ-5D Effect Value Score System calculation in China, the EQ-5D and its health effect value of the nurse group was (0.9382 ± 0.1078), which was significantly lower than the QoL level of urban civilian in a certain province of China (16) ($t = -7.125, P < 0.001$).

TABLE 1 Fit indices of latent class analysis and distribution rate of HRQoLs (EQ-5D).

Cluster	AIC	BIC	SaBIC	Entropy	LMR	BLRT	Latent class distribution rate (%)				
							1	2	3	4	5
2-class	30,721.99	30,852.45	30,772.30	0.819	<0.001	<0.001	11.9	88.1			
3-class	30,562.57	30,758.25	30,643.88	0.804	0.017	<0.001	48.9	4.2	46.9		
4-class	30,467.94	30,728.84	30,576.35	0.784	0.042	<0.001	2.8	7.6	47.1	42.5	
5-class	30,406.42	30,732.55	30,541.94	0.783	0.002	<0.001	11.6	37.9	1.5	44.0	5.0

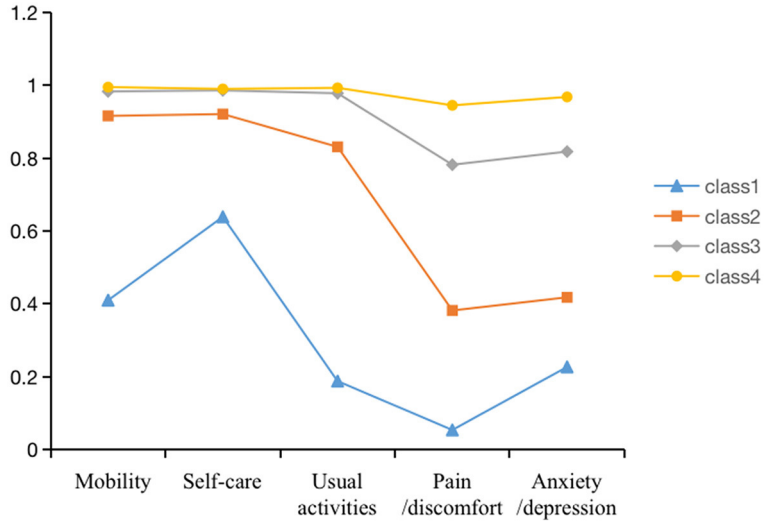

FIGURE 1
Types of health-related quality of life by latent classes.

3.2 Classification of nurses' quality of Life

This study begins with the initial model of the two categories and gradually increases the number of categories to determine the best model. The fitting index data are presented in Table 1. As the model category increased, the AIC, BIC, and SaBIC values of each category decreased. When the number of categories was three, the entropy value of the latent-category model was 0.804. When the number of categories was four, the entropy value was 0.784, nearly 0.8, which indicates that the classification accuracy exceeds 90%. When dividing the categories, they were distinguished in combination with practical significance and interpretability. The second category was too concise and lacked practical significance, while the fifth category was too complicated to explain. The AIC and BIC indicators of the fourth category were smaller than those of the third category, and the entropy value was close to 0.8. Comprehensively, the four-category model was the optimal model.

A model with four potential categories was used as the optimal model to obtain the parameter estimation results. The conditional probability distributions for each category are presented in Figure 1. In this study, nurses were divided into four groups based on five factors. In category 1, the conditional probabilities of mobility, self-care, daily activities, pain, and anxiety/depression at the no difficulty level were 0.410, 0.639, 0.188, 0.054, and 0.227, respectively; in category 2, the conditional probabilities were 0.916, 0.921, 0.831, 0.382, and 0.418, respectively; in category 3, the conditional probabilities were 0.983, 0.986, 0.978, 0.782, and 0.818, respectively; in category 4, the conditional probabilities were 0.995, 0.990, 0.993, 0.945, and 0.968, respectively. The distribution trend of each factor was relatively consistent, consequently, they were named: "Low-level group (2.8%) (category 1)," "Pain and discomfort group (7.6%) (category 2)," "Medium-level group (47.1%) (category 3)," and "High-level group (42.5%) (category 4)."

3.3 Comparison of various demographic and psychological characteristics among various categories

Comparing different category characteristics, the results showed that the average age of the low-level group was (31.42 ± 5.68) years old, which was lower than other groups, and the proportion of junior professional titles and below was 79.2%, which was higher than other groups.

TABLE 2 Comparison of characteristics among latent classes in Chinese nurses *n* (%).

Variables	Class 1 ($n = 48$)	Class 2 ($n = 129$)	Class 3 ($n = 799$)	Class 4 ($n = 719$)	F/χ^2	*P*
Personal characteristics						
Age (years, M ± SD)	31.42 ± 5.68	35.87 ± 7.17	30.50 ± 6.38	36.16 ± 7.56	91.067	<0.001
Gender						
Male	2 (4.2)	5 (3.9)	50 (6.3)	16 (2.2)	15.404	0.001
Female	46 (95.8)	124 (96.1)	749 (93.7)	703 (97.8)		
Marital status						
Unmarried	8 (16.7)	15 (11.6)	224 (28.0)	45 (6.3)	140.957	<0.001
Married	538 (79.2)	114 (88.4)	568 (71.1)	664 (92.4)		
Other	2 (4.2)	0 (0)	7 (0.9%)	10 (1.4%)		
Education level						
Master and above	1 (2.1)	4 (3.1)	14 (1.8)	15 (2.1)	32.873	<0.001
Undergraduate	43 (89.6)	107 (82.9)	595 (74.5)	607 (84.4)		
Below undergraduate	4 (8.3)	18 (14.0)	190 (23.8)	97 (13.5)		
Professional title						
Associate senior and above	1 (2.1)	14 (10.9)	7 (0.9)	62 (8.6)	214.873	<0.001
Intermediate	9 (18.8)	59 (45.7)	137 (17.1)	297 (41.3)		
Primary and below	38 (79.2)	56 (43.4)	655 (82.0)	360 (50.1)		
Department						
Internal medicine	9 (18.8)	26 (20.2)	202 (25.3)	216 (30.0)	23.438	0.024
Surgery	13 (27.1)	33 (25.6)	178 (22.3)	157 (21.8)		
Obstetrics and Gynecology	15 (31.3)	27 (20.9)	132 (16.5)	111 (15.4)		
Pediatrics	7 (14.6)	16 (12.4)	101 (12.6)	98 (13.6)		
Other	4 (8.3)	27 (20.9)	186 (23.3)	137 (19.1)		
Health status						
EQ-VAS (M ± SD)	54.58 ± 17.22	67.26 ± 17.48	78.73 ± 17.20	83.40 ± 15.05	75.217	<0.001
Health behavior						
Smoking						
No	46 (95.8)	122 (94.6)	785 (98.2)	707 (98.3)	9.200	0.027
Yes	2 (4.2)	7 (5.4)	14 (1.8)	12 (1.7)		
Drinking						
No	43 (89.6)	124 (96.1)	768 (96.7)	705 (98.5)	15.714	0.001
Yes	5 (10.4)	5 (3.9)	26 (33)	11 (1.5)		
Psycho-emotional status						
K10 score (M ± SD)	29.96 ± 7.72	26.65 ± 7.22	22.80 ± 7.37	20.05 ± 6.39	61.90	<0.001

The proportion of obstetrics and gynecology workers was 31.3%, which was higher than other groups. In addition, a one-way analysis of variance was used to explore the differences in EQ-VAS scores and K10 scores for each category. The results showed that the low-level group had the lowest EQ-VAS score, that is, the worst health level ($F = 75.217$, $P < 0.001$), and the highest K10 score, that is, the worst psychological health level ($F = 61.90$, $P < 0.001$) (Table 2).

3.4 Multivariate logistic regression analysis of potential quality of life categories of nurses

Nurses' quality of life category was taken as the dependent variable (category four as the reference group), nurses' characteristics (age, sex, marital status, education level, professional title, and department), health level (EQ-VAS), health behavior

TABLE 3 Multinomial logistic regression models of latent class analysis of health-related quality of life.

Variables	Class 1		Class 2		Class 3	
	OR	95% CI	OR	95% CI	OR	95% CI
Personal characteristics						
Age	**0.891**	**0.817–0.973**	**0.951**	**0.913–0.991**	**0.927**	**0.903–0.951**
Gender (Male)	0.982	0.149–6.482	0.972	0.269–3.513	1.474	0.726–2.994
Marital status						
Unmarried	0.486	0.053–4.475	1.279	0.742–5.617	**3.374**	**1.034–11.010**
Married	0.371	0.050–2.754	1.733	0.733–8.873	1.252	0.407–3.875
Education level						
Master and above	1.846	0.144–23.681	0.839	0.219–3.224	0.897	0.362–2.225
Undergraduate	2.280	0.689–7.544	0.774	0.428–1.401	0.735	0.540–1.001
Professional title						
Associate senior and above	1.016	0.093–11.104	**4.619**	**1.687–12.645**	**0.236**	**0.090–0.619**
Intermediate	0.431	0.145–1.282	**2.134**	**1.203–3.787**	**0.629**	**0.450–0.881**
Department						
Internal medicine	1.574	0.425–5.825	0.624	0.330–1.180	**0.649**	**0.461–0.914**
Surgery	3.112	0.903–10.725	0.929	0.505–1.710	0.845	0.593–1.203
Obstetrics and Gynecology	**6.457**	**1.852–22.512**	1.311	0.690–2.494	0.879	0.599–1.288
Pediatrics	2.544	0.648–9.992	0.691	0.336–1.423	**0.641**	**0.426–0.964**
Health status						
EQ-VAS (M ± SD)	**0.935**	**0.919–0.952**	**0.960**	**0.948–0.971**	**0.989**	**0.982–0.997**
Health Behavior						
Smoking (No)	1.324	0.157–11.177	0.295	0.076–1.147	2.265	0.949–7.261
Drinking (No)	**0.107**	**0.023–0.488**	1.124	0.282–4.476	0.451	0.181–1.124
Psycho-emotional status						
K10 score (M ± SD)	**1.153**	**1.100–1.209**	**1.096**	**1.065–1.129**	**1.062**	**1.043–1.082**

Criterion variables: economic activities (no = 0), smoking (no = 0), drinking (no = 0), depression (no = 0), suicidal compulsion (no = 0), and chronic disease (no = 0). Bold values represent the statistical significance at the *P*-value < 0.05.

(smoking, alcohol consumption), and psycho-emotional status (K10 score) were taken as independent variables, and a multivariate logistic regression model was constructed to analyse the relevant factors influencing nurses' low health levels. The results showed that increased age (*OR* = 0.819, 95% *CI*: 0.817, 0.973), never having drunk alcohol (*OR* = 0.107, 95% *CI*: 0.023, 0.488), and increased EQ-VAS scores (*OR* = 0.935, 95% *CI*: 0.919, 0.952) were quality of life protective factors, while working in obstetrics and gynecology (*OR* = 6.457, 95% *CI*: 1.852, 22.512) and higher K10 scores (*OR* = 1.153, 95% *CI*: 1.100, 1.209) were quality of life risk factors (Table 3).

4 Discussion

4.1 Low level of quality of life for nurses

This study found that the quality of life of nurses was lower than that of the general urban population in China (16). Nurses in the 21st century are facing increasingly difficult challenges to maintain a high quality of life (17). From long hours to inadequate pay, nurses are often overworked and underpaid (18, 19). According to the China Statistical Yearbook on Health and Family Planning, the number of registered nurses in China in 2015 was 3 million (20). Considering China's great population, China needs at least 6 million nurses (21). Due to the shortage of medical personnel, they have to work longer hours under tremendous pressure but receive very low rewards (22, 23). This leads to decreased job satisfaction and a decrease in quality of care. Therefore, there is a need to focus on the professional development of nurses at the policy level, improve the protection and training system and raise the quality of life level of the nursing community.

4.2 Potential categories of quality of life levels in the nurse population

This study used latent class analysis to examine the quality of life of the nurse population to reveal differences in the different

quality of life categories and their distribution on demographic and sociological variables. The model fitting results of the four latent categories were found to be the best, consequently, the researchers divided quality of life into four categories according to the nurses' response probability map of each item of the EQ-5D-3L scale. These categories were named low-level groups, pain and discomfort group, medium-level group, and high-level group; each group accounted for 2.8%, 7.6%, 47.1%, and 42.5%, respectively, among which the middle- and high-level groups were the majority groups. In addition, the pain symptoms of nurses in each group were more apparent than other symptoms, which may be related to the high work intensity and heavy workload of nurses (24, 25). The results suggest that nursing managers should pay attention to the quality of life and work intensity of nurses and take appropriate timely intervention measures to improve the pain symptoms of clinical nurses.

4.3 Attention should be paid to low quality-of-life groups

Compared to the nurses in the high-level group, younger age, working in obstetrics and gynecology, and poor emotional state were quality-of-life risk factors for the nurses in the low-level group, while higher health scores and non-smoking were quality-of-life protective factors for the nurses in the low-level group.

Study have shown that an increase in years of working experience results in employees having strong professional technical abilities, rich knowledge, strong economic strength, and social status (26). Consequently, the level of supervisor happiness is high and the quality of life is better (27), which is consistent with this study's results. Compared to the high-level group, obstetrics and gynecology nurses were 6.45 times more likely to experience a lower quality of life. A possible reason is that the work of obstetrics and gynecology nurses is centered on the puerpera, and the time of puerpera's labor has no rules (28). Consequently, nurses often need to participate in emergency treatment and surgery (29). Therefore, the requirements of obstetrics and gynecology nurses are relatively high. In addition, it is common for obstetrics and gynecology nurses to work overtime. The significant amount of work consumes the obstetrics and gynecology nurses' energy, resulting in poor quality of life (30). Simultaneously, the quality of life of nurses with poor emotional states was lower, while the quality of life of nurses who did not drink alcohol and had a high level of health was higher, further verifying previous research results (27, 31). Therefore, the results suggest that clinical nursing managers should pay attention to low-level quality-of-life nurse groups, such as obstetrics and gynecology nurses with fewer working years.

4.4 Limitations

This study has some limitations. Firstly, although this study adopted a multistage stratified whole-group sampling method, the selection of primary hospitals was relatively large, and the representativeness was biased. Therefore, these conclusions should be further explored and tested continuously. Secondly, this study did not include interventional research or an assessment of the impact of psychotherapy or psychological interventions on nurses' quality of life. Considering the potential significance of these interventions, future research is needed to address this gap.

5 Conclusions

In this study, the quality of life levels of nurses in 12 hospitals in Shandong province was analyzed using latent class analysis, and the number of optimal model categories was fitted to four groups: low-level group, pain and discomfort group, medium-level group, and high-level group. The clinical characteristics of nurses in different groups were distinguished, and the probability of entering the low-level quality of life group was higher for younger nurses, who work in obstetrics and gynecology, and have poor emotional states than those entering the high-level group. This method sought to identify nursing staff with poorer quality of life in a more targeted manner and can provide an important reference basis for clinical interventions to improve nurses' quality of life.

Data availability statement

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

Ethics statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the Ethics Committee of the School of Public Health, Shandong University (approval number: 20181219).

Author contributions

YZ: Writing – original draft. BY: Data curation, Methodology, Software, Writing – original draft, Writing – review & editing. JC: Conceptualization, Formal analysis, Funding acquisition, Resources, Supervision, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This study was supported by Education and Teaching Reform Research Project of Shandong University, No. 2020Y236.

Acknowledgments

We would like to express our deepest gratitude to the directors of the hospital that hosted the study and to all the nursing staff who agreed to participate.

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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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 07 January 2025
DOI 10.3389/fpubh.2024.1441389

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OPEN ACCESS

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RECEIVED 31 May 2024
ACCEPTED 16 December 2024
PUBLISHED 07 January 2025

CITATION
Zheng Y, Li X, Sun Y, Mao C, Huang J, Li J, Zhang G, Wei N, Wang X and Teng Y (2025) Association between workplace violence from patients and the mental health status of healthcare workers in Zhuhai China: a cross-sectional study.
Front. Public Health 12:1441389.
doi: 10.3389/fpubh.2024.1441389

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Association between workplace violence from patients and the mental health status of healthcare workers in Zhuhai China: a cross-sectional study

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Objective: Workplace violence (WPV) poses a serious occupational risk. This study aims to explore the association between WPV from patients and the occurrence of insomnia, depression, and anxiety among healthcare workers.

Methods: Information about the WPV from patients was collected by a self-designed questionnaire. Generalized Anxiety Disorder-7 (GAD-7), Patient Health Questionnaire-9 (PHQ-9), and Insomnia Severity Index (ISI) were used for the assessment of mental health. Logistic regression was used to explore the association between WPV from patients and insomnia, depression, and anxiety. Mediation analysis was used to evaluate the mediation effect of depression and anxiety on the relationships between WPV from patients and insomnia.

Results: Of 10,413 included healthcare workers, 40.05% experienced verbal violence, 6.44% experienced physical violence from patients in the past year. There is a significant association between verbal violence and insomnia (OR = 1.780, 95% CI: 1.591–1.990), depression (OR = 1.823, 95% CI: 1.640–2.026), and anxiety (OR = 1.831, 95% CI: 1.606–2.087), as well as physical violence (insomnia: OR = 1.220, 95% CI: 1.002–1.481; depression: OR = 1.274, 95% CI: 1.052–1.540; anxiety: OR = 1.316, 95% CI: 1.058–1.630). Moreover, depression and anxiety mediated the relationship between WPV and insomnia, the mediated proportion was 62.21% in the association between verbal violence and insomnia, and 60.22% in the association between physical violence and insomnia.

Conclusions: The association between WPV from patients and heightened risks of mental health issues emphasizes the necessity of supportive work environments. Recognizing the mediating role of depression and anxiety stresses the significance of tailored mental health training for healthcare staff.

KEYWORDS

workplace violence, patient, depression, insomnia, healthcare worker

Introduction

Workplace violence (WPV) poses a significant occupational hazard for healthcare workers and has become a focal point of concern (1, 2). According to the International Labor Organization (ILO), about a quarter of WPV incidents occur in medical institutions (3). In the United States, 70%–74% proportion of WPV occurs in healthcare institutions

(4). From 2012 to 2015, the overall rate of WPV affecting hospitals increased by 23% (5). Patients are the most common perpetrators of WPV among these institutions (6). A survey conducted in 2014 on WPV in hospitals in the United States found that WPV from patients accounted for 75% of cases (7). The prevalence of WPV in medical home visits after work in Australia was 47.1% in 2017, and just over half (51.8%) of the cases came from patients, verbal violence was the commonest (48.3%) (8). The same is true in China. According to data from the China Judgment Online System, the proportion of healthcare workers experiencing WPV by patients increased from 35% in 2013 to 73% in 2016 (9). The alarming escalation of WPV underscores its detrimental impact on the wellbeing of healthcare professionals, leading to both physical and psychological harm.

Studies have established a link between WPV and adverse outcomes such as depression, anxiety, and insomnia among workers (10–14). The WPV may be an important factor causing depression and anxiety among workers (15). Healthcare workers, given the demanding nature of their profession, are particularly vulnerable to these mental health conditions, with depression prevalence ranging from 21.53% to 32.77% in high-income countries in 2015 (16). WPV among healthcare workers has been closely linked to depression and anxiety. Zafar et al. found that healthcare workers who have been subjected to WPV exhibit higher rates of burnout and are more susceptible to depression and other psychological disturbances (17).

Persistent depression and anxiety can disrupt sleep patterns, leading to insomnia, which further exacerbates daytime functioning issues and contributes to a host of negative health outcomes, including fatigue, irritability, and reduced work performance (18, 19). Various work-related stressors are known to play a role in the development of insomnia, with WPV being a particularly prominent stressor. Individuals who have experienced WPV are 2.35 times more likely to experience poor sleep quality than those who have not encountered such violence (20). Moreover, Wang et al. study underscores the detrimental effects of WPV, emphasizing its role in job burnout and diminished work efficiency, with insomnia serving as a key mediating factor in this relationship (21).

Addressing the complex interplay between WPV, mental health disorders, and sleep disturbances is crucial in safeguarding the wellbeing of healthcare professionals and optimizing their performance in an inherently challenging work environment (22, 23). However, current research has some limitations. Some studies tend to focus exclusively on the prevalence of WPV in specific clinical departments, such as emergency and psychiatric units, neglecting other departments like radiology where staff also interact closely with patients. Furthermore, there is a scarcity of analysis differentiating the impacts of verbal and physical violence within the context of WPV. Many studies independently analyze the effects of WPV, and the precise connections between WPV and insomnia, depression, and anxiety remain inadequately understood. Addressing these limitations could contribute to a more comprehensive understanding of the complex interplay between WPV and mental health outcomes among healthcare workers.

This study aims to explore the associations between WPV from patients and the mental health of healthcare workers, with a specific focus on the pathways through which verbal and physical violence impact depression, anxiety, and insomnia. By delving into these relationships, we aim to provide a scientific basis for developing more effective prevention and intervention strategies to protect the mental and physical wellbeing of healthcare workers and enhance work efficiency.

Materials and methods

Study design and participants

This study conducted a cross-sectional survey of clinicians, nurses, and paramedical staff in secondary and tertiary medical institutions and community health service centers in Zhuhai, China in October 2023, including radiology, anesthesiology, and other departments. This study was conducted in accordance with the Declaration of Helsinki, and was approved by the ethics committee of Zhuhai Third People's Hospital.

Data collection

Data were collected using an online questionnaire consisting of 64 questions that included demographic information, job-related information, and three standardized scales for depression, anxiety, and insomnia. The link was sent to participants via WeChat social media group chats organized by the institution. The foreword of the questionnaire provides an introduction to the research, and participants can choose to click "agree" to continue the survey or click "disagree" to exit the survey, so as to ensure the informed consent of participants. To ensure the quality of the survey, we set some quality control questions (including the answer to the capital of China and the average working hours/days per day/week). Incorrect or unreasonable answers were excluded from the analysis. Fifty-one medical institutions in Zhuhai met the survey requirements, with a total of 17,279 healthcare workers. Thirteen thousand eighty-six questionnaires were completed, with a coverage rate of 75.73%. Finally, 10,413 were included in the study, with a pass rate of 79.57%, and the average time for participants to complete the questionnaire was 703 s.

Assessment of WPV

The frequency of physical and verbal violence from patients was evaluated using a customized questionnaire. Participants were queried with the question, "In the past year, how many times have you faced physical violence from patients such as hitting, kicking, pushing, biting, or hair-pulling?" Response choices included "None," "1–3 times," "4–6 times," "7–9 times," and "10 times or more." Similar questioning was applied to verbal violence, with participants asked, "In the past year, how many times have you faced verbal violence from patients in the form of

threatening language, humiliation, or other disrespectful remarks while on duty?" Participants selected one of the aforementioned five response options.

Assessment of insomnia

The validated Chinese version of the Insomnia Severity Index (ISI) was employed for the assessment of insomnia (24, 25). This 7-item self-report questionnaire measures the severity and impact of insomnia across multiple domains, including sleep onset, sleep maintenance, early morning awakening problems, sleep dissatisfaction, interference with daytime functioning, perception by others, and distress caused. Each item was assessed on a 5-point Likert scale ranging from 0 to 4, where 0 indicates the absence of the issue and 4 indicates a severe problem. The total score was from 0 to 28, and a score of 15 or greater was considered insomnia.

Assessment of depression

The validated Chinese versions of the 9-item Patient's Health Questionnaire (PHQ-9) were utilized to assess depressive symptoms over the previous 2 weeks (26, 27). Participants rated each item on a 4-point Likert scale, with response options of "not at all," "several days," "more than half the days," and "nearly every day" corresponding to scores of 0, 1, 2, and 3, respectively. The highest potential score on the PHQ-9 was 27, participants with a total score of $\geq$10 are considered to have depression.

Assessment of anxiety

The validated Chinese versions of the Generalized Anxiety Disorder Questionnaire (GAD-7) were employed to evaluate anxiety symptoms experienced during the preceding 2 weeks (28, 29). Analogous to the PHQ-9, the score for each item on the GAD-7 ranged from 0 (not at all) to 3 (nearly every day). The maximum achievable score on the GAD-7 was 21, participants with a total score of $\geq$10 are considered to have anxiety.

Covariates

The selection of covariates is based on previous literature (30, 31). Sociodemographic factors included age (18–29 years, 30–44 years, and 45–60 years), gender (male and female), marital status (married, unmarried/divorced/widowed), education attainment (high school or below, university, and postgraduate or above). Work-related factors included monthly income (<5,000 yuan, 5,000–10,000 yuan, 10,001–20,000 yuan, >20,000 yuan), income satisfaction (relatively satisfied, average, not satisfied), workload (not heavy, average, heavy), and job category (clinicians, nurses, paramedical staff). Additionally, data were collected on the participants' interpersonal relationships, the number of mental health lectures attended in the past year, and the experience of major negative life events such as divorce, unemployment, bereavement, and healthy lifestyle as covariates. Interpersonal relationships were synthesized by investigating participants' relationships with leaders, colleagues, and family members. Participants rated each relationship from 1 to 5, with the better the relationship, the better the score. A total score of <9 was considered poor, <12 was considered average, and $\geq$12 was considered good. The study considered four lifestyle behaviors based on prior research: smoking, drinking, physical activity, and BMI (32–34). Non-current smoking and non current drinking were defined as low-risk behavior. BMI was calculated from participants' self-reported height and weight and low-risk BMI was defined as >18.5 and <23.9. Physical activity was evaluated by asking participants about moderate-intensity exercise frequency over the last 3 months. Exercising at least 30 min, five or more times per week was considered low-risk behavior. Participants received 1 point for each low-risk behavior, contributing to an overall healthy lifestyle score ranging from 0 to 4, where a higher score denoted a healthier lifestyle.

Statistical analysis

The basic characteristics of the participants were described using the percentage for categorical variables and means $\pm$ standard deviations for continuous variables. Logistic regression models were constructed to assess the association between different types and frequencies of WPV from patients and insomnia, depression, and anxiety. Three models were developed for analysis. Model One adjusted for age, gender, education attainment, and marital status. Model Two further included work-related factors including income satisfaction, monthly income, workload, and job category. Model Three additionally added interpersonal relationships, negative significant life events, healthy lifestyle scores, and mental health lectures. In these models, physical violence and verbal violence were adjusted to each other. Further, we conducted an individual model to evaluate the effect of the interaction between verbal violence and physical violence on the basis of Model Three.

The mediation effect of depression and anxiety on the relationships between WPV from patients and insomnia of healthcare workers was evaluated. Indirect, direct, and total effects for each mediator were computed by combining the mediator and outcome models with the adjustment of all the covariates in Model Three. Further subgroup analyses were performed to examine potential differences in the relationship between verbal and physical violence and their interaction and depression and anxiety based on gender and job category. Additionally, we evaluated the odd ratio (OR) for participants exposed to various violence types versus those not exposed to any violence. Data cleaning and regression modeling were performed using the R statistical software (version 4.3.2), and mediation analysis was performed using IBM SPSS version 26.0.

Results

There were 13,086 healthcare workers who completed the assessment. After excluding participants under 18 or over 60 years old (n = 93), those with incorrect responses on quality

control questions (n = 2,246), and those lacking complete socio-demographic information (n = 334). A total of 10,413 healthcare workers were ultimately included in this study.

Characteristics of included participants

Among 10,413 participants, 1,900 (18.25%), 2,364 (22.70%), and 1,335 (12.82%) were with insomnia, depression, and anxiety, separately. The majority of the participants were female (74.12%), aged 30–44 years (50.85%), married (63.32%), and possessed a postgraduate or higher education level (81.28%). Most of the participants were nurses (48.89%) with a monthly income ranging from 5,000 to 1,0000 yuan (45.42%). About 34.62% of the participants perceived their workload as heavy, and 27.00% were not very satisfied with their income. Only 25.22% of the participants had received mental health lectures, and 11.04% had experienced negative life events in the past year. There were 4,170 participants (40.05%) experienced verbal violence, 671 participants (6.44%) experienced only physical violence. The detailed characteristics of participants are shown in Table 1.

Association between WPV from patients and insomnia, depression, and anxiety

In the full-adjusted model, verbal violence and physical violence were associated with a higher risk of insomnia, depression, and anxiety. Compared with those who did not experience verbal violence, those who experienced verbal violence had a 78.0% increased risk of insomnia (OR = 1.780, 95% CI: 1.591–1.990), an 82.3% increased risk of depression (OR = 1.823, 95% CI: 1.640–2.026), and an 83.1% increased risk of anxiety (OR = 1.831, 95% CI: 1.606–2.087). Compared with those who did not experience physical violence, participants who experienced physical violence had a 22.0% increased risk of insomnia (OR = 1.220, 95% CI: 1.002–1.481), a 27.4% increased risk of depression (OR = 1.274, 95% CI: 1.052–1.540), and a 31.6% increased risk of anxiety (OR = 1.316, 95% CI: 1.058–1.630). Analysis of the interaction between physical violence and verbal violence revealed no significant interaction between the two forms of violence (P = 0.251), however, upon inclusion of the interaction term for verbal violence and physical violence, physical violence was only associated with a higher risk of depression and anxiety, with no significant association with insomnia observed. The results of four models between WPV among patients and the mental health status of medical staff are shown in Figure 1.

Association between insomnia and depression and anxiety

Depression and anxiety were associated with an increased risk of insomnia. The likelihood of insomnia occurring with depressive symptoms is 7.606 times higher than those without depressive symptoms (OR = 7.606, 95% CI: 6.601–8.764). Similarly, compared with those who did not have anxiety symptoms, those who had anxiety symptoms had a 110.3% increased risk of insomnia (OR = 2.103, 95% CI: 1.792–2.467). Detailed information can be found in Table 2.

The mediating effect of depression and anxiety between WPV from patients and insomnia

Mediation analyses showed that depression and anxiety had significant mediating effects on the association between WPV from patients and insomnia of healthcare workers. The proportion of mediation of depression and anxiety between verbal violence and insomnia is 59.25% and 44.75%, respectively, while the proportion of mediation between physical violence and insomnia is 56.81% and 45.06%, respectively (both $P < 0.001$). Moreover, when depression and anxiety were both included in the mediation model, the mediated proportion was 62.21% in the association between verbal violence and insomnia, and 60.22% in the association between physical violence and insomnia. Detailed information can be found in Figure 2.

We further evaluated the association between different frequencies of violence and the risk of insomnia, depression, and anxiety, a higher frequency of verbal violence was associated with a higher risk of insomnia, depression, and anxiety. Compared with those who did not experience verbal violence, those who experienced 1–3 times verbal violence had a 69.4 percent increased risk of insomnia (OR = 1.694, 95% CI: 1.556–1.844), a 108.7 percent increased risk of depression (OR = 2.087, 95% CI: 1.886–2.310), and a 72.0 percent increased risk of anxiety (OR = 1.720, 95% CI: 1.576–1.878). While after adjusting for verbal violence and other covariates, physical violence was not significantly associated with insomnia, depression, or anxiety. The details of the association between WPV from patients and the mental health status of healthcare workers in the full-adjusted model are shown in Figure 3.

Furthermore, the association between different types of violence and the risk of insomnia, depression, and anxiety was evaluated (Supplementary Table S1). Compared to participants who have not experienced any violence, experiencing any type of violence is associated with a higher risk of insomnia, depression, and anxiety. After adjustment for confounders, compared to those who have not experienced violence, those who have only experienced verbal violence have a 1.766 times higher risk of insomnia (OR = 1.766, 95% CI: 1.576–1.980), 1.858 times higher risk of depression (OR = 1.858, 95% CI: 1.668–2.069), 1.859 times higher risk of anxiety (OR = 1.859, 95% CI: 1.626–2.125), those who have only experienced physical violence have 1.465 times higher risk of insomnia (OR = 1.465, 95% CI: 0.852–2.411), 1.884 times higher risk of depression (OR = 1.884, 95% CI: 1.164–2.977), and 1.802 times higher risk of anxiety (OR = 1.802, 95% CI: 0.984–3.110). Those who have experienced both have a 2.123 times higher risk of insomnia (OR = 2.123, 95% CI: 1.716–2.620), 2.211 times higher risk of depression (OR = 2.211, 95% CI: 1.798–2.714), and 2.338 times higher risk of anxiety (OR = 2.338, 95% CI: 1.843–2.954).

TABLE 1 The characteristics of the participants included in the study.

Characteristic	Total $N = 10,413$	Insomnia $N = 1,900$	Depression $N = 2,364$	Anxiety $N = 1,335$
Age group				
18–29	3,570 (34.28%)	639 (33.63%)	814 (34.43%)	449 (33.63%)
30–44	1,548 (14.87%)	994 (52.32%)	293 (12.39%)	153 (11.46%)
45–60	5,295 (50.85%)	267 (14.05%)	1,257 (53.17%)	733 (54.91%)
Gender				
Male	7,718 (74.12%)	495 (26.05%)	1,795 (75.93%)	1,029 (77.08%)
Female	2,695 (25.88%)	1,405 (73.95%)	569 (24.07%)	306 (22.92%)
Marital status				
Married	6,594 (63.32%)	1,165 (61.32%)	1,440 (60.91%)	831 (62.25%)
Unmarried/divorced/widowed	3,819 (36.68%)	735 (38.68%)	924 (39.09%)	504 (37.75%)
Education attainment				
High school or below	205 (1.97%)	31 (1.63%)	28 (1.18%)	21 (1.57%)
University	1,744 (16.75%)	303 (15.95%)	365 (15.44%)	208 (15.58%)
Postgraduate or above	8,464 (81.28%)	1,566 (82.42%)	1,971 (83.38%)	1,106 (82.85%)
Healthy lifestyle score				
0	179 (1.72%)	45 (2.37%)	50 (2.12%)	23 (1.72%)
1	896 (8.60%)	199 (10.47%)	275 (11.63%)	152 (11.39%)
2	3,696 (35.49%)	689 (36.26%)	864 (36.55%)	486 (36.40%)
3	5,476 (52.59%)	951 (50.05%)	1,150 (48.65%)	661 (49.51%)
4	166 (1.59%)	16 (0.84%)	25 (1.06%)	13 (0.97%)
Income satisfaction				
High	2,741 (26.32%)	285 (15%)	340 (14.38%)	181 (13.56%)
Moderate	4,860 (46.67%)	843 (44.37%)	1,092 (46.19%)	596 (44.64%)
Low	2,812 (27.00%)	772 (40.63%)	932 (39.42%)	558 (41.80%)
Monthly income				
<5,000	1,407 (13.51%)	225 (11.84%)	293 (12.39%)	182 (13.63%)
5,000–10,000	4,730 (45.42%)	884 (46.53%)	1,093 (46.24%)	631 (47.27%)
10,001–20,000	3,829 (36.77%)	730 (38.42%)	906 (38.32%)	483 (36.18%)
>20,000	447 (4.29%)	61 (3.21%)	72 (3.05%)	39 (2.92%)
Work load				
Low	1,239 (11.90%)	102 (5.37%)	117 (4.95%)	68 (5.09%)
Moderate	5,569 (53.48%)	722 (38%)	962 (40.69%)	485 (36.33%)
High	3,605 (34.62%)	1,076 (56.63%)	1,285 (54.36%)	782 (58.58%)
Job category				
Clinicians	2,105 (20.22%)	593 (31.21%)	390 (16.50%)	223 (16.70%)
Nurses	3,217 (30.89%)	1,010 (53.16%)	727 (30.75%)	397 (29.74%)
Paramedical staff	5,091 (48.89%)	297 (15.63%)	1,247 (52.75%)	715 (53.56%)
Mental health training	2,626 (25.22%)	343 (18.05%)	436 (18.44%)	235 (17.60%)
Negative life events	1,150 (11.04%)	257 (13.53%)	351 (14.85%)	188 (14.08%)

(Continued)

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TABLE 1 (Continued)

Characteristic	Total $N = 10,413$	Insomnia $N = 1,900$	Depression $N = 2,364$	Anxiety $N = 1,335$
Interpersonal relationship				
Poor	131 (1.26%)	75 (3.95%)	105 (4.44%)	81 (6.07%)
Moderate	2,477 (23.79%)	761 (40.05%)	1,037 (43.87%)	637 (47.72%)
Good	7,805 (74.95%)	1,064 (56%)	1,222 (51.69%)	617 (46.22%)
Verbal violence				
0 times	6,243 (59.95%)	787 (41.42%)	986 (41.71%)	516 (38.65%)
1–3 times	3,245 (31.16%)	759 (39.95%)	969 (40.99%)	547 (40.97%)
4–6 times	519 (4.98%)	166 (8.74%)	209 (8.84%)	139 (10.41%)
7–9 times	109 (1.05%)	43 (2.26%)	49 (2.07%)	30 (2.25%)
≥10 times	297 (2.85%)	145 (7.63%)	151 (6.39%)	103 (7.72%)
Physical violence				
0 times	9,742 (93.56%)	1,698 (89.37%)	2,113 (89.38%)	1,177 (88.16%)
1–3 times	566 (5.44%)	165 (8.68%)	205 (8.67%)	137 (10.26%)
4–6 times	65 (0.62%)	19 (1.00%)	27 (1.14%)	12 (0.90%)
7–9 times	16 (0.15%)	7 (0.37%)	7 (0.30%)	4 (0.30%)
≥10 times	24 (0.23%)	11 (0.58%)	12 (0.51%)	5 (0.37%)
Violence type				
None	6,139 (58.96%)	767 (40.37%)	957 (40.48%)	500 (37.45%)
Verbal violence	3,603 (34.60%)	931 (49.00%)	1,156 (48.90%)	677 (50.71%)
Physical violence	104 (1.00%)	20 (1.05%)	29 (1.23%)	16 (1.20%)
Verbal violence & physical violence	567 (5.45%)	182 (9.58%)	222 (9.39%)	142 (10.64%)

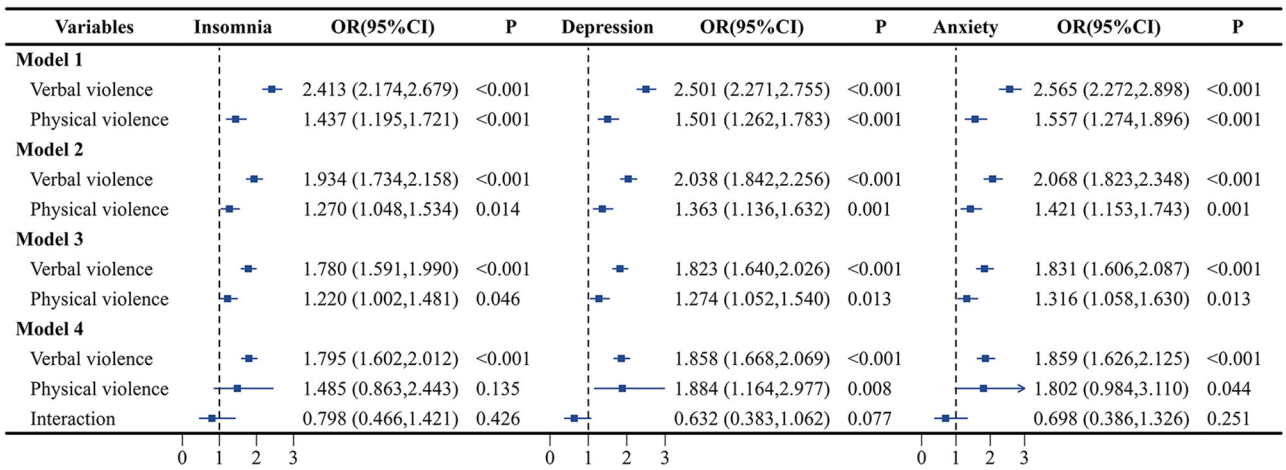

FIGURE 1
Association of verbal violence and physical violence with insomnia, depression, and anxiety. Model 1: adjust for sex, age group, marital status, education attainment. Model 2: adjust for the covaries in model 1 plus income satisfaction, monthly income, workload, and job category. Model 3: adjust for the covaries in model 2 plus healthy lifestyle score, mental health training, negative life events, and interpersonal relationships.

Subgroup analyses of sex showed that verbal violence was associated with a higher risk of insomnia, depression, and anxiety in both males and females, and physical violence was significantly associated with an increased risk of depression in women (OR = 1.761, 95% CI: 1.029–2.933). The subgroup analysis results of job categories showed that verbal violence was

associated with an increased risk of insomnia, depression, and anxiety among nurses, clinical doctors, and medical staff. However, physical violence was only associated with an increase in depression and anxiety risk among paramedical staff (OR = 3.307, 95% CI: 1.014–9.689, OR = 5.027, 95% CI: 1.408–15.493) (Supplementary Table S2).

TABLE 2 Association of depression and anxiety with insomnia.

Variables	Insomnia	
	OR (95% CI)	*P*
Depression		
Model 1	4.626 (4.296–4.981)	<0.001
Model 2	4.319 (4.004–4.658)	<0.001
Model 3	4.281 (3.957–4.631)	<0.001
Anxiety		
Model 1	4.286 (3.960–4.639)	<0.001
Model 2	3.904 (3.601–4.233)	<0.001
Model 3	3.736 (3.437–4.062)	<0.001

Model 1: adjust for sex, age group, marital status, education attainment. Model 2: adjust for the covaries in model 1 plus income satisfaction, monthly income, workload, and job category. Model 3: adjust for the covaries in model 2 plus healthy lifestyle score, mental health training, negative life events, interpersonal relationships.

Discussion

A total of 10,413 healthcare workers were included in the study, with 18.25% reported insomnia, 40.05% reporting experiencing verbal violence and 6.44% reporting physical violence from patients in the past year. A total of 58.96% of participants did not experience any violence, while 5.45% experienced both types of violence. The study found that both verbal violence and physical violence were associated with an increased risk of insomnia, depression, and anxiety, with verbal violence showing greater significance. Moreover, a higher frequency of verbal violence was associated with elevated risks. The study also indicated that depression and anxiety played a significant mediating role in the association between WVP and insomnia.

The prevalence of WPV from patients in Zhuhai was lower at 41.04% compared to other regions in China such as Jiangsu Province (62.26%), Xinjiang Province (68.69%), Heilongjiang Province (64.88%), and the national average reported in a 2018 survey (65.3%) (35–38). This disparity in findings may be attributed to the composition of the survey subjects in this study, which included clinical doctors, nurses, and paramedical staff. Previous studies primarily focused on doctors and nurses in emergency departments, pediatrics, and other clinical departments, where the likelihood of experiencing WPV from patients is generally higher (39–41). A cross-sectional survey in China found that 82.4% of

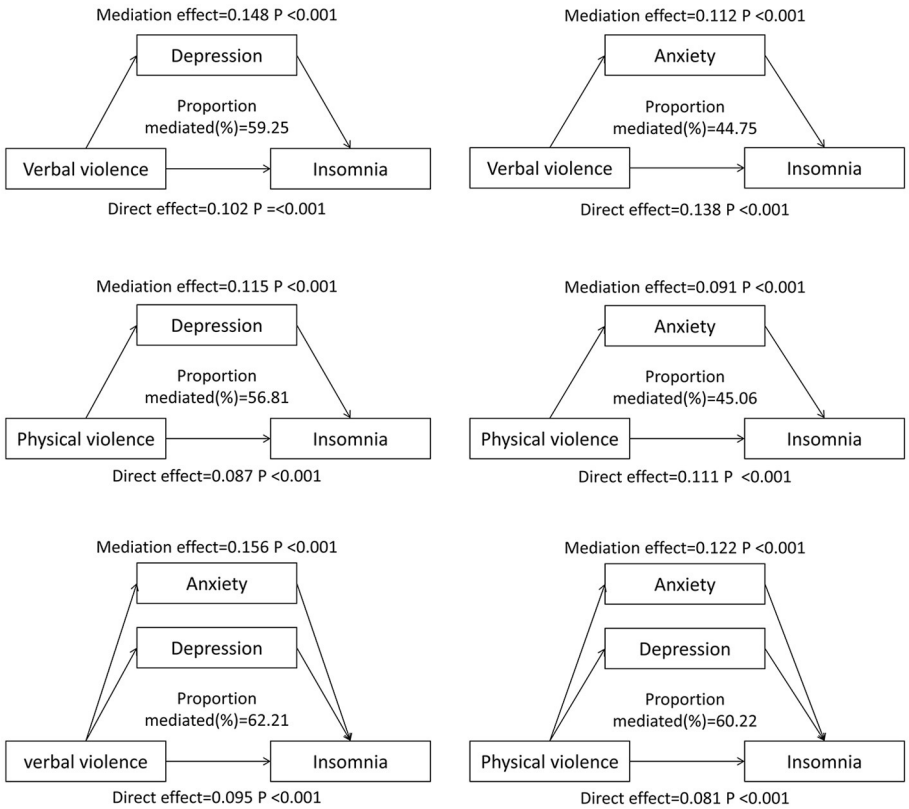

FIGURE 2
Mediating effects of healthy lifestyles in workplace violence and mental health. Models adjusted for sex, age group, marital status, education attainment, healthy lifestyle score, income satisfaction, monthly income, workload, job category, mental health training, negative life events, and interpersonal relationships.

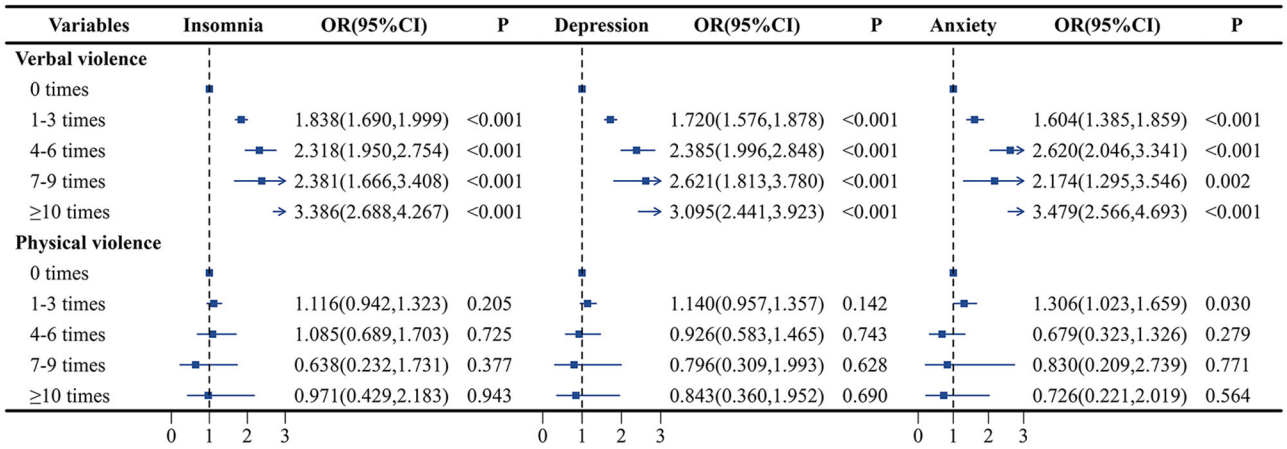

FIGURE 3
Association of different frequencies of verbal violence and physical violence with insomnia, depression, and anxiety. Adjust for sex, age group, marital status, education attainment, healthy lifestyle score, income satisfaction, monthly income, workload, job category, mental health training, negative life events, and interpersonal relationships.

psychiatric nurses have experienced at least one violent event in the past 6 months, with a verbal violence incidence rate of 78.6% (42), which was higher than other studies. Furthermore, the economic prosperity and robust healthcare infrastructure in Zhuhai may play a role in mitigating violence rates within healthcare settings (43, 44). The incidence of WPV from patients in Zhuhai is comparable to the 44.6% WPV reported in Hong Kong in 2017, and the geographical location and economic level of the two places are relatively similar, with both regions sharing similar geographical locations and economic profiles (45). These findings emphasize the need for targeted interventions and further research to understand better the contextual, regional, and socio-economic influences on violence in healthcare environments.

Our study found that there is a significant association between physical and verbal violence and insomnia, depression, and anxiety among healthcare workers. This is in line with other studies demonstrating the detrimental impact of WPV on mental wellbeing (46–49). A systematic review focusing on WPV against nurses highlighted its potential to trigger various work-related and mental health consequences, including depression and anxiety (14). Similarly, a cross-sectional study in Taiwan demonstrated a significant association between psychiatric nurses who experienced patient attacks and depressive symptoms (50). These studies emphasized the need for effective interventions and support systems to mitigate the impact of WPV on mental health.

Interestingly, our study revealed that the association between verbal violence and mental health issues is more significant than that of physical violence, with a higher frequency of verbal violence increasing the risk of these mental health problems, and the interaction has no statistical significance. This suggests that verbal violence may have a deeper and longer-lasting impact on individuals, potentially leading to psychological trauma and mental health issues (51, 52). Zhan et al. found that physical violence was not significantly correlated with the adverse occupational outcomes of healthcare workers (53). This is similar to our results. As the most common form of WPV experienced by healthcare workers, frequent verbal violence can severely affect an individual's mental health, with its destructive effects potentially lasting for months or even years (46, 54, 55). However, there is a concerning lack of reporting of verbal violence incidents within the healthcare system, with a study showing that while 64.7% of nurses have encountered verbal violence, only 36.9% have reported it to their superiors, as this type of violence does not result in physical harm and they do not know how to report it or believe that hospitals tend to support patients more (56). Another possible reason might be due to the extremely low prevalence of physical violence reported by participants, which resulted in a less significant association between each frequency of physical violence and mental health issues. Still, the noteworthy adverse impact of non-physical patient violence on occupational outcomes warrants heightened scrutiny and robust intervention efforts from policymakers and law enforcement authorities at the national, provincial, and local levels, as well as from hospital administrators. Moreover, our research underscores the importance of future investigations delving into various manifestations of violence perpetrated by patients and their families or friends.

The mediation analysis revealed that depression and anxiety played a mediating role in the association between verbal violence and insomnia. Verbal violence was linked to heightened risks of depression and anxiety, subsequently increasing the likelihood of insomnia. Stressful events can trigger physiological and psychological stress responses in individuals (57–59). Incidents of WPV that jeopardize safety may activate individual defense mechanisms, resulting in tension, anxiety, and coping difficulties (6, 60). The accumulation of psychological pressure and negative emotions directly manifests as depression and anxiety, impacting an individual's quality of sleep. Many studies have proven insomnia is an important symptom of depression and anxiety (18, 19, 61, 62). Additionally, insomnia can prevent the body from receiving sufficient rest and recovery, thereby affecting an individual's emotional and psychological state, exacerbating

symptoms of depression and anxiety, and forming a vicious cycle (58, 63). The existence of this mediating effect further emphasizes the importance of depression and anxiety in the impact of WPV on insomnia and provides a new perspective for further exploring the relationship between WPV, depression, anxiety, and insomnia.

This study has several strengths. First, this study has a large sample size and rich variables. Second, this study discussed in detail the impact of different frequencies of violence on the mental health of healthcare workers and discussed the mediating role of healthy lifestyles for the first time in China. However, there are also some limitations. Firstly, the study only surveyed healthcare workers in all secondary and tertiary hospitals in Zhuhai, which limits the generalizability of the results. Secondly, the study collected basic information and past year violence experiences of healthcare workers through self-reporting, which may lead to recall bias. Thirdly, this study did not investigate the experience of healthcare workers being subjected to WPV from patients' family members, which may have led to an underestimate of the incidence of violent incidents, and the severity of the consequences. Fourthly, as this study is a cross-sectional design, it cannot determine the causal relationship between WPV from patients and psychological health.

Conclusion

In conclusion, this study reveals a significant association between WPV from patients and the mental health issues (insomnia, depression, and anxiety) of healthcare workers. This finding underscores the need for public health authorities to address the problem of WPV from patients, as it may adversely affect the mental wellbeing of healthcare workers and have implications for the quality of medical services and patient safety (64). Healthcare administrators should implement a series of preventive measures, including staff training, patient education, reporting mechanisms, and psychological support, to improve healthcare workers' mental health through coordinated efforts (65–67). Furthermore, the mediation analysis underscores the role of depression and anxiety in the relationship between verbal violence and insomnia. The existence of this mediating effect further emphasizes the importance of depression and anxiety in the impact of WPV on insomnia and provides a valuable perspective for further exploring the relationships among WPV, depression, anxiety, and insomnia. Future research should focus on the long-term effects of WPV on mental health, as well as the effectiveness of specific intervention measures, in order to deepen our understanding of WPV and its impact on healthcare workers.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: The data that support the findings of this study are available from the corresponding author upon reasonable request. Requests to access these datasets should be directed to Yongyong Teng, gztengyy@163.com.

Ethics statement

The studies involving humans were approved by the Ethics Committee of Zhuhai Third People's Hospital. The studies were conducted in accordance with the local legislation and institutional requirements. The ethics committee/institutional review board waived the requirement of written informed consent for participation from the participants or the participants' legal guardians/next of kin because the questionnaire was distributed electronically, and the introductory statement provided an overview of the study. Participants were informed that they could withdraw at any time, and waiving written consent would not negatively impact them. Additionally, the large number of participants made it impractical to obtain written informed consent from each individual.

Author contributions

YZ: Conceptualization, Software, Writing – original draft, Writing – review & editing. XL: Conceptualization, Methodology, Writing – review & editing, Writing – original draft. YS: Data curation, Investigation, Writing – original draft. CM: Data curation, Investigation, Writing – original draft. JH: Data curation, Investigation, Writing – original draft. JL: Supervision, Writing – review & editing. GZ: Investigation, Writing – original draft. NW: Writing – review & editing, Supervision. XW: Writing – review & editing, Investigation. YT: Conceptualization, Project administration, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Acknowledgments

The authors want to express their gratitude to all participants in the study. In addition, we gratefully thank Dr. Shuiyuan Xiao of Xiangya School of Public Health of Central South University for his contribution to the study design and comments regarding the manuscript.

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

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2024.1441389/full#supplementary-material

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frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 14 January 2025
DOI 10.3389/fpubh.2024.1422395

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OPEN ACCESS

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RECEIVED 23 April 2024
ACCEPTED 16 December 2024
PUBLISHED 14 January 2025

CITATION
Kubo H, Kaneko Y, Saitoh K, Furihata R, Jike M, Otsuka Y, Uchiyama M and Suzuki M (2024) Coping strategies and correlations with depressive symptoms among female nurses working in Japanese general hospitals.
Front. Public Health 12:1422395.
doi: 10.3389/fpubh.2024.1422395

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Coping strategies and correlations with depressive symptoms among female nurses working in Japanese general hospitals

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Introduction: Preventing depression among nurses is a critical issue from the perspective of occupational welfare, but associations between depressive symptoms in nurses and stress-coping strategies remain unclear.

Methods: In the present study, an epidemiological study was conducted based on a cross-sectional questionnaire survey. Data obtained from 2,534 female nurses working at three general hospitals in Tokyo, Japan, were analyzed. Participants completed a questionnaire comprising 42 items, including depressive symptoms and stress-coping strategies, in addition to sociodemographic information and perceived mental stress.

Results: Our study showed that the emotional distraction strategy "Engaging in hobbies or relaxing" was negatively associated with both depressed mood and loss of interest. In addition, the problem-solving strategy "Making an effort to think optimistically" was negatively associated with loss of interest. Conversely, use of avoidant strategies was positively associated with both depressive symptoms.

Discussion: Our findings may indicate the importance of focusing on types of coping styles when developing strategies to prevent depressive symptoms in nurses.

KEYWORDS

depression, healthcare worker, nurse, occupational health, stress coping

1 Introduction

In recent years, the mental wellbeing of healthcare professionals has become an important issue from the perspective of occupational welfare. Among the various healthcare-related professions, nurses are the most likely to experience a variety of occupational stressors (1), including frequent decision-making, heavy workload, irregular work schedule, and difficult patients and their families, making mental health measures for nurses a priority issue. Among

the many factors related to the mental health of nurses, depression is a particularly common problem related to continued work (2, 3). Recently, the relationship between stress and depression has been becoming clearer in studies involving nurses (4, 5), in addition to a general population study (6). Development of appropriate measures to cope with stress is expected to aid in the prevention of depression.

Stress coping is the process by which cognitive or behavioral strategies work to adapt to or tolerate a specific source of psychological stress (7). The relationships between coping strategies and health outcomes have been examined extensively, primarily on the basis of classification into the three categories of problem-solving, emotion-focused, and avoidant strategies (8, 9). A problem-solving strategy is one in which action is taken to change the situation causing stress. An emotional arousal strategy is one in which action is taken to change the individual's own experience of the negative emotions that cause stress. An avoidant strategy is one in which the individual strives to distance themself from the cause of the stress. These different strategies are known to have differing effects on many health outcomes (9, 10). More specifically, several studies conducted in clinical settings (11, 12) and an epidemiological setting (8, 13) have reported that problem-focused coping strategies are associated with a decreased risk of depression, whereas some emotion-focused coping strategies and avoidant strategies are associated with increased risks of depression. Furthermore, stress-coping strategies are beginning to be examined by occupation, including nursing (14, 15), based on the idea that factors and risks will vary by occupation. The associations between the coping strategies used by nurses and depressive symptoms may differ from those in the general population, since nurses, especially hospital nurses, are more susceptible to a range of stressors such as workload, uncertain treatment, conflict with doctors and other nurses, and death and dying (16), and they may experience difficulty finding sufficient time to cope with stress. However, to the best of our knowledge, no studies have examined the relationship between depression and stress-coping strategies in hospital nurses, beyond a small number of relatively small-scale studies (17, 18). Identifying the relationship between depression and stress-coping strategies in hospital nurses may be meaningful in view of previous findings that depression and suicidal ideation are associated with workplace stress (19, 20).

An epidemiological survey was conducted among three samples of hospital nurses to identify stress-coping strategies associated with depressive symptoms. We investigated whether any correlations exist between the two core depressive symptoms of "depressed mood" and "loss of interest" and stress-coping strategies among more than 3,000 female nurses working in Japanese general hospitals. The research question in the present study was: which strategies are positively or negatively associated with depressive symptoms in hospital nurses?

2 Materials and methods

2.1 Participants

We administered a cross-sectional questionnaire-based epidemiological survey of sleep, mental health, and lifestyle to nurses in 2015 (21). In this study, data from a multicenter survey were collected to avoid bias in the data due to hospital characteristics. Participants were nursing staff working at general hospitals in Tokyo, Japan. Three general hospitals (Hospitals A, B, and C) affiliated with different medical schools and each having about 1,000–1,100 beds participated in the present survey. The Director of Nursing at each institution explained the purpose of the present study and requested the cooperation of the heads of wards or outpatient divisions of all staff working at each hospital. The heads provided each of their subordinate nursing staff with an envelope containing information about the purpose of the survey, a request to participate, a questionnaire on sleep, mental health, and lifestyle, and an envelope for returning the completed questionnaire. Participation in the survey was initiated by returning the sealed envelope to the Director of Nursing, which ensured anonymity. The envelopes were grouped by the Director of Nursing and delivered to the administrative staff. As for the nursing staff who did not want to participate in this study, each staff member was also required to provide a letter stating that he/she did not wish to participate, which was returned to staff outside the hospital organization via the head of nursing in a sealed envelope. It was indicated in writing that their privacy was protected and that they would not be disadvantaged if they did not cooperate with this survey, and only asked them to complete the survey if they gave their consent. A total of 3,037 nurses (Hospital A, $n = 1{,}042$; Hospital B, $n = 980$; Hospital C, $n = 1{,}015$) from the three hospitals were selected for the survey. The total number of participants was 2,692, for a collection rate of 88.6%. Among these 2,692 participants, those for whom data on sex ($n = 12$), age ($n = 15$), or self-reported depressive symptoms ($n = 6$) were missing were excluded from the analysis. Given the small numbers, male nurses ($n = 125$) were also not included. We analyzed data from the final sample of 2,534 female nurses. The mean age of the participants was 31.1 ± 9.0 years. Demographic characteristics of participants are presented in Table 1. All study protocols were approved by the Ethics Committee of Nihon University School of Medicine (approval number: 27–1-0).

2.2 Procedures

For this survey, we developed a self-administered questionnaire, which asked about sociodemographic characteristics and contained 42 individual questions focusing on sleep, mental health, and lifestyle. The 42 items were categorized into: (1) sociodemographic information such as age, hospital, department, position, and night shift; (2) perceived mental stress; (3) depressive symptoms (depressed mood and loss of interest); and (4) stress-coping strategies.

Sociodemographic variables included age (20–29 years, 30–39 years, and ≥ 40 years), hospital (A, B or C), department in the hospital (internal medicine, surgery or other), professional position (head or staff). Present engagement in night shifts was examined by asking the frequency (less than once per month or once or more per month).

Perceived mental stress was evaluated by asking "Was there stress due to dissatisfaction, worries or hardship?" This question included the following response items: "much," "some," "little" or "none." Respondents answering "much" or "some" were defined as stressed, whereas those answering "little" or "none" were defined as unstressed.

Two symptoms for depression during the previous month were included in the questionnaire (21, 22):

(1) Have you been bothered by feeling down, depressed, or hopeless? ("never"/"seldom"/"sometimes"/"often"): depressed mood.

TABLE 1 Demographic characteristics for each of the age groups.

		Age					
		20–29		30–39		40–	
	n	n	%	n	%	n	%
Total	2,534	1,381	54.5	696	27.5	457	18.0
Department							
Medical	1,160	690	59.5	313	27.0	157	13.5
Surgical	665	379	57.0	165	24.8	121	18.2
Others	709	312	44.0	218	30.7	179	25.2
Shift work							
Once or more per month	2016	1,260	62.5	495	24.6	261	12.9
Less than once per month	515	119	23.1	201	39.0	195	37.9
Professional position							
Chief	338	21	6.2	140	41.4	177	52.4
Staff	2,181	1,350	61.9	554	25.4	277	12.7
Psychological stress							
Stressed	2027	1,089	53.7	559	27.6	379	18.7
Unstressed	507	292	57.6	137	27.0	78	15.4

(2) Have you been bothered by little interest or pleasure in doing things than usual? ("never"/"seldom"/"sometimes"/"often"): loss of interest.

Participants who answered "often" to Question 1 or 2 were classified as having a depressed mood or loss of interest, respectively (21, 22). Cronbach's alpha, which represents internal consistency, was 0.56 in the present study, lower than that in the previous study of postpartum depression (23). In this study, the area under the curve reflecting validity was 0.84.

To explore the stress-coping strategies of participants, the following 12 questions taken from questionnaires used in prior epidemiological surveys conducted by the Japanese Ministry of Health, Labour and Welfare (13) were embedded in the questionnaire. These 12 items differentiated among three different coping strategies: problem-focused (1 and 2); emotion-focused (3–10); and avoidant (11 and 12). Participants were asked to answer the question "Do you use the following coping strategy when you have stress?" for: (1) Making an effort to solve problems actively (yes/no); (2) Making an effort to think optimistically (yes/no); (3) Venting emotions by talking to others (yes/no); (4) Engaging in hobbies or relaxing (yes/no); (5) Engaging in sports (yes/no); (6) Watching TV/listening to the radio (yes/no); (7) Eating (yes/no); (8) Drinking alcoholic beverages (yes/no); (9) Smoking (yes/no); (10) Seeking strong stimuli or excitement (yes/no); (11) Giving up attempts to solve problems (yes/no); and (12) Bearing stress without action (yes/no).

2.3 Statistical analyses

Differences in the prevalence of depressive symptoms were compared between groups with different sociodemographic characteristics (age, hospital, department, night shift, position) and perceived psychological stress using chi-squared tests. Differences in the percentage of respondents to stress-coping questionnaires were also compared between age groups using chi-squared tests. Logistic regression analysis was used to assess the associations of stress-coping strategies with the two core depressive symptoms. We initially examined all variables in univariate models. Multivariate logistic regression analyses were then performed to adjust for the confounding effects of sociodemographic factors (sex, age, hospital, department, position, and night shift), and perceived mental stress. We then performed additional multiple logistic regression analyses for all items that showed a significant association in multivariate models to assess for the confounding effects of other significant items, in addition to sociodemographic factors and perceived mental stress. Significance was set at the 5% level. All analyses were performed using SPSS version 24 software (IBM Corporation, Armonk, NY, United States).

3 Results

3.1 Prevalence of depressive symptoms

The prevalence of depressive symptoms by age group, hospital department, engagement in night shift, professional position, and psychological stress is presented in Table 2. Depressed mood and loss of interest were found in 14.9 and 8.5% of participants, respectively. The prevalence of depressed mood differed by age, frequency of night shift, and presence of psychological stress. The prevalence of loss of interest differed by age and presence of stress. Perceived stress was seen to be associated with increased prevalences of both core depressive symptoms.

3.2 Types of coping strategy

The stress-coping strategies incorporated in the questionnaire and their prevalence by age group are summarized in Table 3. One item

TABLE 2 Prevalence of depressive symptoms for each of the groups defined by sociodemographic factors.

		Depressed mood		Loss of interest	
	n	n	%	n	%
Total		377	14.9	215	8.5
Age, y					
20–29	1,381	218	15.8	131	9.5
30–39	696	82	11.8	44	6.3
≥40	457	77	16.8	40	8.8
Chi-squared			7.6		6.0
p-value			0.023		0.049
Department					
Medical	1,160	175	15.1	101	8.7
Surgical	665	103	15.5	57	8.6
Other	709	99	13.9	57	8.0
Chi-squared			0.7		0.3
p-value			ns		ns
Professional position					
Head	338	51	15.1	24	7.1
Staff	2,181	323	14.8	191	8.8
Chi-squared			0.0		1.0
p-value			ns		ns
Night shift					
Once or more per month	2016	318	15.8	181	9.0
Less than once per month	515	59	11.4	34	6.6
Chi-squared			6.1		3
p-value			0.013		ns
Perceived mental stress					
Stressed	2027	366	18.0	209	10.3
Unstressed	507	11	2.2	6	1.2
Chi-squared			80.6		43.4
p-value			< 0.001		< 0.001

ns, not significant.

included in problem-solving strategies and one in avoidant strategies showed effects of age. Effects of age were found for all items in emotion-focused strategies. The predominance of younger age groups was apparent for several items in emotion-focused strategies.

3.3 Association between stress-coping strategies and depressive symptoms

After adjusting for the confounding effects of age, hospital, department, professional position, night shift, perceived mental stress, and other stress-coping strategies, multivariate logistic regression analyses showed several types of associations between depressed mood and coping strategies (Table 4). Positive associations were found for the two avoidant strategies ("Giving up attempts to solve problems" and "Bearing stress without action"), whereas negative associations were found for "Engaging in hobbies or relaxing" as an emotion-focused strategy.

The final multivariate logistic regression analysis showed that problem-solving ("Making an effort to think optimistically") and emotion-focused ("Engaging in hobbies or relaxing") strategies were negatively associated with loss of interest (Table 5). The two avoidant strategies ("Giving up attempts to solve problems" and "Bearing stress without action") were positively associated with loss of interest.

4 Discussion

In the present study, we surveyed depressive symptoms and stress-coping strategies among female nurses working in three general hospitals affiliated with different medical schools by asking participants to choose the applied coping strategies from among 2 problem-solving, 8 emotion-focused and 2 avoidant strategies. We identified the following associations between stress-coping strategies and depressive symptoms: (1) some problem-solving and emotion-focused strategies showed negative associations with depressive symptoms, but none showed any

TABLE 3 Percentage of respondents for stress-coping questionnaires by age group.

Stress-coping strategy	Respondents (%)					
	Total	Age (y)			Chi-squared	*p*-value
		20–29	30–39	≥40		
Problem-solving strategy						
Making an effort to solve problems actively	15.4	13.5	18.5	16.6	9.6	0.008
Making an effort to think optimistically	36.3	37.3	32.7	38.7	5.7	ns
Emotional distraction strategy						
Venting emotions by talking to others	65.7	71.4	64.3	50.8	65.9	<0.001
Engaging in hobbies or relaxing	61.1	69.2	54.6	46.8	89.6	<0.001
Engaging in sports	19.5	19.8	21.5	15.5	6.4	0.040
Watching TV/listening to the radio	36.9	40.0	31.9	35.2	13.7	<0.001
Eating	41.9	47.0	40.7	28.0	51.6	<0.001
Drinking alcoholic beverages	31.5	34.2	31.2	23.4	18.6	<0.001
Smoking	6.6	5.9	6.4	9.2	6.2	0.045
Seeking strong stimuli or excitement	4.3	6.2	2.7	0.7	31.7	<0.001
Avoidant strategy						
Giving up attempts to solve problems	8.8	9.3	9.6	5.7	6.6	0.037
Bearing stress without action	27.2	27.2	25.8	29.1	1.5	ns

ns, not significant.

TABLE 4 Association between stress-coping strategies and depressed mood.

	Crude			Adjusted 1[1]			Adjusted 2[2]		
	OR	95%CI	*p*-value	OR	95%CI	*p*-value	OR	95%CI	*p*-value
Problem-solving strategy									
Making an effort to solve problems actively	0.79	0.58–1.09	ns						
Making an effort to think optimistically	0.84	0.67–1.06	ns						
Emotional distraction strategy									
Venting emotions by talking to others	1.06	0.84–1.33	ns						
Engaging in hobbies or relaxing	0.72*	0.58–0.90	0.004	0.73*	0.58–0.92	0.007	0.73*	0.58–0.92	0.007
Engaging in sports	0.81	0.60–1.08	ns						
Watching TV/listening to the radio	0.87	0.69–1.10	ns						
Eating	1.23	0.99–1.53	ns						
Drinking alcoholic beverages	1.15	0.91–1.45	ns						
Smoking	1.10	0.72–1.69	ns						
Seeking strong stimuli or excitement	1.23	0.74–2.05	ns						
Avoidant strategy									
Giving up attempts to solve problems	1.82*	1.30–2.54	<0.001	1.65*	1.17–2.31	0.004	1.56*	1.10–2.19	0.012
Bearing stress without action	1.91*	1.52–2.40	<0.001	1.61*	1.27–2.04	<0.001	1.76*	1.39–2.23	<0.001

ns, not significant; *p-value < 0.05.
[1]Adjusted by age group, hospital, department in the hospital, professional position, night shift, and perceived mental stress.
[2]Adjusted by age group, hospital, department in the hospital, professional position, night shift, perceived mental stress, and stress-coping strategies showing significant associations with depressed mood in Adjusted 1.

positive associations with depressive symptoms; (2) avoidant coping strategies exclusively showed positive associations with depressive symptoms; and (3) the number of coping strategies showing significant associations differed between the two core depressive symptoms.

4.1 Prevalence of depressive symptoms

The prevalence of each depressive symptom in our study was 8.5–14.9%, comparable to that in women from a previous general

TABLE 5 Associations between stress-coping strategies and loss of interest.

	Crude			Adjusted 1[1]			Adjusted 2[2]		
	OR	95%CI	*p*-value	OR	95%CI	*p*-value	OR	95%CI	*p*-value
Problem-solving strategy									
Making an effort to solve problems actively	0.64*	0.41–0.99	0.046	0.69	0.44–1.08	ns			
Making an effort to think optimistically	0.64*	0.47–0.87	0.005	0.64*	0.47–0.88	0.006	0.61*	0.45–0.84	0.002
Emotional distraction strategy									
Venting emotions by talking to others	0.89	0.67–1.19	ns						
Engaging in hobbies or relaxing	0.53*	0.40–0.71	<0.001	0.51*	0.38–0.69	<0.001	0.53*	0.39–0.70	<0.001
Engaging in sports	0.79	0.54–1.15	ns						
Watching TV/listening to the radio	0.89	0.66–1.19	ns						
Eating	0.99	0.75–1.33	ns						
Drinking alcoholic beverages	1.06	0.79–1.43	ns						
Smoking	1.50	0.92–2.45	ns						
Seeking strong stimuli or excitement	1.65	0.92–2.94	ns						
Avoidant strategy									
Giving up attempts to solve problems	1.88*	1.25–2.82	0.003	1.68*	1.11–2.54	0.014	1.77*	1.16–2.72	0.009
Bearing stress without action	1.59*	1.19–2.13	0.002	1.38*	1.02–1.85	0.035	1.49*	1.10–2.02	0.010

ns, not significant; *p-value < 0.05.
[1]Adjusted by age group, hospital, department in the hospital, professional position, night shift, and perceived mental stress.
[2]Adjusted by age group, hospital, department in the hospital, professional position, night shift, perceived mental stress, and stress-coping strategies showing significant associations with loss of interest in Adjusted 1.

population study (24). The prevalence of depressed mood was highest in participants ≥40 years old, where administrative tasks are often required, whereas loss of interest was highest in 20–29 year olds, who are just starting nursing and need to become accustomed to their career.

4.2 Associations between coping strategies and age

Many emotion-focused strategies showed higher prevalences in younger age groups, in accordance with a previous general population study from our group (13). In contrast, no such tendency was found for problem-solving or avoidant strategies. The reason only emotion-focused strategies correlated with age is unclear, but this could be interpreted as meaning that strategies such as engaging in sports or talking to others may be preferred by younger generations.

Compared with women in our previous general population study (13), the strategies used much more frequently by nurses in our study (percentage difference > 10%) were "Venting emotions by talking to others," "Engaging in hobbies or relaxing," "Eating," "Drinking alcoholic beverages," and "Bearing stress without action." However, the only strategy that nurses used much less frequently (percentage difference > 10%) than women from the general population sample (13) was "Smoking." This suggests that nurses tend to use emotional distraction strategies other than smoking. This may be an indication that nurses are more aware of stress-coping strategies due to their occupational characteristics. Moreover, a higher awareness of the benefits of avoiding smoking as healthcare professionals may have been related to this difference.

4.3 Association between stress-coping strategies and depressive symptoms

Our study showed that the emotional distraction strategy of "Engaging in hobbies or relaxing" was negatively associated with both core depressive symptoms. This result was in line with a previous study showing that the coping style of "Taking his/her ease," which belongs to the emotional distraction strategy, was negatively associated with depression among females in the general population (13). Although the present study did not examine causal relationships, our result may suggest that taking one's ease reduces depressive symptoms in nurses; previous meta-analysis and systematic review studies have shown relaxation as significantly reducing depressive symptoms (25, 26). Moreover, our results indicated that the problem-solving strategy "Making an effort to think optimistically" was negatively associated with loss of interest. Various studies using multivariate analyses have shown that negative thinking can predict future depression (27, 28). Given these findings, introducing the strategy of optimistic thinking can also be expected to help reduce depressive symptoms in nurses. Unlike a previous study of a general population (13), the problem-solving strategy "Making an effort to solve problems actively" did not show an association with any of the core depressive symptoms. This may be because problems in nursing are often difficult to handle or solve. Distracting themselves through hobbies or relaxation may thus be more effective in stress coping for nurses than directly aiming to solve problems. Further, providing nurses with sufficient time for hobbies and

relaxation is considered important from the perspective of stress management.

Moreover, use of avoidant strategies was positively associated with both depressed mood and loss of interest. This result is consistent with many previous studies in both clinical (29, 30) and community (13) settings, which have shown that avoidant strategies were positively associated with depressive symptoms. In addition, longitudinal studies have indicated that avoidant strategies are predictive of future depression (31, 32) and have suggested that life stressors may mediate the association between baseline avoidant strategies and risk of depressive symptoms (31). Our results, together with these preceding findings, suggest that use of avoidant strategies may be inadvisable for nurses, who generally tend to experience many stressors.

Combining the results of the present study with those of a recent cluster analysis of nurse data may help us better understand the appropriate nurse coping style to prevent or alleviate depressive symptoms (18). In this study, participants were classified into three groups according to the coping style used (emotional-response type, problem-solving type, and reality-escape type), and we compared the magnitude of K6 scores used to screen for depression and anxiety in each group. The results showed that the problem-solving type cluster had lower K6 scores than the other two clusters, suggesting the usefulness of the problem-solving strategy as well as our results. Combining these results with our findings above, together with another study that showed a negative relationship between taking a problem-solving strategy and psychological distress (33), it may be suggested that problem-solving strategies are the main methods to improve mental conditions including depressive symptoms, whereas taking time for hobbies and relaxation may also be a promising method. In the future, it would be desirable to conduct a longitudinal study to establish stress-coping strategies for nurses and to examine which stress-coping strategies may reduce or prevent depressive symptoms.

4.4 Limitations

The present study had several limitations that should be kept in mind when interpreting the results. First, because this was a cross-sectional study, causal relationships between stress-coping strategies and symptoms of depression could not be elucidated. The investigation of causality was beyond the scope of this study, so longitudinal research is needed to clarify such causal relationships. Second, because this study used a self-rating questionnaire to assess depressive symptoms, the lack of objectivity may have been an issue. Further improvements, such as the introduction of interview methods, are desirable in future work. Third, this study only targeted female nurses and did not examine the association between stress-coping strategies and depressive symptoms in male nurses, since most nurses in these hospitals were female at the time the data for this study were collected. By accumulating data from hospitals where many male nurses work, we would like to examine the association between stress-coping strategies and depressive symptoms in male nurses and examine the differences with women. Fourth, all data used in our study were from nurses working in hospitals in Tokyo, so it is unclear whether similar results would be obtained in hospitals in other countries or regions, given a report of cultural and regional differences influencing coping style. Future studies should clarify regional differences in coping strategies to reduce depressive symptoms. Finally, the present study did not assess psychiatric or physical comorbidities, which may have influenced the results.

5 Conclusion

The present study demonstrated that the prevalence of different depressive symptoms in nurses working at general hospitals in Japan was associated with different types of stress-coping strategies. Our findings may indicate the importance of focusing on certain types of coping styles, such as engaging in hobbies or relaxing, when developing strategies for preventing depression in nurses. Incorporating coping strategies into the training or continued education of nurses or as a leisure activity for nurses may be helpful to implement in hospital settings. Further longitudinal studies that examine the causal relationships between stress-coping strategies and symptoms of depression are needed.

Data availability statement

Derived data supporting the findings of this study are available from the corresponding author Yoshiyuki Kaneko on request (kaneko.yoshiyuki@nihon-u.ac.jp).

Ethics statement

The studies involving humans were approved by Ethics Committee of Nihon University School of Medicine. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

HK: Conceptualization, Data curation, Methodology, Visualization, Formal analysis, Investigation, Writing – original draft. YK: Conceptualization, Data curation, Methodology, Visualization, Funding acquisition, Project administration, Resources, Supervision, Validation, Writing – review & editing. KS: Investigation, Writing – review & editing. RF: Investigation, Writing – review & editing. MJ: Funding acquisition, Investigation, Writing – review & editing. YO: Investigation, Writing – review & editing. MU: Project administration, Resources, Writing – review & editing. MS: Project administration, Supervision, Validation, Writing – review & editing.

Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. This work was funded by JSPS KAKENHI (26460849). The funder had no role in the study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Acknowledgments

The authors would like to thank the directors of nursing and heads of nursing staff for their research cooperation.

Conflict of interest

YK has received speaker's honoraria from Eisai, Meiji Seika Pharma, MSD, Otsuka Pharmaceutical, Sumitomo Pharma, and Viatris. RF has received research grants from Nishikawa Foundation for Medical Promotion and Terumo Life Science Foundation. KS has received research grants from Fondation FondaMental and speaker's honoraria from Eisai and Mitsubishi Tanabe Pharma. MU has served as a medical consultant for Idorsia Pharmaceuticals Japan Ltd., Lixil Corporation, and Taisho Pharmaceutical Co., Ltd. MS has received payment for expert testimony, research grants, and speaker's honoraria from Eisai and Mochida Pharmaceutical, research grants and speaker's honoraria from EA Pharma, Meiji Seika Pharma, Mochida Pharmaceutical, Otsuka Pharmaceutical, Shionogi Pharma, and Sumitomo Pharma, payment for expert testimony from Jazz Pharmaceuticals and Kao Corporation, and speaker's honoraria from Kyowa Pharmaceutical Industry, MSD, Takeda Pharmaceutical, Viatris, and Yoshitomi Pharmaceutical.

The remaining 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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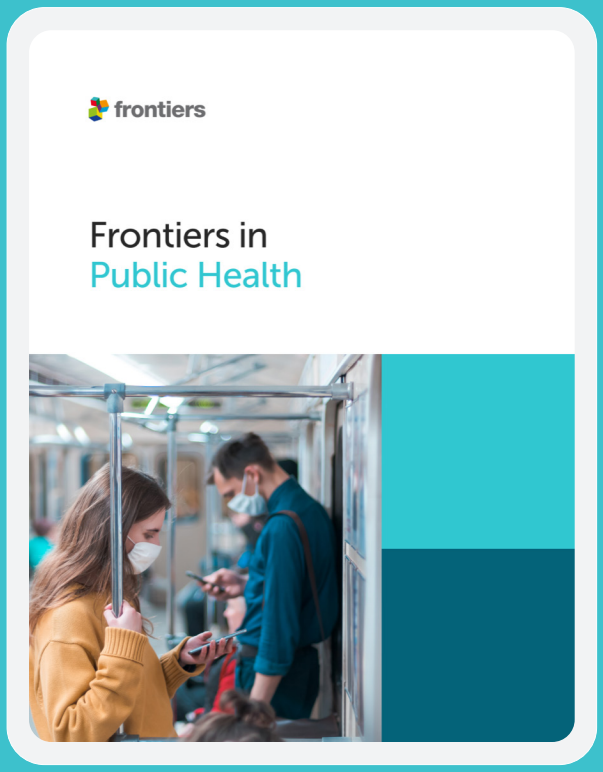

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