



The effect of a workplace stress prevention program on psychosocial work characteristics among primary healthcare nurses; a controlled community-based quasi-experimental study

Mi Phan Thanh Tra¹, Xuan Phan Thanh^{1*}

¹University of Medicine and Pharmacy at Ho Chi Minh City, Ho Chi Minh City, Vietnam

Correspondence to:

Xuan Phan Thanh, Email:
ptxuanytcc@ump.edu.vn

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Abstract

Introduction: Workplace stress among primary healthcare nurses is a major concern because it can impair mental health, reduce job satisfaction, and compromise the quality of patient care. Structured workplace stress prevention programs may help improve these psychosocial conditions.

Objectives: This study aimed to evaluate the effects of a workplace stress-prevention program on psychosocial work characteristics among primary healthcare nurses.

Materials and Methods: A controlled quasi-experimental study was conducted from January 2024 to December 2025 among nurses at two district health centers in Ho Chi Minh city, Vietnam. Nurses at district 6 health center received a six-month stress-prevention program consisting of small-group education sessions, individual counseling, and ongoing follow-up, while Tan Phu district health center served as the control site. Psychosocial work characteristics were assessed using the Vietnamese version of the Karasek Job Content Questionnaire (K-JCQ). Baseline and post-intervention outcomes were compared using descriptive and inferential statistical analyses.

Results: A total of 294 (mean age 42.3 ± 5.6 years) nurses participated in the study. Caring for children under five years of age (Risk ratio [RR] = 8.37, 95% CI: 1.13–62.19) and holding additional managerial responsibilities (RR = 4.35, 95% CI: 1.59–11.89) were associated with a higher risk of high job strain, whereas 6–9 years of work experience was associated with a lower risk (RR = 0.16, 95% CI: 0.04–0.72). The health education and counseling-based stress prevention program enhanced nurses' psychosocial work characteristics, notably physical job demand, social support, and relaxed job status, but showed limited benefit for high job strain.

Conclusion: The workplace stress prevention program based on health education and counseling significantly improved psychosocial work characteristics, especially physical job demand, social support, and relaxed job status, though it had a limited effect on high job strain itself. These findings support implementing such programs alongside targeted organizational measures to further reduce job strain.

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Introduction

Nursing is consistently identified as one of the most stressful professions, and psychosocial job stress in nurses is linked to poorer mental health, absenteeism, turnover intention, reduced productivity, and impaired care quality (1,2). Across primary care and hospital settings, reported stress prevalence among nurses varies widely, from 9% to 68% globally, reflecting differences in settings, instruments, and workforce conditions (3). Burnout is also common; an umbrella review found pooled prevalence estimates of 33.45% for emotional exhaustion, 25.0% for depersonalization, and 33.49% for low personal accomplishment among nurses worldwide (4). In primary health care, the burden is also substantial; a multicenter study of 1,125 primary health care nursing

professionals in Brazil found 18.3% burnout prevalence, with associations involving inadequate rest, poor technical resources, night shift work, and dissatisfaction with work (5). Among primary health care nurses in Saudi Arabia, about 30% had severe or very severe stress, and all measured workplace stress sources were positively associated with stress (3). These findings support the view that psychosocial strain in nursing is shaped not only by individual vulnerability but also by modifiable work and organizational conditions.

Vietnamese evidence shows a similar pattern. Among 600 clinical nurses in a tertiary hospital in Hanoi, the prevalence of self-reported stress, anxiety, and depression was 18.5%, 39.8%, and 13.2%, respectively, while 45.3% reported at least one mental

Key point

This study identified caring for children under five and holding additional managerial responsibilities as the principal risk factors for high job strain, while intermediate working experience was protective, and all other demographic and occupational characteristics showed no significant association. Evaluation of the workplace stress prevention program demonstrated that the intervention group achieved broader and more consistent improvements than the control group, significantly increasing low physical job demand, social support, and relaxed-job status, with a borderline gain in decision latitude, whereas the control group improved significantly only in social support; notably, high job strain remained unchanged in both groups, indicating that the program enhanced overall psychosocial work characteristics but had limited effect on high job strain specifically.

health problem and 7.3% reported all three; nurses in the highest-burden cluster reported high task demand, high conflict, low job control, and low reward, underscoring the importance of psychosocial work characteristics as correlates of distress (1). Other Vietnamese studies have reported occupational stress prevalence ranging from 19.6% to 35.1% among nurses before COVID-19, and 7.7% to 44.6% among healthcare workers during the pandemic, suggesting that stress is both common and context-sensitive (6,7).

Several workplace factors recur across studies as potentially modifiable intervention targets. In a 13-country survey of 2,864 nurses, workplace conflict was associated with roughly threefold higher odds of burnout, depression, and anxiety, while lack of social support was also associated with multiple adverse outcomes (2). In Vietnam, increased workload and working time were associated with higher depression, anxiety, and stress scores during COVID-19, and lower income was also associated with worse psychological outcomes (8). Additional evidence links stress with night shifts, temporary employment, work intensity, poor sleep, and difficult patient care environments (2,6,9).

Intervention evidence suggests that prevention programs can improve stress-related outcomes, although the size and certainty of effects vary by program type and implementation. A systematic review of 19 clinical trials involving 1,427 nurses found that most interventions reported at least one significant improvement, and overall concluded that work environment interventions are effective ways to increase job satisfaction, although heterogeneity prevented identification of a single best approach (10). A meta-analysis of 83 stress management interventions reported a medium overall effect on stress-related outcomes (Hedges' $g = 0.42$), with stronger short-term effects for person-directed interventions (11). A recent cluster randomized trial in nursing staff also found an approximately 2-point improvement in psychosocial safety climate, but the 95% credible interval crossed zero (-0.32 to 4.44), indicating uncertainty and the importance of implementation quality and uptake (12).

Despite growing international evidence, important gaps remain for primary healthcare nurses in Vietnam. Much of the Vietnamese literature has focused on hospital-based staff, cross-sectional prevalence estimates, or general mental health symptoms rather than changes in psychosocial work characteristics following a workplace program (1,7). Primary health care settings have distinct organizational demands, patient flow patterns, staffing structures, and community-facing roles that may shape stress differently from tertiary hospitals; moreover, evidence from primary care emphasizes that organizational, individual, and combined interventions can all be relevant, with combined approaches often described as the preferred strategy for prevention (3). Therefore, evaluating a workplace stress prevention program among nurses in Vietnamese primary healthcare centers is justified by the high burden of stress-related outcomes, the central role of modifiable psychosocial work characteristics, and the still limited intervention evidence in this specific setting.

Objectives

This study aimed to evaluate the effect of a workplace stress-prevention program on psychosocial work characteristics and high job strain among primary healthcare nurses in a controlled, community-based, quasi-experimental study in Ho Chi Minh city, Vietnam.

Materials and Methods**Study design and participants**

This controlled quasi-experimental, community-based study was conducted between January 2024 and December 2025 at two district health centers in Ho Chi Minh city, Vietnam, employing a parallel-group, pretest–posttest design to evaluate the effectiveness of a workplace stress prevention program for nurses. District 6 Health Center was selected as the intervention site, whereas Tan Phu district health center served as the control site. The target population comprised all nurses working at district health centers in Ho Chi Minh city, while the study population consisted of nurses employed at district 6 health center and Tan Phu district health center during the study period.

Inclusion criteria and exclusion criteria

Eligible participants were nurses currently employed at District 6 Health Center or Tan Phu district health center during the study period who provided written informed consent to participate. Nurses were excluded if they had received a similar educational program during the six-month study period, were on extended leave (such as maternity, sick, or study leave) during the data collection period, were temporarily assigned or seconded from another facility, declined to participate or did not provide informed consent, received a similar education program during the six months study period, or did not complete both the pretest and posttest assessments.

Sample size

A total population sampling strategy was employed, as the number of nurses meeting the inclusion criteria across both study sites was approximately equal to the minimum required sample size. The sample size calculation aimed to detect a reduction in the prevalence of high job strain from 15.9% to an expected prevalence of 10% following the intervention. Assuming a two-sided significance level of 5% and a statistical power of 85%, the minimum required sample size was estimated to be 151 nurses per group.

Group allocation

The study employed a parallel-group design for allocation of participants to the intervention and control arms. Participants were divided into separate intervention and control groups throughout the study without switching between treatments. The groups were followed concurrently for six months, and outcomes were compared between these independent groups at the end of the trial.

Intervention

The intervention comprised a structured workplace stress prevention program delivered to nurses employed at District 6 Health Center, while nurses at Tan Phu district health center continued routine practice and thus constituted the control group. The program was implemented over six consecutive months at district 6 health center, encompassing seven clinical and administrative departments and 14 commune health stations, with Tan Phu district health center designated as the non-intervention site for comparative purposes. Before implementation, baseline assessments were conducted in both centers to ascertain the prevalence of high job strain and its associated determinants, and these data informed the development and tailoring of the intervention content. The program included both group-based and individualized educational components focusing on mental health promotion, recognition and prevention of work-related stress, adoption of healthy lifestyle behaviors, engagement in regular physical activity, maintenance of balanced nutrition, and application of practical strategies to mitigate occupational stress. Group sessions were conducted in small groups of approximately 8–10 nurses within each department or health station, with each session lasting around 30 minutes, while supplementary individual counseling was provided through a dedicated telephone hotline managed by the research team for participants requiring additional support. Each participating department or health station received two intervention sessions during the study period, and ongoing follow-up was undertaken to ensure that all nurses were exposed to the intervention materials and activities. The program was delivered by trained public health research assistants under the supervision of the principal investigator, and upon completion of the

intervention, the same standardized questionnaire was administered in both the intervention and control groups to assess changes in psychosocial work characteristics and to evaluate the effectiveness of the workplace stress prevention program.

Data collection and outcomes measurement

Before implementation, all research staff received standardized training regarding the study objectives, data collection procedures, participant communication, and confidentiality requirements. Data were collected using anonymous self-administered questionnaires. Participants were informed that the survey aimed to assess psychosocial working conditions rather than evaluate individual performance. Confidentiality was emphasized throughout the study to minimize response bias related to workplace concerns. Following data collection, all questionnaires were reviewed for completeness and consistency. Invalid or incomplete questionnaires were excluded before statistical analysis. The questionnaire consisted of three sections:

The first section collected participants' demographic information, including age, sex, marital status, childcare responsibilities for children younger than five years, caregiving responsibilities for older adults or disabled family members, housing status, and monthly income. The second section collected occupational characteristics, including educational attainment, department, years of working experience at the health center, years of experience in the current department, average weekly working hours, and additional managerial responsibilities. The third section assessed psychosocial work characteristics using the validated Vietnamese version of the Karasek Job Content Questionnaire (K-JCQ), comprising 33 items covering three domains: physical job demand, decision latitude, and social support. The Vietnamese version was translated and psychometrically validated by Hoang et al in collaboration with Hai Phong university of medicine and pharmacy and has been demonstrated to be a valid instrument for assessing occupational stress in Vietnam (13). Prior to the main survey, the questionnaire was pilot-tested among 50 nurses to evaluate internal consistency using Cronbach's alpha, and minor revisions were made before formal implementation. The primary outcome was the prevalence of high job strain. Secondary outcomes included physical job demand, decision latitude, social support, and job type classifications. All outcomes were assessed before and after the intervention in both study groups. Because the intervention consisted solely of workplace activities and questionnaire-based assessments, no intervention-related adverse events were anticipated or systematically monitored.

Statistical analysis

All statistical analyses were performed using Stata version 15 (StataCorp LLC, College Station, TX, USA).

Descriptive statistics were used to summarize baseline sociodemographic and work-related characteristics, with continuous variables presented as means and standard deviations and categorical variables as frequencies and percentages. Comparisons between groups and between baseline and post-intervention assessments were performed using chi-square tests for categorical variables. To identify factors associated with high job strain at baseline, a logistic regression model was fitted, and associations were expressed as risk ratios (RRs) with corresponding 95% confidence intervals (CIs) and *P* values. To evaluate the effectiveness of the workplace stress prevention program, changes in psychosocial work characteristics and high job strain between pre- and post-intervention assessments were compared separately in the intervention and control groups, and within-group changes over time in paired categorical outcomes were examined using the McNemar test. The preventive value (PV) was calculated as: $PV = (PB - PA) / PB$, where PB represents the baseline prevalence, and PA represents the post-intervention prevalence, and intervention effectiveness was calculated as the difference in preventive value between the intervention and control groups. A two-sided *P* value of less than 0.05 was considered to indicate statistical significance.

Results

A total of 294 nurses participated in the study, with a mean age of 42.3 ± 5.6 years, and the majority were older than 40 years. Most participants were female and married, and the majority reported caring for children under five years of age as well as for elderly or disabled family members. With respect to housing, most nurses lived in rented accommodation, and the majority earned a monthly income in the middle range. In terms of psychosocial work characteristics, most participants reported a low physical job demand, while the majority experienced a high level of decision latitude and a high level of social support (Table 1).

The logistic regression analysis identified several factors associated with high job strain among the participating nurses. Nurses who reported caring for children under five years of age had significantly higher odds of experiencing high job strain compared with those who did not, and having additional managerial responsibilities was likewise significantly associated with elevated job strain. In contrast, longer working experience appeared protective, as nurses with intermediate experience had significantly lower odds of high job strain relative to the most experienced group. Several other characteristics, including age, sex, marital status, caring for elderly or disabled family members, housing status, monthly income, educational level, department, and weekly working hours, showed no statistically significant association with high job strain in the logistic regression model. Overall, the principal risk factors for high job strain were caring

Table 1. Baseline characteristics and psychosocial work characteristics of participating nurses

Characteristics	Group	N (%) / Mean $\pm$ SD
Age (years)	Mean $\pm$ SD	42.3 $\pm$ 5.6
	≤ 40	124 (42.2)
	> 40	170 (57.8)
Sex	Female	211 (71.8)
	Male	83 (28.2)
Marital status	Married	209 (71.1)
	Single	53 (18.0)
	Other	32 (10.9)
Caring for children < 5 years	Yes	197 (67.0)
	No	97 (33.0)
Caring for elderly/disabled family members	Yes	263 (89.5)
	No	31 (10.5)
Housing status	Own house	98 (33.3)
	Rented house	171 (58.2)
	Other	25 (8.5)
Monthly income (million VND)	< 7	52 (17.7)
	$7 - < 14$	239 (81.3)
	≥ 14	3 (1.0)
Physical job demand	Low	139 (47.3)
	High	106 (36.1)
	Very high	49 (16.6)
Decision latitude	Low	28 (9.5)
	High	263 (89.5)
	Very high	3 (1.0)
Social support	Very low	2 (0.7)
	Low	54 (18.4)
	High	235 (79.9)
	Very high	3 (1.0)

SD: Standard deviation.

for young children and holding additional managerial responsibilities (Table 2).

Table 3 compares changes in psychosocial work characteristics and high job strain between the control and intervention groups before and after the workplace stress prevention program. In the intervention group, the program produced significant improvements across several parameters: nurses showed a significant increase in the proportion reporting low physical job demand, a significant improvement in social support, and a significant rise in those classified as having a relaxed job, with decision latitude showing a borderline improvement. By contrast, the control group demonstrated significant change only in social support, while physical job demand, decision latitude, and relaxed job status remained statistically unchanged over the same period. High job strain showed no significant change in either group, remaining stable from pre- to post-assessment. Overall, the comparison indicates that the intervention group experienced broader

Table 2. Logistic regression analysis for identifying factors associated with high job strain among nurses

Variable		High job strain		RR (95% CI)	P value
		Yes, n (%)	No, n (%)		
Age (years)	≤40	11 (8.9)	113 (91.1)	Ref	0.102
	>40	7 (4.1)	163 (95.9)	0.46 (0.18–1.17)	
Sex	Male	6 (7.2)	77 (92.8)	Ref	0.620
	Female	12 (5.7)	199 (94.3)	0.79 (0.30–2.03)	
Marital status	Married	10 (4.8)	199 (95.2)	Ref	0.426
	Single	4 (7.5)	49 (92.5)	1.58 (0.51–4.84)	
	Other	4 (12.5)	28 (87.5)	2.61 (0.87–7.85)	
Caring for children <5 years	No	1 (1.0)	96 (99.0)	Ref	0.038
	Yes	17 (8.6)	180 (91.4)	8.37 (1.13–62.19)	
Caring for elderly/disabled family members	No	4 (12.9)	27 (87.1)	Ref	0.098
	Yes	14 (5.3)	249 (94.7)	0.41 (0.14–1.18)	
Housing status	Own house	10 (10.2)	88 (89.8)	Ref	0.063
	Rented house	6 (3.5)	165 (96.5)	0.34 (0.13–0.92)	
	Other	2 (8.0)	23 (92.0)	0.78 (0.18–3.36)	
Monthly income (million VND)	<7	2 (3.8)	50 (96.2)	Ref	0.451
	7–<14	16 (6.7)	223 (93.3)	1.74 (0.41–7.36)	
	≥14	0 (0.0)	3 (100.0)	–	
Educational level	College or below	3 (12.0)	22 (88.0)	Ref	0.196
	University or above	14 (5.5)	240 (94.5)	0.46 (0.14–1.49)	
	Other	1 (6.7)	14 (93.3)	0.56 (0.06–4.89)	
Working experience	>9 years	16 (10.3)	139 (89.7)	Ref	0.016
	<3 years	0 (0.0)	6 (100.0)	–	
	3–6 years	0 (0.0)	18 (100.0)	–	
	6–9 years	2 (1.7)	113 (98.3)	0.16 (0.04–0.72)	
Department	Clinical	10 (5.0)	192 (95.0)	Ref	0.182
	Paraclinical	4 (10.5)	34 (89.5)	2.13 (0.70–6.44)	
	Administrative	2 (4.7)	41 (95.3)	0.94 (0.21–4.15)	
	Logistics	2 (18.2)	9 (81.8)	3.67 (0.91–14.80)	
Weekly working hours	>48 hours	14 (10.6)	118 (89.4)	Ref	0.363
	≤40 hours	0 (0.0)	100 (100.0)	–	
	41–48 hours	4 (6.5)	58 (93.5)	0.61 (0.21–1.78)	
Additional managerial responsibilities	No	5 (2.7)	179 (97.3)	Ref	0.004
	Yes	13 (11.8)	97 (88.2)	4.35 (1.59–11.89)	

RR: Risk ratio, CI: Confidence interval.

and more consistent favorable changes in psychosocial work characteristics than the control group, supporting the effectiveness of the program, although its impact on high job strain specifically was limited in both groups ([Table 3](#)).

Discussion

High job strain appeared to be influenced by both workplace and family-related responsibilities. Nurses caring for young children experienced a substantially higher prevalence of high job strain than those without childcare responsibilities, while nurses with managerial responsibilities also reported greater strain. These findings are consistent with the Job Demands–Resources model, which suggests that work-related and non-work demands jointly influence occupational stress. A scoping review by McVicar identified workload, work–family conflict, limited decision authority, and insufficient managerial support as common antecedents of nurse stress (14). Similarly, studies among nurse managers have consistently

shown that additional leadership responsibilities, resource constraints, and administrative workload contribute to poorer occupational well-being (15–17). In contrast, nurses with 6–9 years of working experience had a lower prevalence of high job strain than those with longer service. One possible explanation is that nurses in this career stage have accumulated sufficient professional experience while not yet assuming the broader managerial responsibilities often associated with senior positions. Previous studies have also suggested that coping strategies and psychological responses vary across different stages of nursing careers rather than following a simple linear relationship (1,18).

The intervention was associated with improvements in several dimensions of the psychosocial work environment. Physical job demand decreased, perceived workplace social support increased, and more nurses were classified as having a relaxed job after the intervention. Because the intervention primarily consisted of repeated health education sessions, small-group discussions, and

Table 3. Effectiveness of the workplace stress prevention program on psychosocial work characteristics and high job strain among nurses at district health centers in Ho Chi Minh city

Parameter	Group								Intervention effectiveness (%)
	Control				Intervention				
	Pre	Post	PV (%)	P value*	Pre	Post	PV (%)	P value*	
	N (%)	N (%)			N (%)	N (%)			
Physical job demand									
Low	81 (55.1)	94 (49.0)	26.19	0.437	58 (39.5)	125 (65.4)	53.09	<0.001	26.90
High	37 (25.2)	61 (31.8)			69 (46.9)	42 (22.0)			
Very high	29 (19.7)	36 (18.8)			20 (13.6)	24 (12.6)			
Decision latitude									
Low	17 (11.6)	18 (9.4)	18.96	0.093	11 (7.5)	31 (16.2)	53.70	0.052	34.74
High	129 (87.8)	164 (85.4)			134 (91.2)	157 (82.2)			
Very high	1 (0.7)	9 (4.7)			2 (1.4)	3 (1.6)			
Social support									
Low	21 (14.3)	14 (7.3)	48.90	<0.001	33 (22.4)	17 (8.9)	60.26	0.001	11.36
High	124 (84.4)	155 (80.7)			111 (75.5)	169 (88.5)			
Very high	1 (0.7)	22 (11.5)			2 (1.4)	5 (2.6)			
High job strain									
Yes	10 (6.8)	13 (6.8)	0.00	0.990	8 (5.4)	10 (5.2)	3.70	0.933	3.70
No	137 (93.2)	179 (93.2)			139 (94.6)	181 (94.8)			
Relaxed job									
Yes	74 (50.3)	89 (46.4)	7.75	0.856	55 (37.4)	104 (54.5)	31.50	0.002	23.75
No	73 (49.7)	103 (53.6)			92 (62.6)	87 (45.5)			

PV: Preventive value, *McNemar test.

individualized counseling, these improvements may reflect greater awareness of occupational stress, better stress-coping behaviors, and stronger peer interaction rather than changes in organizational structure or staffing. These findings are compatible with previous evidence showing that psychosocial workplace interventions most consistently influence modifiable work resources rather than broader psychological outcomes. Systematic reviews have identified social support, manageable workload, and improved working conditions as important targets for interventions designed to improve nurses' work environments (10). Likewise, international evidence indicates that stronger workplace support is associated with lower psychological distress, burnout, and turnover intention among nurses across different healthcare settings (2). Our findings suggest that even relatively low-cost educational interventions may improve nurses' perceptions of their psychosocial work environment in primary healthcare settings.

The intervention, however, produced little change in the prevalence of overall high job strain. This result may initially appear inconsistent with the improvements observed in several psychosocial domains, but it is not entirely unexpected. Job strain represents a multidimensional construct that reflects the combined influence of job demand, decision latitude, and social support, together with personal and family circumstances. Consequently, improvements in individual domains may not immediately translate into measurable reductions in overall job strain. A recent meta-analysis of stress management interventions among nurses found that workplace interventions generally produced modest improvements

in stress-related outcomes, with greater effects observed for interventions targeting individual coping strategies than for organizational interventions alone (11). Other reviews have similarly argued that reducing nurse stress often requires sustained organizational changes addressing staffing levels, workload, and resource allocation in addition to psychosocial support (14,19). In the present study, the intervention did not directly modify workload allocation, staffing levels, managerial responsibilities, or family caregiving demands. Therefore, the limited change in overall high job strain is understandable despite improvements in several psychosocial work characteristics.

In summary, this controlled quasi-experimental study among nurses demonstrated that a six-month workplace stress prevention program was effective in improving several key psychosocial work characteristics, including lower perceived physical job demand, higher levels of social support, and a greater proportion of nurses classified as having a relaxed job profile in the intervention site compared with the control site. At the same time, the intervention did not lead to a statistically significant reduction in the prevalence of high job strain over the study period, suggesting that while organizational and educational strategies can positively modify important dimensions of the psychosocial work environment, more intensive, longer-term, or structurally targeted approaches may be required to produce measurable changes in high job strain itself. These findings underscore both the potential and the limitations of relatively low-intensity, multicomponent stress prevention programs in resource-constrained primary care settings and highlight the need for integrated interventions that address workload, role

demands, and family–work conflicts, particularly among nurses with young children and additional managerial responsibilities.

Conclusion

This study demonstrates that high job strain among nurses at district health centers in Ho Chi Minh City is shaped primarily by caregiving and managerial burdens, with caring for young children and holding additional managerial responsibilities emerging as the principal risk factors, while greater working experience appears protective. The workplace stress prevention program proved effective in improving key psychosocial work characteristics, particularly physical job demand, social support, and relaxed job status, with the intervention group showing broader and more consistent gains than the control group. However, the program's limited impact on high job strain itself suggests that structural and organizational stressors may require more targeted and sustained measures. These findings support the integration of workplace stress prevention programs into nursing work environments, while highlighting the need for complementary strategies—such as workload redistribution, managerial support, and family-friendly policies—to more effectively reduce high job strain. Further studies with longer follow-up and larger samples are recommended to confirm these results and to evaluate the long-term sustainability of the program's benefits.

Limitations of the study

First, the controlled quasi-experimental design without random allocation of individual nurses or clusters introduces a risk of selection bias and residual confounding, as pre-existing differences between District 6 and Tan Phu Health Centers may have influenced both baseline psychosocial work characteristics and responsiveness to the intervention. Second, the study was conducted in only two district health centers in Ho Chi Minh city, which limits external validity and reduces the generalizability of the results to other settings, regions, or types of healthcare institutions with different organizational structures and work cultures. Third, all outcomes were assessed using self-administered questionnaires, which are susceptible to information bias, including social desirability bias and common-method variance, particularly in the context of workplace stress where perceptions may be influenced by concerns about professional evaluation. Fourth, the intervention period was relatively short (six months), and follow-up was restricted to a single post-intervention assessment, which may have been insufficient to capture longer-term changes in job strain or to detect delayed effects of the workplace stress prevention program. Finally, the absence of systematic monitoring of adverse events or unintended consequences, combined with potential contamination or co-interventions within routine practice at the control site, constrains the ability to

attribute observed changes solely to the intervention and to comprehensively evaluate its safety and implementation fidelity.

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Authors' contribution

Conceptualization: Xuan Phan Thanh.

Data curation: All authors.

Formal analysis: Mi Phan Thanh Tra.

Investigation: Xuan Phan Thanh.

Methodology: Mi Phan Thanh Tra.

Project Management: Xuan Phan Thanh.

Resources: All authors.

Supervision: All authors.

Validation: Mi Phan Thanh Tra.

Writing—original draft: All authors.

Writing—review and editing: All authors.

Conflicts of interest

The authors declare no conflict of interest.

Data availability statement

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

Ethical issues

This study was conducted at District 6 Health Center and Tan Phu District Health Center, Ho Chi Minh City, Vietnam. Ethical approval was obtained from the Institutional Review Board of the University of Medicine and Pharmacy at Ho Chi Minh City (Approval No. 806/HDDD-DHYD, dated 17 December 2021). Written informed consent was obtained from all participants before enrollment. Participation was voluntary, and participants could withdraw from the study at any time without consequences. All data were collected anonymously and used solely for research purposes. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. The authors also confirm adherence to accepted standards of research integrity, including the avoidance of plagiarism, data fabrication, falsification, and duplicate publication.

Declaration of generative artificial intelligence (AI) and AI-assisted technologies in the writing process

While preparing this work, the authors utilized AI (Grammarly and Perplexity) to refine grammar points and language style. Subsequently, they thoroughly reviewed and edited the content as necessary, assuming full responsibility for the publication's content.

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