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The moderating role of coping styles on the associations of fatigue with life satisfaction in Chinese nurses: a cross-sectional study

Yuekun Wu^{1†}, Wen Bo^{1†}, Mengyao Li¹, Li Liu¹ and Hui Wu^{1*}

Abstract

Background Fatigue affects nurses negatively and may influence life satisfaction. According to the stress process model, active coping might influence the impact of adverse conditions such as fatigue on well-being measures such as life satisfaction. However, no research examined the associations among nurses' fatigue, coping styles, and life satisfaction.

Methods The cross-sectional study was conducted in Liaoning Province, China. 482 effective questionnaires were collected (effective response rate of 80.3%). The questionnaire included Fatigue Scale-14, Simplified Coping Style Questionnaire and Satisfaction with Life Scale. The association among fatigue, coping styles and fatigue × coping styles interaction with life satisfaction was examined by hierarchical multiple regression analysis. The interaction was visualized by simple slope analysis.

Results Mean score of life satisfaction was 22.74 ± 6.11 . Active coping moderated the relationship between mental fatigue and life satisfaction. The impacts of mental fatigue on life satisfaction gradually decreased in the low (1 SD below the mean, $\beta = -0.400$, $P < 0.001$), mean ($\beta = -0.312$, $P < 0.001$), and high (1 SD above the mean, $\beta = -0.224$, $P < 0.001$) groups of active coping.

Conclusion The life satisfaction of Chinese nurses was relatively low. Active coping could alleviate the impact of mental fatigue on life satisfaction. Developing active coping styles might be a crucial strategy to alleviate nurses' mental fatigue and improve life satisfaction.

Keywords Life satisfaction, Fatigue, Mental fatigue, Coping styles, Moderating effect, Nurses

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Introduction

Background

Life satisfaction was defined as a cognitive and global evaluation of the quality of one's life as a whole [1]. Life satisfaction was the cognitive component of subjective well-being and reflected the state of an individual's life as well as their mental state [2]. With the prevalence of the biopsychosocial model of health, life satisfaction has become a major public health topic concern in many countries, including the United States, and Poland [3, 4].

However, a previous study has found that the majority (nearly 74%) of nurses reported low-to-moderate levels of life satisfaction [5]. The subjective well-being of nurses was lower than that of the general population [6]. Low life satisfaction would adversely affect nurses' healthy lifestyle choices (e.g., exercise, healthy diet, and good sleep habits), care rationing, self-learning ability, and willingness to take on new challenges [4, 5, 7–10].

Fatigue, which could be primarily classified into mental and physical fatigue [11], was defined as the state of feeling very tired, weary or sleepy resulting from insufficient sleep, prolonged mental or physical work, or extended periods of stress or anxiety [12]. Fatigue and psychiatric disorders frequently occur comorbidly and share similar phenomenological features. Studies have shown that mental fatigue was a central component of the cognitive and clinical characteristics of stress-related exhaustion disorder [13]. Healthcare professionals such as nurses encountered the risks of high exposure to posture-related harm, which could lead to physical fatigue [14]. Mental fatigue resulted from work-related emotional stress such as patients' demands and expectations [15].

According to a previous study, 84.9% of female nurses have experienced physical and mental fatigue [16]. Nurses experienced higher levels of fatigue compared to other occupations (e.g., industrial workers) [17]. Fatigue, especially mental fatigue, affects nurses negatively and may influence life satisfaction. Using simple logistic regression analyses, Rosqvist et al. (2017) found that fatigue might be a risk factor for life satisfaction [18]. Emotional exhaustion (mental fatigue) correlated significantly and negatively with life satisfaction [19]. Work intensity could influence life satisfaction through emotional exhaustion (mental fatigue) [20].

Positive psychology advocates positive orientations in psychology [21], and positive organizational behavior emphasizes the development and management of individual psychological advantages [22]. With the rise of positive psychology and positive organizational behavior, some researchers have begun to focus their life satisfaction research on the mitigation and regulation of personal positive resources. Active coping has received more attention as a positive personal trait that could be changed and improved [23].

Coping styles referred to stable psychological and behavioral strategies, positive or negative, to overcome external and internal challenges [24]. Coping styles could be categorized as active coping and passive coping. Active coping, also known as problem-focused coping, referred to taking a direct and rational way to solve a problem, while passive coping, also known as emotion-focused coping, involved dealing with problems by avoidance, withdrawal, and denial [24].

Active coping strategies have always been associated with healthier outcomes (e.g., lower fatigue, and higher life satisfaction [25, 26]). Active coping styles could help nurses to fight work-related stress and fatigue [27, 28]. Several studies have indicated that active coping enhanced individuals' life satisfaction [26, 29]. For instance, Li et al. (2016) found that active coping improves college students' and employees' life satisfaction [26]. Coping skills such as active coping [30] and positive reframing [31] were positively associated with life satisfaction, while coping skills like self-distraction [32], denial [33], behavioral disengagement, and self-blame [34] were negatively associated with life satisfaction.

Theoretical framework: stress process models

Stress process models have been used to characterize protective and risk factors for caregivers' life satisfaction [35]. Risk factors included primary caregiving stressors (stressors directly arising from caregiving) and other stresses outside of caregiving, such as poor caregiver health. Protective factors (moderating factors) included adaptive caregiving appraisals (subjective reactions to problems), personality, coping responses, social networks, and social support. Personal adaptation or coping might influence the impact of adverse conditions in life, such as fatigue, on personal life satisfaction [36]. Gillett and Crisp (2017) found that avoidance-focused coping had a specific moderating role in the relationship between perceived stress and subjective well-being [37]. Greater use of active coping strategies could alleviate the negative impact of poly-victimization on life satisfaction [38]. Taken together, coping styles might play a moderating role in the relationship between fatigue and life satisfaction. In line with the stress process model, researchers have called for an examination of psychosocial resources (i.e., moderators) influencing caregivers' life satisfaction to identify potential intervention points for this vulnerable group [39, 40].

The aim of the study

However, no studies have assessed the associations between nurses' fatigue, coping styles, and life satisfaction. Therefore, this study aimed to analyze the possible role of coping style as a moderator in the relationship between fatigue and life satisfaction among nurses. Using

the stress process model as the theoretical framework, we hypothesized that nurses with higher levels of fatigue would have poorer life satisfaction and that active coping would moderate the association between fatigue and life satisfaction among nurses. If coping styles can moderate the association between fatigue and life satisfaction, it will provide another vital clue to improve nurses' fatigue and life satisfaction in the current work environment.

Methods

Ethic statement

The study was approved by the Research Ethics Committee of China Medical University (No. 2013PS170K). All methods were performed in accordance with the relevant guidelines and regulations.

Study design and participants

Estimation of sample size

The sample size was estimated based on the following formula [41]. According to a previous study [42], the standard deviation (S) of nurses' life satisfaction was 5.51, and the allowable error (d) was taken as 0.5. The 95% confidence limit $U_{\alpha}=1.96$. The effect of the multi-stage complex sampling design ($deff$) was 1. The sample size calculated based on the above formula was approximately 467. Taking into account the effective response rate of 80%, the sample size of this study was finally determined to be 600.

$$n = \frac{U_{\alpha}^2 S^2}{d^2} \times deff$$

Study design and participants

A multi-center, cross-sectional study was conducted from October to November 2020. The multi-stage random sampling method was used to select subjects [43]. This study selected five districts (Heping District, Huanggu District, Shenhe District, Tiexi District, and Yuhong District) from thirteen districts of Shenyang, Liaoning Province. Two tertiary hospitals (with over 500 beds) were randomly sampled in each region. Finally, 600 female nurses were sampled from different departments (including internal medicine, surgery, obstetrics and gynecology, pediatrics, laboratory, radiology, emergency, ICU, and oncology departments) in these ten selected hospitals. One investigator was recruited in each hospital (ten in total) and they were trained to conduct the questionnaire surveys. The self-administered questionnaires were distributed to nurses after obtaining written informed consent. The participants completed the questionnaires in a private place. Of all subjects, 482 participants answered all items completely, with an effective response rate of 80.3% eventually.

Inclusion criteria included [44]: (1) nurses with qualification certificates and volunteered; (2) nurses who have been engaged in nursing work for at least one year. Exclusion criteria included: (1) retired nurses, refresher nurses, practice nurses, and other nurses who did not provide direct patient care; (2) nurses who suffered from severe mental illness or took psychotropic drugs; (3) nurses who were on leave during the investigation.

Measurement

Life satisfaction

The Satisfaction with Life Scale (SWLS) developed by Diener et al. (1985) was used to assess the level of life satisfaction [45]. This scale consists of five items (e.g., In most ways, my life is close to my ideal.), with each item using a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). With higher scores indicating greater life satisfaction. A previous study has demonstrated satisfactory validity and reliability of the scale among Chinese groups [46]. In this study, the Cronbach's α coefficient of the SWLS was 0.946.

Fatigue

The fatigue level was assessed by Fatigue scale-14 (FS-14) [11]. The FS-14 scale is a common tool that is generally considered to effectively reflect fatigue levels. It has 14 items, including the physical fatigue dimension and the mental fatigue dimension. Items 1–8 measure physical fatigue (e.g., "Do you have problems with tiredness?", "Do you need to rest more?" etc.), and items 9–14 measure mental fatigue (e.g., "Do you have difficulty concentrating?", "Do you think as clearly as usual?", "Do you make slips of the tongue when speaking?" etc.). Items 10 and 14 are scored in reverse. Each item has two responses, 0 (no fatigue-related problem) and 1 (have fatigue-related problem). The total score ranges from 0 to 14. Higher scores indicate higher levels of fatigue. The FS-14 could be used to measure fatigue in healthcare professionals in China [47]. Cronbach's α coefficients of physical fatigue dimension and mental fatigue dimension were 0.933 and 0.914, respectively.

Coping styles

Coping styles were assessed with the Simplified Coping Style Questionnaire (SCSQ) [48], adapted from the Ways of Coping Questionnaire [49]. The SCSQ scale contains 20 items, and consists of two dimensions: active coping (items 1–12) and passive coping (items 13–20). Active coping reflects the characteristics of individuals taking active coping strategies when facing problems, such as "solving problems by work, learning or other things", "looking at the good side of things", "finding several different ways to solve the problem", "asking for advice from relatives, friends or classmates", etc. In contrast, passive

coping reflects the characteristics of individuals adopting negative coping strategies when facing problems, such as “relieving worries by smoking, drinking, taking medicine and eating”, “fantasizing that some kind of miracle might happen to change the status quo”, “relying on others to solve problems” etc. [50]. The items measure coping style using a four-point Likert scale (0=never; 1=occasionally; 2=sometimes; 3=frequently). The average score of the active coping dimension and the passive coping dimension were calculated separately. The average score reflects individuals’ coping style preferences, with dimensions with higher scores indicating that individuals are more likely to adopt the relevant coping style [51]. The SCSQ has been applied to the Chinese population with good validity and reliability [52]. The Cronbach’s α coefficients of active coping and passive coping were 0.939 and 0.836, respectively.

Demographic and working factors

Demographic and working factors included age, marital status (“unmarried”, “married/cohabited”, and “single/divorced/separated”), educational level (“Junior college and below”, “College and above”), monthly income (“ ≤ 5000 yuan”, “5001-8000 yuan”, and “ > 8000 yuan”), weekly work time and night shift [53, 54]. Using the domestic working hour standard in China as the cut point, weekly work time was divided into “ ≤ 40 h/week” and “ > 40 h/week”. Night shift was divided into yes or no [53, 54].

Statistical analysis

For reducing data loss, missing values of datasets ($< 10\%$ missing values) were replaced by the expectation maximization method. The mean scores of life satisfaction in different categories of sociodemographic variables and health conditions variables were tested by Student’s t-test or one-way ANOVA. Pearson’s correlation analysis was used to analyze the association among life satisfaction, fatigue, and coping styles. Hierarchical multiple regression analyses were applied to investigate the factors in relation to life satisfaction. All variables that were associated with life satisfaction in univariate analysis ($P < 0.05$) were entered into the hierarchical multiple regression models. In this study, variance inflation factor (VIF) values < 10 , indicating that there was no issue of multicollinearity in the estimation. In the hierarchical multiple regression model, demographic and working factors that were statistically significant (P less than 0.05) in the univariate analysis would be added in step 1 to adjust for confounding factors. Fatigue and coping styles were entered into step 2. The products of fatigue with coping styles were added in step 3. If the interaction effect was statistically significant, the simple slope analysis was conducted to visualize the interaction term. All analyses were

conducted using SPSS 21.0, with a two-tailed probability value of < 0.05 considered to be statistically significant.

Results

Description of demographic characteristics

The average score of life satisfaction level among the nurses surveyed was 22.74 ± 6.11 . The results of univariate analyses between life satisfaction and demographic and working factors of the study subjects are shown in Table 1. The nurses surveyed were aged 33.08 ± 6.13 years old. 69.1% of nurses were married and 82.0% of them had an education level at college and above. Nearly 81.1% of nurses earned 5000 yuan or more a month. 47.3% of nurses worked more than 40 h per week, and 73.4% of nurses had night shifts. Furthermore, age, marital status, weekly work time, and night shift were significantly associated with life satisfaction.

Correlation between continuous variables

Correlations among continuous variables are presented in Table 2. The level of life satisfaction was positively correlated with active coping, and negatively correlated with mental fatigue and passive coping. Mental fatigue was positively correlated with passive coping and negatively correlated with active coping.

Hierarchical multiple regression

The results of hierarchical regression analyses are displayed in Table 3. In the first step, the linear combination of demographic and working control variables (age, educational level, weekly work time, and night duty) explained life satisfaction ($F = 18.802$, adjusted $R^2 = 0.156$, $P < 0.01$). In the second step, mental fatigue was significantly and negatively related to life satisfaction ($\beta = -0.311$, $P < 0.01$), while AC was significantly and positively associated with life satisfaction ($\beta = 0.358$, $P < 0.01$). After adding mental fatigue and active coping, the model fit of life satisfaction was improved ($F = 44.540$, adjusted $R^2 = 0.388$, $P < 0.01$). In the third step, the mental fatigue \times AC interaction term was significantly and positively associated with life satisfaction ($\beta = 0.091$, $P < 0.05$). Thus, AC played a moderating role in the relationship between mental fatigue and life satisfaction. The simple slope analysis of the interaction shown in Fig. 1 indicated that the impacts of mental fatigue on life satisfaction were different in low (1 SD below the mean, $\beta = -0.400$, $P < 0.001$), mean ($\beta = -0.312$, $P < 0.001$) and high (1 SD above the mean, $\beta = -0.224$, $P < 0.001$) levels of AC. As AC increased, the effect of mental fatigue on life satisfaction became weaker.

As shown in Table 4, in step 2, after adjusted control variables, mental fatigue was found to be significantly and negatively related to life satisfaction ($\beta = -0.359$, $P < 0.01$), while PC was not significantly associated with life satisfaction ($\beta = 0.057$, $P > 0.05$). In step 3, mental

Table 1 Demographic and working variables of participants in relation to life satisfaction (N = 482)

Variables	N	%	Life Satisfaction			
			Mean	SD	F/t	P-value
Age (years)						
< 30	158	32.8	25.39	5.76	26.338	< 0.001
30–40	285	59.1	21.68	5.84		
> 40	39	8.1	19.74	5.86		
Marital status						
Unmarried	120	24.9	23.54	5.58		
Married/cohabited	333	69.1	22.79	6.00	7.058	0.001
divorced/widowed/separated	29	6.0	18.86	7.96		
Education level						
Junior college and below	87	18.0	21.76	5.66	-1.662	0.097
College and above	395	82.0	22.96	6.19		
Monthly income (RMB)						
≤ 5000	91	18.9	23.40	6.41	0.667	0.513
5001–8000	207	42.9	22.52	5.91		
> 8000	184	38.2	22.67	6.19		
Weekly work time						
≤ 40 h/week	254	52.7	23.39	6.73	2.514	0.012
> 40 h/week	228	47.3	22.02	5.26		
Night duty						
Yes	354	73.4	22.12	6.43	-4.342	< 0.001
No	128	26.6	24.47	4.75		

Abbreviations: SD, standard deviation

Table 2 Correlations among life satisfaction, physical fatigue, mental fatigue, AC and PC

Variables	Mean ± SD	1	2	3	4
1.Life satisfaction	22.74 ± 6.11	1			
2.Physical fatigue	3.95 ± 2.52	0.044	1		
3.Mental fatigue	3.04 ± 0.97	-0.430**	-0.031	1	
4.AC	2.81 ± 0.57	0.470**	0.074	-0.179**	1
5.PC	2.31 ± 0.68	-0.690**	0.016	0.279**	-0.238**

Abbreviations: SD, standard deviation; AC active coping; PC passive coping

Notes: ** $P < 0.01$, * $P < 0.05$

Table 3 Hierarchical multiple regression results of life satisfaction

Variables	Block 1	Block 2	Block 3
Age	-0.332**	-0.160**	-0.160**
Marital status			
Dummy 1	0.064	0.029**	0.028**
Dummy 2	-0.090	-0.078	-0.076
Weekly work time	-0.109**	-0.108	-0.107**
Night duty	0.205**	0.117**	0.121**
Mental fatigue		-0.311**	-0.312**
AC		0.358**	0.360**
Interaction			0.091*
F	18.802**	44.540**	40.248**
Adjusted R ²	0.156	0.388	0.395
ΔR ²	0.165	0.232	0.008

Note: * $P < 0.05$; ** $P < 0.01$. Dummy 1: married/cohabited versus unmarried; Dummy 2: divorced/ widow/ separated versus unmarried; Night duty, yes versus no; AC, Active coping

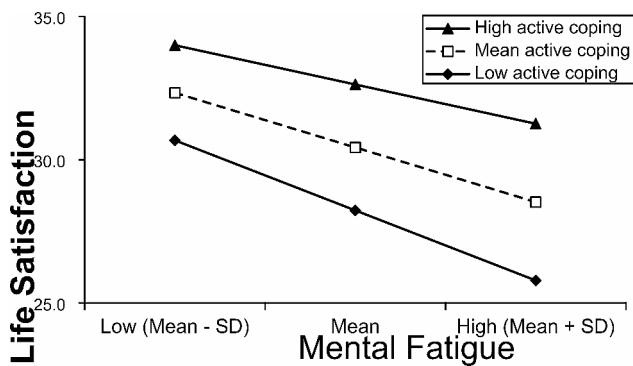


Fig. 1 Simple slope plot of the interaction between mental fatigue and active coping on life satisfaction. **Notes:** The values of mental fatigue and active coping were centered before regression analysis. Low indicates 1 SD below the mean; high indicates 1 SD above the mean; SD indicates standard deviation

fatigue × PC interaction term was not significantly associated with life satisfaction ($\beta=-0.045, P>0.05$). Thus, PC did not moderate the relationship between mental fatigue and life satisfaction.

Discussion

This study investigated the relationship between fatigue and life satisfaction, and the moderating effect of coping styles in that relationship. The results showed that mental fatigue was negatively associated with life satisfaction among nurses, and active coping styles significantly moderated the relationship between mental fatigue and life satisfaction. Mental fatigue had a less negative impact on life satisfaction when nurses adopted a more active coping style.

This study showed that the average life satisfaction level score of nurses surveyed was 22.74 ± 6.11 , which was slightly higher than the nurses’ life satisfaction level of previous studies of 21.03 ± 6.39 [55] and 19.71 ± 5.41 [5]. However, the life satisfaction level of nurses was still lower than that of the general population [56]. In

addition, this study suggested that the physical fatigue level of nurses was 3.95 ± 2.52 , and the mental fatigue level was 3.04 ± 0.97 . In contrast, another study of Chinese nurses showed that the mean score for physical fatigue was 4.89 ± 1.43 , and the score for mental fatigue was 2.05 ± 1.18 [57]. Our study found that nurses generally had lower levels of life satisfaction and higher levels of mental fatigue.

Mental fatigue was negatively correlated with nurses’ life satisfaction, as shown in this study. Other literature (e.g., [58, 59]) has also documented the significant relationship between fatigue and life satisfaction. Krenzien et al. (2017) found the same relationships between fatigue and life satisfaction among elderly liver transplant recipients [59]. Furthermore, a German study indicated that fatigue might affect life satisfaction among community people in a negative way [58]. This study complemented the investigation of the relationship between fatigue and life satisfaction in the nurse population. However, no correlation was found between physical fatigue and nurses’ life satisfaction in this study. Life satisfaction involved a favorable attitude towards one’s life—rather than an assessment of current feelings [45]. If nurses were exhausted from high-intensity physical activity, they might struggle to run, lift, or play, but their alertness and focus would remain the same, which might not affect the individual’s positive attitude toward life.

In addition to fatigue, coping styles might also affect nurses’ life satisfaction. In this study, active coping was positively correlated with life satisfaction, and passive coping was negatively correlated with life satisfaction. Specifically, individuals developing more active and less passive coping were more likely to have higher levels of life satisfaction. The positive relationship between life satisfaction with active coping style (i.e., problem-solving, seeking social support, and positively rationalized explanation) and negative relationship with passive coping (enduring, escape, emotional venting, and wishful

Table 4 Hierarchical multiple regression results of life satisfaction

Variables	Block 1	Block 2	Block 3
Age	-0.332**	-0.262**	-0.263**
Marital status			
Dummy 1	0.064	0.041	0.042**
Dummy 2	-0.090	-0.070	-0.066
Weekly work time	-0.109**	-0.103**	-0.100*
Night duty	0.205**	0.149**	0.150
Mental fatigue		-0.359**	-0.360**
PC		0.057	0.052**
Interaction			-0.045
F	18.802**	27.077**	23.872**
Adjusted R ²	0.156	0.275	0.276
ΔR ²	0.165	0.121	0.002

Note: * $P < 0.05$; ** $P < 0.01$. Dummy 1: married/cohabited versus unmarried; Dummy 2: divorced/ widow/ separated versus unmarried; Night duty, yes versus no

thinking/denial) were reported previously [60]. Scientific literature suggested that active coping was associated with positive attitudes [23]. Active coping had protective effects on life satisfaction, possibly because active coping styles enabled individuals to consider difficult events from more adaptive and positive perspectives [23].

What's more, active coping styles could mitigate the detrimental effect of mental fatigue on life satisfaction among nurses, which provided support for the stress-coping model [35]. It has been previously observed that the moderating effect of avoidance-focused coping on the relationship between perceived stress and subjective well-being [37]. Riley et al. (2020) reported that active coping style had a moderating effect on the relationship between poly-victimization and life satisfaction [38]. However, for the first time, the association between coping styles, fatigue, and life satisfaction in nurse population was analyzed in this study. Nurses with higher active coping may avoid or combat mental fatigue better in the high-pressure context of the hospital, as they could more easily recognize and manage stress caused by long-term cognitive activity or nurse-patient conflicts, and relax themselves timely [61]. In addition, nurses with higher active coping may suppress the negative experiences, anxiety, and psychological distress that emanate due to mental fatigue, thus alleviating the adverse impact of mental fatigue on their life satisfaction [29, 36].

The "Healthy China 2030" plan proposed that screening and prevention of mental health problems in certain professional groups should be prioritized. Therefore, improving mental well-being among nurses should be a top concern for healthcare policymakers. Nurses' mental fatigue may be difficult to effectively alleviate due to the unavoidable long-term cognitive activities at work. Based on the results of our research, improving coping styles might be a good way to minimize the negative impact of mental fatigue on life satisfaction. Nurses themselves should continuously enrich and improve their skills and psychological quality in clinical practice, maintain a positive and optimistic attitude towards life, to form a positive coping style [23]. On the other hand, nurses should be trained to learn active coping strategies such as seeking emotional support and striving for change [49]. Hospital managers could set up programs such as mindfulness-based therapy that improve nurses' ability to respond to negative emotions [62]. In future research, researchers can further explore intervention measures to improve coping styles and carry out relevant empirical research.

Limitation

Several limitations of the study should be considered. First, the cross-sectional design simultaneously measured associations between fatigue, coping styles, and

life satisfaction. Due to the observational nature of the cross-sectional design, any causal relationship between the factors examined and life satisfaction cannot be inferred. The possibility cannot therefore be ruled out that life satisfaction may contribute to fatigue. However, this explanation seems less likely in light of some evidence showing that some adverse psychological state may uni-directionally and negatively predict life satisfaction in longitudinal studies of non-nurse populations [63]. Second, as the study adopted the self-report measures, recall and response biases might have occurred. Our study attempted to minimize bias by using the scales well-validated in the Chinese population, such as SWLS, FS-14, and SCSQ, and training the investigators uniformly before investigation. Third, participants in this study were drawn from tertiary hospitals with more than 500 beds, where the work environment and workload may differ from those in small clinics, so extrapolation of the findings to nurses in other types of healthcare settings is limited.

Conclusions

This study found that the life satisfaction of Chinese nurses was relatively low. Mental fatigue was negatively associated with life satisfaction. When active coping level was higher, the effect of mental fatigue on life satisfaction became weaker. Active coping could alleviate the associations of mental fatigue with life satisfaction. Developing active coping styles is a crucial strategy to reduce mental fatigue and improve life satisfaction among nurses.

Implication

Nurses may experience mental fatigue that is difficult to alleviate in the short term due to the frequent exposure of work-related emotional stress (e.g., patients' needs and expectations). This study suggests that positive psychological resources such as active coping styles can be considered as an intervention point to alleviate nurses' mental fatigue, thereby safeguarding nurses' mental health.

Hospital managers could relieve the adverse effect of nurses' mental fatigue on life satisfaction by training them to master active coping strategies and engage in active thinking, ultimately achieving the goal of improving the quality of nursing services and maintaining the stability of the nursing team.

Future research could also incorporate some qualitative methods, such as using Online Photovoice (OPV) [64] and collaborating with nurses from the perspective of community-based participatory research (CBPR) to explore comprehensive active coping styles suitable for nurses and how to promote nurses to adopt active coping styles.

Abbreviations

SWLS	Satisfaction with Life Scale
FS-14	Fatigue Scale-14
SCSQ	Simplified Coping Style Questionnaire
AC	Active coping
PC	Passive coping
SD	Standard deviation

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Author contributions

YW and WB have contributed equally to this work and share first authorship. YW and WB participated in data collection, data analysis, making tables, writing and revising the manuscript. ML and LL revised the manuscript and checked the data. HW provided guidance in study design, supervised the investigation. All authors read and approved the final manuscript.

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Data availability

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

Declarations

Ethics approval and consent to participate

The study was approved by the Research Ethics Committee of China Medical University (No.2013PS170K) and performed in accordance with the Declaration of Helsinki. Written informed consent was obtained from each participant. Information collected from all participants was kept confidential and anonymous.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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