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## Observational Study

# Influence of resilience on depression among nurses in clean operating departments: The mediating effect of life satisfaction

Xue-Fei Shen, Li Li, Hong Ma, Jing Liu, Li-Wei Jin, Xue Li, Jia-Shu Wang, Ge Gao

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## Abstract

### BACKGROUND

A clean operating room is an important part of surgical and critical treatment in hospitals. The workload is substantial, the pace is rapid, and the working environment is intense; therefore, nurses who work in clean operating rooms are constantly challenged, which can lead to anxiety, depression, and other mental health issues. Life satisfaction and resilience are important factors that ensure mental health. Therefore, exploring the mediating role of life satisfaction in the influence of resilience on depression among nurses in clean operating rooms can help improve nursing services and teamwork.

### AIM

To explore the mediating effect of satisfaction on the influence of resilience on depression among nurses in a clean operating department.

### METHODS

From April to November 2022, 196 nurses from the Department of Clean Operating at Harbin Medical University Cancer Hospital participated in this study. Participants were selected using convenience sampling. Participants' gender, age, marital status, position, length of service, personal monthly income, daily working hours, employment status, and professional title were collected, and the Connor-Davidson resilience scale, satisfaction with life scale, and self-rating depression scale were used to evaluate resilience, life satisfaction, and depression. The researchers conducted professional training in advance, introduced the research methods to the participants before the investigation, and explained the study's significance and purpose. Surveys were distributed and collected on-site. Each questionnaire took 30 min to complete.

### RESULTS

The average scores for life satisfaction, resilience, and depression were 3.13 ( $\pm$



0.28), 4.09 ( $\pm 0.78$ ), and 56.21 ( $\pm 8.70$ ), respectively. The correlation between resilience and depression was negative ( $r = -0.829$ ,  $P < 0.01$ ). Life satisfaction was positively related to resilience ( $r = 0.855$ ,  $P < 0.01$ ) and negatively related to depression ( $r = -0.778$ ,  $P < 0.01$ ). The relationship between resilience and depression was partially mediated by life satisfaction. The value of the mediating effect was -6.853 (26.68% of the total effect).

## CONCLUSION

Life satisfaction partially mediates the link between resilience and depression among nurses in clean operating departments.

**Key Words:** Psychological resilience; Depression; Life satisfaction; Clean operation department; Nurses; Mediating effect

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**Core Tip:** The professional and psychological qualities of clean operating department nurses affect their operation success. Clinical practice emphasizes the importance of the mental health of nurses in operating rooms. This study found that, for nurses working in clean operating departments, resilience was positively correlated with life satisfaction and negatively correlated with depression, indicating that resilience can increase life satisfaction and decrease depression. Life satisfaction mediated the relationship between resilience and depression. This suggests that nurses in clean operating departments should improve their life satisfaction and resilience to adversity to improve their mental health.

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## INTRODUCTION

The psychological health of nursing staff has received increasing attention in recent years[1,2]. Relevant studies have shown that heavy, harsh, and demanding working conditions; medical requirements of patients and their families; public opinion; difficulty balancing work and family; salary; and other factors affect the psychological well-being of nursing personnel[3,4]. A clean operating department is necessary for hospitals to provide surgical procedures and treat critically ill patients, and the workload is closely related to the number and difficulty of operations[5,6]. Especially in tertiary hospitals, all types of difficult and complicated diseases are more complex, and new surgical techniques are rapidly being developed. In addition, in clean operating departments, the workload is large, rhythm is fast, and intensity is high, constantly challenges nurses in clean operating departments, and can easily result in negative emotional states, such as depression and anxiety, and ultimately, psychological problems.

Life satisfaction is the overall cognitive appraisal of a person's level of satisfaction in their life[7]. Life satisfaction is a crucial factor in achieving good mental health and directly associated with various psychological, behavioral, interpersonal, and social factors such as reduced stress, externalized behavior, and internalized problems[8,9]. Therefore, life satisfaction is one of the most important indicators used to gauge an individual's level of happiness and overall quality of life. Further, resilience plays a significant role in positive psychology[10]. Resilience is a psychological quality that allows individuals to cope well with adversity and a protective factor for individual mental health[11,12]. Previous research has reported that life satisfaction is positively associated with individual psychological health and negatively correlated with depression[13,14]. The results of studies conducted with different groups have shown that individual life satisfaction is positively correlated with resilience[15-17].

However, few studies have examined the correlations among resilience, depression, and life satisfaction in nurses in clean operating departments. This study aims to explore the mediating role of life satisfaction in the effects of resilience on depression and to provide a scientific basis for improving resilience, increasing life satisfaction, and reducing the occurrence of depression among nursing staff in clean operating departments.

## MATERIALS AND METHODS

### Participants

From April to November 2022, 196 nurses from the Department of Clean Operating at Harbin Medical University Cancer Hospital took part in this study. Participants were selected using convenience sampling. The inclusion criteria were as follows: (1) Currently employed on the nursing staff with at least one year of job experience; (2) no personal or family history of mental illness; and (3) no psychotropic drugs use in the last year. The exclusion criteria were as follows: (1) Non-frontline nurses; (2) nurses who took long-term personal, sick, or maternity leave during the study period; (3) nurses

from other departments; (4) nurses participating in other clinical studies; and (5) nurses who were working on an internship or in training.

### Basic information survey

The general demographic variables questionnaire designed by this research team was used to collect basic information on the participants, including gender, age, marital status, position, length of service, personal monthly income, daily working hours, employment, and professional title.

### Life satisfaction survey

The satisfaction with life scale (SWLS) by Diener *et al*[18] was used to measure life satisfaction. The SWLS includes five items, each rated on a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). In this study, average scores across the five life satisfaction questions ranged from 1 to 7 points. The SWLS has been shown to be trustworthy and is often utilized in quality-of-life research conducted in Chinese populations[19].

### Resilience survey

Resilience was evaluated using the Chinese version of the Connor-Davidson resilience scale (CD-RISC)[20], which has 25 items. Responses were rated on a five-point Likert scale ranging from 0 (never) to 4 (always). The overall scale's average value ranged from 0 to 4, and higher scores indicated greater resilience.

### Depression survey

The Self-Rating Depression Scale (SDS), compiled by Zung[21], was used to assess depressive symptoms among the participants in the current or previous week. The scale has 20 questions, 10 positive and negative, rated on a four-point Likert scale (no, sometimes, often, and continuously, rated between 1-4 points respectively). The original score was multiplied by 1.25 to take the integer as the standardized score, and a standardized score > 53 was considered to indicate the presence of depressive symptoms.

### Quality control

Prior to beginning the study, the researchers conducted a professional training session in which they introduced the research methods to the participants with unified guidance language and explained the study's significance and purpose. Questionnaires were distributed in person and collected immediately after participants completed them. Participants took approximately 30 min to complete the survey. After eliminating invalid questionnaires, the effective questionnaire recovery rate was 90.8% (178 out of 196). Questionnaire review and score entry was completed by two researchers.

### Statistical analysis

Data collected in this study were analyzed using IBM SPSS version 26.0. The significance threshold for each two-sided statistical test was set at  $P < 0.05$ . The mean, standard deviation (SD), number ( $n$ ), and percentage (%) were used for descriptive statistics of participant demographics and other factors. A  $t$ -test and single-factor analysis of variance were used to compare the variations among classification crowds. Pearson correlation analysis was used to examine the relationship between continuous variables. The mediating effects were examined using Hayes' Process Macro Model 4. To determine whether the regression coefficient of the mediating effect of the estimated chain of 5000 samples in the initial data was significant by employing repeated random sampling, it was determined using a bootstrap 95% confidence interval (CI). If the 95%CI did not contain zero, the indirect effect was considered statistically significant.

## RESULTS

### Participant characteristics

A total of 196 surveys were distributed, and 178 valid surveys were returned, for a response rate of 90.8%. The participants' ages ranged between 22-52 years, with a mean age of 33.69 years (SD = 6.99). Employment duration ranged between 1-30 years, with a mean of 10.80 years (SD = 7.12). Descriptive statistics are shown in Table 1.

### Correlations among resilience, life satisfaction, and depression

Resilience was negatively correlated with depression ( $r = -0.829$ ,  $P < 0.01$ ) and positively correlated with life satisfaction ( $r = 0.855$ ,  $P < 0.01$ ). Life satisfaction was negatively correlated with depression ( $r = -0.778$ ,  $P < 0.01$ ) (Table 2).

### Analysis of influencing factors of mental resilience, life satisfaction and depression

As shown in Table 3, the results of multi-factor analysis show that gender, age, working time and employment status are the main factors affecting the level of mental resilience; gender, age and working time are the main factors affecting life satisfaction; gender, age, working time and employment status are the main factors affecting depression score.

### Mediating effects of life satisfaction between resilience and depression

In testing the mediating effects, resilience was the independent variable, life satisfaction the mediating variable, and depression the dependent variable. Figure 1 depicts the mediation model established in this study. The regression results

Table 1 Sociodemographic characteristics and their differences among primary variables

Variables		n	%	Life satisfaction	Resilience	Depression
				mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD
Gender	Male	58	32.58	4.23 $\pm$ 0.74	3.25 $\pm$ 0.23	53.55 $\pm$ 7.10
	Female	120	67.42	4.03 $\pm$ 0.79	3.06 $\pm$ 0.25	57.50 $\pm$ 9.13
	<i>t</i>			2.733	31.112	9.262
	<i>P</i>			0.100	< 0.001	0.003
Age	< 30	60	33.71	4.72 $\pm$ 0.82	3.27 $\pm$ 0.27	51.47 $\pm$ 6.95
	30-45	107	60.10	3.79 $\pm$ 0.53	3.06 $\pm$ 0.26	58.02 $\pm$ 8.31
	46-60	11	6.18	3.60 $\pm$ 0.33	2.93 $\pm$ 0.22	64.55 $\pm$ 8.78
	<i>F</i>			44.439	14.769	19.699
	<i>P</i>			< 0.001	< 0.001	< 0.001
Marital status	Married	104	58.43	3.93 $\pm$ 0.65	3.10 $\pm$ 0.27	56.86 $\pm$ 8.46
	Unmarried	48	26.97	4.55 $\pm$ 0.90	3.21 $\pm$ 0.29	52.79 $\pm$ 7.61
	Divorced or other	26	14.61	3.88 $\pm$ 0.67	3.09 $\pm$ 0.29	59.96 $\pm$ 9.69
	<i>F</i>			13.505	2.829	6.824
	<i>P</i>			< 0.001	0.062	0.001
Educational level	Junior college or below	77	43.26	4.07 $\pm$ 0.77	3.11 $\pm$ 0.30	56.18 $\pm$ 8.99
	University degree or above	101	56.74	4.11 $\pm$ 0.78	3.14 $\pm$ 0.27	56.24 $\pm$ 8.52
	<i>t</i>			0.094	0.566	0.002
	<i>P</i>			0.759	0.453	0.966
Professional title	Primary	54	30.34	4.53 $\pm$ 0.88	3.21 $\pm$ 0.29	53.11 $\pm$ 7.89
	Intermediate	110	61.80	3.92 $\pm$ 0.64	3.10 $\pm$ 0.26	57.61 $\pm$ 8.40
	Senior	14	7.87	3.80 $\pm$ 0.68	3.04 $\pm$ 0.32	57.21 $\pm$ 11.32
	<i>F</i>			14.515	3.738	5.169
	<i>P</i>			< 0.001	0.026	0.007
Years of work experience	< 10	79	44.38	4.51 $\pm$ 0.83	3.22 $\pm$ 0.27	53.06 $\pm$ 7.25
	10-19	74	41.57	3.80 $\pm$ 0.55	3.07 $\pm$ 0.27	58.07 $\pm$ 8.52
	20-38	25	14.04	3.63 $\pm$ 0.45	2.98 $\pm$ 0.25	60.68 $\pm$ 10.15
	<i>F</i>			27.726	9.837	11.328
	<i>P</i>			< 0.001	< 0.001	< 0.001
Monthly income (RMB)	< 3000	39	21.91	4.69 $\pm$ 0.88	3.25 $\pm$ 0.28	51.46 $\pm$ 6.89
	3000-5000	118	66.29	3.94 $\pm$ 0.66	3.10 $\pm$ 0.27	57.55 $\pm$ 8.57
	5001-10000	21	11.80	3.83 $\pm$ 0.62	3.05 $\pm$ 0.28	57.52 $\pm$ 9.73
	<i>F</i>			17.594	5.195	8.034
	<i>P</i>			< 0.001	< 0.001	< 0.001
Daily working hours (h)	< 8	49	27.53	3.83 $\pm$ 0.54	3.08 $\pm$ 0.26	57.86 $\pm$ 9.44
	8-10	129	72.47	4.19 $\pm$ 0.83	3.14 $\pm$ 0.29	55.59 $\pm$ 8.36
	<i>t</i>			7.919	1.694	2.430
	<i>P</i>			0.005	0.195	0.121
Employment status	Formal employee	121	67.98	3.85 $\pm$ 0.60	3.08 $\pm$ 0.26	58.07 $\pm$ 8.72
	Contract employee	57	32.02	4.61 $\pm$ 0.85	3.23 $\pm$ 0.29	52.26 $\pm$ 7.30
	<i>t</i>			46.088	12.488	19.031



	<i>P</i>	< 0.001	0.001	< 0.001
Mean		4.09 ± 0.78	3.13 ± 0.28	56.21 ± 8.70

Table 2 Correlations for study variables

Variables	Resilience	Life satisfaction	Depression
Resilience	1		
Life satisfaction	0.855 <sup>a</sup>	1	
Depression	-0.829 <sup>a</sup>	-0.778 <sup>a</sup>	1

<sup>a</sup>*P* < 0.01 (two-tailed), the correlation was significant.

Table 3 Analysis of influencing factors of mental resilience, life satisfaction and depression

Factor	Variables	B	SE	Beta	<i>t</i>	<i>P</i>
Resilience	Gender	-5.847	0.958	-0.392	-6.101	< 0.001
	Age	-0.861	0.131	-0.857	-6.551	< 0.001
	Daily working hours (h)	-6.947	1.617	-0.443	-4.296	< 0.001
	Employment status	2.297	1.160	0.189	1.979	0.049
Life satisfaction	Age	-0.092	0.011	-0.831	-8.132	< 0.001
	Daily working hours (h)	-0.748	0.176	-0.432	-4.246	< 0.001
	Gender	-0.337	0.104	-0.204	-3.234	0.001
Depression	Age	1.167	0.165	0.937	7.061	< 0.001
	Daily working hours (h)	9.209	2.033	0.474	4.530	< 0.001
	Gender	5.485	1.205	0.296	4.553	< 0.001
	Employment status	-3.422	1.459	-0.227	-2.346	0.02

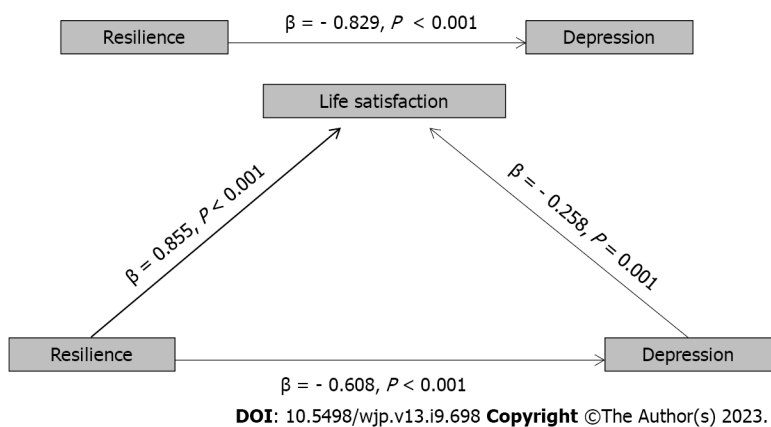


Figure 1 The model of the mediating role of life satisfaction in the relationship between resilience and depression.

are presented in Table 4. Resilience had a negative and considerable direct predictive effect on depression ( $\beta = -0.608$ ,  $P < 0.001$ ). Further, resilience was found to significantly and positively predict life satisfaction ( $\beta = 0.855$ ,  $P < 0.001$ ) and negatively predict depression ( $\beta = -0.829$ ,  $P < 0.001$ ). Finally, life satisfaction was found to significantly negatively predict depression ( $\beta = -0.258$ ,  $P = 0.001$ ).

As shown in Table 5, the 95%CI of the direct effect of resilience-depression was (-23.636, -14.104), excluding 0, indicating that the direct effect was significant (the value of the effect was -18.832, accounting for 73.32% of the total effect). The 95%CI of the indirect effect of resilience-life satisfaction-depression was (-10.546, -3.120), excluding 0, indicating that life satisfaction mediated the relationship between resiliency and depression (the value of the effect was -

**Table 4 Regression analysis of the mediating effect of life satisfaction on resilience and depression**

Outcome variable	Predictor variable	<i>R</i>	<i>R</i> <sup>2</sup>	<i>F</i>	$\beta$	<i>t</i>	<i>P</i>
Depression	Resilience	0.829	0.687	385.463	-0.829	-19.633	< 0.001
Life satisfaction	Resilience	0.855	0.732	480.175	0.855	21.913	< 0.001
Depression	Resilience	0.839	0.704	208.553	-0.608	-7.656	< 0.001
	Life satisfaction				-0.258	-3.257	0.001

**Table 5 Mediating effect of life satisfaction on resilience and depression**

Model pathways	Effect	Boot SE	95%CI		Relative mediation effect, %
			Lower	Upper	
Resilience-life satisfaction-depression	-6.853	1.920	-10.546	-3.120	26.68%
Resilience-depression	-18.832	2.444	-23.636	-14.104	73.32%
Total mediation effect	-25.685	2.515	-23.794	-14.007	-

95%CI: 95% confidence interval.

6.853, accounting for 26.68% of the total effect).

## DISCUSSION

The professional and psychological qualities of nurses working in clean operating departments are important factors that affect the success of an operation[22,23]. Maintaining the mental health of nurses in operating departments has become a focus of clinical practice. that the nurses who participated in this study had a mean depression score of 56.21 ( $\pm$  8.70) points, which exceeded the critical value for the norm score on the Chinese SDS, which is consistent with previous research[24,25]. Clean operating room nurses not only face fast work rhythms and heavy workloads but also need to constantly improve their professional skills[26,27]. In addition, the operating room is an important place to rescue critically ill patients, and surgical nurses often need to complete emergency rescue tasks, which can impact on their mental health.

This study found that, compared with female nurses in clean operating departments, male nurses had higher resilience and life satisfaction scores and lower depression scores, which may be related to gender differences in personality traits. The results also showed that older respondents had lower resilience and life satisfaction scores, and higher depression scores, compared with younger respondents. This may be due to older nurses often being required to deal with more complex work because of their rich work experience, resulting in increased work pressure and, subsequently, more psychological difficulties. Regarding marital status, the findings showed that, compared with unmarried nurses, nurses whose marital status was married, divorced, or other had lower resilience scores and higher depression scores. This may be because married nurses tend to receive family support and help, and can often obtain psychological comfort in their marriage. This study further found that, compared with nurses with intermediate and senior professional titles, those with junior professional title had lower resilience and life satisfaction scores and higher depression scores. This may be related to the fact that pressure to receive a promotion often negatively affects the mental health of those with low-level professional titles. In this study, compared to nurses with less than ten years of work experience, those in the groups with 10-19 or 20-38 years of work experience had lower resilience and life satisfaction scores and higher depression scores. This may be because nurses with extensive work experience have experienced more problems that can arise in emergency surgery, high-risk patients, medical problems, and job promotions, resulting in greater psychological pressure. Compared with those with a personal monthly income < 3000 yuan, nurses with a personal monthly income of 3000-5000 yuan or 5001-10000 yuan had lower resilience and life satisfaction scores and higher depression scores, which may be related to higher income indicating more job requirements, promotion pressure, and family expectations. In addition, compared with contract nurses, formal nurses had lower resilience and life satisfaction scores and higher depression scores. This may be because formal nurses must deal with administrative work while also completing nursing work and face a more stringent assessment mechanism.

This study found that resilience among the participants was positively correlated with life satisfaction scores and negatively associated depression scores. This indicates that, among nurses working in clean operating departments, the better the resilience, the greater the life satisfaction and lower the depression, which is in accordance with the findings of previous studies[28,29]. Good resilience and life satisfaction are indicators of less psychological difficulty. As a protective factor for adversity, resilience can mobilize individuals to use their own strengths and resources, mitigate the negative impact of risk factors, and ultimately reduce the probability of negative consequences while increasing that of positive

outcomes. These positive outcomes will increase life satisfaction, so that the individual's cognition of people and things related to it is more positive. In addition, nurses will have more positive experiences in life, work, and study, resulting in a decreased risk for psychological problems[30,31].

This study's findings indicate that the connection between resilience and depression is partially mediated by life satisfaction among nurses working in a clean operating department. The value of the effect was -6.853, accounting for 26.68% of the total effect. Related studies have shown that the higher an individual's resilience, the higher their life satisfaction, and high life satisfaction indicates good mental health and low depressive symptoms[32,33]. One characteristic of highly resilient individuals is that they can maintain a high level of life satisfaction in a complex environment, and the positive emotional experience generated by high life satisfaction reduces depression[34,35]. In view of the psychological status of nurses in the operating room, hospitals should regularly carry out psychological and physiological assessment activities for nurses in the operating room, understand the source of stimuli and the causes of nurses' depression, and carry out targeted intervention measures to help nurses decompress psychologically, relieve fatigue and boredom, and improve their life satisfaction and psychological resilience. At the same time, the hospital should further deepen the reform of management mode, establish the professional ethics of medical staff, stimulate the enthusiasm and standardization of nurses' work, and create a good working atmosphere. In addition, we suggest that the hospital actively take targeted intervention measures to optimize the working state of nurses by improving their psychological quality and mental resilience, and finally improve their life satisfaction. For example, experts are invited to hold lectures regularly, and nurses are trained to endure hardships and overcome setbacks through practical experience or typical cases. Psychological lectures, cognitive behavior intervention, relaxation training and other activities were carried out for nurses to help them improve their physical and mental state, psychological resilience and life satisfaction.

However, several factors can affect the mental health of nurses in clean operating departments, such as work boredom, work pressure, job burnout, and lack of social support. This study selected only one direction for in-depth discussion, which is a limitation. In future studies, we hope to further analyze other factors. To improve the mental health of nurses in clean operating departments to provide a more reliable theoretical basis.

## CONCLUSION

Depression scores were negatively correlated with resilience. Life satisfaction was positively related to resilience and negatively related to depression. The connection between resilience and depression was partially mediated by life satisfaction among nurses working in a clean operating department.

## ARTICLE HIGHLIGHTS

### Research background

A clean operating department is important for hospitals to implement surgical treatments and attend to critically ill patients. These departments have a large workload, fast rhythm, and high intensity. The working environment in clean operating departments constantly challenges nurses and can easily lead to negative mental states, such as despair and anxiety, and ultimately, psychological problems. However, ensuring the mental health of nurses in clean operating departments is key to the normal functioning of hospital operating rooms.

### Research motivation

A crucial determinant of a person's subjective well-being and quality of life is their level of life satisfaction. Resilience is a protective factor for individual mental health. Both are important factors in ensuring mental health. Therefore, exploring the mediating role of life satisfaction in the effects of resilience on depression among nurses in clean operating departments can provide a reference for promoting harmonious development among nursing teams in operating rooms and improving the quality of nursing services.

### Research objectives

To investigate how depression and resilience are related and the possible mediating role of life satisfaction in this association among nurses in clean operating departments and provide a scientific basis for increasing their resilience and life satisfaction, and reducing the occurrence of depression.

### Research methods

A total of 196 nurses from three clean operating departments in one hospital were selected using convenience sampling. The Connor-Davidson resilience scale, satisfaction with life scale, and self-rating depression scale (SDS) were used to evaluate resilience, life satisfaction, and depression.

### Research results

The mean depression score for nurses in the clean operating department was 56.21 ( $\pm 8.70$ ), which exceeded the critical value of the norm score for the Chinese SDS. Nurses' resilience was positively correlated with life satisfaction and negatively correlated with depression. Life satisfaction served as a partial mediator between resilience and depression in

the nurses in the clean operating department, with a mediation effect value of -6.853, accounting for 26.68% of the total effect.

### Research conclusions

Life satisfaction had a partial mediating role between resilience and depression among nurses in a clean operating department, suggesting that hospitals should not only increase the resilience of medical staff in the face of adversity but also promote the mental health level of this group by improving their life satisfaction.

### Research perspectives

Depression is not the only psychological problem that nurses in clean operating departments face. In the future, we will further study psychological distress and its influencing factors among nurses in clean operating departments to provide a more reliable theoretical basis for ensuring their mental health.

## FOOTNOTES

**Author contributions:** Gao G and Shen XF contributed to study concepts and study design; Li L, Ma H, and Liu J contributed to data acquisition and data analysis; Jin LW, Li X, and Wang JS contributed to literature research.

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