Analysis of the current status and influencing factors of moral courage among operating room nurses in Southwest China: a multi-center study

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Abstract

Background Moral courage is crucial for nurses to act ethically despite professional risks. Operating room (OR) nurses frequently encounter ethical dilemmas, requiring a balance between personal convictions and institutional policies. This study investigates the current status of moral courage among OR nurses in Southwest China and explores key influencing factors.

Materials and methods The cross-sectional, multi-center study was conducted from April to May 2024. A total of 482 operating room nurses from 16 hospitals in Southwest China were surveyed. The nurses were assessed using a self-designed demographic questionnaire, the Nurses' Moral Courage Scale (NMCS), the Psychological Empowerment Scale (PES), and the Hospital Ethical Climate Survey (HECS). Statistical analyses, including Spearman's rho and multiple linear regression, were used to explore the relationships between nurses' moral courage and various influencing factors, such as age, educational level, income, professional title, psychological empowerment, and hospital ethical climate.

Results The total score for operating room nurses' moral courage in this study was 80.26 ± 19.30, with subscale scores as follows: moral integrity (26.89 ± 6.73), moral responsibility (15.33 ± 3.92), commitment to providing quality care to patients (18.81 ± 4.77), and compassion and genuine presence with patients (19.23 ± 4.86). The moral courage was positively correlated with age, hospital level, years of experience, professional title, income, psychological empowerment and hospital ethical climate score. The multiple linear regression analysis revealed that work meaning, autonomy, work impact, and relationships with nurses, patients, and the hospital being significant factors influencing moral courage. The correlation analysis showed no significant correlation between educational level and moral courage. Furthermore, although nurses with lower income had lower moral courage scores, there was no significant correlation between income satisfaction and moral courage.

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Conclusion Psychological empowerment and a positive hospital ethical climate are key determinants of moral courage among OR nurses. Hospitals should implement targeted interventions to enhance nurses' ethical decision-making capacities, foster professional autonomy, and strengthen interpersonal support networks to mitigate ethical distress.

Clinical trial number Not applicable.

Keywords Moral courage, Operating room nurses, Moral courage scale, Psychological empowerment, Ethical climate

Background

The healthcare system in Southwest China faces unique challenges compared to the more developed Eastern coastal regions [1]. Due to geographical, economic, and resource disparities, hospitals in Southwest China often encounter limitations in healthcare infrastructure, access to advanced medical technologies, and the availability of skilled professionals [2]. These gaps may influence the quality of healthcare services, particularly in high-stress environments like operating room (OR). Nurses in these settings play an essential role, not only in patient care but also in maintaining the ethical standards of practice [3]. OR nurses often manage multiple high-risk surgeries daily, they are responsible for a wide range of critical tasks, including patient preparation, monitoring, and collaboration with the surgical team [4, 5], that limiting their ability to advocate for ethical patient care. This overwhelming workload can result in moral distress when nurses feel unable to intervene in ethically challenging situations, such as unsafe surgical practices or cost-driven medical decisions. Therefor, they often encounter complex ethical dilemmas that require them to demonstrate moral courage. Moreover, the hierarchical structure of Chinese hospitals places surgeons and senior physicians at the top of decision-making, often discouraging OR nurses from speaking out against ethical violations. This power imbalance suppresses moral courage, as nurses fear retaliation or professional repercussions. Addressing these challenges requires organizational reforms, ethical training, and enhanced psychological empowerment to strengthen the moral courage of OR nurses in Southwest China.

Moral courage refers to the ability to act according to one's ethical convictions, even in the face of personal or professional risk. In the healthcare setting, this courage is particularly crucial as nurses may be confronted with situations where patient care decisions conflict with their moral beliefs, institutional policies, or the expectations of other healthcare providers [6]. Previous studies on moral courage in nursing have predominantly focused on various specialties, revealing distinct challenges and factors influencing its presence [7]. In oncology, for example, nurses have reported difficulties in addressing issues related to end-of-life care and futile treatments [8]. In pediatric care, moral courage often centers on

advocating for the best interests of vulnerable patients [9]. While emergency nurses reported high levels of perceived moral courage, they also indicated a low willingness to take direct action in care-limited environments [10]. Several factors, such as organizational culture, nurse autonomy, education, and institutional support, have been identified as key influences on moral courage across different nursing specialties.

OR nurses encounter particularly complex and challenging ethical dilemmas that arise from the unique nature of their work environment [11, 12]. They care for patients undergoing surgery, who may be from diverse age groups and suffer from a wide range of conditions. Many of these patients are critically ill, requiring complex interventions that may carry uncertain outcomes. In addition to dealing with technical difficulties, OR nurses are often confronted with issues such as ineffective care, false hope, limited interventions, and disputes regarding end-of-life decisions. Besides, OR nurses frequently encounter ethical conflicts such as patient advocacy in unsafe surgical procedures, upholding infection control despite institutional pressure, and maintaining patient dignity in high-risk interventions [11]. These dilemmas necessitate moral courage, as nurses must act against potential backlash from colleagues or superiors [12]. These situations can place nurses in morally challenging positions, where they must balance their professional obligations with their ethical convictions. Specifically, a conflict between nurses' moral values and hospital protocols can lead to moral distress and burnout [10]. However, when hospitals foster ethical climates that align with nurses' professional values, moral courage is strengthened [13]. Therefore, Moral courage is an essential strategy for nursing professionals to navigate such ethical dilemmas and enhance the effectiveness of care.

Understanding the specific organizational and psychological factors that influence moral courage in OR nurses holds significant practical implications. While moral courage has been studied in Western contexts, there is limited research on how factors such as hospital ethical climate and psychological empowerment shape moral courage in Southwest China OR nurses. This study aims to assess the level of moral courage among operating room nurses in Southwest China, across 15 healthcare institutions. By utilizing a specially designed

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questionnaire, we seek to identify the factors that influence moral courage in this context. The findings of this research will provide valuable insights for healthcare administrators, aiding in the development of targeted interventions to improve the moral courage of operating room nurses, ultimately contributing to the enhancement of ethical practices and patient care in the region.

Subjects and methods

Subjects

This study was approved by The Ethics Committee of First Affiliated Hospital of Chengdu Medical College Affiliated Hospital and in accordance with the Declaration of Helsinki (approved ID: 2024CYFYIRB-BA-08). The clinical trial number: not applicable.

Convenience sampling was employed to recruit operating room nurses from 16 hospitals in Southwest China between April to May 2024. Given the challenges of recruiting OR nurses across multiple institutions in Southwest China, this study was not able to include all OR nurses in the area, convenience sampling was chosen to ensure a sufficient sample size while maintaining the feasibility of data collection.

Inclusion criteria were as follows: registered nurses currently employed, with at least one year of experience in operating room nursing, who provided informed consent and volunteered to participate. Exclusion criteria included intern nurses, visiting nurses, and those solely engaged in clerical work within operating rooms.

The study included 21 independent variables for multiple linear regression analysis (12 general demographic factors + dimensions of the Psychological Empowerment Scale and the Hospital Ethical Climate Survey). Based on a sample size recommendation of 10–20 times the number of independent variables, a sample size of 270–540 was calculated. Ultimately, 482 valid responses were obtained. Ethical approval was secured from the institutional ethics review board.

Methods

Research instruments

General demographic questionnaire

A self-designed questionnaire collected data on gender, age, hospital level, operating room work experience, education, professional title, position, employment status, personality, marital status, participation in clinical teaching, salary, and satisfaction with personal benefits.

Nurses' Moral Courage Scale (NMCS)

Developed by Numminen et al. [14], the NMCS assesses nurses' self-evaluated moral courage. It consists of four dimensions and 21 items: moral integrity (7 items), commitment to providing good care (5 items), compassion and true presence with patients (5 items), and moral responsibility (4 items). Responses are rated on a 5-point Likert scale ranging from 1 ("Not at all true of me") to 5 ("Completely true of me"), yielding a total score range of 21–105. Higher scores indicate greater moral courage. The Cronbach's alpha for this scale is 0.91.

Psychological Empowerment Scale (PES)

The Chinese version of the PES, adapted by Sun et al. [15], measures employees' psychological perceptions of empowerment from superiors. The scale includes four dimensions with 12 items: work significance, autonomy, self-efficacy, and work impact, each containing three items. Responses are rated on a 5-point Likert scale from 1 ("Strongly disagree") to 5 ("Strongly agree"). Higher scores signify higher levels of psychological empowerment. The Cronbach's alpha for this scale is 0.85, indicating good reliability and validity.

Hospital Ethical Climate Survey (HECS)

The Chinese version of the HECS, modified by Wang et al. [16], consists of 25 items and five dimensions: relationships with peers (4 items), patients (4 items), managers (6 items), physicians (5 items), and hospital/organization (6 items). A 5-point Likert scale is used, ranging from 1 ("Almost never true") to 5 ("Almost always true"). Higher scores reflect a more positive perception of the hospital's ethical climate. The Cronbach's alpha for this scale is 0.92, indicating excellent reliability and validity.

Data collection

Data were collected using the online platform Questionnaire Star (https://www.wjx.cn), which was shared via WeChat, an instant messaging application. The NMCS was translated using a standard forward-backward translation method, following WHO guidelines for cross-cultural adaptation of scales. This process involved expert review to ensure linguistic and conceptual equivalence. The questionnaire included an informed consent form and the NMCS, PES, and HECS scales. Completion time was approximately 15 min. Specialized investigators entered the responses into a web-based database to ensure accuracy. Out of 616 distributed questionnaires, 90 nurses did not respond due to work commitments, 13 returned incomplete questionnaires, and 31 completed the questionnaire in less than 5 min. Ultimately, 482 valid questionnaires were analyzed.

Statistical analysis

Statistical analyses were conducted using SPSS version 22.0 (IBM, Armonk, NY, USA). The Kolmogorov-Smirnov test was used to assess the normality of variables. Categorical variables were analyzed using chi-squared or Fisher's exact tests, with results presented as percentages. One-way analysis of variance (ANOVA)

Table 1 General demographics of operating room nurses in this study

Variable	Number (Percentage)
Gender	
Male	43 (8.9%)
Female	439 (91.1%)
Age (years)	33.1 ± 5.3 (22–55)
20–30	117 (36.7%)
30–40	281 (58.3%)
> 40	24 (5.0%)
Hospital Level	
Primary (Level I)	109 (22.6%)
Secondary (Level II)	161 (33.4%)
Tertiary (Level III)	212 (44%)
Years of Experience in Operating Room	
1–2 years	139 (28.8%)
2–5 years	156 (32.4%)
6–10 years	79 (16.4%)
> 10 years	108 (22.4%)
Educational Level	
Associate Degree	61 (12.7%)
Bachelor's Degree	372 (77.1%)
Master's Degree or Above	49 (10.2%)
Professional Title	
Licensed Practical Nurse	197 (40.9%)
Junior Nurse	160 (33.2%)
Senior Nurse	97 (20.1%)
Advanced Practice Nurse	28 (5.8%)
Position	
Clinical Nurse	375 (77.8%)
Nursing Team Leader	69 (14.3%)
Nursing Officer	18 (3.8%)
Chief Nursing Officer	20 (4.1%)
Marital Status	
Unmarried	84 (17.4%)
Married	305 (63.3%)
Divorced/Widowed	93 (19.3%)
Participation in Clinical Teaching	
Yes	367 (76.1%)
No	115 (23.9%)
Monthly Income	
< 4000 RMB	246 (51.0%)
4001–6000 RMB	75 (15.6%)
6001–8000 RMB	96 (19.9%)
> 8000 RMB	65 (13.5%)
Satisfaction with Monthly Income	
Yes	110 (22.8%)
No	372 (77.2%)
Has Children	
Yes	309 (64.1%)
No	173 (35.9%)

was applied to compare mean values of the scores of moral courage in operating rooms nurses with different characteristics (e.g. gender, age, hospital level, years of experience in operating room, educational level, professional title, position and income which across groups). Bonferroni correction was used for multiple comparisons. Spearman's rho was used to evaluate correlations between nurses' characteristics and total moral courage scores. Pearson correlation was performed to analyze relationships between moral courage scores, psychological empowerment, and hospital ethical climate scores. Multiple linear regression analysis was used with the total moral courage score as the dependent variable, and statistically significant characteristics from univariate analysis, along with psychological empowerment and ethical climate scores, as independent variables. A two-tailed test with a significance threshold of $P < 0.05$ was applied.

Results

General demographics of operating room nurses

Among the 482 operating room nurses surveyed, 43 (8.9%) were male and 439 (91.1%) were female. The average age was 33.1 ± 5.3 years (range: 22–55 years). A total of 212 (44%) nurses worked in tertiary hospitals, while 156 (32.4%) had 2–5 years of experience in the operating room. Most of the nurses (372, 77.1%) had a bachelor's degree, and 197 (40.9%) were licensed practical nurses (LPNs). The majority of respondents (375, 77.8%) were frontline clinical nurses, and 246 (51.0%) had a personal monthly income of less than 4000 RMB. Only 110 (22.8%) nurses reported satisfaction with their current income (Table 1).

Scores of moral courage, psychological empowerment, and hospital ethical climate among operating room nurses

The total score for nurses' moral courage in this study was 80.26 ± 19.30, with subscale scores as follows: moral integrity (26.89 ± 6.73), moral responsibility (15.33 ± 3.92), commitment to providing quality care to patients (18.81 ± 4.77), and compassion and genuine presence with patients (19.23 ± 4.86). The total score for psychological empowerment was 45.35 ± 11.18, and the total score for perceived hospital ethical climate was 100.65 ± 24.03 (Table 2).

The average variance extracted and composite reliability value for scales

The average variance extracted (AVE) value was 0.901, 0.784 and 0.902, composite reliability (CR) value was 0.973, 0.936 and 0.979 for the NMCS, PES and HECS, respectively (Table 2).

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Table 2 Scores of moral courage, psychological empowerment, and hospital ethical climate among operating room nurses

Variable	Score	AVE	CR
Total Moral Courage Score	80.26 ± 19.30	0.901	0.973
Moral Integrity (1)	26.89 ± 6.73		
Moral Responsibility (2)	15.33 ± 3.92		
Commitment to Providing Quality Care (3)	18.81 ± 4.77		
Compassion and Genuine Presence with Patients (4)	19.23 ± 4.86		
Total Psychological Empowerment Score	45.35 ± 11.18	0.784	0.936
Work Significance	11.77 ± 3.15		
Self-Efficacy	11.25 ± 3.03		
Autonomy	11.72 ± 3.13		
Work Impact	10.61 ± 3.33		
Total Perceived Hospital Ethical Climate Score	100.65 ± 24.03	0.902	0.979
Relationship with Nurses	15.68 ± 3.93		
Relationship with Physicians	22.66 ± 6.04		
Relationship with Patients	15.58 ± 3.85		
Relationship with Hospital/ Organization	23.26 ± 5.63		
Relationship with Managers	23.48 ± 5.83		

Note AVE, Average Variance Extracted; CR, Composite Reliability

Comparison of moral courage scores among operating room nurses with different characteristics

Statistically significant differences in the total moral courage scores were found among operating room nurses with different characteristics, including "age," "hospital level," "years of experience in the operating room," "educational level," "professional title," "monthly income," and "satisfaction with current income" ($P < 0.05$ for all). The details are presented in Table 3.

Correlation between moral courage and personal characteristics, psychological empowerment, and hospital ethical climate among operating room nurses

A correlation analysis (Spearman's rho) was conducted to examine the relationship between the significant demographic characteristics of operating room nurses and their total moral courage scores. The results indicated the following: The total moral courage score was positively correlated with age groups ($r = 0.124$, 95% Confidence Interval [CI] 0.036–0.208, $P = 0.007$), hospital level ($r = 0.105$, 95% CI 0.014–0.191, $P = 0.022$), years of experience in the operating room ($r = 0.129$, 95% CI 0.029–0.210, $P = 0.005$), and professional title ($r = 0.149$, 95% CI 0.053–0.230, $P = 0.001$). There was no statistically significant correlation between moral courage and educational level ($r = -0.075$, 95% CI -0.171 to 0.014, $P = 0.101$). The total moral courage score was positively correlated with monthly income ($r = 0.128$, 95% CI 0.036–0.211, $P = 0.005$). There was no statistically significant

correlation between moral courage and satisfaction with current monthly income ($r = 0.040$, 95% CI -0.050 to 0.129, $P = 0.383$).

Furthermore, Pearson correlation analysis was performed to assess the relationship between the total moral courage score and the total scores for psychological empowerment and hospital ethical climate. The results showed: A strong positive correlation between the total moral courage score and the total psychological empowerment score ($r = 0.875$, 95% CI 0.834–0.907, $P < 0.001$). A similarly strong positive correlation between the total moral courage score and the total hospital ethical climate score ($r = 0.881$, 95% CI 0.832–0.918, $P < 0.001$).

Multiple linear regression analysis of the factors influencing moral courage among operating room nurses

The results of the multiple linear regression analysis revealed that six key dimensions significantly influenced the moral courage of operating room nurses: the dimensions of "Work Meaning," "Autonomy," and "Work Impact" from the Psychological Empowerment Scale, and the dimensions of "Relationship with Nurses," "Relationship with Patients," and "Relationship with the Hospital" from the Hospital Ethical Climate Survey. These six dimensions together explained 80.6% of the total variance in moral courage, as shown in Table 4.

Discussion

This study aimed to investigate the current status of moral courage among OR nurses in Southwest China and to identify key factors influencing its development. Given the high-stress, ethically complex environment of OR settings, moral courage is essential for ensuring patient safety, upholding professional standards, and mitigating moral distress. However, limited research has examined how psychological empowerment and hospital ethical climate contribute to moral courage in this unique context. The results demonstrated that older OR nurses, higher hospital level, greater operating room experience, advanced professional title, higher income, and stronger psychological empowerment were all associated with higher levels of moral courage. Six factors (work meaning, autonomy, work impact, and relationships with nurses, patients, and hospitals) were identified as the primary determinants of moral courage among operating room nurses. Our findings provide empirical insights into these associations, offering evidence for targeted interventions to support Southwest China OR nurses in maintaining ethical integrity.

The study found significant differences in moral courage scores based on several characteristics, including age, hospital level, years of operating room experience, educational level, professional title, and income. Nurses with higher age, senior professional titles, and greater work

Table 3 Comparison of moral courage scores among operating room nurses with different characteristics

Nurse characteristics	Item 1 (Moral integrity)	P value	Item 2 (Moral responsibility)	P value	Item 3 (Commitment to quality care)	P value	Item 4 (Compassion and presence)	P value	Total Score	P value
Gender		0.444		0.455		0.135		0.262		0.284
Male	26.13±7.10		14.90±4.39		17.76±5.14		18.44±5.37		77.25±21.03	
Female	26.96±6.69		15.37±3.87		18.90±4.72		19.31±4.80		80.55±19.11	
Age (years)		0.001		0.007		0.001		0.009		0.001
20–30	26.35±6.73		15.18±3.77		18.46±4.73		19.18±4.71		79.18±18.88	
30–40	26.81±6.78		15.21±4.07		18.71±4.81		19.01±5.00		79.76±19.69	
>40	31.79±3.71		17.79±2.14		22.33±2.91		22.16±2.94		94.08±11.27	
Hospital Level		0.001		0.001		0.130		0.001		0.002
Primary (Level I)	26.04±7.01		14.61±4.37		18.495±4.74		18.81±5.13		77.97±20.19	
Secondary (Level II)	25.78±6.97		14.85±4.08		18.36±5.08		18.26±5.36		77.26±20.58	
Tertiary (Level III)	28.16±6.18		16.07±3.41		19.29±4.50		20.18±4.09		83.71±17.24	
Years of Experience in Operating Room		0.001		0.009		0.003		0.007		0.001
1–2 years	26.10±7.20		14.98±3.87		18.30±5.01		18.89±4.89		78.29±20.02	
2–5 years	26.26±6.62		15.01±4.15		18.47±4.85		18.73±5.15		78.49±19.67	
6–10 years	26.29±6.52		15.03±3.88		18.30±4.65		18.86±4.71		78.49±18.76	
>10 years	29.24±5.91		16.46±3.49		20.28±4.12		20.65±4.23		86.64±16.92	
Educational Level		0.012		0.004		0.024		0.013		0.007
Associate Degree	27.26±6.55		15.52±3.70		19.03±4.57		19.62±4.43		81.44±18.32	
Bachelor's Degree	27.18±6.58		15.53±3.85		19.00±4.72		19.42±4.81		81.14±18.98	
Master's Degree or Above	24.18±7.52		13.57±4.34		17.04±5.11		17.30±5.35		72.10±21.22	
Professional Title		0.001		0.026		0.001		0.008		0.002
Licensed Practical Nurse	25.85±7.24		14.89±4.21		18.15±5.13		18.56±5.13		77.47±20.73	
Junior Nurse	26.63±6.34		15.16±3.68		18.48±4.55		19.10±4.68		79.40±18.06	
Senior Nurse	28.85±5.65		16.23±3.49		20.25±3.94		20.48±4.26		85.83±16.56	
Advanced Practice Nurse	28.82±7.01		16.21±4.07		20.17±4.86		20.32±4.98		85.53±20.32	
Position		0.094		0.072		0.191		0.163		0.104
Clinical Nurse	26.99±6.59		15.43±3.89		18.81±4.73		19.29±4.83		80.53±19.04	
Nursing Team Leader	25.55±7.42		14.43±4.27		18.31±4.98		18.56±5.00		76.86±20.67	
Nursing Officer	29.88±5.38		16.94±2.77		21.01±4.13		21.33±4.17		89.16±15.68	
Chief Nursing Officer	26.90±7.25		15.10±3.68		18.30±4.93		18.55±5.02		78.85±20.40	
Marital Status		0.709		0.638		0.758		0.451		0.844
Unmarried	27.40±6.54		15.67±3.66		18.50±4.73		19.57±4.68		81.15±18.60	
Married	26.83±6.82		15.29±3.92		18.81±4.78		19.30±4.82		80.26±19.44	
Divorced/Widowed	26.59±6.65		15.13±4.16		19.03±4.79		18.69±5.14		79.46±19.59	
Participation in Clinical Teaching		0.378		0.186		0.868		0.598		0.453
Yes	26.73±6.83		15.20±4.03		18.78±4.89		19.16±4.95		79.89±19.74	
No	27.37±6.39		15.75±3.55		18.86±4.36		19.44±4.55		81.44±17.80	
Monthly Income		0.001		0.023		0.033		0.001		0.003
<4000 RMB	25.72±7.18		14.81±4.18		18.23±5.16		18.43±5.26		77.20±20.73	
4001–6000 RMB	28.25±5.29		15.90±3.24		19.09±3.84		20.24±3.51		83.49±14.91	
6001–8000 RMB	27.37±6.60		15.65±3.87		19.21±4.73		19.61±4.58		81.86±18.82	
>8000 RMB	29.00±5.75		16.16±3.47		20.01±3.96		20.55±4.50		85.73±16.94	
Satisfaction with Monthly Income		0.011		0.018		0.312		0.020		0.027
Yes	28.32±5.54		16.10±2.96		19.20±4.03		20.18±3.82		83.82±15.33	
No	26.46±6.99		15.10±4.14		18.68±4.96		18.95±5.09		79.20±20.21	
Has Children		0.422		0.889		0.435		0.660		0.540
Yes	27.07±6.74		15.35±3.96		18.93±4.77		19.30±4.88		80.66±19.39	
No	26.56±6.71		15.30±3.86		18.57±4.76		19.10±4.83		79.54±19.15	

Table 4 Results of multiple linear regression analysis of factors influencing moral courage among operating room nurses

Variable	β	SE	β´	t value	P value
Constant	2.875	3.797	-	0.757	0.449
Age	0.109	0.081	0.030	1.349	0.177
Hospital Level	0.024	0.607	0.001	0.039	0.968
Years of Experience in Operating Room	-0.591	0.712	-0.034	-0.829	0.406
Professional Title	1.138	0.805	0.053	1.412	0.158
Current Monthly Income	0.137	0.586	0.007	0.234	0.814
Psychological Empowerment Dimensions					
Work Meaning	0.649	0.259	0.106	2.507	0.012
Self-Efficacy	0.235	0.258	0.036	0.911	0.362
Autonomy	0.983	0.264	0.159	3.712	<0.001
Work Impact	1.000	0.191	0.173	5.228	<0.001
Hospital Ethical Climate Dimensions					
Relationship with Nurses	0.671	0.262	0.137	2.559	0.011
Relationship with Physicians	-0.029	0.170	-0.009	-0.174	0.861
Relationship with Patients	0.822	0.256	0.164	3.201	0.001
Relationship with Hospital/Organization	0.505	0.199	0.147	2.533	0.012
Relationship with Managers	0.268	0.192	0.081	1.395	0.163

Note Variable assignments: Hospital Level, 1 = "Primary," 2 = "Secondary," 3 = "Tertiary"; Years of Experience in Operating Room, 1 = "1–2 years," 2 = "2–5 years," 3 = "6–10 years," 4 = ">10 years"; Professional Title: 1 = "Nurse," 2 = "Nurse Practitioner," 3 = "Head Nurse," 4 = "Deputy Chief Nurse and above"; Monthly Income, 1 = "<4000 RMB," 2 = "4001–6000 RMB," 3 = "6001–8000 RMB," 4 = ">8000 RMB". The model explained $R^2 = 0.813$ and adjusted $R^2 = 0.806$, with a significant F-test (F = 126.219, $P < 0.001$)

experience exhibited higher levels of moral courage. The relationship between educational level and moral courage was somewhat paradoxical: nurses with graduate degrees scored lower than their counterparts with bachelor's or associate degrees. Despite the significant differences observed in the educational levels, the correlation analysis did not show a statistically significant relationship between education and moral courage scores ($r = -0.075$, $P = 0.101$).

This discrepancy may be explained by several factors. It is possible that graduate nurses, often with more theoretical knowledge and research-oriented training, may feel less empowered to navigate moral dilemmas compared to their more clinically focused counterparts. Bickhoff et al. [17] indicated that most nursing students lack the moral courage to intervene or speak up when faced with poor practice. Additionally, the transition from academia to clinical practice might not always align with the practical application of moral courage, as higher academic achievements do not necessarily translate into higher levels of moral courage in real-world settings.

Furthermore, the study found that nurses with lower income (less than 4000 RMB/month) had significantly lower moral courage scores compared to their peers. Huang et al. [18] illustrated the monthly income were significantly associated with moral courage among nurses in China. However, the correlation between nurses' subjective satisfaction with income and their moral courage was not statistically significant ($r = 0.040$, $P = 0.383$), suggesting that while income dissatisfaction affects some nurses' perceptions, it does not necessarily diminish their moral courage.

This finding could reflect the strong professional ethics of nurses, where moral courage is sustained by professional duty and moral integrity, regardless of financial frustrations. Nurses in lower income brackets might still prioritize patient care and ethical decision-making, highlighting the resilience of their professional ethics despite economic challenges. These results are particularly relevant in the context of Southwest China's healthcare system, which is characterized by a diverse range of hospitals, from primary to tertiary care, and significant regional disparities in resource allocation, healthcare accessibility, and nurse training.

The multiple linear regression analysis revealed that six key factors, three from psychological empowerment (work meaning, autonomy, and work impact) and three from the hospital ethical climate (relationships with nurses, patients, and the hospital) were significant predictors of moral courage in operating room nurses.

By linking our findings to studies from ICU, emergency, oncology, long-term care, and COVID-19 frontline settings, we demonstrate that the factors influencing moral courage are not only relevant in OR nursing but are universally significant across healthcare contexts. This strengthens the argument that hospital administrators must actively enhance work meaning, autonomy, and ethical climate to empower OR nurses in making morally courageous decisions. Studies in ICU and oncology nursing show that nurses who perceive their work as meaningful exhibit higher moral courage when advocating for patient rights, ethical end-of-life care, and pain management [17]. In emergency departments, nurses with greater autonomy are more likely to intervene in cases of patient neglect, advocate for better pain management, and resist pressure to discharge patients prematurely due to hospital efficiency demands [10].

Similarly, OR nurses in institutions that support autonomy are more confident in challenging unethical surgical practices, such as improper sterilization or rushed procedures [11]. This aligns with our findings that work meaning and autonomy are the critical factors in enhancing moral courage, emphasizing the need for hospital policies that empower OR nurses to make ethical decisions without fear of retaliation.

Noteworthily, moral distress occurs when nurses recognize the ethically appropriate action but feel constrained from taking it due to institutional barriers. OR nurses often experience moral distress when they are witnessing unsafe surgical practices, such as surgeons did not observe the rule of hand washing and did not perform surgical safety checklist, and the anesthesiologist did not close the door well, did not observe the rule of clothing and masks [19]. Many nurses initially attempt to voice concerns, but when faced with hierarchical resistance, professional intimidation, or fear of retaliation, they stop speaking out over time. Over time, this distress weakens their moral courage, making them less likely to advocate for ethical decision-making in future cases. This distress can erode moral courage over time.

Moreover, moral courage enables nurses to challenge unethical practices despite professional risks. Kashani et al. [20] revealed that nurses with high moral courage are more likely to challenge unethical behaviors, such as neglect or unsafe practices (., 2023). Besides, Jeon et al. [11] explored moral courage in OR nurses, highlighting how those with high moral courage are more likely to intervene when surgeons bypass sterilization protocols, pressure staff to cut corners, or rush surgical procedures at the expense of patient safety.

Nurses who perceive their work as meaningful are more likely to display moral courage. This is consistent with studies suggesting that when nurses see their work as having a purpose, particularly in critical environments like the operating room, even those younger and less experienced nurses are adequately supported, they may thrive in the operating room environment [21]. The sense of autonomy, or the ability to make independent decisions, was positively correlated with moral courage. Nurses who feel empowered to make decisions and have control over their practice are more likely to act in line with their moral convictions. This finding aligns with research indicating that autonomy enhances job satisfaction and professional responsibility [22, 23]. Nurses who feel that their work has a significant impact on patient outcomes are more likely to demonstrate moral courage. A strong sense of responsibility and the recognition of their role in patient safety and ethical care can drive nurses to confront moral challenges in the operating room.

Positive relationships with fellow nurses are crucial for moral courage. When nurses support each other and work in an environment where collegiality is encouraged, they are more likely to advocate for ethical practices and speak out against unethical behaviors. This is in line with studies showing that teamwork and peer support are vital to fostering a culture of moral courage in healthcare settings [24]. A strong relationship with patients can also foster moral courage. Nurses who feel a deep connection with their patients and are committed to their well-being are more likely to act in their best interest, even when faced with ethical dilemmas or organizational pressure. This underscores the importance of patient-centered care and providing safe care [20]. Lastly, the hospital's ethical climate, particularly the relationship between nurses and the institution, was found to be a significant factor in promoting moral courage. A hospital culture that prioritizes ethics, supports nurses' autonomy, and provides a safe environment for ethical decision-making can significantly enhance nurses' willingness to act courageously in morally complex situations [13].

These factors highlight that moral courage is not solely an individual trait but is influenced by organizational and environmental factors. These findings are crucial in understanding how specific aspects of the work environment within Southwest China healthcare system contribute to nurses' moral courage. Creating a supportive work environment that promotes psychological empowerment and fosters positive relationships among staff, patients, and the hospital as a whole is essential for enhancing moral courage among nurses.

Theoretical Implications: This study enhances the theoretical understanding of moral courage among OR nurses in Southwest China. It expands Bandura's Social Cognitive Theory by demonstrating that moral courage is not solely intrinsic but shaped by institutional and psychological factors. This study highlights the critical role of hospital ethical climate and psychological empowerment in sustaining moral courage. Furthermore, it contributes to the growing discourse on moral distress, showing how hierarchical barriers and resource constraints erode ethical decision-making over time. These insights provide a foundation for future research on interventions, ethical training programs, and leadership strategies to strengthen nurses' ethical resilience in OR settings, particularly in Southwest China's healthcare system.

Practical Implications: This study has important practical implications for hospital administrators, nursing educators, and policymakers. Given that psychological empowerment and hospital ethical climate significantly influence moral courage, hospitals should promote nurse autonomy, ethical leadership, and peer support. Administrators must establish safe reporting systems for ethical concerns, ensuring nurses can challenge unsafe practices without fear of retaliation. Policymakers should require ethical climate assessments and implement standardized ethical training to reinforce moral courage. These strategies will strengthen ethical integrity, and improve overall healthcare quality, ensuring OR nurses are equipped to act courageously in complex ethical situations.

Limitations and future research: First, due to the cross-sectional nature of this study, we can only establish associations, not causation, between moral courage and its

influencing factors (e.g., psychological empowerment, ethical climate). Longitudinal or experimental studies would be necessary to confirm causal relationships and determine whether improvements in ethical climate or psychological empowerment directly lead to increased moral courage over time. Second, this study relied on self-reported questionnaires which may be subject to bias, participants might have overestimated or underestimated their moral courage due to personal or professional pressures. Although anonymity was assured, nurses might still have responded in a way that aligns with perceived professional expectations. Future studies should incorporate objective behavioral assessments or peer evaluations to enhance data validity. Third, the study was conducted in a specific geographic region, and the results may not be generalizable to other regions or countries with different healthcare systems and cultural contexts. Fourth, given the challenges of recruiting OR nurses across multiple institutions in Southwest China, convenience sampling was chosen to ensure a sufficient sample size while maintaining the feasibility of data collection, but there is potential selection bias, in the future, we will conduct the survey in more hospitals and make long-term follow-up in order to reduce the selection bias and observe the changes in various influencing factors.

In conclusion, this study provides valuable insights into the factors influencing moral courage among operating room nurses in Southwest China. The findings emphasize the importance of psychological empowerment, positive relationships within the healthcare environment, and a strong hospital ethical climate in fostering moral courage.

Data availability
On request, the corresponding authors will provide the datasets that were used and analyzed in the current study.

Declarations

Ethics approval and consent to participate
This study was approved by The Ethics Committee of The First Affiliated Hospital of Chengdu Medical College (approved ID: 2024CYFYIRB-BA-08), and in accordance with the World Medical Association Declaration of Helsinki, the written informed consent was provided when the questionnaire was submitted by the operating room nurses.

Consent for publication
A Consent to participate were collected using the online platform Questionnaire Star, the questionnaire included an informed consent form.

Competing interests
The authors declare no competing interests.

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