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Relationship between transition shock, resilience, career calling, and retention intention among new nurses: a moderated mediation model

Dinuo Xin[1†], Wanling Li[2†], Wenjuan Zhu[3], Min Li[4], Na Xu[5], Lihong Yue[6], Liping Cui[1*] and Ying Wang[7*]

Abstract

Background Nurse shortage has become an ongoing and urgent problem worldwide. The high turnover rate of new nurses, who are the primary backup personnel for the nursing force, exacerbates the possibility of this situation. Transition shock has been demonstrated to be critical in influencing new nurses' retention intention. However, the mechanisms underlying this impact remain unclear.

Objectives This study aims to explore transition shock's effect mechanism on retention intention among new nurses, and to clarify the career calling's mediating role and the resilience's moderating role in this relationship.

Methods This is a multicenter cross-sectional study. From January 28 to February 20, 2024, an online questionnaire survey was administered among 739 new nurses from 11 hospitals in Shanxi Province, China, using convenience sampling. The survey included a demographic information questionnaire, the Transition Shock of Newly Graduated Nurses Scale, the Medical Staff Resilience Scale, the Career Calling Scale, and the Nurses' Intention to Stay Scale. The data were analyzed using descriptive analysis, Pearson correlation analysis, and the PROCESS Macro Model 4 and 7 for the regression.

Results Transition shock was significantly negatively correlated with retention intention ($p < 0.001$). Career calling played a partial mediating role between transition shock and retention intention, accounting for 63.53% of the total effect. Further, resilience moderated transition shock's effect on career calling; thereby, a moderated mediation model was developed.

Conclusions Transition shock reduces retention intention by decreasing new nurses' levels of career calling, while resilience moderates this mechanism. Nursing managers can adopt measures to increase retention intention among new nurses by reducing their transition shock and enhancing their career calling education and resilience training.

[†]Dinuo Xin and Wanling Li contributed equally to this work.

*Correspondence:
Liping Cui
sxtylsj-1@163.com
Ying Wang
3049194186@qq.com
Full list of author information is available at the end of the article

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Background

In recent years, the COVID-19 pandemic has highlighted the importance of nursing staff. However, the continuing nurse shortage has become a concern and a major challenge for the healthcare system worldwide [1]. According to the World Health Organization's State of the World's Nursing 2020 report, the total number of nursing graduates would need to increase by an average of 8% annually until 2030 to meet the projected shortage of 5.7 million nurses [2].

Globally, although the total number of newly graduated nurses has been increasing [3], their high turnover rate impacts the efficiency of nursing human resources. A report revealed that nearly 30% of new nurses working in the United States leave in their first year of employment [4]. In a longitudinal study in Shanghai, China, new nurses' turnover intention was as high as 71.8% after one year of employment [5]. Likewise, in another recent longitudinal study in Korea, new nurses' turnover rate increased by more than 10% in the second year compared to the first year [6]. Such nursing turnover not only exacerbates the current nurse shortage but also increases the cost of recruiting, training, and assessing new nurses [7]. Simultaneously, it potentially threatens nursing quality and patient safety [8]. Retention intention refers to an individual's intention to remain in the same job rather than seek other job opportunities, which is a significant predictor of retention behavior [9]. Most previous studies have focused on the influence of external factors, such as demographics, organizational factors, and work environment, on nurses' retention intentions, whereas few studies have explored the underlying mechanisms of nurses' retention intentions based on an internal perspective [10]. Therefore, we explored the potential mechanisms of the external environment (transition shock), intrinsic motivation (career calling), and personal ability (resilience) as predictors of new nurses' retention intentions, aiming to provide novel ideas for nurse managers and, thereby, improve new nurses' retention intentions.

Generally, nurses who have been working for less than two years after graduation are called "new nurses" [11]. During their transition from school to hospital, new nurses face various challenges, including heavy workload, immature clinical experience and knowledge base, and a lack of interpersonal communication and resilience [12, 13]. Transition shock refers to an individual's feelings and experience of anxiety, disorientation, confusion, doubt, and uncertainty, which are influenced by the relationships, knowledge, and responsibilities that occur when their role changes [14]. A sustained state of heightened transition shock not only negatively impacts new nurses' physical and psychological health, but also decreases their work engagement and job satisfaction, which reduces their retention intention [15, 16]. The primary reason for new nurses' turnover in the transition phase is their inability to successfully transition [17]. Therefore, it is necessary to pay special attention to new nurses' transition shock and to adopt measures to reduce their turnover rate.

Career calling refers to an individual's sincere desire and strong passion for their profession, with no expectation of additional material or monetary rewards [18]. Nurses with a career calling are more focused on the meaning, value, and responsibility associated with their work, which motivates their work engagement and is an intrinsic motivator for their career development [19]. Relevant studies have demonstrated that transition shock—as an external source of stressful stimuli—may seriously diminish new nurses' enthusiasm, initiative, and motivation for their work; trigger a deep doubt regarding their careers' value and significance, and, thereby, reduce their sense of career calling [20]. Therefore, we hypothesized that transition shock is negatively related to career calling. Per prior research, career calling serves as an internal, deep psychological construct that mobilizes nurses' intrinsic motivation [21]. Nurses with a strong career calling are inclined to devote time and energy to their work; simultaneously, they can deeply feel their work's meaning and value, which in turn enhances their intention to stay in their positions [22]. Based on these findings, we hypothesized that career calling is positively related to retention intention, with potential implications for the relationship between transition shock and retention intention.

Additionally, new nurses' internal psychological resources may moderate this process. Resilience refers to an individual's ability to rebound and recover when faced with negative events such as adversity, setbacks, and trauma [23]. Previous studies have revealed that resilience helps individuals develop positive coping strategies to effectively cope with and resolve barriers and difficulties [24]. When new nurses experience transition shock, resilience serves as a protective factor that enables them to cope with and adapt to stressful situations positively, thereby alleviating the negative effects of stress [25]. Moreover, resilience—an important predictor of career calling—enhances individuals' flexibility and adaptability in the face of career challenges, while also strengthening

their determination to overcome difficulties and pursue career goals, thereby deepening their identification and pursuit of career values [26, 27]. Thus, resilience, as a positive psychological resource, may play a moderating effect in this process.

According to the job demand-resource (JD-R) model [28], each occupation's characteristics can be divided into job demands and job resources. Job demands refer to the "negative factors" of a job that incur energy, physical, and psychological costs. On the contrary, job resources are the "positive factors" of a job that exert a motivational effect and promote the achievement of one's work goals. The model underscores that job demands and job resources impact burnout and work engagement through two different pathways, namely, the "fatigue process" and the "motivation process," respectively. Job demands operate through the "fatigue process," which refers to the constant exertion of energy and physical strength by employees owing to high job demands, resulting in negative outcomes such as impaired physical and mental health, burnout, and decreased work engagement. Job resources operate through the "motivation process," which refers to the motivation role of sufficient job resources in promoting employees' commitment, enthusiasm, and performance [29]. In this model, transition shock plays the role of "job demands," which consume new nurses' energy, resulting in burnout, reduced work engagement, and retention intention. "Career calling" and "resilience" are considered job resources in nursing that facilitate individuals to cope appropriately with their job demands, and increase their work engagement, thus increasing their retention intention. Furthermore, the model suggests that job resources buffer employees' attrition from high job demands; that is, job resources mitigate job demands' negative impact on employees. Thus, "resilience" as a job resource, moderates the transition shocks' negative impact on career calling and retention intention [11]. Conservation of resources theory (COR) suggests that individuals tend to preserve, protect, and acquire valuable resources, irrespective of whether

it a threat pertains to the loss of existing resources or the actual loss of resources that results in negative outcomes [30]. Based on this theoretical framework, "career calling" and "resilience" can be considered personal resources, while "transition shock" can be considered a resource-demanding event that threatens these personal resources. High levels of transition shock deplete new nurses' physical and psychological resources, thus decreasing retention intention. Therefore, based on this theoretical support and previous research, this study proposed the following hypotheses and constructed a moderated mediation hypothesis model with transition shock, career calling, resilience, and retention intention as the independent, mediating, moderating, and dependent variables, respectively (Fig. 1):

H1 Transition shock is negatively correlated with retention intention among new nurses.

H2 Career calling mediates the relationship between transition shock and retention intention.

H3 Resilience moderates the relationship between transition shock and career calling.

H4 Resilience moderates the indirect relationship between transition shock and retention intention through career calling.

Methods
Study design
This was a cross-sectional study. The STROBE checklist was applied as the reporting guideline for this study.

Participants and settings
From January 28 to February 20, 2024, new nurses from 11 hospitals in Shanxi Province, China, were selected as study participants using convenience sampling. The inclusion criteria were as follows: (1) clinical in-service registered nurses with nurse qualification certificates, (2)
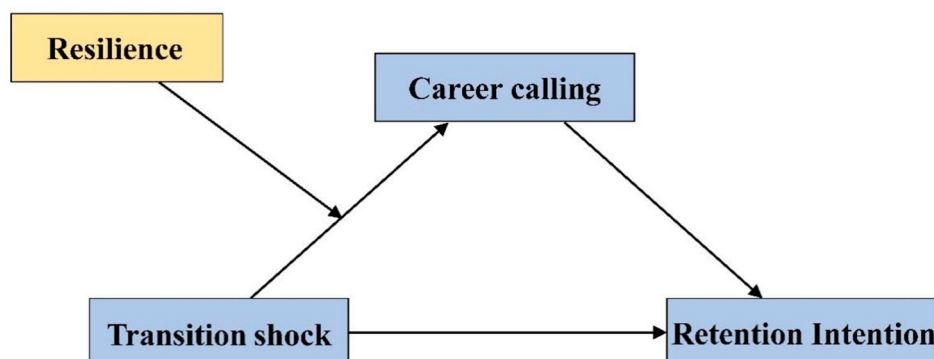

Fig. 1 Hypothesized model

those who have worked within two years after graduation, and (3) those who voluntarily participate in this study based on informed consent. The exclusion criteria were as follows: (1) those who are unable to participate in the survey because of sick leave, vacation, or further training during the survey period, (2) those who have worked in two or more hospitals after graduation, (3) those who are not a regular employee of the hospital (such as student nurse or trainee nurse). According to Kendall's principle of sample size estimation [31], the sample size of a cross-sectional study is typically 10 to 20 times the number of variables. In this study, the demographic information questionnaire contained 20 variables, and the four scales contained 10 variables. Considering that 20% of the questionnaires were invalid, the sample size was estimated to be 375 to 750. Eventually, a total of 826 questionnaires were sent out, and 739 valid questionnaires were returned, with a return validity rate of 89.47%.

Measures
Demographic information questionnaire
A self-designed questionnaire was used to access the participant's demographic information, including age, gender, educational level, marital status, birthplace, residential environment, type of hospital, work department, employment status, family support for nursing work, monthly income, weekly working hours, whether the participants came from a one-child family, the average number of night shifts per week.

Transition shock of newly graduated nurses scale
The scale was developed by Xue et al. [32], which comprises 27 items across four dimensions, namely, physical (6 items), psychological (8 items), knowledge and skills (5 items), and sociocultural and developmental (8 items). It has a Cronbach's α coefficient of 0.92 and content validity of 0.91. A 5-point Likert scale was used, ranging from 1 ("completely disagree") to 5 ("completely agree"). The overall score is 135, with higher scores indicating higher levels of transition shock. The Cronbach's α coefficient for this scale in the present study was 0.960, and the Cronbach's α coefficient for the subscales were 0.905, 0.911, 0.877, and 0.923, respectively.

Medical staff resilience scale
The scale was developed by Zhu et al. [33] and has a Cronbach's α coefficient of 0.907. The scale comprises 18 items across four dimensions: decision-making coping (6 items), interpersonal connection (4 items), rational thinking (4 items), and flexible self-adaptation (4 items). It utilizes a 5-point Likert scale, with scores ranging from 1 ("completely disagree") to 5 ("completely agree"). The total score ranges from 18 to 90, with higher scores indicating higher levels of coping with adversity. In this study,

the Cronbach's α coefficient for the overall scale was 0.939, and the Cronbach's α coefficient for the subscales were 0.920, 0.917, 0.893, and 0.844, respectively.

Career calling scale
The scale was compiled by Dobrow and Tosti-Kharas [34] and translated into Chinese by Pei and Zhao et al. [35]. The Cronbach's α coefficient of the scale is 0.944. The scale comprises 12 single-dimension items and is scored using a seven-point Likert scale where "1" represents "totally disagree" and "7" represents "totally agree." The total score on the scale ranges from 12 to 84 points, with higher scores indicating higher levels of career calling. In this study, the Cronbach's α coefficient for this scale was 0.961.

Nurses' intention to stay scale
The scale was developed by Turnley and Feldman [36], with a Cronbach's α coefficient of 0.860. Tao and Wang [37] translated and revised the scale into Chinese. The scale is a one-dimensional scale comprising 6 items and is scored on a 5-point Likert scale where "1" represents "totally disagree" and "7" represents "totally agree." The items 2, 3, and 6 are reverse-scored. The scale has a total score ranging from 6 to 30. The higher the score, the higher the nurses' intention to stay in the job, and vice versa the lower the score. In this study, the Cronbach's α coefficient for this scale was 0.817.

Ethical consideration
The study was authorized by the Medical Ethics Committee of Shanxi Bethune Hospital (No. YXLL-2023-290). The principles of informed consent and voluntary participation were adhered to throughout the study. Before implementing the investigation, the participants were informed about the purpose, significance, possible risks, and benefits of the study. All data collected were used only for this study and kept strictly confidential to ensure that participants' rights and interests were fully protected.

Data collection
Before the survey was conducted, the researchers imported the survey questionnaires into the Questionnaire Star online platform, and a QR code was generated after releasing the questionnaire. Subsequently, the researchers delivered the questionnaire individually to the managers of each hospital's nursing department and explained it to them to obtain their consent and support. Thereafter, the nursing managers shared the QR codes with new nurses at their hospitals. The survey was answered anonymously, with uniform guidelines provided at the beginning of the questionnaire, which included the study's purpose and significance as well as

the precautions to be considered when answering the questionnaire. To ensure the survey's completeness and quality, all questions were mandatory and could be submitted only once from the same IP address. After the survey, the researchers obtained the completed questionnaires from the backend and rechecked them to eliminate invalid questionnaires, such as those with logical inconsistencies, simple repetitive patterns, and excessively short or long completion times.

Data analysis
The SPSS 27.0 software and SPSS PROCESS Macro 4.1 (Hayes, 2022) were used to analyze the data. Descriptive analysis was utilized to analyze the participants' demographic characteristics and the scores of four main variables. Pearson's correlation was used to analyze the relationships among these variables. Subsequently, PROCESS Model 4 was conducted to test the mediating role of career calling between transition shock and retention intention, while Model 7 was used to test the moderating role of resilience in the relationship between transition shock and retention intention. To further confirm the resilience's moderating role, a simple slope test was applied to assess the relationship between transition shock and career calling for different resilience levels. The indirect effect of the mediation effect was assessed using a bootstrap method with 5000 samples, and the 95% confidence interval (CI) did not include zero indicating a significant effect. All statistical analyses were two-sided, and a p-value of less than 0.05 was considered statistically significant.

Results
Demographic characteristics of the participants
The results of the participants' characteristics are shown in Table 1(See end of article for details).

Common method variance test
Since all data collected in this study used self-assessment questionnaires, there was a potential common method bias. The Harman's one-way factor test was performed to check for the common method bias. The results indicated that there were 10 factors with eigenvalues greater than 1, and the first common factor explained 33.566% of the variance, which is lower than the critical criterion (40%), suggesting that there was no serious problem of common method bias in this study.

Descriptive statistics and correlations of the main variables
The mean, standard deviation, and Pearson correlation coefficients for the main variable are shown in Table 2. The overall average scores of transition shock, resilience, career calling, and retention intention among new nurses were (2.922 ± 0.820), (3.907 ± 0.599), (5.011 ± 1.046), and

(3.752 ± 0.650), respectively. The Pearson correlation analysis revealed that transition shock was significantly negatively correlated with resilience ($r = -0.346$, $p < 0.001$), career calling ($r = -0.433$, $p < 0.001$), and retention intention ($r = -0.425$, $p < 0.001$). Therefore, H1 was supported. Resilience was significantly positively correlated with career calling ($r = 0.608$, $p < 0.001$) and retention intention ($r = 0.445$, $p < 0.001$). Moreover, career calling was significantly positively correlated with retention intention ($r = 0.690$, $p < 0.001$).

The mediation of career calling
After standardizing the main variables, Model 4 in PROCESS was used to assess the mediating role of career calling between new nurses' transition shock and retention intention. The results revealed that transition shock significantly negatively predicted retention intention ($\beta = -0.425$, $p < 0.001$) and career calling ($\beta = -0.433$, $p < 0.001$). When career calling was included in the regression equation model, it was positively significantly associated with retention intention ($\beta = 0.623$, $p < 0.001$), whereas the negative predictive effect of transition shock on retention intention remained statistically significant ($\beta = -0.155$, $p < 0.001$; Table 3). The Bootstrap test indicated that career calling partially mediated the relationship between transition shock and retention intention (indirect effect = -0.270, BootSE = 0.025, 95% CI = [-0.320, -0.222]), with the mediating effect accounting for 63.53% of the total effect (Table 4). Therefore, H2 was supported.

Moderating effects of resilience
Model 7 in PROCESS was adopted to test moderated effects. As shown in Table 5, transition shock negatively predicted retention intention ($\beta = -0.155$, $p < 0.001$), and career calling positively predicted retention intention ($\beta = 0.623$, $p < 0.001$). Additionally, transition shock exerted a significant negative predictive effect on career calling ($\beta = -0.265$, $p < 0.001$) and the interaction between transition shock and resilience on career calling was significant ($\beta = 0.070$, $p < 0.01$), indicating that resilience exerted a moderating effect on the relationship between transition shock and career calling. Therefore, H3 was supported. Moreover, the moderating role of resilience was further analyzed using simple slope analysis. The levels of resilience were categorized into high and low groups based on $M \pm 1SD$ (Fig. 2). In both the high and low resilience groups, transition shock significantly negatively impacted career calling. In the low resilience group, the effect of transition shock on career calling was stronger ($\beta = -0.335$, t = -7.841, $p < 0.001$) than that in the high resilience group ($\beta = -0.196$, t = -5.337, $p < 0.001$; Table 6). Thus, it can be considered that with the increase in resilience level, the negative predictive effect of transition shock on career calling gradually decreased. Moreover,

Table 1 Demographic characteristics and differences of new nurses (*n* = 739)

Characteristics	Categories	N	%
Age grade	<23	95	12.9
	23 ~ 25	476	64.4
	>25	168	22.7
Gender	Male	77	10.4
	Female	662	89.6
Education level	Junior college	141	19.1
	Bachelor	568	76.9
	Master or above	30	4.1
Consistency between place of origin and city of work	Yes	450	60.9
	No	289	39.1
Birthplace	Urban	523	70.8
	Rural	216	29.2
Only-child	Yes	117	15.8
	No	622	84.2
Residential environment	Living with families	306	41.4
	co-renting	230	31.1
	live alone	203	27.5
Type of hospital	general	592	80.1
	Specialist	147	19.9
Marital status	Married	69	9.3
	Unmarried	670	90.7
Employment status	Contact system	661	89.4
	Permanent	36	4.9
	Other	42	5.7
Work experience (months)	1 ~ 6	269	36.4
	7 ~ 12	148	20.0
	13 ~ 18	246	33.3
	19 ~ 24	76	10.3
Pre-service training period (days)	≤ 7	270	36.5
	8 ~ 14	203	27.5
	15 ~ 21	110	14.9
	22 ~ 28	52	7.0
	>28	104	14.1
Work department	Internal medicine	223	30.2
	Surgical	130	17.6
	Gynecology and obstetrics	39	5.3
	Pediatric	44	6.0
	Oncology	22	3.0
	ICU or emergency	113	15.3
	Operating room	24	3.2
	Nursing department	16	2.2
	Other	128	17.3
Monthly income (RMB)	≤ 3000	305	41.3
	3001 ~ 5000	378	51.2
	> 5000	56	7.6
Independent nursing work	Yes	431	58.3
	No	308	41.7
Weekly working hours	≤ 40	150	20.3
	41 ~ 50	445	60.2
	51 ~ 60 h	111	15.0
	>60 h	33	4.5

Table 1 (continued)

Characteristics	Categories	N	%
Average number of night shifts per week	none	228	30.9
	one time	107	14.5
	2 times	346	46.8
	≥ 3 times	58	7.8
One-way commute length	≤ 10 min	144	19.5
	11 ~ 20 min	377	51.0
	21 ~ 30 min	138	18.7
	>30 min	80	10.8
Family support for nursing work	Yes	716	96.9
	No	23	3.1
Reasons for choosing nursing work	Easily employable	282	38.2
	Personal passion	141	19.1
	Listening to others	69	9.3
	Limited by college entrance examination score grades	53	7.2
	Accepting transfers	48	6.5
	Other	146	19.8

Table 2 Descriptive statistics and correlation analysis (r)

Variables	M ± SD	1	2	3	4
1. transition shock	2.922 ± 0.820	1			
1.1 physical	3.387 ± 0.979				
1.2 psychological	2.861 ± 0.923				
1.3 knowledge and skills	2.978 ± 0.891				
1.4 sociocultural and developmental	2.922 ± 0.820				
2. resilience	3.907 ± 0.599	-0.346***	1		
2.1 decision-making coping	3.952 ± 0.694				
2.2 interpersonal connection	4.076 ± 0.709				
2.3 rational thinking	3.788 ± 0.779				
2.4 flexible self-adaptation	3.790 ± 0.759				
3. career calling	5.011 ± 1.046	-0.433***	0.608***	1	
4. retention intention	3.752 ± 0.650	-0.425***	0.445***	0.690***	1

Note: M = mean; SD = standard deviation

*** $p < 0.001$

Table 3 Testing for the Mediation Effect

Predictors	Model 1 (retention intention)		Model 2 (career calling)		Model 3 (retention intention)	
	β	t	β	t	β	t
transition shock	-0.425***	-12.743	-0.433***	-13.054	-0.155***	-5.332
career calling	—	—	—	—	0.623***	21.469
R^2	0.181		0.188		0.496	
F	162.385***		170.404***		362.308***	

*** $p < 0.001$

Table 4 The total, direct, and indirect effects of the mediation model

	β	SE	LLCI	ULCI	%
Total effects	-0.425	0.033	-0.490	-0.359	100
Direct effects	-0.155	0.029	-0.212	-0.098	36.47
Indirect effects	-0.270	0.025	-0.320	-0.222	63.53

bias-corrected percentile bootstrap analysis confirmed that the indirect effects of transition shock on retention intention through career calling were significant under different levels of resilience, and the index of the moderated mediation was 0.043, with a 95% confidence interval [0.005, 0.079] that did not contain 0, suggesting that the moderated mediated effect test was significant (Table 7). Consequently, H4 was supported.

Table 5 Coefficients for the tested Moderated Mediation Model

Predictors	Model 1 (career calling)			Model 2 (retention intention)		
	β	SE	t	β	SE	t
transition shock	-0.265***	0.030	-8.851	-0.155***	0.029	-5.332
resilience	0.516***	0.030	17.401	—	—	—
career calling	—	—	—	0.623***	0.029	21.469
transition shock×resilience	0.070**	0.026	2.662	—	—	—
R^2	0.432			0.496		
F	186.357***			362.308***		

Note: × represents the interaction of transition shock and resilience
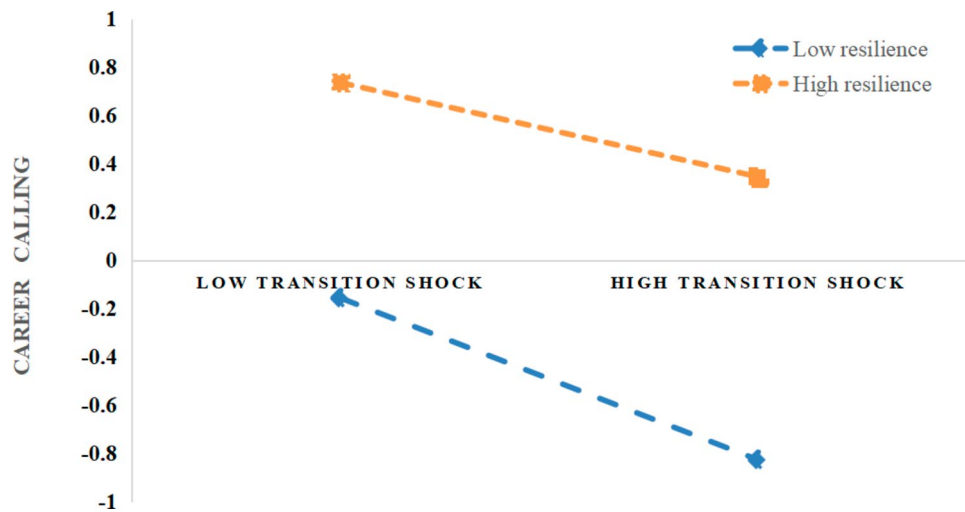
**p<0.01 ***p<0.001

Fig. 2 Moderating effect diagram of resilience

Table 6 Conditional direct effects of transition shock on career calling at different levels of resilience

resilience	β	SE	t	p	LLCI	ULCI
M-1SD	-0.335	0.043	-7.841	0.000	-0.419	-0.251
M	-0.265	0.03	-8.851	0.000	-0.324	-0.207
M+1SD	-0.196	0.037	-5.337	0.000	-0.268	-0.124

Table 7 Conditional indirect effects of transition shock on retention intention at different levels of resilience

resilience	Indirect effect	Boot SE	LL 95% CI	UL 95% CI
M-1SD	-0.209	0.032	-0.270	-0.145
M	-0.165	0.022	-0.208	-0.123
M+1SD	-0.122	0.025	-0.173	-0.074
Index of moderated mediation	0.043	0.019	0.005	0.079

Discussion

Based on COR theory and the JD-R model, this study explored the relationship between transition shock and retention intention, as well as the role of career calling and resilience in this relationship, among new nurses. The results of this study demonstrated a negative relationship between transition shock and retention intention among new nurses, while career calling partially mediated the relationship between transition shock and retention intention. Further, resilience played a moderating role in the relationship between transition shock and career calling and formed a moderated mediation model. This study provides a novel conception for improving the level of new nurses' retention intention, and it also provides a theoretical and practical foundation for subsequent researchers to further deepen relevant investigations into new nurses' retention intention.

Relationship between transition shock and retention intention among new nurses

This study revealed that new nurses' transition shock is negatively correlated with their retention intention, which is consistent with Cao et al.'s findings [16]. The transition shock that new nurses face during the transition period may directly affect their physical and mental health, resulting in burnout, job adjustment barriers,

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and decreased job satisfaction, which in turn affects their retention intentions [38]. Simultaneously, anxiety, frustration, and doubts regarding their professional value brought about by the transition shock may reduce new nurses' identification and enthusiasm for the profession [39]. Additionally, transition shocks may indirectly impede career development, result in interpersonal tensions, and diminish perceptions of organizational support, all of which are intertwined and combine to diminish the retention intentions of new nurses [40]. Therefore, hospital administrators and nursing managers should provide new nurses with adequate organizational support and a safe working environment, as well as establish a fair and reasonable salary system, incentive mechanism, and title promotion mechanism to enhance their sense of professional value. Moreover, nursing managers should rationalize human resources allocation and implement a flexible scheduling system that reduces new nurses' physical and mental stress [41]. The clinical instructors should play a positive role as a mentor and develop a personalized teaching plan that enable new nurses to integrate theoretical knowledge with clinical practice, thereby improving the comprehensiveness and quality of the care; simultaneously, positive feedback and constructive criticism should be utilized to help new nurses build self-confidence and enhance their sense of security and belonging [42]. Furthermore, new nurses should face the challenges of transition actively, take the initiative to seek help and resources, and continuously improve their professional competence and adaptability, to better integrate into the collective environment and enhance their retention intention [43].

The mediating role of career calling

Career calling mediated the relationship between transition shock and retention intention among new nurses. That is, transition shock impacted retention intention by influencing career calling, thus supporting Hypothesis 2. First, the results of this study revealed that transition shock was negatively related to career calling among new nurses, which is similar to the findings of Su et al. [44]. According to COR theory, sustained high levels of transition shock gradually deplete new nurses' mental and physical resources. Among new nurses, the continuous loss of resources gradually results in negative experiences, and consequently, the value recognition and career calling of the nursing profession declines [45]. Additionally, we found that career calling was positively related to retention intention, suggesting that a low sense of career calling reduces retention intention, which is consistent with the findings of Xu et al. [46]. Career calling serves as a means to maintain resources and reduce the drain of transition shock on one's resources. If new nurses' sense of career calling weakens, their sense of

career achievement and value recognition decreases, and subsequently, they exhibit negative work attitudes and behaviors, which may ultimately reduce their retention intention. By contrast, when new nurses exhibit a strong sense of career calling, the work stress and burnout levels that they experience significantly reduce because they can fully realize their self-worth at work. This manifestation of self-worth fosters a deep sense of fulfillment and satisfaction, which strengthens retention intention [47]. Given these findings, nursing educators and managers should strengthen the cultivation and shaping of new nurses' career calling. Specifically, career management courses can be established to deepen new nurses' cognition of professional roles and responsibilities and, thereby, stimulate their inner sense of professional mission. Simultaneously, new nurses should be provided with individualized career development planning based on their personalities, interests, strengths, and career development needs—to enable them to pay greater attention to the intrinsic value of their careers rather than pursuing external rewards. Moreover, nursing managers should support new nurses' continuing education and academic advancement by providing them with learning platforms and opportunities to facilitate their professional growth and potential release [48]. Clinical instructors should consciously establish themselves as exemplary role models, and give full play to the role of "teaching," "helping," and "leading," influencing new nurses through their excellent performance and professionalism. Meanwhile, clinical instructors should frequently share their clinical experiences with new nurses to strengthen the latter's true love for the nursing profession and enhance their level of career calling [49]. Finally, new nurses should establish clear career goals, actively seek and cherish all growth opportunities, and deeply integrate personal development into their nursing career—to enable their career calling to become a powerful driving force promoting their personal and professional progress [19].

The moderating role of resilience

An important finding of this study is that resilience moderates transition shock' direct as well as indirect effects on retention intention, thus supporting Hypotheses 3 and 4. That is, transition shock' negative effects on retention intention diminish as the resilience level increases, both in direct and indirect relationships. Previous studies have reported similar findings [50]. The Resilience Framework for Nursing and Healthcare elucidates resilience as a powerful work resource that plays a protective role in varied contexts, effectively moderating the relationship between negative events and their potentially adverse consequences, thereby significantly mitigating the deleterious effects of stressors [51]. Specifically, new nurses with high resilience are more likely to consider transition

shock an opportunity rather than a threat and, thus, exhibit stronger adaptive, stress-resistant, and self-regulatory abilities. They strive to mobilize existing resources and seek effective strategies to cope with transition shock and are more likely to experience a sense of value and meaning in nursing profession, thus exhibiting high career calling and retention intention [52]. By contrast, new nurses with lower resilience cannot engage in positive self-regulation when facing transition shock, which precipitates resistance, fatigue, and a low sense of career happiness and fulfillment, thus decreasing their career calling and retention intention [53]. Therefore, nursing educators and managers should focus on developing and cultivating new nurses' resilience and provide them with effective stress management strategies, including mindfulness-based stress reduction, resilience training, and group counseling. These measures aim to enhance new nurses' psychological adaptation ability in the face of adversity and promote role change and adaptation [54]. Clinical instructors should focus on the development of new nurses' emotional management and self-confidence, teach them skills and experience in coping with setbacks, and encourage them to face challenges and improve their stress resistance [55]. Additionally, new nurses must continue improving their professional theoretical knowledge and practical skills, and enhancing their professional self-confidence and ability to cope with adversity independently by accumulating experience through practice. Second, they should take the initiative to maintain effective communication with colleagues and leaders in the department and actively seek others' advice and support to better cope with stressors in their workplace [56].

Limitations
Although this study's findings support the proposed hypotheses, it has some limitations, predominantly in the following aspects: First, this study employed convenience sampling and surveyed only some of the new nurses in Shanxi Province, thus limiting the generalizability and extrapolation of the findings. In the future, expanding the sampling scope and applying a more rigorous probability sampling method, such as random or stratified sampling, must be considered. Second, the cross-sectional design utilized in this study cannot explain the causal relationships between the variables. Future researchers are recommended to employ a longitudinal design to explore the trajectory of the variables. Finally, this study utilized subjectively reported measures, which may produce some degree of recall bias and social desirability bias. Therefore, future studies should incorporate face-to-face qualitative interview data to increase the findings' realism and reliability.

Conclusion
Within the context of the global nursing shortage, increasing the retention intention of new nurses has become an urgent concern. This study's results demonstrate that career calling partially mediates the relationship between new nurses' transition shock and retention intention and that resilience moderates the indirect pathway of transition shock impacting new nurses' retention intention through career calling. Nursing managers should adopt all-around and deep-level interventions to improve the level of new nurses' resilience and career calling, mitigate the negative impact of transition shock, increase retention intention, and promote new nurses' stable development.

Data availability
The raw data supporting the conclusions of this article will be made available by asking the corresponding author.

Declarations

Ethics approval and consent to participate
This study has been reviewed and approved by the Medical Ethics Committee of Shanxi Bethune Hospital (No. YXLL-2023-290) and performed following the Declaration of Helsinki. All participants gave their voluntary written informed consent before study participation.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Nursing Department, Shanxi Bethune Hospital, Shanxi Academy of Medical Sciences, Third Hospital of Shanxi Medical University, Tongji Shanxi Hospital, Taiyuan, Shanxi 030032, China
[2]Comprehensive Medical Department, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei 430030, China
[3]Department of Breast Surgery, Shanxi Bethune Hospital, Shanxi Academy of Medical Sciences, Third Hospital of Shanxi Medical University, Tongji Shanxi Hospital, Taiyuan, Shanxi 030032, China
[4]Department of Rehabilitation Medicine, Shanxi Bethune Hospital, Shanxi Academy of Medical Sciences, Third Hospital of Shanxi Medical University, Tongji Shanxi Hospital, Taiyuan, Shanxi 030032, China
[5]Central Surgery Department, Shanxi Bethune Hospital, Shanxi Academy of Medical Sciences, Third Hospital of Shanxi Medical University, Tongji Shanxi Hospital, Taiyuan, Shanxi 030032, China

[6]Department of Infectious Diseases, Shanxi Bethune Hospital, Shanxi Academy of Medical Sciences, Third Hospital of Shanxi Medical University, Tongji Shanxi Hospital, Taiyuan, Shanxi 030032, China
[7]Nursing Department, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei 430030, China

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