

The Impact of Nursing Heads Leadership on Research Innovation Behavior of Junior Nurses with Master's Degree: The Mediation of Perceived Barriers and the Moderation of Motivation

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Background: Nursing leadership is recognized as essential to fostering innovation in hospitals, while the precise relationship between them has yet to be established.

Aim: The objective of this study is to examine the association among leadership in nursing research, research motivation, perceived barriers, and innovation behavior of junior nurses who hold a master's degree or above in the hospital.

Methods: A cross-sectional survey was conducted and electronic questionnaires were distributed online. An online data analysis tool SPSSAU was adopted to conduct descriptive analysis, correlation analysis, and structural equation model construction. This study adhered to the STROBE guideline.

Results: A total of 1025 valid questionnaires were collected in this survey. The leadership in nursing research of head nurses affected nurses' innovation behavior via perceived barriers. The indirect effect accounted for 59.75% of the total response variance. Research motivation was identified as a moderator in the mediation model, revealing that leadership in nursing research did not significantly affect innovation behavior when nurses showed high motivation.

Conclusion: Leadership in nursing research of head nurses and research motivation of junior nurses with master's degree are crucial to enhancing nursing innovation behavior in the hospitals.

Keywords: head nurse, research leadership, research barriers, research motivation

Introduction

Nursing innovation plays a crucial role in improving clinical nursing quality and driving reform. Nurses must continually seek out innovative solutions and adapt to new advancements to maintain high standards of care. Therefore, there is a growing focus on nurses' innovation behavior. Nurse innovation behavior is the process in which nurses seek and develop new methods, technologies, and methods to promote health, prevent diseases, and improve patient care quality, and introduce and apply them to clinical care after obtaining support from others.¹ Individuals play a vital role in the invention process, as they are the generators, holders, and processors of new ideas.² Therefore, they serve as the foundation for all subsequent innovations, especially the nurses who have higher education degree and systemic knowledge and skill of nursing innovation and research. While nursing research is a systematic process that uses scientific inquiry to explain the essence of nursing phenomena, explore the laws of nursing activities, generate new nursing ideas and knowledge, solve problems in nursing practice, nursing education, and nursing management, provide reliable and valuable evidence for nursing decision-making, and enhance the importance of the nursing discipline, which

is important to transform clinical nursing and ensure high-quality care.³ Therefore, nursing innovation is a compulsory part for carrying out nursing research.

Nurses play a crucial role in providing primary healthcare, accounting for up to 80% of healthcare professionals. Their innovative approach and skills not only enhance the quality of nursing services but also boost overall medical efficiency.⁴ Nurses who hold a master's degree have undergone systematic training in innovation thinking, scientific research knowledge and skills. As a result, they are more likely to validate new concepts through rigorous research design and implementation, generating research and innovation that benefit patients and promote the continuous development of the nursing field. With the growing availability of advanced education opportunities for nursing professionals worldwide, we are seeing an increasing number of nurses with master's degrees entering the workforce in hospitals, driving nursing research and innovation activities.^{5,6} According to the 2023 China Health Statistics Yearbook, the number of nurses with a master's degree among registered nurses in China increased from 0.2% in 2020 to 0.3% in 2022, indicating that 15,058 registered nurses have a master's degree or above till 2022.⁷ However, the activity level of clinical nursing research and innovation behavior is still not optimistic as expected⁸ because of various barriers. In a word, nurses with master's degree should have relied on their good research thinking and skills to carry out research and innovation in clinical practice to promote the improvement and transformation of clinical nursing quality. However, various obstacles have prevented them from doing this, making them the focus of this study.

The barriers of nursing research and innovation behavior have been explored by many researchers at the individual, organizational, and environmental levels, such as lack of nursing research and innovation culture,⁹ poor knowledge, skill and experience,^{10,11} insufficient time and resources,^{12,13} high work pressure and low satisfaction,¹⁴ low cooperation,¹⁵ and negative attitude.¹⁶ The transition of work and learning roles from school to hospital has made it challenging for junior nurses with master's degrees to balance the relationship between clinical care and nursing research,¹⁷ resulting in more barriers and blocking the implementation of nursing research and innovation activities, which is important for their future career direction. The theoretical domains framework of James¹⁸ is a comprehensive theory to explore the barriers of behavior change and was developed to be a scale (TDF questionnaire) by Huijg¹ to measure the degree of barriers in 14 domains. Considering that barriers to nursing research and innovation have been identified from various perspectives in previous studies, the TDF questionnaire would be employed to assess these barriers in the present study.

Leadership of head nurses has been identified to be a key factor for facilitating research and innovation in nursing practice,^{19–21} because that the leaders could create a good climate as well as offer resources for nursing innovation.^{22,23} Previous studies have used the same measurements to evaluate research and innovation leadership in nursing as they use for clinical nursing leadership, without considering the unique aspects of nursing research and innovation. Additionally, it was not well understood how leadership influences nurses' attitudes and actions towards research and innovation. It is important to recognize that there is a significant dissimilarity between leadership in nursing research and conventional leadership in clinical practice. Leadership in nursing research necessitates the ability to facilitate and encourage scientific research in an all-inclusive manner with the goal of maximizing the quality and impact of the research.²⁴ which required the nursing leaders have different abilities compared with daily affairs management in the ward, such as inspiring of scientific thinking and obtaining external resource related to nursing research. In this study, a scale specially designed for nursing research and innovation developed by our team²⁵ would be used to measure the leadership and help to explore its relationship with nurses research and innovation behavior.

Motivation is the psychological inclination or internal drive that stimulates and maintains the actions of individuals, and directs them towards a certain goal.²⁶ Research motivation refers to an internal driving force for researchers to conduct research activities and plays an important role in the research process,²⁷ which affects their attitude, initiative, creativity and behavior during the procedure²⁸ and determines the direction, intensity, and persistence of behavior.^{29,30} Previous study had identified the correlation between motivation and research behavior and creativity of undergraduate students.^{31,32} Thus, the research motivation would be further analyzed as a moderator in the relationship of leadership in nursing research, barriers and innovation behavior.

Theoretical Framework

The Leader-Member Exchange theory (LMX)³³ and Job Demands - Resource Theory (JD-R)³⁴ were used to support the hypothesis of this study. According to LMX, the relationships between leaders and their staff were divided into two types

according to the quality: low or high. Leaders tend to give more resources to employees in a high-quality relationship and enable them to improve work performance, and obtain achievements based on this relationship, while the members in low-quality relationship with leaders were more likely to get not enough resources to promote their work. JD-R revealed that job characteristics can be divided into requirements and resources, which could affect employees in two ways: “loss” and “gain”. The “loss” can be triggered when work demands are too high or resources are insufficient, leading to negative organizational outcomes (such as low work performance). However, abundant job resources can stimulate motivation gains for employees, resulting in positive work impacts (eg high organizational commitment). According to LMX and JD-R, the head nurse could provide resources to nurses who are in high-quality relationships so that to reduce their perceived barriers and engage more in nursing research and innovation activities.

Hypothesis 1 Leadership in nursing research of the head nurse is associated with the innovation behavior of junior nurses with master’s degree in their department.

Hypothesis 2 Perceived barrier is a mediator between leadership in nursing research and the innovation behavior.

Hypothesis 3 Motivation is a moderator in the relationship between leadership in nursing research and the innovation behavior of junior nurses with master’s degree.

The logic framework diagram was shown in Figure 1.

Method

Study Design and Samples

This was a nationwide cross-sectional study, and electronic questionnaires were collected from 59 hospitals in 22 provinces in China. The sampling process was conducted as follows: (1) four or five representative provinces were selected from the eastern, western, southern, northern, and central regions of the Chinese Mainland, (2) two or three Class A tertiary hospitals were selected in each province because of the high number of highly educated clinical nurses, and (3) electronic questionnaires were distributed after consultation with the nursing department of the hospital. The inclusion criteria were: (1) registered nurses with a master’s degree or studying for a master’s degree, (2) associated with fixed clinical departments, and (3) had no management position, (4) working experience in their hospital is equal to or less than 3 years. The exclusion criteria were: (1) working in the management department (such as the nursing department). The study was reported based on the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.³⁵ According to Kendall’s sample size estimation method,³⁶ it is best to have

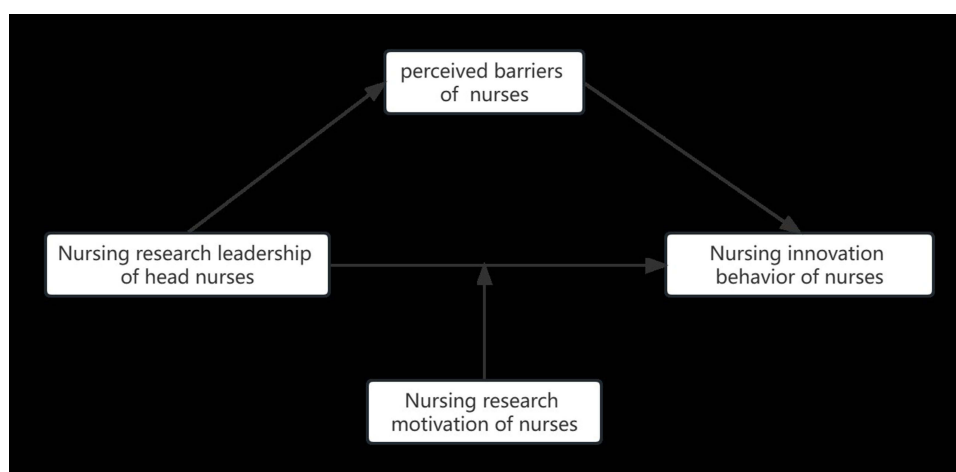


Figure 1 The logic framework diagram of this study.

a sample size of more than 15 times the number of variables. There were 20 variables included in this study. Thus, the smallest sample size was 334 considering 10% invalid sample rate.

Measurement

General Information Scale

A general information scale was developed according to the research objective, including information of head nurses and clinical nurses, such as sex, age, length of employment, technical title, and more. The detailed information is listed in Table 1.

Nursing Research Leadership Scale (NRLS)

The NRLS was developed by Guo in 2022,²⁵ which included 15 items in five dimensions (foresight, influence, inspiring, decisiveness, and control) to assess the leadership of head nurses as perceived by clinical nurses. The rating was a five-

Table 1 The General Information of Subjects (n=1025)

Index	Frequency(percentage)/ Median (Quartile)	NIBS(M±SD)	F/t/r	P
Daily working				
Full-time clinical nurse	572	39.92±6.34	3.486	0.031
Part-time research nurse	394	40.91±7.09		
Full-time research nurse	39	42.00±8.19		
Nurse education				
Part-time master's degree in study	78	37.75±5.42	6.322	<0.001
Graduated from part-time master's degree	66	41.15±6.55		
Full-time master's degree	881	40.58±6.79		
Nurse sex				
Male	153	39.86±8.74	-0.770	0.442
Female	872	40.43±6.29		
Marital status				
Unmarried	808	40.06±6.91	24.565	<0.001
Married	208	41.14±5.23		
Widowed	9	55.00±0.00		
Employment form				
Temporary employment	36	43.25±8.74	7.313	<0.001
Contract labor	333	39.97±5.53		
Personnel Agency	290	39.97±5.53		
Hospital staffing	285	41.64±8.20		
School staffing	63	37.71±6.68		
Others	18	36.00±3.09		
Income (¥)				
≤5000	141	42.09±6.59	11.708	<0.001
5001~10,000	514	40.76±6.81		
10,001~15,000	328	39.00±6.56		
15,001~20,000	33	44.00±3.35		
>20,000	9	33.00±0.00		
Head nurse sex				
Male	45	42.60±6.15	40.31±6.74	
Female	980	40.31±6.74		
Head nurse title				
Middle	393	40.82±7.03	2.853	0.058
Sub-senior	503	39.91±6.53		
Senior	129	41.14±6.44		

(Continued)

Table 1 (Continued).

Index	Frequency(percentage)/ Median (Quartile)	NIBS(M±SD)	F/t/r	P
Head nurse education				
Undergraduate or below	42	42.00±1.75	36.898	<0.001
Part-time master's degree in study	448	39.39±6.13		
Graduated from part-time master's degree	303	38.93±6.10		
Full-time master's degree	214	43.29±7.57		
Doctor's degree	18	53.00±2.06		
Years since graduation	1.77±1.02		0.071	0.022
Nurse employed experience	1.94±0.89		-0.103	0.001
Nurse age	27.32±1.99		0.061	0.050
Proportion of scientific research shifts	16(1,30)		0.117	<0.001
Head nurse age	45.11±2.35		-0.032	0.306
Number of night shifts in last year	30 (10,70)		0.193	<0.001
Head nurse employed experience	16.97±7.64		-0.276	<0.001

point (0~4) Likert scale ("Fully disagree" to "Fully agree"), and higher scores indicate stronger leadership in nursing research. The Cronbach's α was 0.897 in this study.

Nursing Research and Innovation Barriers Scale (NRIBS)

This scale was formed by combining the Theoretical Domains Framework Questionnaire developed by Huijg³⁷ with the purpose of this study, which contained 32 items in 11 domains. It is a generic questionnaire that assesses behavioral determinants with different targets, actions, contexts, and times of interest. In this research, the original questionnaire was translated, retranslated, and proofread after obtaining permission from the author. Then, the items were refined to pertain to nursing research and innovation behavior. A cognitive interview was conducted with ten nursing leaders and clinical nurses with master's degree to revise the items. To evaluate the content validity, 10 experts in the field of nursing management were consulted about the draft. After group discussion, some items were modified to form a final translation. The items scored 1 to 5 points (highly disagree, slightly disagree, neutral, slightly agree, highly agree). The average score of items in each domain was regarded as the domain score and lower scores indicated more barriers in nursing research and innovation behavior. The Cronbach's α was 0.871, and the content validity index (S-CVI) was 0.856.

Nursing Innovation Behavior Scale (NIBS)

The NIBS was developed by Bo Ling¹ in 2012, including 10 items in 3 dimensions (idea generation, support obtaining and idea achievement). The Likert 5 scaling was adopted (1~5 means never ~ always) and higher scores indicated more active nursing innovation behavior. The Cronbach's α was 0.836 in this research.

Research Motivation Scale (RMS)

The Chinese version of RMS was formed by Ji Lili³⁸ in 2012, which contained 19 items in 3 dimensions (Internal motivation, Avoiding failure motivation and external motivation). The Likert 5 scored method was adopted and higher scores indicated stronger nursing research motivation. The average score of each dimension was regarded as the dimension score. The Cronbach's α was 0.857 in this research.

Ethical Considerations and Data Collection

This study was approved by the Ethics Committee the First Affiliated Hospital of Zhengzhou University. All of the questionnaires were anonymous, and data was only available to research team members. The questionnaires were collected online from 1 February 2023 to 16 March 2023. To facilitate easier access to the participants, we initially sought informed consent from the nursing departments of each hospital. Subsequently, an electronic questionnaire was

distributed within a WeChat group consisting of nurses with master's degree affiliated with their respective hospitals. To ensure that respondents met the inclusion and exclusion criteria, we incorporated questions regarding these criteria at the beginning of the electronic questionnaire. Those who did not meet these criteria were directed to the end interface, while those who met them proceeded to the formal investigation interface and underwent an informed consent process. During this process, nurses were provided with information about the research and given the opportunity to withdraw if they chose not to participate. The completion of the questionnaire indicated voluntary participation in this study.

Data Quality Inspection

The questionnaires were initially screened through the system settings of the electronic questionnaire collection platform. A questionnaire would be regarded as invalid if the selection consistency rate of all scale items was greater than 90% or if the time to complete the questionnaire was less than 5 minutes. The researchers then reviewed the questionnaire at a time. Illogical questionnaires would also be considered invalid. Finally, 21 questionnaires were regarded as invalid, and the efficiency was 98.0%.

In this study, the questionnaires were all collected online at the same time, which might lead to common method bias.³⁹ Thus, we conducted the Harman single-factor test for all the item scores to assess the common method bias for the sample data. Tang reported the criteria of non-common method bias as follows: (1) more than one factor with characteristic root >1 , and (2) the variance interpretation of the largest factor $<40\%$ or 50% .⁴⁰ The results of this study revealed six factors with characteristic root >1 , and the maximum variance interpretation rate was 27.353%, indicating that the common method bias of the data was acceptable.

Statistical Analysis

SPSSAU (spssau.com) was used to conduct data analysis in this study. The general information of subjects was described as mean $\pm$ standard (M $\pm$ SD), frequency, and percentage. The data was all standardized before analysis. The NIBS difference between groups was analyzed using one-way ANOVA and *T*-test. The Pearson and Spearman correlation analysis was used to analyze the correlations among variables. The bootstrap method was used to analyze the mediation and moderation effect. Model 5, developed by Hayes (<http://www.afhayes.com>) in moderated mediation analysis, was used to analyze the mediating effect of NRIBS and the moderating effect of RMS. The general information with significant differences between groups were set as the control index. The bootstrap method was used to test the mediating effect and the indirect effect with a 95% confidence interval. In the moderating analysis, the high and low levels of the moderating variable were set as "Mean - SD" and "Mean + SD", respectively. The sampling bootstrap was 5000 and the statistical significance level was set at $\alpha = 0.05$, and the mediation effect was acceptable when the *t* value was >1.9 .

Results

Demography and Work-Related Characteristics of Head Nurses and Clinical Nurses

A total of 1046 nurses participated in this survey, but 21 invalid questionnaires were deleted. The effective rate of the questionnaire was 98.0%. Of all the participants, 39 (3.8%) nurses worked in full-time research positions, and 394 (38.4%) nurses had part-time research positions. Further analysis results showed that the proportions of part-time research nurses were 38.69%, 46.88% and 0 in Third-tier, Second-tier and First-tier hospital, respectively, and the proportion of full-time research nurses was 2.99% in Third-tier hospital. There were no full-time research nurses in the Second-tier and First-tier hospital.

The detailed characteristics of the clinical nurses and head nurses are displayed in [Table 1](#).

Correlation Analysis

The scores of Nursing Research Leadership Scale, Nursing Research and Innovation Barriers Scale, Nursing Innovation Behavior Scale, and Research Motivation Scale of nurses in this study were 41.30 ± 12.43 , 120.64 ± 14.94 , 40.42 ± 6.73 and 45.97 ± 11.57 , respectively. The results of correlation analysis demonstrated that the nursing innovation behavior of clinical nurses with Master's degree was positively associated with research motivation ($r=0.214$, $P<0.001$) themselves,

the leadership in nursing research of head nurses ($r=0.441$, $P<0.001$), but negatively with nursing research and innovation barriers scores ($r=-0.671$, $P<0.001$), indicating that more active nursing innovation was associated to stronger leadership in nursing research, higher motivation and lower barriers. The scores of NIBS, HNRLS, RMS, NRIBS, and other correlations among variables are displayed in Table 2.

Testing the Mediation Model

After adjusting the demographic variables, the total effect ($\beta=2.325$, 95% CI [1.924~2.726]) and the direct effect ($\beta=0.938$, 95% CI [0.598~1.278]) of head nurse leadership in nursing research on the nursing innovation behavior of nurses were significant, which meant that the higher head nurse leadership in nursing research could improve nursing innovation behavior of nurses with master's degree directly. The indirect effect of head nurse leadership in nursing research on the nursing innovation was also significant ($\beta=0.173 \times 8.030=1.389$, bootstrap 95% CI [0.967~1.744]), accounting for 59.75% ($1.389/2.325=59.75\%$) of the total effect, which meant that the higher leadership in nursing research of head nurses could promote the nursing innovation behavior of nurses with master's degree through reducing their perceived barriers. The detailed results are displayed in Table 3.

Testing the Moderated Mediation Model

After research motivation was added as a moderating variable into the structure model, the interaction effects of research motivation and head nurse leadership in nursing research ($\beta=0.070$, $p<0.001$) was significant (Table 4). The results of simple slope analysis indicated that the 95% CI of the direct effect included 0 when the motivation was high, but excluded 0 at the mean and low levels, indicating that research motivation could moderate the direct effect of head nurse

Table 2 Descriptive Statistics and Correlations Among the Key Variables (n=1025)

	Mean (SD)	NIBS	HNRLS	RMS	NRIBS
NIBS	40.42±6.73	I			
HNRLS	41.30±12.43	0.441**	I		
RMS	45.97±11.57	0.214**	0.270**	I	
NRIBS	120.64±14.94	0.671**	0.347**	0.246**	I

Note: ** $P<0.001$.

Table 3 The Mediating Effect of NRIBS (n=1025)

		Y	X	R ²	β	SE	t	p	95% CI
Model 1	c	NIBS	HNRLS	0.360	2.325	0.205	11.351	<0.001	1.924~2.726
Model 2	a	NRIBS	HNRLS	0.251	0.173	0.015	11.219	<0.001	0.143~0.203
Model 3	c'	NIBS	HNRLS	0.593	0.938	0.173	5.413	<0.001	0.598~1.278
	b		NRIBS		8.030	0.335	23.997	<0.001	7.374~8.686

Table 4 The Mediating Effect of NRIBS and the Moderating Effect of RMS (n=1025)

	X	Y	β	SE	t	p	R ²	F	P
Model1	HNRLS	NIBS	4.120	0.629	6.552	<0.001	0.607	73.656	<0.001
	RMS		0.065	0.014	4.557	<0.001			
	HNRLS*RMS		0.070	0.014	5.152	<0.001			
	NRIBS		8.515	0.340	25.054	<0.001			
Model2	HNRLS	NRIBS	0.173	0.015	11.219	<0.001	0.251	18.703	<0.001

Table 5 Results of Conditional Direct Effect (n=1025)

Level	Mean in this Level	Effect	SE	t	p	LLCI	ULCI
Mean-1SD	34.404	1.698	0.219	7.766	<0.001	1.270	2.127
Mean	45.974	0.884	0.174	5.087	<0.001	0.543	1.225
Mean+1SD	57.544	0.070	0.250	0.279	0.780	-0.420	0.560

Abbreviations: LLCI, Low limit of 95% confidence interval; ULCI, Up limit of 95% confidence interval.

leadership in nursing research on the nursing innovation behavior, that is, the leadership in nursing research of head nurses was not associated with the innovation behavior when the research motivation of master's degree nurses was low. (Table 5).

Discussion

Despite the emphasis on the role of nursing leadership to enhance nursing research and innovation activity and performance,^{21,41} few researchers have conducted a quantitative analysis of the effects of leadership in nursing research due to the lack of specific tools. This study is believed to be an important study that links leadership in nursing research of head nurses, perceived barriers, motivation, and innovation behavior of junior nurses with master's degree. Our team devised a tool to evaluate leadership in nursing research and its influence on nurses' innovation behavior. This study thus lays the groundwork for prospective research on leadership in nursing research.

Hypothesis 1 was supported by our findings in this study, indicating that the head nurse's leadership in nursing research had a positive effect on the innovation behavior of junior nurses holding a master's degree, which is in accordance with an earlier report.¹⁹ The transition of junior nurses with master's degrees from schools to hospitals implies a shift in their research and innovation activities from being full-time and guided by mentors to part-time and independent ones, which poses challenges for nursing research and innovation efforts. However, a head nurse with strong leadership in nursing research can play a crucial role in promoting innovation behavior among nurses by allocating appropriate resources and offering guidance through the exercise of their authority. Importantly, the support and emphasis that head nurses place on nursing research and innovation can foster a positive attitude towards such activities among nurses, who tend to follow their leaders' expectations.⁴² Therefore, the role of leadership in nursing research of head nurses is critical in enabling junior nurses with master's degrees to make significant contributions to research and innovation efforts in nursing.

Based on the findings, it can be inferred that the perceived research barriers among junior nurses with master's degrees played a mediating role between the leadership in nursing research of their head nurses and the innovation behavior of these nurses, which was accordance with the perspective of previous researches.^{22,23} This can be explained by the Leader-Member Exchange (LMX) theory and the Job Demands-Resources (JD-R) theory, wherein the head nurse could set high expectations for some of the nurse and establishes a high-quality leader-member relationship with them, providing them with more resources, trust, and autonomy to overcome perceived barriers. As a result, the head nurse's leadership behavior can serve as a catalyst for promoting nursing innovation among junior nurses with master's degrees in the high-quality relationship. Meanwhile, the junior nurses with master's degree may need specific support that is tailored towards nursing research and innovation, including training, position, and opportunities.⁴³ Thus, head nurses provide resources (such as time, funds, sample source, technical guidance expert) and psychological support (such as trust, appreciation, encouragement) to them to meet their needs and overcome barriers that may hinder nursing research and innovation through leadership implementation. According to JD-R, job performance would be reduced when employees have insufficient resources to support them in meeting job requirements.³⁴ In such cases, nurses may not receive the necessary resources and support required to overcome barriers through a low leader-member relationship, resulting in reduced nursing research and innovation. Therefore, head nurses should ensure that sufficient resources are provided when formulating plans and shifts for nursing research and innovation.

According to the results of the moderating analysis, the motivation plays a moderated role between the leadership in nursing research and innovation behavior of junior nurses with master's degree. The leadership in nursing research has no

effect on nurses' innovation behavior when nurses' have high motivation. Motivation refers to the inner drive that compels an individual to pursue a particular activity. Nurses who possess high levels of motivation are more likely to expend greater effort in overcoming obstacles in nursing research and innovative activities, even in the absence of leadership support, which promotes the smooth implementation of innovative activities and reduces their perceived barriers. A previous study⁴⁴ confirmed this result, which identified that a nurse with higher motivation would engage them more in their working. Conversely, when nurses have low motivation, they lack the inner drive needed to overcome barriers encountered in innovation procedure, where leadership can come into play by providing the necessary resources to cope with these barriers. This suggests that head nurses should first identify the research and innovation motivations of nurses, in cases where nurses lack motivation, the barriers they face should be promptly identified, and leadership should be implemented to help them overcome these barriers, thereby promoting a smooth implementation of innovation activities.

This study inspired us to deeply thinking about the clinical research and innovation management of head nurses. As the direct leader of nurses with master's degree, the head nurse should not only focus on improving clinical knowledge and skills but also guiding and supporting in the academic gap period when these nurses entered hospitals from universities, because it was difficult for nurses to get guidance from mentor as in school period and the head nurse became the first mentor of their nursing career. Thus, the head nurses largely determined the future career direction of nurses with master's degree, whether to become a clinical practice nurse as whom had not been trained for nursing research or a research nurse to utilize research and innovation competence. It was obvious that the latter was consistent with the original intention of hospitals to introduce nurses with master's degrees for promoting disciplinary development through nursing research innovation. Therefore, we suggest that hospital leaders should pay more attention to improving the leadership in nursing research of head nurses while introducing master's degree nurses, so that they can lead master's degree nurses to actively carry out nursing research and innovation activities, thereby promoting the improvement and transformation of nursing quality. For example, a series of training on "How to become a head nurse with strong leadership in nursing research" is necessary. On the other hand, the head nurse should also take some measures to promote the development of research and innovation activities for master's degree nurses, such as establishing an appropriate incentive system to enhance the motivation of nurses for nursing research and innovation, considering the manpower and positions required for nursing research when reporting employment plans each year to ensure that the busy clinical care in the department does not take up manpower and time for nursing research and innovation. Finally, a smooth communication channel between the head nurse and the master's degree nurse is necessary to ensure the perfect combination of the head nurse's rich clinical nursing and management experience with the research thinking and skills of the master's degree nurse, promoting efficient and practical nursing research innovation results.

Limitations

There were some limitations in this study, such that the causal relationship between various variables could not be determined because of the cross-sectional study design. Hence, experimental and longitudinal research could be used to further explore the causal relationships of the different variables in future studies.

Conclusions

This was an important study that explored the relationship between leadership in nursing research of head nurse, barriers, motivation, and innovation behavior of junior nurses with master's degree in the hospital. Our findings suggested that hospital leaders should improve head nurses' leadership in nursing research to provide the necessary support and resources for nurses to carry out their research and innovation activities. And it is also necessary to promptly identify the barriers and motivations of nurses in research and innovation activities. Researchers could develop a series of training courses aimed at improving leadership in nursing research in the future, so as to enhance the leadership in nursing research of head nurses.

Data Sharing Statement

Data can be obtained from corresponding author for acceptable reasons.

Ethics Approval and Consent to Participate

This study has the approval of the Ethics Review Committee of life sciences in the First Affiliated Hospital of Zhengzhou University (2020-KS-HNSR071) and informed consent was obtained from all the included nurses. And all methods in research were carried out in accordance with the Declaration of Helsinki.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declared no conflict of interest.

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