

Current status and influencing factors of innovative behavior among Master of Nursing students

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Research Article

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Abstract

Background

Innovative behavior is an important indicator of research competence among nursing postgraduates. However, the current level of innovative behavior among Master of Nursing students and its associated factors remain insufficiently understood. In particular, the relationship between impostor phenomenon and innovative behavior may be more complex than a simple linear association. This study aimed to investigate the current status of innovative behavior among Master of Nursing students in Jiangxi Province and to identify its core influencing factors, with a particular focus on the association between impostor phenomenon and innovative behavior.

Methods

A cross-sectional survey was conducted between January and February 2026. Using convenience sampling, 159 Master of Nursing students from a university in Jiangxi Province, China, were recruited. Data were collected using a general information questionnaire, the Innovative Behavior Scale, and the Impostor Phenomenon Scale. Univariate analysis, Spearman's correlation analysis, and multiple linear stepwise regression were performed to explore factors associated with innovative behavior.

Results

The total score for innovative behavior was 34.05 (30.00, 39.00), indicating a moderately high level. The total score for impostor phenomenon was 25.42 (23.00, 28.00), indicating a moderate level. Correlation analysis showed no significant linear association between innovative behavior and impostor phenomenon ($r = 0.065$, $P > 0.05$). However, multiple linear stepwise regression showed that supervisor guidance style, average weekly time spent on self-directed learning, daily learning efficiency, and impostor phenomenon were independent factors associated with innovative behavior among Master of Nursing students (all $P < 0.05$), explaining 20.5% of the variance. Professional identity in nursing also entered the regression model and showed a positive trend, although it did not reach the conventional level of statistical significance.

Conclusions

Introduction

Innovation competence is a core attribute of advanced nursing professionals and an important driving force for the development of the nursing discipline and the improvement of nursing care quality [1, 2]. Innovative behavior, as the practical expression of innovation competence, involves the entire process of

idea generation, resource acquisition, and implementation [1, 2]. As an important reserve force for the innovative development of nursing, Master of Nursing students undertake high-level research training and academic development tasks. Therefore, their level of innovative behavior is related not only to individual training quality, but also to the development of a sustainable pool of innovative talent in nursing [3, 4].

Innovative behavior is jointly influenced by multiple factors, including the educational environment, individual cognition, and psychological status. Previous studies have shown that factors such as learning support environment, creative self-efficacy, and achievement motivation are closely associated with innovative behavior among nursing students [1]. Meanwhile, professional identity, as an important psychological resource influencing learning engagement, career development motivation, and professional commitment, may also affect individuals' initiative and persistence in innovative activities [5]. Because innovative behavior involves not only the generation of new ideas, but also the expression of viewpoints, the acquisition of resources, and the promotion of practical implementation, its occurrence and manifestation are often accompanied by uncertainty and pressure from external evaluation [1, 2].

Impostor phenomenon refers to a cognitive experience in which individuals continue to doubt their own abilities despite objective achievements, tend to attribute their success to external factors, and fear being "exposed" as incompetent [6, 7]. This phenomenon is relatively common in higher education and high-achieving populations, and has been shown to be closely associated with negative psychological outcomes among healthcare professionals, such as burnout and role-related stress [8–10]. However, existing studies have mainly focused on the negative psychological consequences of impostor phenomenon, and direct empirical evidence remains limited regarding its manifestations among Master of Nursing students and its relationship with innovative behavior [4]. Given that innovative behavior is characterized by uncertainty, exposure to evaluation, and practical implementation, the effect of impostor phenomenon on innovative behavior may not follow a simple unidirectional linear pattern and therefore warrants further investigation.

Against this background, the present study targeted Master of Nursing students at a university in Jiangxi Province, China, to investigate the current status of innovative behavior and impostor phenomenon, identify factors associated with innovative behavior, and examine the relationship between impostor phenomenon and innovative behavior. The findings may provide a reference for the development of educational strategies to enhance innovation competence and psychological support strategies for Master of Nursing students.

Participants and methods

Participants

A cross-sectional survey was conducted between January and February 2026. Using convenience sampling, nursing postgraduate students from a university in Jiangxi Province, China, were recruited as study participants. The inclusion criteria were as follows: being a Master of Nursing student and

providing informed consent for voluntary participation. Students who were unable to complete the questionnaire because of leave or other special circumstances were excluded.

According to the sample size requirement for multiple regression analysis, the sample size should be 5–10 times the number of independent variables. After accounting for a possible 20% rate of invalid questionnaires, the estimated sample size ranged from 63 to 125. In the present study, 159 participants were finally enrolled.

This study was approved by the Biomedical Research Ethics Committee of the Second Affiliated Hospital of Nanchang University (approval no. O-Yi Yan Lun Shen [2026] No. 003).

1.2 Data collection tools

1.2.1 General information questionnaire

The general information questionnaire was developed by the researchers based on a review of the relevant literature. It collected data on gender, marital status, year of the master's program, degree type, program duration, full-time work experience before admission, research experience, weekly time spent on self-directed learning, daily learning efficiency, professional identity in nursing, the degree of supervisor guidance, the level of communication within the team, and graduation requirements for the master's program.

1.2.2 Nurses' Innovative Behavior Scale

The Nurses' Innovative Behavior Scale was developed by Bao Ling et al. [11] in 2012 through a literature review and semi-structured interviews, with consideration of the professional characteristics of nursing, to assess innovative behavior among nurses. The scale consists of three dimensions: idea generation (3 items), obtaining support (4 items), and idea implementation (3 items), with a total of 10 items. Each item is rated on a 5-point Likert scale ranging from "never" to "frequently" with scores from 1 to 5. The total score ranges from 10 to 50, with higher scores indicating more prominent innovative behavior among nurses. Permission to use this scale was obtained from the original author. In the present study, the Cronbach's α coefficient of the scale was 0.929.

1.2.3 Chinese version of the Clance Impostor Phenomenon Scale (CIPS)

The Clance Impostor Phenomenon Scale (CIPS) was originally developed by Clance et al. [12] and was translated into Chinese by Peng Ying et al. [6] in 2023. The Chinese version consists of 8 items across two dimensions: self-denial (3 items) and self-doubt (5 items). Each item is rated on a 5-point Likert scale (1 = very untrue, 2 = rarely, 3 = sometimes, 4 = often, and 5 = very true). There are no reverse-scored items. Higher scores indicate a more severe level of impostor phenomenon. In the present study, the Cronbach's α coefficient of the scale was 0.859.

1.3 Data collection

Data were collected through a questionnaire survey. The QR code for the questionnaire and the survey instructions were distributed to student group chats for each academic year, and eligible Master of Nursing students completed the questionnaire voluntarily. Standardized instructions were used to explain the purpose, significance, content, and completion method of the survey. To ensure data quality, only one submission was permitted for each IP address, and all items were mandatory.

After data collection, the questionnaires were checked and cleaned by the researchers. Questionnaires with excessively long or short completion times, patterned responses, illogical answers, or failure to follow the item instructions were excluded. A total of 160 questionnaires were distributed and returned, among which 159 were valid, resulting in an effective response rate of 99.37%.

1.4 Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics version 27.0. Normally distributed continuous variables were described as mean $\pm$ standard deviation, whereas non-normally distributed continuous variables were described as median and interquartile range [M(P_{25} , P_{75})]. Categorical variables were described using frequencies and percentages. The association between innovative behavior and impostor phenomenon among Master of Nursing students was examined using Spearman's correlation analysis. Multiple linear stepwise regression analysis was performed to identify factors associated with innovative behavior. A two-sided P value of < 0.05 was considered statistically significant.

Results

2.1 Scores of innovative behavior and impostor phenomenon among Master of Nursing students

The total innovative behavior score among Master of Nursing students was 34.05 (30.00, 39.00), with an item mean score of 3.41 (3.00, 3.90). Among the three dimensions, idea generation had the highest item mean score, followed by obtaining support and idea implementation. The total impostor phenomenon score was 25.42 (23.00, 28.00), with an item mean score of 3.18 (2.88, 3.50). For its two dimensions, the item mean score for self-denial was higher than that for self-doubt. The results are presented in Table 1.

Table 1
Scores of innovative behavior and impostor phenomenon among Master of Nursing students (n = 159)

Variable	Total score, M(P_{25} , P_{75})	Item mean score, M(P_{25} , P_{75})
Total innovative behavior score	34.05(30.00, 39.00)	3.41(3.00, 3.90)
Idea generation	10.83(9.00, 12.00)	3.61(3.00, 4.00)
Obtaining support	13.37(12.00, 15.00)	3.34(3.00, 3.75)
Idea implementation	9.85(8.00, 12.00)	3.28(2.67, 4.00)
Total impostor phenomenon score	25.42(23.00, 28.00)	3.18(2.88, 3.50)
Self-denial	10.27(9.00, 12.00)	3.42(3.00, 4.00)
Self-doubt	15.14(13.00, 17.00)	3.03(2.60, 3.40)

2.2 Univariate analysis of total innovative behavior scores among Master of Nursing students with different characteristics

As shown in Table 2, univariate analysis showed statistically significant differences in innovative behavior scores according to average weekly time spent on self-directed learning, daily learning efficiency, professional identity in nursing, the degree of supervisor guidance, and the level of communication within the team (all $P < 0.05$). Higher innovative behavior scores were generally observed among students with longer self-directed learning time, higher daily learning efficiency, stronger professional identity in nursing, more frequent supervisor guidance, and more frequent communication within the team.

Table 2

Univariate analysis of total innovative behavior scores among Master of Nursing students with different characteristics

Variable	n	Innovative behavior score, M(P ₂₅ , P ₇₅)	Z/Hc	P
Average weekly time spent on self-directed learning			19.063	0.000265
< 7h	61	30.00(27.50, 35.50)		
7h<-<14h	54	35.00(30.00, 40.00)		
14h<-<21h	27	36.00(31.00, 39.00)		
> 21h	17	35.00(31.00, 39.50)		
Daily learning efficiency			12.428	0.002
Low	35	31.00(30.00, 34.00)		
Moderate	113	35.00(30.00, 39.00)		
High	11	39.00(37.00, 39.00)		
Professional identity in nursing			15.955	0.000343
Low	41	32.00(29.50, 35.00)		
Moderate	97	34.00(30.00, 38.50)		
High	21	39.00(34.00,44.00)		
The degree of supervisor guidance			17.118	0.000192
Rarely	36	32.00(27.75, 35.00)		
Moderate	80	32.00(30.00, 37.00)		
Frequently	43	38.00(33.00, 40.00)		
Level of communication within the team			10.849	0.004
Rarely	37	32.00(28.50, 35.50)		
Moderate	89	33.00(30.00, 38.00)		
Frequently	33	37.00(34.00, 39.00)		

2.3 Correlations between innovative behavior and impostor phenomenon among Master of Nursing students

As presented in Table 3, spearman's correlation analysis showed no significant associations between innovative behavior and impostor phenomenon among Master of Nursing students. In addition, no

statistically significant correlations were observed between the three dimensions of innovative behavior and the dimensions or total score of impostor phenomenon (all $P > 0.05$).

Table 3

Correlation analysis between innovative behavior and the dimensions of impostor phenomenon among Master of Nursing students (r values)

Variable	Self-denial	Self-doubt	Total impostor phenomenon score
Idea generation	0.086	-0.023	0.016
Obtaining support	0.136	0.1	0.118
Idea implementation	-0.007	0.01	0
Total innovative behavior score	0.085	0.05	0.065
Note: None of the correlation coefficients reached statistical significance (all $P > 0.05$).			

2.4 Multiple linear regression analysis of factors associated with innovative behavior among Master of Nursing students

The total innovative behavior score was entered as the dependent variable. Based on the univariate analysis, the five variables that showed statistical significance were included as independent variables. In addition, the total impostor phenomenon score was entered as an independent variable based on professional considerations. Multiple linear regression analysis was then performed using a stepwise method (entry criterion $\alpha = 0.05$; removal criterion $\alpha = 0.10$). The coding of variables was as follows: average weekly time spent on self-directed learning (< 7 h = 1, 7 to < 14 h = 2, 14 to < 21 h = 3, and > 21 h = 4); daily learning efficiency (low = 1, moderate = 2, and high = 3); professional identity in nursing (low = 1, moderate = 2, and high = 3); the degree of supervisor guidance (rarely = 1, moderate = 2, and frequently = 3); and total impostor phenomenon score (entered as the original value).

Stepwise multiple linear regression analysis showed that average weekly time spent on self-directed learning, daily learning efficiency, the degree of supervisor guidance, and total impostor phenomenon score were significantly associated with innovative behavior among Master of Nursing students (all $P < 0.05$). Professional identity in nursing was also retained in the regression model and showed a positive trend, although it did not reach the conventional level of statistical significance ($P = 0.069$). The final model explained 20.5% of the variance in innovative behavior. The results are presented in Table 4.

Table 4

Multiple linear regression analysis of factors associated with innovative behavior among Master of Nursing students (n = 159)

Variable	<i>B</i>	<i>SE</i>	β'	<i>t</i>	<i>P</i>
Constant	15.355	3.201		4.797	0
Professional identity in nursing	1.468	0.801	0.147	1.834	0.069
Average weekly time spent on self-directed learning	1.097	0.458	0.178	2.393	0.018
The degree of supervisor guidance	1.92	0.688	0.221	2.792	0.006
Daily learning efficiency	2.103	0.915	0.178	2.299	0.023
Total impostor phenomenon score	0.234	0.085	0.2	2.736	0.007
Note: $R^2 = 0.230$, adjusted $R^2 = 0.205$, $F = 9.147$, $P < 0.001$.					

Discussion

3.1 Innovative behavior among Master of Nursing students was at a moderate level, with uneven performance across dimensions

The present study showed that the innovative behavior score of Master of Nursing students was 34.05 (30.00, 39.00), which was above the midpoint of 25, indicating a moderately high level. This finding is similar to those reported by Wang Lü et al. [13] and Zhu Jiayi et al. [14], and is also consistent with the overall trend observed in studies on innovative behavior among nursing students [1]. This may be related to the higher academic training demands at the postgraduate level, as well as to students' stronger expectations for academic development and innovation training. However, the innovative potential of Master of Nursing students remains to be further explored.

Across the different dimensions, the score for idea generation was the highest, whereas the scores for obtaining support and idea implementation were relatively lower. This finding is highly consistent with that reported by Yuan Ying et al. [15] among nursing interns, suggesting that nursing students generally possess a certain degree of innovative awareness and problem-identification ability, but often encounter bottlenecks in seeking resource support and translating ideas into practice. This may be related to factors such as the learning support environment, resource accessibility, and innovative self-efficacy, which may cause many innovative ideas to remain at the conceptual stage and hinder their practical implementation.

3.2 Innovative behavior among Master of Nursing students was driven by multiple factors, with both environmental and individual factors playing important roles

3.2.1 The degree of supervisor guidance and academic engagement

The results of the multiple linear regression analysis in the present study showed that the degree of supervisor guidance, time spent on self-directed learning, and learning efficiency were factors associated with innovative behavior among Master of Nursing students ($P < 0.05$). Frequent and effective supervisor guidance may provide not only academic support, but also role modeling that strengthens students' confidence in innovation, helps them refine innovative ideas, and facilitates the identification of pathways for implementation. Average weekly time spent on self-directed learning and daily learning efficiency are also important objective indicators of academic engagement. Innovation does not occur spontaneously; rather, it requires a broad accumulation of knowledge and in-depth reflection, both of which depend on sufficient and efficient self-directed learning. Zhang Huimin et al. [16] reported that academic engagement fully mediated the relationship between the supervisor–student relationship and innovative behavior. This suggests that the positive effect of supervisor guidance on innovative behavior may operate, at least in part, through promoting more active and sustained learning engagement. Students with higher learning efficiency often demonstrate better self-management, information integration, and deep learning abilities, which may enable them to build a stronger knowledge base more rapidly and to apply what they have learned more effectively to identifying new problems and generating novel solutions. Although the level of communication within the team was not retained as an independent predictor in the final model, the univariate analysis suggests that the team support environment still warrants attention.

3.2.2 Professional identity in nursing

Students with a stronger professional identity in nursing may have a greater sense of responsibility and ownership regarding the development of the profession, and may therefore be more willing to promote progress in nursing practice through innovative behavior. In contrast, low professional identity may weaken the internal motivation to engage in innovative exploration. Previous studies have shown that professional identity is positively associated with innovation competence among nursing students, with motivation playing a mediating role in this relationship [5]. In the present study, when the multiple linear regression model for innovative behavior among Master of Nursing students was constructed, the coefficient direction of professional identity in nursing was consistent with previous findings [15, 17]. Although the association did not reach statistical significance ($P = 0.069$), it may still indicate a potential role that should be further examined in studies with larger sample sizes.

3.3 Impostor phenomenon may have a complex association with innovative behavior

The present study showed that the impostor phenomenon score among Master of Nursing students was 25.42 (23.00, 28.00), indicating a moderate level. This suggests that this group generally experiences a certain degree of self-doubt and a tendency to attribute success to external factors. Previous studies and reviews have shown that impostor phenomenon is not uncommon among nursing students and nurses and is associated with negative psychological outcomes such as stress, anxiety, emotional exhaustion, and burnout [10, 18]. However, the findings of the present study suggest that its relationship with innovative behavior may be more complex.

Although the bivariate correlation analysis did not identify a significant association between innovative behavior and impostor phenomenon, impostor phenomenon showed a significant positive association in the multiple regression model after educational environment and learning engagement variables were included. This finding suggests that the association between impostor phenomenon and innovative behavior may not follow a simple univariate linear pattern. Among postgraduate students, who are generally a high-achieving group, a moderate level of impostor phenomenon may not function solely as a barrier. As described by Zhang Yan et al. [19], individuals with this tendency often experience feelings of self-doubt and inadequacy, accompanied by passive self-concealment. One possible explanation is that, in an attempt to compensate for their perceived lack of competence, such individuals may invest more effort in excessive preparation. Objectively, this compensatory behavior may contribute to higher scores on the Innovative Behavior Scale, particularly in the dimensions that require action, such as obtaining support and idea implementation. This finding may also reflect a suppression effect, the emergence of an association after adjustment for confounding variables, or heterogeneous effects of this psychological characteristic at different levels. These possible explanations still require further verification in longitudinal studies.

Conclusions

The findings of the present study showed that innovative behavior among Master of Nursing students was at a moderately high level, although there remains room for further improvement. The main associated factors included the degree of supervisor guidance, indicators related to learning engagement, and impostor phenomenon, while professional identity in nursing showed a positive trend in the regression model. These findings suggest that training institutions may enhance innovative behavior among Master of Nursing students by strengthening supervisor development, promoting autonomy-supportive supervisory approaches, reinforcing professional identity education, optimizing the learning environment and team atmosphere, and providing appropriate psychological support for students with high levels of impostor phenomenon.

This study has several limitations. First, the participants were limited to Master of Nursing students from one university in Nanchang, which may restrict the representativeness of the sample and affect the generalizability of the findings. Second, because this was a cross-sectional study, causal relationships among variables could not be established. Future studies should expand the study setting and sample scope and use longitudinal or qualitative designs to further clarify the dynamic relationship between impostor phenomenon and innovative behavior.

Declarations

Authors'contributions

All authors (WXZ, XF, PY, TH, CYF and WY) participated in the conception and design of the study. WXZ analyzed the data, and wrote the initial draft of the manuscript. XF and PY assisted in interpretation of data, and preparation of the manuscript. PY, TH, CYF and WY supervised the study. CYF contributed to data collection. All authors have contributed to the interpretation and critically reviewed the manuscript. All authors approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Ethics approval and consent to participate

All procedures performed in studies involving human participants were in accordance with the ethical standards of the Institutional and/or National Research Committee and with the 1964 Helsinki Declaration and its later amendments, or comparable ethical standards. The study was approved by Ethics Committee of the Second Affiliated Hospital of Nan Chang University (approval number: O-Yi Yan Lun Shen [2026] No. 003) and Master of Nursing students signed the informed consent.

Consent for publication

Not applicable

Competing interests

No conflict of interest has been declared by the authors

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Author Contribution

All authors (WXZ, XF, PY, TH, CYF and WY) participated in the conception and design of the study. WXZ analyzed the data, and wrote the initial draft of the manuscript. XF and PY assisted in interpretation of data, and preparation of the manuscript. PY, TH, CYF and WY supervised the study. CYF contributed to data collection. All authors have contributed to the interpretation and critically reviewed the manuscript. All authors approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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Data availability

The datasets during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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