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Current status of vocational delay of gratification among practicing nursing students and its influencing factors: a cross-sectional study

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Abstract

Background Practicing nursing students play a critical role in addressing the nursing workforce shortage. Their vocational delay of gratification influences career planning and practice quality. This study aimed to assess the level of vocational delay of gratification among nursing students and identify its influencing factors.

Methods A convenience sample of 250 nursing students practicing in three tertiary hospitals in Anhui Province (February–May 2024) was studied. Data were collected using a general information questionnaire, job involvement scale, clinical communication ability scale, and vocational delay of gratification scale. Random forest, independent samples t-test, analysis of variance (ANOVA), and multiple linear regression analyses were applied to identify the key influencing factors.

Results There were 39 (15.6%) males and 211 (84.4%) females who participated in this study and the mean score for vocational delay of gratification was (2.843 ± 0.513), the mean score for level of job involvement was (2.468 ± 0.923), and the mean score for ability to communicate with patients was (2.830 ± 1.083). Influencing factors included willingness to upgrade education, whether you are willing to work in nursing after graduation, whether a relative works in a medical facility, ability to communicate with patients, intention to study nursing, level of job involvement ($P < 0.05$).

Conclusion Nursing students demonstrated a moderate-to-high level of vocational delay of gratification. Training programs addressing these factors can enhance students' capabilities, improve internship quality, and support long-term career development. The study conducted in three hospitals in Anhui Province may limit the generalizability of the results due to regional differences in education and practice. Nonetheless, this study provides important insights for optimizing the career development and retention of nursing interns.

Trial registration No medical interventions were administered to human participants in this study. Clinical trial number: not applicable.

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Keywords Internship, Nursing students, Delayed gratification, Vocation, Random forests

Background

The World Health Organization (WHO) estimates that by 2030 there will be a shortfall of 4.5 million nurses [1]. The National Nursing Career Development Plan (2021–2025) [2] suggests strengthening the training of nursing personnel to fully mobilize the enthusiasm of nurses, the number of nurses in the workforce continues to increase, and to promote the high-quality development of China's nursing career. The shortage of high-quality nurses has been identified as a core issue in the healthcare system's workforce [3]. The turnover rate for nurses in the U.S. is reported to be as high as 17.2%, and according to the U.S. Bureau of Labor Statistics (2020), jobs for registered nurses (RNs) are projected to increase by 12% from 2018 to 2028, which translates to a need for more than 200,000 additional nurses annually. Parts of the U.S. and its push for nursing juniors to enter clinical to alleviate hospital nursing shortages and increase the future supply of RNs [4]. Nursing students are the reserve force of nurses, and cultivating high-quality nursing students is an important measure to alleviate the shortage of nursing talent in the future. The internship is the transition stage of the transition from nursing students to nurses, which can help nursing students understand and adapt to the future of clinical nursing work in depth [5]. In this stage of the career planning of the nursing students, the attitude of the work will affect the future development of nursing careers of nursing students. However, practicing nurses at this stage is challenging [6], and low-quality internship experiences cause high rates of nursing student turnover [7]. Nurse educators and healthcare educators need to pay close attention to the internship phase of nursing so that practicing nurses feel valued in the profession, which will help to make the transition better for them. In order to minimize nursing brain drain and improve the quality of practicum.

In the early 1970s, Walter Mischel systematically proposed the concept of delayed gratification [8]. Based on the definition of delayed gratification and referring to Bembenuy's (1998) definition of academic delayed gratification [9], Liu Xiaoyan defines vocational delay of gratification (VDOG) [10] is the capacity for delayed gratification demonstrated by individuals in the course of their career development, in order to complete their work tasks more efficiently, to obtain more lucrative benefits in return, and to achieve higher career goals makes them willing to give up leisure, recreation, or other impulsive behaviors that may interfere with their current work in order to pursue a series of more valuable long-term outcomes.

Vocational delay of gratification of practicing nurses affects the quality of practice and the level of future career development, and higher levels of vocational delay of gratification are effective in reducing turnover of practicing nurses [7]. It is also effective in improving nurses' creative behaviors [11]. Higher levels of vocational delay of gratification also contribute to higher job satisfaction and increased job involvement [12, 13]. Previous studies have shown that vocational delay of gratification partially mediates the relationship between role stress and job involvement in practicing nursing students [14], whether being an only child and place of residence (rural or urban) were influential factors in the vocational delay of gratification of practicing nursing students [15]. However, there are fewer studies on vocational delay of gratification of practicing nursing students. Therefore, this study investigates and analyzes the current situation of vocational delay of gratification of practicing nursing students and the related influencing factors with practicing nursing students as the target, so as to provide some references for improving and fostering the overall level of vocational delay of gratification of intern nursing students. This study investigated and analyzed the current status of vocational delay of gratification among practicing nursing students and the factors influencing it. By focusing on this specific population, the findings provide a foundation for developing strategies to enhance the overall career development of nursing students during their internships. These insights not only hold the potential to improve the quality of nursing education and training but also carry significant implications for fostering emotional resilience, professional perseverance, and long-term commitment in clinical practice. Ultimately, the results of this study may guide future interventions and contribute to the advancement of the healthcare workforce. On this basis, two hypotheses are proposed: (1) Personal factors such as ability to communicate with patients, level of job involvement, and gender had a significant effect on the level of vocational delay of gratification among practicing nursing students. (2) Currently practicing nursing students have low levels of vocational delay of gratification.

Methods

Participants and measures

This study adopted the convenience sampling method to select nursing students who were on internship in three tertiary hospitals in Anhui Province from February to May of the year 2024. Practicing nursing students from three tertiary hospitals were selected to ensure a more representative sample. Inclusion criteria: (1) nursing

students who are practicing in three tertiary hospitals in Anhui Province; (2) full-time fresh nursing students in internship; (3) voluntary and informed consent to participate in this research study. Exclusion criteria: (1) the total duration of the internship was less than 6 months; (2) it was not the first internship since enrolling in the nursing program.

Data were collected online face-to-face through questionnaire star software at the nurses' stations in each unit, and before completing the questionnaire for practicing nursing students who met the exclusion criteria, they were informed that the questionnaire was collected for the purpose of the study and that the information would not be disclosed or used for any other purpose. The QR code was scanned to fill in the questionnaire after seeking permission from practicing nursing students, and it was set to be filled in only once per device. In order to reduce common method bias, we performed anonymous questionnaire completion as well as set up randomization of the order of questionnaire entries. Completed data were double-checked and ambiguous questionnaires were verified in person by the researcher.

The linear model calculations [16] in the G*Power software (version 3.1.9.7) [17] were used to determine the sample size required for the multiple linear regression using parameters such as a power level of 0.95, an effect size of $f^2=0.15$ (indicating a medium effect size), and an alpha level of 0.01 to increase the level of confidence, for a total of 10 predictor variables, resulting in a final sample size calculation of 221. The final effective sample size for this study was 250.

Instruments

(1) The general information questionnaire: This scale was developed on our own for this study based on the characteristics of practicing nursing students, included entries such as academic qualifications, willingness to upgrade education, gender, whether the nursing major was the first choice, whether you are willing to work in nursing after graduation, whether a relative works in a medical facility, whether to serve as class leader, ability to communicate with patients, intention to study nursing.

(2) The Vocational Delay of Gratification Scale [10]: Developed by Xiaoyan Liu, it includes 2 dimensions and 8 entries, including job delay of gratification and career delay of gratification. The scale is scored on a 4-point Likert scale, with "very non-compliant" scoring 1, "less compliant" scoring 2, "more compliant" scoring 3, and "Very Compliant" is scored as 4 points. The self-test Cronbach's alpha coefficient for the scale was 0.854.

(3) Job Involvement Scale [18]: Zhang Yiwen adapted the Utrecht Work Involvement Scale (UWES) developed by Schaufeli et al. [19] into a Chinese version. The Job Involvement Scale has been widely used in the study of

job involvement in different occupational groups. The scale consists of 3 dimensions and 15 items. A Likert 7-point scale was used, with an entry mean score of 4 ("1 time per week") or more defined as a high level of job involvement, an entry mean score of 2–4 as a moderate level of job involvement, and a score of 2 or less as a low level of job involvement. The self-test Cronbach's alpha coefficient for the scale was 0.961.

(4) Clinical Communication Skills Assessment Scale for Nursing Students [20]: The version used in this study is the one prepared by Fangyu Yang, it includes 6 dimensions and 58 entries. A 4-point Likert scale was used, with scores ranging from 1 to 4 from "never use" to "often use", and scores ranging from 58 to 232, with higher scores indicating better clinical communication skills of nursing students. The self-test Cronbach's alpha coefficient of the scale was 0.840. In this study, a total score of 145 was used as a cut-off score to distinguish the communication skills of the nurse interns, with a total score of greater than 145 being high communication skills and a total score of less than 145 being low communication skills. The self-test Cronbach's alpha coefficient for the scale was 0.947.

Ethics

This study design has been approved by the Ethics Committee of Affiliated Hospital of Jiangnan University (JNMS040300072). The purpose of the study was explained to each participant and consent was obtained, and participants' information was kept completely confidential to protect their privacy.

Statistical analysis

Using the Random Forest Model [21] to Calculate the Importance of Relevant Predictor Variables. The Random Forest model was constructed using the R Studio software, and the *mtry* parameter was set to calculate the individual values of %IncMSE and IncNodepurity for the 10 independent variables that were initially included in order to filter out the variables that contributed more to the predictability of the dependent variable.

Statistical analysis was performed using SPSS 27.0. Qualitative data were presented as frequencies and percentages, and quantitative data were presented as mean \pm standard deviation ($\bar{x} \pm s$). Data comparisons between multiple groups were analyzed by one-way ANOVA, comparison of the differences in the data between the two groups was performed using the independent samples t-test. Multifactorial analysis used multiple linear stepwise regression models to further analyze the factors associated with vocational delay of gratification among practicing nursing students. *p*-value less than 0.05 was regarded as a statistically significant.

Multicollinearity and common method bias

Due to the use of a questionnaire to collect data and the use of multiple scales in the questionnaire. In order to test whether the relationships between the variables were misjudged or exaggerated by the practicing nursing students in completing the questionnaire, thus affecting the accuracy and reliability of the study’s conclusions, a Harman’s single factor test [22] was performed on the scale entries and the result was 47.55%, which is below the threshold of 50% [23]. Meanwhile, in order to ensure that the independent variables are set to maximize and make more sense of sampling, this study tested for multicollinearity for the 10 independent variables, and the results showed that the VIF was less than 1.5.

Results

General information on practicing nursing students

The results of the study showed that among the 250 nursing students, the percentage of females(84.4%) was significantly higher than that of males (15.6%), and the Academic qualifications are mainly from junior college (78.8%), while bachelor degree and technical secondary school education accounted for 13.6% and 7.6%, respectively. Most of the students had a positive attitude towards the nursing profession and related development, of which 76.5% were willing to upgrade their academic qualifications, 78.4% regarded the nursing profession as their first choice, and 90% expressed their willingness to work in nursing after graduation. In addition, although 65.2% of the students chose not to be class cadres, 83.2%

Table 1 General information on nursing intern

Variables	Group	N=250	Percentage
Gender	Male	39	15.6%
	Female	211	84.4%
Academic qualifications	Technical secondary school education	19	7.60%
	Junior college	197	78.8%
	Bachelor degree	34	13.6%
Willingness to upgrade education	Yes	152	76.5%
	No	98	23.1%
whether the nursing major was the first choice	Yes	196	78.4%
	No	54	21.6%
Whether you are willing to work in nursing after graduation	Yes	225	90%
	No	25	10%
Whether a relative works in a medical facility	Yes	86	34.4%
	No	164	65.6%
Whether to serve as class leader	Yes	87	34.8%
	No	163	65.2%
Ability to communicate with patients	High level	140	44%
	Low level	110	56%
Intention to study nursing	Yes	208	83.2%
	No	42	16.8%

of them clearly expressed their willingness to study nursing. Further details are provided in Table 1.

Importance ranking of factors influencing vocational delay of gratification among practicing nursing students based on random forest model

A total of 10 variables were included, so the mtry parameter was set to 3. 1,000 trees were used for random forest model construction, and the %IncMSE values and the IncNodepurity values for each variable were calculated for plotting, and the results are shown in Fig. 1.

This result shows that the main predictor variables affecting the level of vocational delay of gratification among practicing nursing students are level of job involvement, whether you are willing to work in nursing after graduation, ability to communicate with patients, intention to study nursing and willingness to upgrade education.

Current status of vocational delay of gratification among practicing nursing students

Based on the statistical analysis of 250 vocational delay of gratification scales, the two dimensions of the vocational delay of gratification scale with the total mean scores of 250 nursing interns are shown in Table 2. The average level of vocational delay of gratification of the nursing interns was in the middle to high range.

A single-factor analysis of vocational delay of gratification among practicing nursing students

Willingness to upgrade education, whether the nursing major was the first choice, whether you are willing to work in nursing after graduation, whether a relative works in a medical facility, ability to communicate with patients, intention to study nursing, level of job involvement($p<0.001$). The difference in delayed gratification scores was statistically significant (See Table 3).

A multifactorial analysis of delayed gratification in practicing nursing students

Willingness to upgrade education, whether the nursing major was the first choice, whether you are willing to work in nursing after graduation, whether a relative works in a medical facility, ability to communicate with patients, intention to study nursing, level of job involvement($p<0.001$) were used as the independent variables, and further regression analyses were carried out, and the methods of assigning the values of the independent variables are whether the nursing major was the first choice (No=1, Yes=2), willingness to upgrade education (No=1, Yes=2), Whether you are willing to work in nursing after graduation(No=1, Yes=2), Ability to communicate with patients(Low level=1, High level=2), Whether a relative works in a medical facility (No=1,

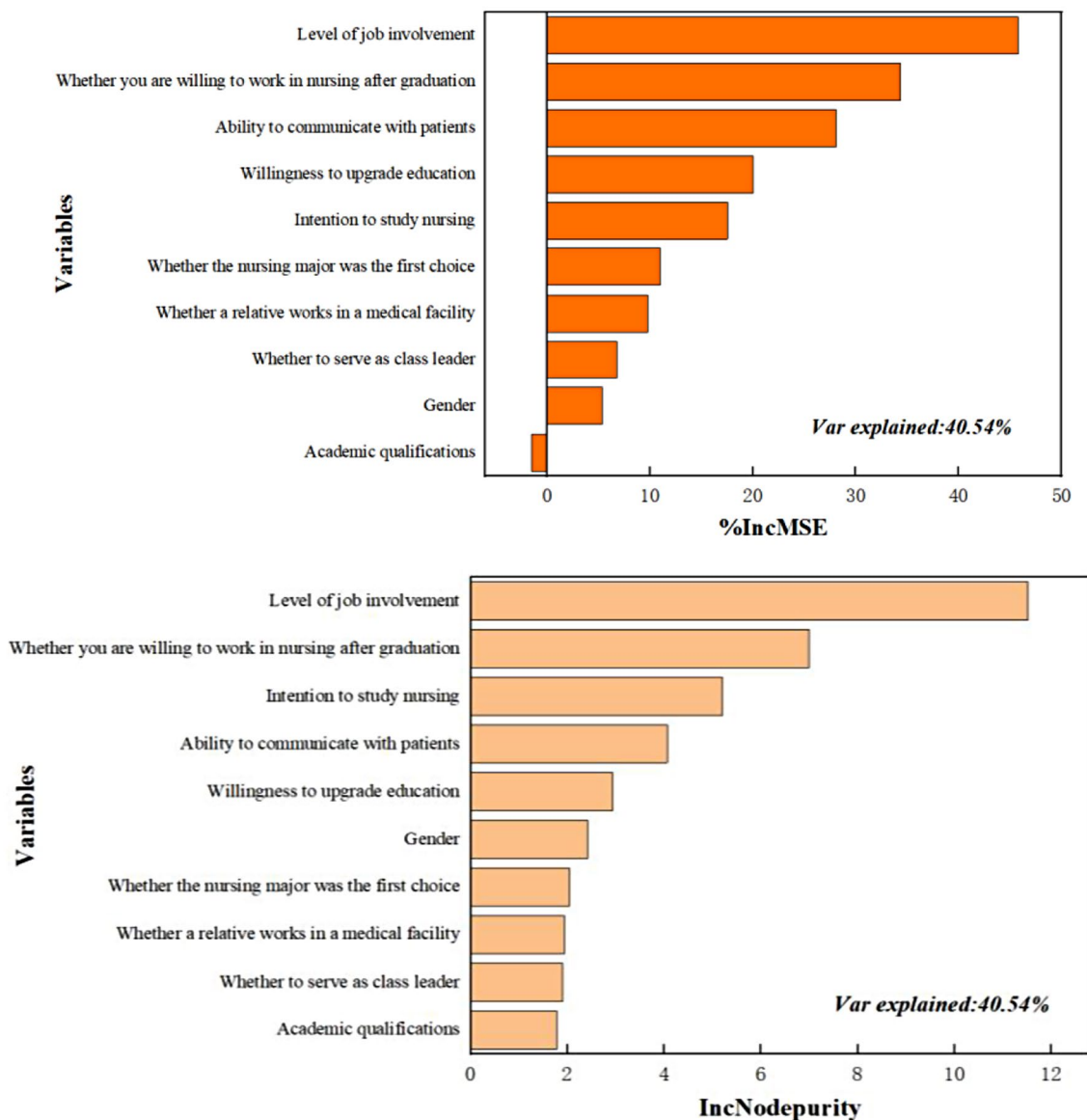


Fig. 1 Importance ranking figures of factors influencing vocational delay of gratification among practicing nursing students

Table 2 Delayed gratification scores for practicing nursing students

Parameter	Entries	Average ± SD
Total score for vocational delay of gratification	8	(2.843 ± 0.513)
Work delay satisfaction score	4	(2.723 ± 0.554)
Career delayed satisfaction score	4	(2.963 ± 0.567)

Yes=2), Intention to study nursing (Involuntary=1, Voluntary=2), and level of job involvement (Low=1, Medium=2, High=3).

Taking the level of delayed gratification compliance as the dependent variable and including the above statistically different variables as independent variables, multiple linear regression analysis was conducted, and the results showed that the delayed gratification influencing

factors of intern nursing students were willingness to upgrade education, whether you are willing to work in nursing after graduation, whether a relative works in a medical facility, ability to communicate with patients, intention to study nursing, level of job involvement ($P < 0.05$), and the results of the analysis are shown in Table 4.

To address potential confounding variables, we included gender, academic qualifications, and whether to serve as class leader as covariates in the multiple regression model. This adjustment allowed us to control for these factors and ensured that the observed relationship between the independent and dependent variables reflected a direct association. The analysis showed that the p -values for all three covariates were greater than

Table 3 A single-factor analysis of vocational delay of gratification among practicing nursing students

Variables	N=250	Average ± SD	t/F	p
Gender	39	2.782±0.685	-0.807	0.421
Male	211	2.854±0.475		
Female				
Academic qualifications	19	3.019±0.391	F=1.278	0.280
Technical secondary school education	197	2.833±0.519		
Junior college	34	2.801±0.531		
Bachelor degree				
Willingness to upgrade education	192	2.902±0.515	3.397	<0.001
Yes	58	2.646±0.457		
No				
whether the nursing major was the first choice	196	2.906±0.481	3.488	<0.001
Yes	54	2.613±0.562		
No				
Whether you are willing to work in nursing after graduation	225	2.905±0.442	6.203	<0.001
Yes	25	2.280±0.734		
No				
Whether a relative works in a medical facility	86	3.008±0.450	3.796	<0.001
Yes	164	2.756±0.523		
No				
Whether to serve as class leader	87	2.896±0.558	1.207	0.229
Yes	163	2.814±0.486		
No				
Ability to communicate with patients	140	2.939±0.539	3.418	<0.001
High level	110	2.720±0.939		
Low level				
Intention to study nursing	208	2.931±0.433	5.075	<0.001
Voluntary	42	2.404±0.643		
Involuntary				
Level of job involvement	250	1.928±0.687	F=50.570	<0.001
Low level	7	2.473±0.458		
Medium level	62	3.004±0.413		
High level	181			

0.6, indicating that these factors did not have a statistically significant impact on the dependent variable in our model.

Discussion

Studying the current status of vocational delay of gratification among practicing nursing students and the factors influencing it is essential for enhancing the quality of care and improving patient prognosis. Delayed gratification is an important psychological ability in the nursing profession to cope with high-pressure environments and ensure the quality of care. Practicing nursing students need to have the ability of delayed gratification to ensure

Table 4 Results of multiple linear regression analysis of factors influencing delayed satisfaction in nurse practitioners

Variables	B	SE	Beta	t	p
constant term	-0.225	0.242	—	-0.930	0.353
Whether the nursing major was the first choice	0.042	0.067	0.034	0.626	0.532
Willingness to upgrade education	0.166	0.060	0.137	2.749	0.006
Whether you are willing to work in nursing after graduation	0.522	0.087	0.306	5.994	<0.001
Whether a relative works in a medical facility	0.054	0.055	0.051	0.992	0.049
Ability to communicate with patients	0.223	0.057	0.335	5.794	<0.001
Intention to study nursing	0.214	0.078	0.157	2.754	0.006
Level of job involvement	0.332	0.057	0.335	5.794	<0.001

Notes R²=0.447, Adjusted R²=0.431, F=27.980, P<0.001.

the quality of care and patients’ health under heavy tasks and clinical pressure. Studying its influencing factors, such as job involvement, educational background and individual traits, not only helps to provide targeted support for practicing nursing students and enhance their career resilience, but also further optimizes the clinical outcomes and health prognosis of patients, providing a scientific basis for nursing management and training.

Current status of vocational delay of gratification among nurse interns

This study found that the mean vocational delay of gratification score among practicing nursing students was (2.843±0.513), indicating a moderate-to-high level. This contrasts with Liu Chunni’s and Zhang Yanhua’s findings of low levels among formal nurses [15, 24]. The difference may stem from practicing nursing students’ initial enthusiasm for clinical work, driven by curiosity and a strong desire to acquire new knowledge and skills. They are more willing to forgo short-term rest for long-term growth opportunities. Additionally, their limited internship duration reduces burnout [25], and with relatively lower work pressure compared to formal nurses, they remain optimistic about their future in nursing, contributing to their higher vocational delay of gratification.

Factors influencing vocational delay of gratification in practicing nursing students

Level of job involvement

The findings of this study revealed that the mean vocational delay of gratification scores among intern nursing students varied significantly with levels of job involvement: (1.928±0.687)for low, (2.473±0.458) for medium,

and (3.004 ± 0.413) for high. A positive correlation was observed, with higher job involvement ($\beta = 0.431$) predicting greater vocational delay of gratification. These results align with Zhang Ying's studies [12, 13, 26], which indicate that interns with higher job involvement are more likely to focus on long-term career goals, willingly sacrificing immediate rest or leisure to enhance their clinical knowledge and skills.

To support this relationship, schools and educators must address the intrinsic needs of intern nursing students by fostering a sense of purpose and setting achievable yet ambitious goals. A rational and scientifically structured workload is essential to prevent burnout while maximizing engagement. Encouraging interns to find accomplishment and satisfaction in their daily tasks can help build confidence and foster resilience during their clinical training.

Hospitals, in turn, play a critical role in creating a supportive internship environment. Providing a nurturing workplace culture and instilling a sense of belonging can significantly enhance interns' job involvement and overall satisfaction. Tailored mentorship programs, positive reinforcement, and opportunities for skill application can further boost engagement. Ultimately, fostering high job involvement not only enhances vocational delay of gratification but also contributes to the professional growth of nursing interns, preparing them for the challenges of long-term clinical practice.

Whether you are willing to work in nursing after graduation

This study emphasizes that the willingness to pursue nursing after graduation has a significant effect on nursing interns' vocational delay of gratification. With an aging population and the "Healthy China" initiative, the demand for skilled nurses is increasing. Clinical internships, as a bridge between education and professional practice, play a crucial role in shaping long-term career trajectories.

To address this critical stage, nursing administrators should implement strategies to strengthen commitment to the nursing profession, such as mentorship programs, supportive environments, and meaningful clinical experiences. Encouraging a strong desire to remain in nursing is critical to increasing vocational delay of gratification and ensuring workforce sustainability. By fostering a sense of professional identity, their career aspirations can be enhanced. These efforts not only increase vocational delay of gratification, but also improve nurse retention and patient care outcomes.

Ability to communicate with patients

The results of this study showed that, after the evaluation of the Clinical Communication Competence Assessment Scale for Nursing Students, a total score of 145 was

used to differentiate the communication competence of practicing nursing students, a total score greater than 145 was high communication competence, and a total score less than 145 was low communication competence. Among the 250 practicing nursing students surveyed, 110 perceived their communication skills with patients to be inadequate. Multiple linear regression analysis further indicated that communication skills with patients had a significant effect on the level of vocational delay of gratification.

Effective communication is the foundation of nursing practice. Practicing nursing students with strong communication skills not only have higher job satisfaction, but also have better learning ability, professional growth and resilience in facing work challenges. These factors enhance their self-confidence and contribute to greater vocational delay of gratification. Both schools and internship hospitals must prioritize the development of communication skills. Incorporating structured communication training into curricula and clinical practice, providing opportunities for role-playing, and offering constructive feedback are necessary steps to close this gap. Strengthening communication skills will enable interns to engage more effectively with patients, develop a sense of professional identity, and ultimately promote higher levels of vocational delay of gratification.

Willingness to upgrade education

The findings of this study corroborate Ganie GR's research [27], which established a significant relationship between vocational delay of gratification and the pursuit of higher education. This study further highlights that nurse interns with aspirations to advance their education demonstrate higher levels of vocational delay of gratification. The act of pursuing advanced education, in itself, exemplifies this concept, as it reflects a deliberate choice to forgo immediate rewards for long-term professional growth.

Nurse interns recognize the critical role that advanced education and deepened professional knowledge play in shaping their future career trajectories. By committing time, effort, and resources to achieve higher qualifications, they exemplify a forward-looking approach rooted in strategic goal-setting and perseverance. This willingness to prioritize long-term career success over short-term gratification not only underscores the essence of vocational delay of gratification but also illustrates how educational aspirations can serve as a pathway for personal and professional development, fostering resilience and commitment in the demanding field of nursing.

Intention to study nursing

This study found a positive correlation between willingness to enroll in nursing programs ($\beta = 0.214$) and the

level of vocational delay of gratification. Nursing students with a strong willingness to enroll often exhibit clear career goals and vocational aspirations, which drive them to prioritize long-term achievements over short-term gratification. This goal-oriented mindset not only enhances their commitment to the profession but also reinforces their capacity to delay immediate rewards for future success.

This relationship suggests that fostering a strong willingness to enroll in nursing programs can play a pivotal role in developing students' ability to navigate the demands of their nursing careers. By cultivating clear professional goals and reinforcing their sense of purpose and efficacy, students are better equipped to demonstrate persistence and resilience, ultimately supporting their long-term success in the nursing profession.

Whether a relative works in a medical facility

The study revealed that practicing nursing students with relatives working in hospitals had a higher mean score of vocational delay of gratification (3.008 ± 0.450) compared to those without such connections (2.756 ± 0.523). Additionally, having relatives in the hospital was identified as an influential factor ($\beta=0.054$) in shaping vocational delay of gratification.

Students with relatives in the medical field are often exposed to the healthcare environment and nursing knowledge from an early age. This early familiarity allows them to gain insights into hospital workflows and working conditions, offering them a clearer understanding of their potential career path. Drawing on the experiences and guidance of their relatives, these students are better equipped to make informed career plans, avoid common pitfalls, and navigate their internships with greater ease. Such advantages contribute to enhanced confidence in their career prospects and a higher level of vocational delay of gratification.

To maximize these benefits, nursing students with relatives in the profession should actively engage in communication and seek advice when faced with challenges or uncertainties. Leveraging these familial connections can provide valuable mentorship, fostering resilience and long-term career focus, ultimately supporting their professional growth and development.

Limitations and implications for nursing research

This study provides valuable insights into the factors that influence vocational delay of gratification among practicing nursing students. However, in order to contextualize the findings and guide future research, it is important to recognize some limitations.

First, the small sample size may affect the reliability of the findings because a smaller sample is more susceptible to random variation, which may lead to overestimation

or underestimation of certain influences. In addition, the findings may not be generalizable to a broader population of nursing interns, especially those in different regions or healthcare systems.

Second, this study was conducted in three tertiary hospitals in Anhui Province, which may be biased by regional differences in medical education, medical practice, and cultural norms. These contextual factors may influence vocational delay of gratification and may not reflect the experiences of nursing interns in other regions or healthcare organizations. In order to minimize these limitations and build on existing findings, future studies should utilize larger, more diverse samples that include more regions. Additionally, the use of a longitudinal design could help to identify changes in vocational delay of gratification occurring among practicing nursing students at different points in time, thereby providing a deeper understanding of the development of this key vocational trait.

Conclusion

In summary, the level of vocational delay of gratification of intern nursing students is in the middle to high range, and whether they have relatives working in medical institutions, willingness to study, level of job involvement, willingness to improve their education, ability to communicate with patients, and willingness to work in nursing after graduation are the influencing factors. Among them, the random forest model showed level of job involvement, whether you are willing to work in nursing after graduation, ability to communicate with patients, intention to study nursing and willingness to upgrade education is strong correlation with the level of vocational delay of gratification among practicing nursing students. To effectively address the growing societal demand for high-quality nurses, nursing administrators and educational institutions must place greater emphasis on the quality of internships and the vocational development of nursing students. As future pillars of the nursing workforce, practicing nursing students represent a critical reserve force for the healthcare system. Therefore, it is essential to adopt a multifaceted approach to foster their professional growth, focusing on enhancing their vocational delay of gratification. By providing targeted support and development opportunities, we can help these students cultivate resilience, patience, and long-term career commitment. This, in turn, will reduce brain drain, ensuring a more stable and sustainable nursing workforce that is equipped to meet the evolving needs of the healthcare sector.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12912-024-02572-x>.

Supplementary Material 1

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Author contributions

Y.W. and J.J. contributed to the conception of the study and provided the critical revision, T.C. and J.Y. performed the data analyses and wrote the manuscript, and X.C., Q.Z. and H.Z. collected the data and helped to perform the data analysis. All authors reviewed and approved the final manuscript.

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Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

This study design has been approved by the Ethics Committee of Affiliated Hospital of Jiangnan University (JNMS040300072). All participants were informed and voluntarily consented to participate in this study.

Consent for publication

Participants in this study were informed of the purpose of data collection prior to collection and published consent was obtained from participants.

Competing interests

The authors declare no competing interests.

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