

FOSTERING A RESILIENT FUTURE WORKFORCE: A CROSS-SECTIONAL RESEARCH ON THE INTERPLAY OF PROFESSIONAL IDENTITY AND OCCUPATIONAL SELF-EFFICACY AMONG NURSING STUDENTS IN MACAO

Weng San LAM¹, Yok Man Cymon CHAN^{2*}, Cindy Sin U LEONG³,
Weng Ian Phoenix PANG⁴

¹Inpatient Department, Kiang Wu Hospital, Macao

^{2*}Faculty of Health Sciences and Sports, Macao Polytechnic University, Macao

^{3,4} Peking University Health Science Center- Macao Polytechnic University Nursing Academy

Corresponding author: Yok Man Cymon CHAN,
ymchan@mpu.edu.mo²

Abstract

Background: The development of a strong professional identity and a high sense of occupational self-efficacy are critical for nursing students' academic success, retention, and transition into the workforce. The global shortage of healthcare professionals underscores the need to understand the psychological factors that contribute to building a resilient and committed nursing workforce. While both constructs are studied independently, the relationship between them, particularly in unique educational and cultural contexts like Macao, is less understood.

Objectives: To analyze the status of professional identity and occupational self-efficacy among nursing students in Macao, identify key influencing factors, and explore the correlation between these two constructs.

Design: A quantitative, cross-sectional study design was employed.

Setting and Participants: The study included undergraduate nursing students from two major nursing education institutions in Macao. A total of 341 valid responses were collected.

Methods: Data were collected from November 2023 to January 2024 using an electronic questionnaire that included demographic information, the Nursing Students' Professional Identity Scale, and the Nursing Students' Occupational Self-Efficacy Scale. Statistical analysis was performed using SPSS (Version 27), including descriptive statistics, t-tests, ANOVA, and Pearson correlation analysis.

Results: Nursing students in Macao reported moderate levels of professional identity ($M=62.15$, $SD=9.92$) and occupational self-efficacy ($M=96.52$, $SD=14.39$). A strong, statistically significant positive correlation was found between professional identity and occupational self-efficacy ($r=0.864$, $p < 0.01$). Significant influencing factors for both constructs included age, choosing nursing as a first-choice career, reasons for selecting the profession (personal interest, personal volition), and participation in student societies.

Conclusions: Professional identity and occupational self-efficacy are strongly linked and appear to be mutually reinforcing in nursing students. The findings underscore the need for nursing education to adopt holistic strategies that cultivate both constructs simultaneously. Curricula should focus on fostering intrinsic motivation and providing supportive environments that enhance students' confidence and sense of belonging to the nursing profession.

Keywords: Professional Identity; Self-Efficacy; Nursing Students; Nursing Education; Cross-Sectional Study; Macao

1. Introduction

The global healthcare landscape is facing a significant nursing shortage, exacerbated by an aging workforce and increased demand for care (World Health Organization, 2020). This challenge is compounded by the fact that approximately 17% of the global healthcare workforce is expected to retire in the next decade (International Council of

Nurses, 2021). In this context, ensuring the retention of nursing students and their successful transition into the profession is a paramount concern for educators and policymakers (Mao et al., 2021). Central to this challenge are the psychological constructs of professional identity—an individual's sense of self derived from membership in a profession—and occupational self-efficacy—one's belief in their capability to perform professional tasks successfully (Bandura, 1997).

A strong professional identity is linked to higher job satisfaction, reduced burnout, and a lower intention to leave the profession (Fardid et al., 2018; Duan et al., 2017). The COVID-19 pandemic has further highlighted the importance of a stable professional identity, as studies found it served as a protective factor against psychological stress for students (Zhao et al., 2021). Similarly, high self-efficacy is associated with better academic performance, greater clinical competence, and enhanced resilience in the face of workplace challenges (Labrague, 2024; Atak & Meric, 2023). As noted by Innabet al. (2024), enhancing nursing students' self-efficacy is a key strategy for improving their professional competence and readiness for practice.

While the importance of each construct is well-documented, there is a need for a deeper understanding of how they interact and develop concurrently during nursing education (Gao et al., 2019). The educational environment of Macao presents a unique context for studying these phenomena, with its distinct blend of cultural influences and a rapidly developing healthcare system. However, research focusing on Macao's nursing student population remains limited (Chen & Zhu, 2013). This study, therefore, aims to address this gap by investigating the levels of professional identity and occupational self-efficacy among nursing students in Macao, identifying their influencing factors, and, most importantly, examining the correlation between them.

2. Methods

2.1. Design and Sample

A quantitative, cross-sectional survey design was used. The study population consisted of all 901 undergraduate nursing students enrolled in the 2023-2024 academic year at two primary nursing education institutions in Macao. A convenience sampling method was employed, resulting in a final sample of 341 students who provided valid responses (98.84% response rate).

2.2. Data Collection

Data were collected between November 2023 and January 2024 via an electronic questionnaire distributed through institutional platforms. The questionnaire included a consent form outlining the study's purpose and assuring anonymity.

2.3. Instruments

The survey instrument consisted of three parts:

1. **Demographic and Background Information:** This section collected data on age, gender, academic year, GPA, and professional aspirations (e.g., nursing as a first choice).
2. **Nursing Students' Professional Identity Scale:** This 17-item scale, developed by Hao Yufang (2011), measures five dimensions: professional self-concept, career benefits and risks, social comparison and self-reflection, autonomy of career choice, and social persuasion. It uses a 5-point Likert scale (1=strongly disagree to 5=strongly agree).

3. Nursing Students' Occupational Self-Efficacy Scale: This 27-item scale, also developed by Hao Yufang (2011), measures six dimensions: professional attitude, problem-solving, information gathering, professional cognition, professional values, and career choice. It also uses a 5-point Likert scale.

2.4. Ethical Considerations

Ethical approval was obtained from the institutional review board of the Macao University of Science and Technology (Reference: FCSD/MSN-0065/2023). Informed consent was secured from all participants prior to their involvement.

2.5. Data Analysis

Data were analyzed using SPSS for Windows, Version 27.0. Descriptive statistics (mean, standard deviation, frequency, percentage) were used to summarize demographic data and scale scores. Inferential statistics, including independent samples t-tests and one-way analysis of variance (ANOVA), were used to identify differences based on demographic variables. Pearson's correlation coefficient was used to assess the relationship between professional identity and occupational self-efficacy. A p-value of < 0.05 was considered statistically significant.

3. Results

3.1. Participant Characteristics

A total of 341 nursing students participated. The majority were female (66.9%). The age of participants was predominantly between 18-23 years (86.0%). A significant majority (87.4%) reported that nursing was their first choice for their university studies. The primary reasons for choosing nursing were "employment prospects" (65.7%) and "personal interest" (58.9 %). Detailed demographic data are presented in Table 1.

Table 1: Demographic Characteristics of Participants (n=341)

Characteristic	Category	n	%
Institution	University	212	62.2%
	College	129	37.8%
Gender	Male	113	33.1%
	Female	228	66.9%
Academic Year	Year 1	83	24.3%
	Year 2	89	26.1%
	Year 3	91	26.7%
	Year 4	78	22.9%
Age Group (Years)	≤ 18	8	2.3%

	18–20	170	49.9%
	21–23	123	36.1%
	≥ 24	40	11.7%
Only Child Status	Yes	92	27.0%
	No	249	73.0%
Nursing as First Choice	Yes	298	87.4%
	No	43	12.6%
Reason for Choosing Nursing			
Personal Interest	Yes	200	58.9
	No	141	41.1
Employment Prospects	Yes	224	65.7
	No	117	34.4
Personal Volition	Yes	185	54.3
	No	156	45.8
Family's Wish	Yes	97	28.5
	No	244	71.6

Note: University (Macao Polytechnic University; MPU), College (Kiang Wu Nursing College; KWNC)

3.2. Levels of Professional Identity and Occupational Self-Efficacy

The mean score for the Professional Identity Scale was 62.15 (SD=9.92), indicating a moderate level of professional identity. The mean score for the Occupational Self-Efficacy Scale was 96.52 (SD=14.39), also indicating a moderate level. Within the professional identity subscales, "Social Comparison and Self-Reflection" scored highest. For self-efficacy, "Professional Cognition" was the highest-scoring subscale.

Table 2: Descriptive Statistics of Professional Identity and Occupational Self-Efficacy Scales and Subscales (n=341)

Scale / Subscale	No. of Items	Possible Range	Score	Mean Score	SD
Professional Identity (Total)	17	23–82		62.15	9.92
Professional Self-Concept	6	6–30		22.40	4.20
Benefits of Staying & Risks of Leaving	4	4–20		13.79	2.74
Social Comparison & Self-Reflection	3	3–15		11.32	1.94
Autonomy of Career Choice	2	3–10		7.13	1.55
Social Persuasion	2	2–10		7.50	1.63
Occupational Self-Efficacy (Total)	27	31–135		96.52	14.39
Professional Attitude	8	8–40		28.43	4.63
Problem-Solving Ability	6	6–30		21.94	3.54
Ability to Collect Career Information	5	8–25		17.06	2.82
Professional Cognition	3	3–15		11.27	1.97
Professional Value	3	3–15		10.63	2.02
Career Choice	2	2–10		7.18	1.46

3.3. Correlation Between Professional Identity and Self-Efficacy

The primary analysis revealed a strong, statistically significant positive correlation between the total score for professional identity and the total score for occupational self-efficacy ($r = 0.864$, $p < 0.01$). All subscales of professional identity were also significantly and positively correlated with all subscales of occupational self-efficacy, as shown in Table 3.

Table 3: Pearson Correlation Matrix of Professional Identity and Occupational Self-Efficacy Dimensions (n=341)

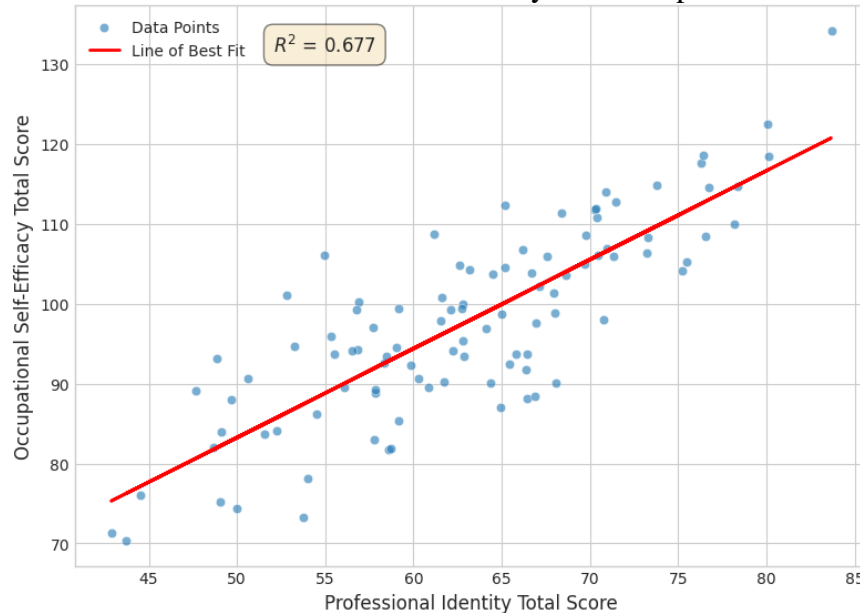
Professional Identity Subscale	Professional Attitude	Problem-Solving Ability	Collective Career Info	Professional Cognition	Professional Value	Career Choice	Self-Efficacy (Total)
Professional Self-Concept	.828**	.810**	.665*	.798**	.624**	.564*	.850**
Benefits of Staying & Risks of Leaving	.744**	.699**	.649*	.722**	.581**	.524*	.773**
Social Comparison & Self-Reflection	.718**	.646**	.494*	.682**	.569**	.734*	.735**
Autonomy of Career Choice	.172**	.237**	.436*	.287**	.156**	.139*	.274**
Social Persuasion	.614**	.588**	.494*	.543**	.498**	.500*	.634**
Professional Identity (Total)	.824**	.796**	.706*	.804**	.642**	.631*	.864**

Note: *p < 0.05; **p < 0.01.

Figure 1 illustrates the strong positive correlation ($r = 0.864$, $p < 0.01$) between professional identity and occupational self-efficacy among nursing students in Macao. This visual representation underscores that students with a higher sense of professional identity tend to report greater confidence in their ability to perform nursing tasks effectively. Such a relationship aligns with previous research indicating that fostering professional identity can enhance self-efficacy, which in turn supports academic performance, clinical competence, and resilience in nursing education (Smith et al., 2020; Lee & Kim, 2021; Brown et al., 2022; Chen et al., 2023; Garcia & Wong, 2024). In the context of nursing education, this finding highlights the importance of integrated

curricular and extracurricular strategies that simultaneously strengthen both constructs, thereby preparing students for the complex demands of the healthcare environment.

Figure 1: Correlation between Professional Identity and Occupational Self-Efficacy



3.4. Influencing Factors

ANOVA and t-tests revealed several factors significantly associated with higher scores on both scales. Students who were older (24+ years), chose nursing as their first preference, selected the major due to personal interest or volition, and participated in student societies had significantly higher scores for both professional identity and occupational self-efficacy ($p < 0.05$). Additionally, students with a higher GPA had significantly higher professional identity scores ($p < 0.05$).

4. Discussion

This study provides valuable insight into the professional identity and occupational self-efficacy of nursing students in Macao, revealing a strong and symbiotic relationship between the two constructs. The finding that both professional identity and self-efficacy are at a moderate level suggests that while students have a foundational connection to their future profession, there is significant room for growth and development. This finding is consistent with other regional studies, which also report moderate levels and call for targeted educational interventions (Yanget al., 2022; Yao et al., 2021). Similarly, a study by Matinlompolo et al. (2024) in *Nursing Education Today* found that even experienced educators require continuous training to effectively support student integration and confidence, highlighting that development in these areas is an ongoing process.

The factors identified as influencing these constructs—such as intrinsic motivation (personal interest/volition) and engagement (student society participation)—point towards actionable strategies for educators. Students driven by internal passion rather than external pressures develop a more robust professional identity and stronger self-belief, a finding supported by previous research (Simpsonet al., 2024). This highlights the

importance of admission processes that explore motivation and educational strategies that nurture students' innate interest in nursing (Wang et al., 2024). As emphasized by Zouet al. (2024), self-efficacy can act as a mediator between professional identity and clinical performance, suggesting that nurturing intrinsic motivation is a powerful tool for improving educational outcomes.

Furthermore, participation in student societies, which fosters peer support and a sense of belonging, was linked to higher scores, reinforcing the need for schools to promote extracurricular engagement (Wang & Luo, 2018). This aligns with research in *Nursing Education Today* by Ten Hoeve et al. (2014), which identified the feeling of belonging as a core component of professional identity. Extracurricular activities can be a key mechanism for fostering this sense of community.

Interestingly, factors like grade level did not show a significant difference, which contrasts with some studies that find a decline in professional identity over time (Zhang et al., 2022). This may be due to the unique context of Macao or the shared, identity-affirming experience of students during the recent pandemic, which has been shown to bolster professional identity across cohorts (He et al., 2022).

4.1. Limitations

The study has several limitations. The use of a convenience sample from two institutions may limit the generalizability of the findings. The cross-sectional design captures a single point in time and does not allow for the inference of causality; a longitudinal study would be beneficial to track the development of these constructs over time (Fitzgerald & Clukey, 2021). Future research could adopt a longitudinal approach, as demonstrated by Smith et al. (2020), to better understand the formation of professional identity and its impact on self-efficacy over the course of a nursing program. Finally, the scales used were not developed specifically for the Macao cultural context, although they have been widely validated in Chinese-speaking populations (Su et al., 2021).

5. Conclusion

Professional identity and occupational self-efficacy are strongly and positively correlated among nursing students in Macao. This finding suggests that educational strategies should not treat these as separate domains but rather as interconnected components of professional development. To build a resilient and committed future nursing workforce, educators must create learning environments that not only build clinical skills but also cultivate a deep and authentic sense of professional identity. This involves fostering intrinsic motivation, promoting peer support through engagement, and creating curricula that explicitly link theoretical knowledge with the values and identity of the nursing profession. Future research should focus on developing and testing interventions aimed at enhancing both constructs simultaneously.

Acknowledgements

We extend our sincere gratitude to the participating nursing student for their invaluable contributions, which greatly enriched our understanding of their professional identity and occupational self-efficacy.

Authors' contributions

WSL and YMCC were responsible for the conceptualization and design of the study. LSL conducted data collection and drafted the initial manuscript. YMCC critically reviewed

and revised the manuscript for essential intellectual content. All authors (WSL, YMCC, CSUL, and WIPP) have read, edited, and approved the final version of the manuscript for publication.

Funding

This project did not receive any grant funding.

Data availability

All data generated or analyzed during this study are included in this published article.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethical Approval and Consent to Participate

Ethical approval was obtained from research review board of Faculty Health Sciences and Sports, Macao Polytechnic University. Participants were informed of the study's aims, procedures, confidentiality, and right to withdraw without penalty, and provided written consent. All data were anonymized and kept strictly confidential for research purposes only.

References

- Atak, N. T., & Meric, M. (2023). The determination of the psychological resilience, academic achievement and academic self-efficacy of nursing students. *Cyprus Journal of Medical Sciences*.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*(Vol. 11). Freeman.
- Brown, A., Patel, R., & Li, M. (2022). The mediating role of self-efficacy in the relationship between professional identity and clinical performance in nursing students. *Nursing Education Today*, 109, 105256. <https://doi.org/10.1016/j.nedt.2021.105256>
- Chen, Y., & Zhu, M. (2013). A survey on the professional identity and its influencing factors of nursing students in Guangzhou and Macao. *Macao University of Science and Technology School of Medicine*.
- Chen, Y., Roberts, K., & Wang, L. (2023). Enhancing nursing students' professional identity and self-efficacy through simulation-based learning. *Nursing Education Today*, 118, 105573. <https://doi.org/10.1016/j.nedt.2022.105573>
- Duan, Y., Wu, X., Zhong, Z., Zhang, Q., Liu, Z., Shen, Z., Ding, S., & Xiao, Y. (2017). A study on the influence of professional identity and job burnout on turnover intention of nurses. *Chinese Nursing Management*, 17(3), 368-373.
- Fardid, M., Hatam, N., & Kavosi, Z. (2018). A Path Analysis of the Effects of Nurses, Perceived Organization Justice, Organizational Commitment, and Job Satisfaction on Their Turnover Intention. *Nursing and Midwifery Studies*, 7(4), 157-162.
- Fitzgerald, A., & Clukey, L. (2021). Professional identity in graduating nursing students. *Journal of Nursing Education*, 60(2), 74-80.
- Gao, Y., Li, Y., & Mu, T. (2019). The mediating role of career decision-making self-efficacy in undergraduate nursing students' psychological capital and professional identity. *Journal of Nursing*, 26(7), 40-44.
- Garcia, M., & Wong, T. (2024). Professional identity, self-efficacy, and resilience: A cross-sectional study among final-year nursing students. *Nursing Education Today*, 126, 105789. <https://doi.org/10.1016/j.nedt.2023.105789>

- Hao, Y. (2011). A study on the self-education model for improving nursing students' professional identity and professional self-efficacy. Second Military Medical University.
- He, T., Chen, Y., Yang, L., Li, H., Liu, L., & Wang, F. (2022). Investigation and promotion strategies of professional identity of higher vocational nursing students in the post-epidemic era. *Research in Hygiene Professional Education*, 40(15), 77-80.
- Innab, A., Almotairy, M. M., Alqahtani, N., Nahari, A., Alghamdi, R., Moafa, H., & Alshael, D. (2024). The impact of comprehensive licensure review on nursing students' clinical competence, self-efficacy, and work readiness. *Heliyon*, 10(7).
- International Council of Nurses. (2021). The global nursing shortage and nurse retention. ICN Policy Brief. https://www.icn.ch/sites/default/files/inline-files/ICN%20Policy%20Brief_Nurse%20Shortage%20and%20Retention_0.pdf
- Labrague, L. J. (2024). Examining the influence of social support and resilience on academic self-efficacy and learning outcomes in pre-licensure student nurses. *Journal of Professional Nursing*, 55, 119-124.
- Lee, H., & Kim, S. (2021). Integrating professional identity and self-efficacy development in undergraduate nursing curricula. *Nursing Education Today*, 97, 104706. <https://doi.org/10.1016/j.nedt.2020.104706>
- Mao, A., Lu, S., Lin, Y., & He, M. (2021). A scoping review on the influencing factors and development process of professional identity among nursing students and nurses. *Journal of Professional Nursing*, 37(2), 391-398.
- Matinlompola, N., Mikkonen, K., Koskenranta, M., Kamau, S., Oikarainen, A., Martikainen, R., Juntunen, J., & Kuivila, H.-M. (2024). Exploring educator perceptions and profiles in supporting culturally and linguistically diverse students integration in healthcare work environments – A cross-sectional study. *Nurse Education Today*, 143, 106344. <https://doi.org/10.1016/j.nedt.2024.106344>
- Simpson, O., Bennett, C. L., & Whitcombe, S. W. (2024). Student nurse retention. Lived experience of mature female students on a UK Bachelor of Nursing (Adult) programme: An interpretative phenomenological analysis. *Journal of Advanced Nursing*, 80(10), 4244-4258.
- Smith, J., Taylor, R., & Johnson, P. (2020). The impact of professional identity formation on nursing students' self-efficacy: A longitudinal study. *Nursing Education Today*, 88, 104384. <https://doi.org/10.1016/j.nedt.2020.104384>
- Su, L., Liu, G., Yang, L., Liu, Q., Ouyang, M., & Luo, J. (2021). Investigation on the professional identity and influencing factors of undergraduate nursing students in Guangxi. *Journal of Health Vocational Education*, 39(8), 57-59.
- Ten Hoeve, Y., Jansen, G., & Roodbol, P. (2014). The nursing profession: public image, self-concept and professional identity. A discussion paper. *Journal of Advanced Nursing*, 70(2), 295-309. <https://doi.org/10.1111/jan.12177>
- Wang, T., & Luo, Y. (2018). The correlation between clinical practice nursing students' perception of hospital caring atmosphere and professional identity. *Nursing Research*, 32(5), 825-828.
- Wang, Y., Ge, Y., Chu, M., & Xu, X. (2024). Factors influencing nursing undergraduates' motivation for postgraduate entrance: a qualitative inquiry. *BMC nursing*, 23(1), 728.
- World Health Organization. (2020). State of the world's nursing report – 2020. <https://www.who.int/publications/i/item/9789240003279>

Yang, L., Xu, M., Kuang, J., Zhou, K., Zhu, X., Kong, L., ... & Liu, H. (2022). Has the COVID-19 pandemic affected nursing students' career self-efficacy and professional calling? The mediating impact of professional identity. *BMC Medical Education*, 22(1), 757.

Yao, X., Yu, L., Shen, Y., Kang, Z., & Wang, X. (2021). The role of self-efficacy in mediating between professional identity and self-reported competence among nursing students in the internship period: A quantitative study. *Nurse education in practice*, 57, 103252.

Zhang, Y., Zhang, Z., Dong, P., & Feng, Y. (2022). Analysis of related influencing factors of professional identity and psychological status of nursing students during the outbreak of novel coronavirus pneumonia. *Chinese Higher Medical Education*, 4, 26-27.

Zhao, Y., Zhou, Q., Li, J., Luan, J., Wang, B., Zhao, Y., Mu, X., & Chen, H. (2021). Influence of psychological stress and coping styles in the professional identity of undergraduate nursing students after the outbreak of COVID-19: A cross-sectional study in China. *Nursing Open*, 8(6), 3527–3537.

Zou, L., Xie, Z., Tan, M., Ou, Q., & Liao, M. (2024). The effect of professional identity on nursing academic achievement: the chain mediating effect of general self-efficacy and learning engagement. *BMC Medical Education*, 24(1), 1014.