Research article

The mediating effect of self-directed learning ability between professional identity and burnout among nursing students

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ABSTRACT

Objectives: Burnout influences students' academic performance and mental health. This study analyzed the relationship between professional identity, self-directed learning ability, and burnout, and examined the mediating effect of self-directed learning ability between professional identity and burnout among nursing students.

Methods: 884 nursing students were recruited at two medical universities in China. Demographic information, Academic Burnout Scale, Professional Identity Questionnaire for Nursing Students, and Self-directed Learning Instrument were distributed to collect data.

Results: Both professional identity ($\beta = -0.17$) and self-directed learning ability ($\beta = -0.43$) showed negative associations with students' burnout. Meanwhile, there was a partial mediating effect of self-directed learning ability between professional identity and burnout (-0.24, 95% CI $= -0.30, -0.20$).

Conclusions: Nursing educators should emphasize on developing effective strategies to improve nursing students' professional identity and self-directed learning ability to prevent or reduce their burnout.

1. Introduction

With the growing need of quality care, nursing students need to obtain more professional knowledge and skills to be competent for their work. Nursing students are vulnerable to burnout as they struggle to manage stress in academic and clinical environments [1]. Burnout refers to the psychological state including emotional exhaustion, depersonalization, and reduced personal accomplishment [2]. Existing studies have shown the prevalence of burnout varying between 2.7% and 44.3% in nursing students [3–5]. Burnout was found to negatively influence nursing students' academic performance and mental health [6]. Thus, it is essential for nursing educators to identify factors affecting burnout to develop effective measures to reduce burnout. A systematic review concluded some factors associated with nursing students' burnout, such as grade, workload, physical activity, self-efficacy, and proactive personality, and suggested to explore more modifiable factors that affected burnout [7].

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Professional identity refers to individuals' self-conception of attributes, values, beliefs, and experience on a profession [8]. Professional identity is crucial to nurses' personal growth and professional development [9]. For nursing students, positive professional identity exhibited associations with higher self-efficacy [10], better learning outcomes and learning satisfaction [11], and higher retention in nursing program [12]. One study revealed that professional identity showed a negative impact on nurses' job burnout [13]. Professional identity is important for nursing students to form an impression of their future profession and adapt to that profession [14], which may help students cope with academic stress and lessen their burnout. However, little is known on how professional identity affects nursing students' burnout.

Self-directed learning (SDL) refers to individuals' ability to be responsible for their learning including identifying needs, setting goals, determining sources, implementing strategies, and evaluating outcomes [15]. SDL ability has benefits in nursing students' personal competence and professional development [16]. Higher SDL ability can facilitate the acquisition of professional knowledge and skills and enable students to become lifelong learners [16]. Higher SDL ability was also associated with lower burnout and better problem-solving ability and academic performance among nursing students [17–19]. As an effective learning ability, SDL ability may help students improve their learning effects and alleviate their academic stress. Thus, the impact of SDL ability on burnout deserves extensive exploration.

According to the Social Cognitive Theory, personal and environmental factors could influence the SDL ability, such as academic year, self-efficacy, and teaching-learning strategies [16]. What's more, one study on medical students revealed the positive impact of professional identity on SDL ability [20]. Other studies also reported SDL ability as a mediator between critical thinking and problem-solving ability [19], as well as between emotional intelligence and academic outcomes [21]. In light of this, SDL ability may serve as a mediator between professional identity and burnout. Given the negative impact of burnout, it is worthwhile to identify the effects of professional identity and SDL ability on burnout, with the purpose of providing evidence to develop effective measures to prevent or reduce students' burnout. Therefore, the present study aimed to explore the relationship between professional identity, SDL ability, and burnout among nursing students, and to examine the mediating effect of SDL ability between professional identity and burnout. Our hypotheses were: (a) professional identity positively influenced SDL ability; (b) professional identity negatively influenced burnout; and (c) SDL ability negatively influenced burnout and acted as a mediator between professional identity and burnout.

2. Methods

This study was a cross-sectional design to explore the effects of professional identity and SDL ability on burnout. This study was reported based on the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist for cross-sectional studies.

2.1. Ethics statement

The study was approved by the ethics committee of the First Affiliated Hospital of Chongqing Medical University (No. 2022-K618) and conformed to the principles of Declaration of Helsinki. Submitting the online questionnaire by participants was regarded as the verbal informed consent.

2.2. Sample

Nursing students were selected at two medical universities in Chongqing City and Zunyi City of China using the convenience sampling method. Inclusion criteria were: (1) having registered the four-year undergraduate nursing program for more than one semester, (2) having access to mobile phones or computers; and (3) willing participation in this survey. Exclusion criteria were: (1) students who were on leave (e.g. sick leave) or dropped out during the survey, and (2) unable to complete the survey due to personal reasons. The sample size of 116 was calculated based on the prior power analysis in G*Power 3.1 (effect size = 0.15, $\alpha = 0.05$, $1\text{-}\beta = 0.90$, and predictors = 5). Among the 922 eligible students, 884 students completed the questionnaire, with response rate of 95.9%.

2.3. Procedure

We collected data using an online survey through the Questionnaire Star platform. Two nursing teachers from two medical universities were trained as investigators and approached eligible nursing students. Before the survey, students were informed of important details of this survey, including research objectives, voluntary participation, anonymity, and confidentiality. If students agreed to participate, they entered into the online questionnaire using their smart phones or computers through a provided questionnaire link and then completed the self-report questionnaire according to the questionnaire instructions.

2.4. Measurements

2.4.1. Academic Burnout Scale (ABS)
The ABS was developed by Chinese researchers to assess university students' burnout [22]. The ABS includes 3 domains: emotional exhaustion, improper behavior, and reduced personal accomplishment. A five-point Likert scale is used for rating the 20 items (1 = strongly inconformity to 5 = strongly conformity). The mean total score of >3 indicates having burnout. The higher score, the more burnout. The ABS has been with satisfactory reliability (Cronbach's $\alpha = 0.87$) and construct validity [22] and has been widely utilized

in Chinese university students. The Cronbach's α were 0.83, 0.71, 0.73, and 0.87 for the three domains and total scale, respectively in this study.

2.4.2. Professional Identity Questionnaire for Nursing Students (PIQNS)

The PIQNS was developed by Chinese researchers to assess nursing students' professional identity [23]. The PIQNS consists of 5 dimensions: social modeling, independence of career choice, social comparison and self-reflection, retention benefit and risk of turnover, and professional self-image. The 17 items are evaluated on a five-point Likert scale between 1 point (completely disagree) and 5 points (completely agree). Higher total mean score reflects more positive professional identity. The PIQNS showed satisfactory reliability (Cronbach's α = 0.83) and validity in Chinese nursing students [23]. In the current study, the Cronbach's α were 0.92, 0.83, 0.67, 0.65, 0.81, and 0.92 for the 5 dimensions and total questionnaire, respectively.

2.4.3. Self-directed Learning Instrument (SDLI)

The SDLI was developed by Chinese researchers to assess the level of SDL ability in nursing students [24]. The SDLI contains 4 domains: learning motivation, planning and implementing, interpersonal communication, and self-monitoring. 20 items are scored by a five-point Likert scale from strongly disagree (1 point) to strongly agree (5 points). The higher score signifies better SDL ability. The SDLI has been demonstrated with good construct validity and internal consistency, Cronbach's α of 0.92 [24]. In this study, the Cronbach's α were 0.86, 0.93, 0.89, 0.88, and 0.96 for the 4 domains and total instrument, respectively.

Additionally, demographic information included age, gender, and academic year.

2.5. Statistical analysis

SPSS 25.0 was used for data analysis. Descriptive statistics were employed to describe the demographic and study variables. Correlations between variables were examined by Pearson's correlation analysis. The procedures developed by Preacher and Hayes were used to determine the mediating effect [25]. The regression analysis of mediating effect was examined using SPSS Process macro (Model 4). The normality, co-linearity, homoscedasticity, and independence of errors were tested for regression analysis. In the mediation model, we tested the effect of professional identity on SDL ability (path *a*), effect of SDL ability on burnout (path *b*), total effect of professional identity on burnout (path *c*), direct effect of professional identity on burnout (path *c'*), and indirect effect of professional identity on burnout through SDL ability. The significance of indirect effect was tested using 5000 bootstrap bias-corrected 95% confidence intervals (CI), with 95%CI not including zero. $P < 0.05$ (two tailed) was considered statistical significance.

3. Results

3.1. Sample characteristics

Table 1 presents the sample characteristics. Mean age of the 884 nursing students was 20.99 (SD = 1.61) years, ranging from 17 to 26 years. Among them, 92.5% were female. The distribution of students in the four academic years was 23.2%, 20.1%, 32.7%, and 24.0%, respectively.

3.2. Descriptive statistics and correlations analysis of variables

The mean score of burnout was 2.79 (SD = 0.48), with 32.4% of students having burnout. In addition, the mean score for professional identity and SDL ability was 3.41 (SD = 0.53) and 3.54 (SD = 0.51), respectively. Descriptive statistics of these variables are presented in Table 2. As shown in Table 3, professional identity ($r = -0.42$, $p < 0.01$) and SDL ability ($r = -0.53$, $p < 0.01$) were negatively correlated with burnout. Meanwhile, greater professional identity was significantly correlated with better SDL ability ($r = 0.57$, $p < 0.01$). In addition, burnout showed negative correlations with age ($r = -0.12$, $p < 0.01$) and academic year ($r = -0.12$, $p < 0.01$). Professional identity was positively correlated with age ($r = 0.07$, $p < 0.05$).

Table 1
Sample characteristics (n = 884).

Variables	N (%)	Mean (SD)
Age (years)		20.99 (1.61)
Gender		
female	818 (92.5)	
male	66 (7.5)	
Academic year		
year 1	205 (23.2)	
year 2	178 (20.1)	
year 3	289 (32.7)	
year 4	212 (24.0)	

Table 2
Descriptive statistics of variables (n = 884).

Variables	Mean (SD)	Min	Max
Burnout	2.79 (0.48)	1.4	4.5
Improper behavior	2.93 (0.56)	1.17	5
Reduced personal accomplishment	2.77 (0.54)	1	5
Emotional exhaustion	2.72 (0.63)	1	4.38
Professional identity	3.41 (0.53)	1.59	5
Independence of career choice	3.63 (0.73)	1	5
Social comparison and self-reflection	3.59 (0.57)	2	5
Social modeling	3.45 (0.63)	1	5
Professional self-image	3.37 (0.67)	1	5
Retention benefit and risk of turnover	3.23 (0.68)	1	5
SDL ability	3.54 (0.51)	2	5
Learning motivation	3.67 (0.53)	2	5
Interpersonal communication	3.53 (0.51)	1.75	5
Self-monitoring	3.47 (0.57)	2	5
Planning and implementing	3.47 (0.60)	1	5

SDL= Self-directed learning.

Table 3
Correlations between variables (n = 884).

Variables	Burnout	Professional identity	SDL ability
Professional identity	−0.42 **	1	–
SDL ability	−0.53**	0.57 **	1
Age	−0.12 **	0.07 *	0.06
Gender	−0.06	−0.07	−0.01
Academic year	−0.12 **	0.07	0.06

SDL= Self-directed learning, $*p < 0.05$, $**p < 0.01$.

3.3. Mediation analysis

The results of regression analyses for the mediating effect are shown in Table 4 and Fig. 1. Tests for the normality, co-linearity, homoscedasticity, and independence of errors suggested that none of them was a concern in the regression analysis. After controlling the demographic variables, the regression analyses indicated that professional identity positively influenced SDL ability ($\beta = 0.57$, $p < 0.01$) and negatively influenced burnout (total effect: $\beta = -0.41$, $p < 0.01$). When including professional identity and SDL ability into the analysis, the effect of SDL ability on burnout was −0.43 ($p < 0.01$) and the direct effect of professional identity on burnout was −0.17 ($p < 0.01$). Moreover, the indirect effect of professional identity on burnout through SDL ability was −0.24 (95% CI = −0.30, −0.20). The above results indicated SDL ability partially mediating the relationship between professional identity and burnout, approximately 58.5% of the total effect of professional identity on burnout.

4. Discussion

This was the first study, to our knowledge, to examine the mediating effect of SDL ability between professional identity and students' burnout. This study revealed the negative effects of both professional identity and SDL ability on nursing students' burnout. Further, SDL ability acted as a mediator between professional identity and burnout. Our findings contribute to a better understanding of the interactions between professional identity, SDL ability, and burnout, which is beneficial for developing effective measures to alleviate students' burnout.

Table 4
Results of regression analyses of mediating effect of SDL ability between professional identity and burnout (n = 884).

Variables	SDL ability			Burnout			Burnout		
	β	SE	t	β	SE	t	β	SE	t
Age	0.01	0.03	0.30	−0.05	0.03	−1.01	−0.05	0.03	−0.97
Gender	0.03	0.11	0.34	−0.08	0.12	−2.65**	−0.07	0.11	−2.47*
Academic year	0.01	0.04	0.81	−0.05	0.05	−1.00	−0.05	0.04	−0.99
Professional identity	0.57	0.03	20.37**	−0.41	0.03	−13.66**	−0.17	0.03	−5.08**
SDL ability	–	–	–	–	–	–	−0.43	0.03	−12.64**
R^2		0.32			0.19			0.32	
F		105.16			51.95			81.00	

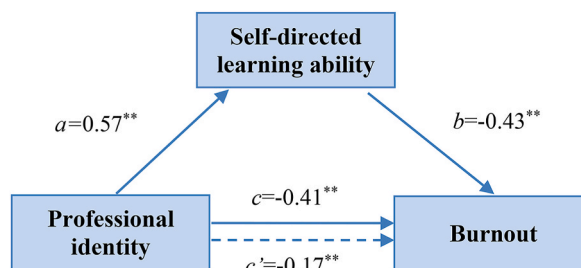SDL= Self-directed learning, $*p < 0.05$, $**p < 0.01$.

Fig. 1. The mediating effect of self-directed learning ability between professional identity and burnout. *a*, effect of professional identity on self-directed learning ability; *b*, effect of self-directed learning ability on burnout; *c*, total effect of professional identity on burnout; *c'*, direct effect of professional identity on burnout; **$p < 0.01$.

Our study showed 32.4% of nursing students experiencing burnout, lower than other Chinese nursing students (39.3% and 42.3%) [5,26] and higher than Brazilian and Spanish nursing students (2.7% and 20%) [3,4]. The differences in the prevalence may be due to the different burnout assessment tools, nursing curriculum, and teaching environment. A possible explanation for the high burnout prevalence may be the heavy academic load and stress related to high requirements of competency-based curriculum on nursing students. Our findings further highlighted the importance of effective measures to reduce nursing students' burnout.

As hypothesized, professional identity negatively affected burnout. For nursing students, the greater positive perception of nursing profession, the less likelihood of experiencing burnout. As a motivating factor of professional development, professional identity was beneficial to increasing students' self-efficacy to coping with academic stress [10] and reducing nursing students' role stress [27]. Professional identity could also enhance students' learning engagement and sense of belonging [28], and these two variables were significantly associated with reduced burnout [26,29]. In addition, a prior study found positive associations between professional identity with learning outcomes and learning satisfaction [11]. Nursing students with positive professional identity may evaluate nursing program positively, participate in academic activities actively, cope with academic tasks effectively, and thereby be less affected by burnout. Consistent with previous studies [6,27], professional identity was at a moderate level for nursing students in our study and needed to be improved. Our findings suggested that enhancing professional identity may be a useful target to reduce students' burnout.

This study found nursing students with a moderate level of SDL ability, supported by previous studies [30,31]. In line with a previous study [18], our study confirmed the negative relationship between SDL ability and burnout, indicating the active role of SDL ability in reducing nursing students' burnout. In the stressful learning environment, SDL ability could foster students' problem-solving ability and help them effectively cope with academic difficulties [19], which may be beneficial for alleviating students' stress. In addition, students with higher SDL ability tended to have more confidence to deal with stress and complete challenging academic tasks and thereby experienced lower levels of burnout [18].

Moreover, we found that SDL ability partially mediated the effect of professional identity on burnout. In other words, positive professional identity may facilitate students' SDL ability in nursing curriculum, which, in turn, would reduce their burnout. Our result was in line with a previous study in which SDL ability acted as a mediator between emotional intelligence and academic outcomes [21]. Positive professional identity may be related to students' high learning motivation, positive learning attitudes, and effective learning strategies to enhance professional competence [20]. Besides, positive professional attitude could promote students' positive perception of academic stress and keep their learning enthusiasm and learning behavior to reduce burnout [5]. Our results emphasized the significant role of improving SDL ability in developing strategies to reduce nursing students' burnout.

However, several limitations should be considered. First, the cross-sectional design may fail to reveal causal relationship between burnout with professional identity and SDL ability. Second, the convenience sampling method may influence the generalization of our findings. To increase the validity of these findings, the longitudinal research or random sampling method is needed. Lastly, the use of self-report questionnaire is difficult to avoid recall bias and socially desirable response.

Our findings highlight more attention to prevent or reduce nursing students' burnout. Regular assessment of burnout can provide valuable information about students' psychological state related to academic stress. Nursing educators should also incorporate effective interventions into the nursing curriculum to reduce students' burnout, such as mindfulness-based education, resilience education, and progressive muscle relaxation [1]. Moreover, the critical roles of professional identity and SDL ability should be noted in reducing students' burnout. It is a continuous process to form positive professional identity. Measures of cultivating professional identity should be considered for nursing students, such as early clinical educational experiences, professional development course, faculty role models, and caring culture [9,14,32]. In addition, appropriate teaching-learning strategies should be employed to foster students' SDL ability, such as blended learning and problem-based learning [16].

5. Conclusions

This study found a medium level of burnout in nursing students. Both professional identity and SDL ability showed negative effects on burnout, and SDL ability acted as a partial mediator between professional identity and burnout. Our findings put forward suggestions for nursing educators to attach emphasis on effective measures to nurture students' professional identity and SDL ability to

prevent or reduce their burnout.

CRediT authorship contribution statement

Ping Hu: Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ling-Na Kong:** Writing – review & editing, Writing – original draft, Validation, Software, Project administration, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Shuo-Zhen Chen:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation, Conceptualization. **Ling Luo:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Conceptualization.

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.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e27707.

References

[1] S. Burleson, L. Thomas, S. DeBoor, Effective interventions for nursing student burnout: a scoping review, Nurse Educ. 48 (3) (2022) E85–E89.
[2] C. Maslach, What have we learned about burnout and health? Psychol. Health 16 (5) (2001) 607–611.
[3] M.I. Ríos-Risquez, M. García-Izquierdo, E.L. Sabuco-Tebar, et al., An exploratory study of the relationship between resilience, academic burnout and psychological health in nursing students, Contemp. Nurse 52 (4) (2016) 430–439.
[4] E.M. Vasconcelos, C.O. Trindade, L.R. Barbosa, et al., Predictive Factors of Burnout Syndrome in Nursing Students at a Public University, Rev. Esc. Enferm. USP 54 (2020) e03564.
[5] Z. Zhou, H. Liu, D. Zhang, et al., Mediating effects of academic self-efficacy and smartphone addiction on the relationship between professional attitude and academic burnout in nursing students: a cross-sectional study, Nurse Educ. Today 116 (2022) 105471.
[6] H. Wei, A. Dorn, H. Hutto, et al., Impacts of nursing student burnout on psychological well-being and academic achievement, J. Nurs. Educ. 60 (7) (2021) 369–376.
[7] L.N. Kong, Y. Yao, S.Z. Chen, et al., Prevalence and associated factors of burnout among nursing students: a systematic review and meta-analysis, Nurse Educ. Today 121 (2023) 105706.
[8] M. Johnson, L.S. Cowin, I. Wilson, et al., Professional identity and nursing: contemporary theoretical developments and future research challenges, Int. Nurs. Rev. 59 (4) (2012) 562–569.
[9] A. Mao, S.E. Lu, Y. Lin, et al., A scoping review on the influencing factors and development process of professional identity among nursing students and nurses, J. Prof. Nurs. 37 (2) (2021) 391–398.
[10] X. Yao, L. Yu, Y. Shen, et al., 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 Educ. Pract. 57 (2021) 103252.
[11] S.Y. Wang, S. Zang, X.Y. Yang, Correlations among learning outcome, learning belief, professional identity and learning satisfactionin nursing undergraduates, Chin. J. Mod. Nurs. 25 (8) (2019) 1040–1043.
[12] M. Worthington, Y. Salamonson, R. Weaver, et al., Predictive validity of the macleod clark professional identity scale for undergraduate nursing students, Nurse Educ. Today 33 (3) (2013) 187–191.
[13] Z. Ren, X. Zhang, X. Li, et al., Relationships of organisational justice, psychological capital and professional identity with job burnout among Chinese nurses: a cross-sectional study, J. Clin. Nurs. 30 (19–20) (2021) 2912–2923.
[14] C. Browne, P. Wall, S. Batt, et al., Understanding perceptions of nursing professional identity in students entering an Australian undergraduate nursing degree, Nurse Educ. Pract. 32 (2018) 90–96.
[15] E. O'Shea, Self-directed learning in nurse education: a review of the literature, J. Adv. Nurs. 43 (1) (2003) 62–70.
[16] F.M.F. Wong, A.C.Y. Tang, W.L.S. Cheng, Factors associated with self-directed learning among undergraduate nursing students: a systematic review, Nurse Educ. Today 104 (2021) 104998.
[17] K.N. Alotaibi, The learning environment as a mediating variable between self-directed learning readiness and academic performance of a sample of saudi nursing and medical emergency students, Nurse Educ. Today 36 (2016) 249–254.
[18] Z.H. Chen, Y.Y. Ma, X.H. Feng, et al., Correlation analysis of self-directed learning ability, self-efficacy and academic burnout of junior nursing college students in closed management colleges, Nurs. Open 10 (4) (2023) 2508–2518.
[19] Y. Song, Y. Lee, J. Lee, Mediating effects of self-directed learning on the relationship between critical thinking and problem-solving in student nurses attending online classes: a cross-sectional descriptive study, Nurse Educ. Today 109 (2022) 105227.
[20] J.C. Bao, X.S. Yu, Relationship between professional identity and self-directed learning ability among medical students, Health Vocat. Educ. 38 (3) (2020) 108–111.
[21] Z. Shafait, M.A. Khan, Y. Bilan, et al., Modeling the mediating roles of self-directed learning and knowledge management processes between emotional intelligence and learning outcomes in higher education, PLoS One 16 (7) (2021) e0255177.
[22] R. Lian, L.X. Yang, L.H. Wu, Relationship between professional commitment and learning burnout of undergraduates and scales developing, Acta Psychol. Sin. 37 (5) (2005) 632–636.
[23] Y.F. Hao, Study of the Model of Self-Education in Enhancing the Level of Professional Identity and Professional Self-Efficacy in Nursing Students, Second Military Medical University, Shanghai, 2011.
[24] S.F. Cheng, C.L. Kuo, K.C. Lin, et al., Development and preliminary testing of a self-rating instrument to measure self-directed learning ability of nursing students, Int. J. Nurs. Stud. 47 (9) (2010) 1152–1158.

[25] A.F. Hayes, Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach, second ed., Guilford Press, New York, 2018.

[26] J. Wang, L. Bu, Y. Li, et al., The mediating effect of academic engagement between psychological capital and academic burnout among nursing students during the COVID-19 pandemic: a cross-sectional study, Nurse Educ. Today 102 (2021) 104938.

[27] L. Sun, Y. Gao, J. Yang, et al., The impact of professional identity on role stress in nursing students: a cross-sectional study, Int. J. Nurs. Stud. 63 (2016) 1–8.

[28] M. Zhang, R.L. Li, The effect of speciality identity on university students' learning engagement: the mediating role of school belonging, Heilongling Res. Higher Educ. 287 (3) (2018) 94–99.

[29] P. Puranitee, W. Kaewpila, S. Heeneman, et al., Promoting a sense of belonging, engagement, and collegiality to reduce burnout: a mixed methods study among undergraduate medical students in a non-Western, Asian context, BMC Med. Educ. 22 (1) (2022) 2327.

[30] M. Jin, C. Ji, The correlation of metacognitive ability, self-directed learning ability and critical thinking in nursing students: a cross-sectional study, Nurs. Open 8 (2) (2021) 936–945.

[31] B.N. Phillips, B.J. Turnbull, F.X. He, Assessing readiness for self-directed learning within a non-traditional nursing cohort, Nurse Educ. Today 35 (3) (2015) e1–e7.

[32] L.Z. Wei, S.S. Zhou, S. Hu, et al., Influences of nursing students' career planning, internship experience, and other factors on professional identity, Nurse Educ. Today 99 (2021) 104781.