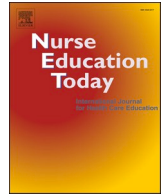




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Research article



The level and influencing factors of graduating nursing students' professional commitment from the perspective of Ecological Systems Theory: A cross-sectional study

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A B S T R A C T

Background: Increased professional commitment is essential for relieving the nursing workforce shortage, which is exacerbated by the COVID-19 pandemic. The professional commitment of graduating nursing students is a powerful predictor of their work commitment. However, limited information is available regarding graduating nursing students' professional commitment. Existing studies investigating nursing students' professional commitment are limited by their lack of theoretical foundation.

Objectives: To investigate the level of graduating nursing students' professional commitment and its multilevel influencing factors from the perspective of the Ecological Systems Theory in the early days following the COVID-19 outbreak.

Design: A descriptive cross-sectional study.

Setting: Three educational institutions in Shanghai, China.

Participants: 513 nursing students who were graduating with an associate or bachelor's degree.

Methods: The independent variables were measured by a self-designed questionnaire. The dependent variable professional commitment was measured by the Nursing Professional Commitment Scale. Hierarchical regression analyses, which allowed the independent variables entered in order, were performed to identify the significant predictor variables of the professional commitment and its dimensions.

Results: The level of professional commitment was 100.15 ± 20.35 (score ranged between 34 and 136). The individual factors (degree, whether had received a scholarship during the past academic years, $\Delta R^2 = 0.142$), family factors (parents and siblings' attitudes towards one's majoring in nursing, $\Delta R^2 = 0.153$), educational factors (academic faculty's belief in nursing profession, leaders' emphasis on nursing profession, satisfaction with clinical instructors' role modeling, $\Delta R^2 = 0.097$), and social factors (reason for majoring in nursing, perceived nurse-patient relationship, $\Delta R^2 = 0.153$) were significant predictors of the graduating nursing students' professional commitment ($R^2 = 47.6\%$, $F = 32.277$, $p < 0.001$).

Conclusions: The graduating nursing students had a moderate level of professional commitment, which needed to be improved. Nursing educators should comprehensively consider various factors to understand the relationship between individuals and environmental systems, and implement targeted interventions to shape the positive professional values of nursing students.

1. Introduction

The shortage of the nursing workforce is a globally recognized issue due to the increasing high-quality healthcare needs. This problem has

been exacerbated by the pandemic of COVID-19 (International Council of Nurses, 2022). China has 800,000 fewer nurses than it actually required. Even in Shanghai, a major metropolitan city in China with 92,000 nurses, the nursing workforce cannot meet clinical demands

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(Cai, 2021). The COVID effect has been leading to increased absence, early retirement, and job burnout which may force the nurses to leave their position and even quit the nursing profession (Özkan Şat et al., 2021). This increased the global shortage, which is estimated to be seven million from 5.9 million prior to the pandemic (World Health Organization, 2016). To ensure population health, a healthcare workforce of sufficient capacity, capability, and quality, which can meet epidemiological challenges and changing demand is expected.

The future of nursing will be determined by nurses who are committed to the profession (Gauthier, 2011; Duran et al., 2021), notably in the era of the COVID-19 pandemic (Kalateh Sadati et al., 2020). In recent years, professional commitment has attracted considerable interest from nursing managers and scholars in order to cope with the workforce shortage. Professional commitment is defined as a commitment to professional objectives, values, beliefs, and willingness to continue in one's profession (Teng et al., 2009). The high professional commitment of nurses is associated with reduced work stress, high job satisfaction, and less turnover intention (Jourdain and Chênevert, 2010; Lu et al., 2019).

The nursing students' professional commitment is a powerful predictor of their professional commitment when they become a registered nurse following graduation (Lu et al., 2000). Professional commitment is a psychological reaction to a person's profession, which is originally shaped by basic education; it tends to be stable at the period of graduation, and is characterized by continuous change following graduation (Lee et al., 2000; Sibandze and Scaffide, 2018). The aim of nursing education is to ensure that graduates not only receive the necessary knowledge and skills to provide safe patient care, but also establish professional commitment to demonstrate continuous efforts in nursing. The graduating nursing students (GNSs) are welcoming the transition of their role from a student to a nurse in their final semester (Järvinen et al., 2018). Their professional commitment right before the labor market entry and how they perceive tied to the nursing profession can immediately affect their career decision-making of whether to be actively involved in the nursing field; it also has a lasting effect on their work experience and long-term career development (Kaihlainen et al., 2021; Wang et al., 2018; Guerrero et al., 2017). Therefore, the GNSs' professional commitment deserves considerable attention.

Accumulated studies have investigated the level and influencing factors of the professional commitment of nursing students in all different grades (Kong et al., 2016; Zheng et al., 2016; Mavor et al., 2014; Klassen and Ming, 2011). However, a limited number of studies have specifically focused on the professional commitment of GNS. Information regarding the professional commitment of GNS and the associated factors may aid both nurse educators and managers to take effective interventions and increase the smooth transition of GNSs to registered nurses (Järvinen et al., 2018; Spector et al., 2015). This is crucial for securing the future nursing workforce in the current COVID-19 times, as well as in the far future.

2. Background

Higher grades were associated with decreased professional commitment among nursing students in some existing studies. For example, Kong et al. (2016) demonstrated that the second-grade college students exhibited a lower nursing professional commitment than those in the first grade. Consistently, an additional study performed in China suggested that the third grade students exhibited lower professional commitment than those in the first grade (Zheng et al., 2016). This may be due to the increased academic pressure noted in the higher grade students, which reduces their professional enthusiasm, thus resulting in lower professional commitment (Mavor et al., 2014; Klassen and Ming, 2011). Certain studies have suggested that senior students exhibit the lowest professional commitment, which is explained by the gap between their idealistic expectations and the stressful clinical practice reality they face through an internship (Zhao et al., 2022; Tan, 2009; Zhao,

2011). In contrast to these observations, other studies conducted in different educational backgrounds have shown increased professional commitment following internship. Based on the increase or decrease in the professional commitment, it is deduced that the clinical internship is crucial for the students allowing them to renew their values and general appraisal of the nursing profession. Therefore, the GNSs deserve specific attention, as they have finished both the school-based courses and hospital-based practice and formed a relatively stable recognition on nursing professionalization (Järvinen et al., 2018; Flott and Linden, 2016). The professional commitment of GNSs can provide feedback on the whole process of college education and a reference for new nurse training programs (Kaihlainen et al., 2021; Wang et al., 2018; Guerrero et al., 2017).

To the best of our knowledge, previous research that have specifically examined the professional commitment of GNSs are scarce. The influencing factors of the nursing students' professional commitment include personality traits, family background, the reason for admission, academic achievement, satisfaction during an internship, and instructor role modeling (Järvinen et al., 2018; Fan et al., 2017; Kong et al., 2016). The lack of a theoretical framework makes it difficult to systematically assess these factors and use the findings to improve the interventions.

Ecological Systems Theory (EST), developed by the American psychologist Urie Bronfenbrenner (1979), is helpful for understanding the multilevel factors influencing nursing students' professional commitment. According to the theory, individual development occurs through a progressive reciprocal interaction between subjects and their environment (Bronfenbrenner, 1979, 1995). The environment consists of the following systems: microsystem (individual factors), mesosystem (interpersonal factors), exosystem (organizational or community factors), and macrosystem (society/policy or culture factors). EST provides a novel perspective to analyze the impact of the multilevel environment on the GNSs' professional commitment. The environments applied to this study included the following: individual, family, college, and social factors.

The literature suggests that the family background exhibits an influence on the professional commitment of the nursing students. The students from urban areas and the single-child families indicated significantly lower professional commitment than the other categories (Järvinen et al., 2018; Kong et al., 2016). In addition, the educational environment was crucial in shaping the nursing students' professional identity (Bijani et al., 2019; Guerrero et al., 2017). The optimal pedagogical atmosphere and supervisory relationship were positively associated with the nursing students' professional commitment.

Previous studies have shown that organizational and social factors are key to the professional commitment of the registered nurses (Guerrero et al., 2017; Chang et al., 2015); however, these factors were mentioned in a limited number of studies investigating the nursing students' professional commitment. The majority of studies examined the students' individual factors, such as gender, degree, and academic performance. According to EST (Bronfenbrenner, 1979), it was hypothesized that organizational and social factors had an effect on GNSs' professional commitment. The current COVID environment also provided evidence to consider these factors. Due to the outbreak and epidemic of COVID-19, additional attention has been paid to the nurse population since it has been shown that the nurses at the front line play an important role while their unique contributions have been previously devalued (Pei et al., 2022). More information is known regarding the nurses' daily work via social media, which is described by high responsibility, heavy workload, high pressure, risk, and intensity. Considering these changes, it is interesting to assess the current level of the professional commitment of GNSs and the associated environmental factors.

The present study was conducted in the spring of 2020, following the outbreak of COVID-19. The first aim was to examine the level of the GNSs' professional commitment based on the COVID-19 pandemic. The second aim was to investigate the influence of specific multilevel factors

(individual, family, educational, and social factors) on the GNSs' professional commitment from the perspective of EST.

3. Methods

3.1. Design and setting

A descriptive cross-sectional design was used. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist for cross-sectional studies was used to report the results.

The present study was conducted from February to April 2020 in three nursing educational institutions in Shanghai, which is a large metropolitan city in eastern China. The three institutions provided associate or bachelor's degrees for nursing students. The associate-degree students had to study in colleges for three years, and the bachelor's degree students had to study in universities for four years. Both of these students could become registered nurses after passing the qualification test and accepting an offer from any hospital. The students should spend at least eight months in their last two academic years working in a hospital as nursing interns and practice their knowledge and skills learned in school in a real clinical context.

3.2. Participants

A convenience sampling was used to recruit the participants. The inclusion criteria were the following: Nursing students who were graduating with an associate or bachelor's degree in June 2020 and had finished the full-time clinical practice. The exclusion criteria were the following: The students who had been diagnosed with mental disorders or those who were suspended from school. The sample size was decided according to the rule of thumb ensuring that at least 10 participants were required for each independent variable in the multiple regression analysis (VanVoorhis and Morgan, 2007). In the present study, the sample size had to be above 150 according to the number of independent variables, which were 15.

3.3. Measures

A self-designed questionnaire was used to collect the variables of individual context, including socio-demographic factors, such as gender and degree, and study experience, such as whether the participants had received scholarships or served as student leaders during the past academic years.

The variables of the external environment were collected through the self-designed questionnaire. The family factors included the residence of the students (urban or rural cities), the presence of siblings, their family financial status, their parents' education degrees, and their parents' and siblings' attitudes towards their majoring in nursing. The educational factors included the academic faculty's belief in the profession, the leaders' emphasis on the nursing profession, and the satisfaction with the clinical instructors' role modeling. The social factors included the reason for majoring in nursing and the perceived nurse-patient relationship.

The professional commitment was evaluated with the self-reported Nursing Professional Commitment Scale developed by Lu et al. (2000), which has been widely used to assess nurses' and nursing students' professional commitment levels. It consists of 34 items and four dimensions: "willingness to make an effort" (16 items) is to evaluate the extent to which one individual is willing to exert considerable effort on behalf of the organization, "desire to stay in the profession" (8 items) reflects the degree to which a nursing student feels that he/she would remain in the current job, "intrinsic positive value of work" (5 items) reflects the individual's perceived or calculated value of the current work, and "belief in goals and values" (5 items) is to evaluate a student's belief in the goals and values of the nursing profession. All items were scored on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree), with higher scores indicating stronger professional

commitment. The overall score of the professional commitment was the sum of the scores of the four dimensions. It ranged from 34 to 136. In the present study, the Cronbach's α value of the dimensions ranged from 0.847 to 0.974, indicating strong internal consistency.

3.4. Data collection and ethical consideration

The data were collected using Wenjuanxing software, which is an online questionnaire system. The students read the questionnaire instruction and the aims of the study and checked the option of giving informed consent if they were willing to participate in this survey. Subsequently, they continued answering the questionnaire. All items must be completed before the questionnaires could be submitted. The average time to complete the survey was approximately 10 min. The students were assured that participation in the study was voluntary and anonymous and could quit answering this questionnaire if they did not want to continue. Following completion of the information, two researchers reviewed the data, and excluded the questionnaires which were finished in 2 min. Ethical approval for this study was obtained from the Institutional Review Board. Finally, 5 students who did not meet the recruitment criteria and 2 questionnaires finished in <2 min were excluded.

3.5. Data analysis

The data were analyzed using IBM SPSS 19.0 software. The mean and standard deviation were used to describe the level of professional commitment. The numbers and percentages were used to describe the independent variables. Had checked the normality of the distribution and the homoscedasticity, the independent samples *t*-test and One-way analysis of variance were used to evaluate the differences in the professional commitment and its dimensions between the groups. Subsequently, the hierarchical regression analyses allowing the individual, family, educational, and social factors entered the model sequentially were used to identify which variables significantly influenced the professional commitment and its dimensions (Adewale et al., 2007). The variables showing significant effects in the univariate analysis were included in the hierarchical regression model. *P*-values < 0.05 were considered to indicate statistically significant differences.

4. Results

4.1. Descriptive characteristics

A total of 513 questionnaires were included in the analysis. The majority of them were derived from students with a bachelor's degree (72.90 %) and from female (89.67 %) participants. The age of the participants ranged from 21 to 24 years old, with the mean of 22 year-old (SD = 1.32). The mean score of professional commitment was 100.15 (SD = 20.35), and the average score per item was 2.95 (SD = 0.60). Among the four dimensions, the "belief in goals and values" scored the highest (15.96 ± 2.72 , 3.19 ± 0.54 per item), followed by the "desire to stay in the profession" (23.98 ± 5.36 , 2.99 ± 0.66 per item) and the "intrinsic positive value of work" (14.40 ± 3.18 , 2.88 ± 0.64 per item); the "willingness to make an effort" scored the lowest (45.81 ± 11.00 , 2.86 ± 0.69 per item). Table 1 indicates the detailed descriptive characteristics of all variables used.

4.2. The influencing factors of professional commitment

The variables showing significant effects in the univariate analyses (Table 1) were included in the hierarchical regression model, and the significant variables were input into the model sequentially from the individual to the society level. Table 2 indicates the results of the hierarchical regression analyses. The individual factor (degree, whether they had received a scholarship during the past academic years, $\Delta R^2 =$

Table 1
Mean of dimensions and total professional commitment scores by independent variables (N = 513).

Variable	n (%)	PC	t/F	WC	t/F	DC	t/F	IC	t/F	BC	t/F
Individual factors											
Gender			-1.850		-1.567		-1.818		-1.826		-1.773
Male	53 (10.3)	95.26 ± 21.84		43.57 ± 11.61		22.72 ± 5.57		13.64 ± 3.43		15.34 ± 3.21	
Female	460 (89.7)	100.71 ± 20.12		46.06 ± 10.91		24.13 ± 5.33		14.48 ± 3.15		16.04 ± 2.65	
Degree			9.027**		8.666**		7.492**		7.819**		5.521**
Associate	139 (27.1)	112.13 ± 17.91		52.26 ± 10.10		26.75 ± 4.37		16.10 ± 2.83		17.02 ± 2.66	
Bachelor	374 (72.9)	95.70 ± 19.40		43.41 ± 10.35		22.95 ± 5.34		13.76 ± 3.08		15.57 ± 2.63	
Had served as a student leader			-2.411*		-2.450**		-2.024**		-0.587		-2.411**
No	279 (54.4)	98.16 ± 19.56		44.72 ± 10.70		23.54 ± 5.20		14.32 ± 2.94		15.58 ± 2.72	
Yes	234 (50.5)	102.52 ± 21.05		47.10 ± 11.23		24.50 ± 5.52		14.49 ± 3.46		16.43 ± 2.65	
Had received a scholarship			2.432*		-2.010*		-2.664**		-1.071		-3.568**
No	244 (47.6)	97.86 ± 20.43		44.78 ± 11.23		23.32 ± 5.30		14.24 ± 3.03		15.52 ± 2.71	
Yes	269 (52.4)	102.22 ± 20.09		46.73 ± 10.73		24.58 ± 5.36		14.54 ± 3.31		16.37 ± 2.66	
Family factors											
Residence			-1.627		-1.690		-1.042		-1.791		-1.529
Urban	351 (68.4)	99.16 ± 21.07		45.28 ± 11.44		23.81 ± 5.47		14.23 ± 3.24		15.84 ± 2.83	
Rural	162 (31.6)	102.30 ± 18.58		46.95 ± 9.93		24.35 ± 5.12		14.77 ± 3.04		16.23 ± 2.45	
Financial condition			1.131		1.027		1.254		0.524		0.896
Lower than average	94 (18.3)	100.15 ± 21.30		45.80 ± 11.22		23.86 ± 5.78		14.36 ± 3.28		16.13 ± 2.54	
At average	389 (75.8)	100.56 ± 20.10		46.02 ± 10.94		24.12 ± 5.29		14.45 ± 3.16		15.97 ± 2.75	
Higher than average	30 (5.8)	94.77 ± 20.49		43.03 ± 11.10		22.53 ± 4.93		13.83 ± 3.25		15.37 ± 2.86	
Father's degree			3.490*		2.906*		3.939**		3.048*		1.643
Secondary school and below	230 (44.8)	102.37 ± 19.51		46.89 ± 10.16		24.44 ± 5.26		14.66 ± 3.08		16.20 ± 2.62	
High school	141 (27.5)	102.22 ± 20.99		46.28 ± 11.46		24.54 ± 5.27		14.65 ± 3.26		15.94 ± 2.78	
Associate	89 (17.3)	95.86 ± 21.75		43.97 ± 11.92		22.84 ± 5.38		13.84 ± 2.98		15.75 ± 2.73	
Bachelor and above	53 (10.3)	94.25 ± 21.23		42.92 ± 11.08		22.43 ± 5.60		14.40 ± 3.18		15.36 ± 2.89	
Mother's degree			3.413*		2.292		3.495*		3.931**		3.055*
Secondary school and below	266 (51.9)	100.67 ± 19.51		46.08 ± 10.43		24.12 ± 5.32		14.52 ± 3.03		15.96 ± 2.62	
High school	136 (26.5)	103.57 ± 20.58		47.03 ± 11.27		24.79 ± 5.31		14.83 ± 3.35		16.40 ± 2.66	
Associate	71 (13.8)	96.66 ± 21.82		44.31 ± 12.29		22.90 ± 5.55		13.80 ± 2.98		15.65 ± 2.98	
Bachelor and above	40 (7.8)	92.93 ± 20.49		42.48 ± 10.88		22.25 ± 5.04		13.15 ± 3.55		15.05 ± 2.83	
Have sibling			1.540		1.673		0.992		0.734		1.943
Yes	193 (37.6)	101.93 ± 20.13		46.85 ± 10.80		24.29 ± 5.54		14.53 ± 3.10		16.26 ± 2.57	
No	320 (62.4)	99.08 ± 20.44		45.18 ± 11.09		23.80 ± 5.25		14.32 ± 3.23		15.78 ± 2.79	
Parents and siblings' attitudes to majoring in nursing			72.170**		64.757**		60.129**		62.576**		28.850**
Not supportive	71 (13.8)	83.41 ± 18.86		36.86 ± 10.30		19.80 ± 5.50		12.01 ± 2.89		14.73 ± 2.43	
Somewhat supportive	173 (33.7)	93.71 ± 17.62		43.66 ± 9.62		22.46 ± 4.76		13.38 ± 2.64		15.21 ± 2.72	
Very supportive	269 (52.4)	108.71 ± 18.01		50.19 ± 9.87		26.07 ± 4.70		15.68 ± 2.98		16.78 ± 2.53	
Educational factors											
Academic faculty's belief in nursing profession			33.412**		28.331**		26.361**		24.919**		29.538**
Not strong	24 (4.7)	82.08 ± 20.36		36.58 ± 10.88		19.13 ± 5.80		12.21 ± 2.87		14.17 ± 3.20	
Somewhat strong	245 (47.8)	95.27 ± 18.07		43.38 ± 9.55		22.96 ± 4.92		13.67 ± 2.96		15.26 ± 2.61	
Very strong	244 (47.6)	106.83 ± 20.11		49.14 ± 11.26		25.49 ± 5.25		15.34 ± 3.14		16.85 ± 2.48	

(continued on next page)

Table 1 (continued)

Variable	n (%)	PC	t/F	WC	t/F	DC	t/F	IC	t/F	BC	t/F
School leaders' emphasis on nursing profession			67.279**		58.253**		52.084**		59.559**		37.034**
No emphasis	70 (13.6)	84.96 ± 19.94		37.76 ± 10.14		20.34 ± 5.95		12.31 ± 2.80		14.54 ± 2.58	
Moderate	243 (47.4)	95.66 ± 17.48		43.66 ± 9.56		22.93 ± 4.79		13.64 ± 2.83		15.42 ± 2.57	
Much emphasis	200 (39.0)	110.92 ± 18.26		51.23 ± 10.33		26.54 ± 4.61		16.04 ± 2.95		17.12 ± 2.50	
Satisfaction with clinical instructors' role modeling			53.011**		46.862**		35.544**		58.673**		28.098**
Not satisfied	30 (5.8)	80.97 ± 15.83		35.93 ± 8.75		19.77 ± 4.69		11.10 ± 2.41		14.17 ± 2.42	
Somewhat satisfied	239 (46.6)	94.10 ± 18.33		42.71 ± 9.92		22.63 ± 5.02		13.45 ± 2.89		15.32 ± 2.57	
Very satisfied	244 (47.6)	108.43 ± 19.06		50.05 ± 10.49		25.83 ± 5.09		15.73 ± 2.91		16.82 ± 2.61	
Social factors											
Reason for majoring in nursing			36.344**		31.750**		36.476**		28.368**		13.348**
Own decision	140 (27.3)	114.09 ± 15.46		52.96 ± 8.85		27.59 ± 3.85		16.36 ± 2.53		17.18 ± 2.54	
Parents' suggestion	142 (27.7)	99.92 ± 19.26		45.85 ± 10.56		23.75 ± 5.07		14.49 ± 2.92		15.82 ± 2.66	
Consideration for employment	86 (16.8)	97.26 ± 17.23		43.91 ± 8.93		23.83 ± 4.26		13.73 ± 3.37		15.79 ± 2.63	
Being assigned	111 (21.6)	88.87 ± 19.06		39.92 ± 9.98		20.91 ± 5.41		12.79 ± 3.02		15.25 ± 2.55	
Other reasons	34 (6.6)	87.85 ± 20.67		40.18 ± 12.28		20.53 ± 5.51		12.82 ± 2.30		14.43 ± 2.58	
Perceived nurse-patient relationship			-6.842**		-6.401**		-5.461**		-8.006**		-4.895**
Not good	248 (48.3)	94.06 ± 20.31		42.71 ± 11.03		22.68 ± 5.40		13.30 ± 3.06		15.37 ± 2.72	
Good	265 (51.7)	105.85 ± 18.70		48.70 ± 10.17		25.20 ± 5.04		15.42 ± 2.95		16.52 ± 2.60	

PC: total score of professional commitment, WC: "willingness to make an effort" dimension, DC: "desire to staying in the profession" dimension, IC: "intrinsic positive value of work" dimension, BC: "belief in goals and values" dimension.

* $p < 0.05$.

** $p < 0.01$.

0.142), the family factor (attitudes of parents and siblings towards majoring in nursing, $\Delta R^2 = 0.153$), the educational factors (presence of siblings, family's financial condition, parents' education degrees, attitudes of parents and siblings towards majoring in nursing, $\Delta R^2 = 0.097$), and social factors (the reason for majoring in nursing and the perceived nurse-patient relationship, $\Delta R^2 = 0.153$) were significant predictors of the GNSs' professional commitment ($F = 32.277$, $p < 0.001$). The R^2 value of the final model of the total professional commitment was 47.6 %, indicating that the significant factors could be used to explain the variability of 47.6 % noted in the professional commitment. The R^2 value of the models of each dimension ranged from 0.284 to 0.429. The predictors of the four dimensions differed slightly and are shown in detail in Table 2.

5. Discussion

By using EST to understand the GNSs' professional commitment, the present study analyzed the interaction between the GNSs and their multilevel environment, which consisted of individual, family, college, and social factors. The factors of each level had significant effects on the GNSs' professional commitment and its four dimensions.

5.1. The level of the GNSs' professional commitment

The GNSs included in the present study indicated a moderate level of professional commitment and the score was slightly higher than that reported in other studies performed in China (Zheng et al., 2016; Wang and Yu, 2021; Zhao et al., 2022; Pan et al., 2020). This may due to the difference of educational context. The current study was conducted in

Shanghai, where the health care and the higher education of nursing are at considerably advanced levels. The increased professional commitment due to the COVID-19 outbreak is one possible reason, which is supported by other studies reporting the increased professional commitment following the outbreak of the COVID-19 pandemic that the nursing students had perceived (Li and Yan, 2021; Pei et al., 2022; Zhang et al., 2022).

The multidimensional assessment of the GNSs' commitment is imperative for understanding more accurately their exact motivation so as to provide targeted intervention to support them. Following comparison of the scores of the four dimensions, the highest was the score of "belief in goals and values" and "desire to stay in the profession", while the score of "willingness to make an effort" was the lowest, which was consistent with the data reported in previous studies (Zheng et al., 2016; Wang and Yu, 2021; Zhao et al., 2022). This finding may be explained by the fact that the high employment rates and the low risk of being unemployed increases the students' willingness to be involved in the profession. However, these advantages have also made the students feel safe and not willing to put considerable effort into their work duties.

5.2. Individual factors

The degree was associated with the score of "willingness to make an effort" and with the total score of professional commitment, indicating that GNSs with an associate degree scored higher than those with a bachelor's degree. It was found that 41.01 % of associate-degree GNSs selected the nursing major voluntarily, while 21.66 % of bachelor-degree GNSs selected it voluntarily. This indicates that a higher number of associate students were interested in nursing prior to being

Table 2
Hierarchical regression analyses of graduating nursing students' professional commitment (N = 513).

Variable	PC			WC			DC			IC			BC		
	β	t	ΔR^2	β	t	ΔR^2	β	t	ΔR^2	β	t	ΔR^2	β	t	ΔR^2
Individual factors (1st step)			0.142			0.139			0.112			0.107			0.090
Degree	-0.093	-2.541*		-0.108	-2.843**		-0.069	-1.790		-0.073	-1.932		-0.043	-1.018	
Had served as a student leader	0.064	1.870		0.071	2.004*		0.045	1.237		-	-		0.113	2.854**	
Had received a scholarship	0.095	2.738*		0.074	2.043*		0.110	3.006**		-	-		0.128	3.156**	
Family factors (2nd step)			0.153			0.137			0.140			0.137			0.067
Father's degree	-0.086	-1.654		-0.064	-1.861		-0.075	-1.553		-0.045	-0.939		-	-	
Mother's degree	-0.013	0.259		-	-		0.007	0.135		-0.041	-0.866		-0.035	-0.909	
Parents and siblings' attitudes to majoring in nursing	0.400	10.127**		0.215	5.188**		0.215	5.111**		0.195	4.691**		0.135	2.912**	
Educational factors (3rd step)			0.097			0.081			0.070			0.099			0.089
Satisfaction with clinical instructors' role modeling	0.149	3.826**		0.143	3.526**		0.101	2.454*		0.202	4.985*		0.102	2.246*	
Academic faculty's belief in nursing profession	0.106	2.800**		0.091	2.298*		0.103	2.578*		0.053	1.339		0.160	3.621**	
School leaders' emphasis on nursing profession	0.120	2.795**		0.109	2.451*		0.110	2.417*		0.107	2.391*		0.112	2.241*	
Social factors (4th step)			0.083			0.072			0.090			0.081			0.037
Reason for majoring in nursing ^a															
Parents' suggestion	-0.247	-6.132**		-0.230	-5.481**		-0.268	-6.287**		-0.200	-4.771**		-0.161	-3.429**	
Consideration for employment	-0.179	-4.584**		-0.183	-4.528**		-0.152	-3.683**		-0.179	-4.392**		-0.081	-1.782*	
Being assigned	-0.283	-6.630**		-0.267	-6.014**		-0.315	-6.961**		-0.240	-5.372**		-0.129	-2.580*	
Other reasons	-0.183	-5.010**		-0.156	-4.112**		-0.210	-5.435**		-0.138	-3.614**		-0.158	-3.710**	
Perceived nurse-patient relationship	0.121	3.553**		0.110	3.099**		0.082	2.277*		0.181	5.091**		0.087	2.190*	

PC: total score of professional commitment, WC: "willingness to make an effort" dimension, DC: "desire to staying in the profession" dimension, IC: "intrinsic positive value of work" dimension, BC: "belief in goals and values" dimension, β : Standardized coefficient.

^a Dummy variable in reference of "own decision".

* $p < 0.05$.

** $p < 0.01$.

admitted to college; therefore, it was easier for them to obtain optimal study experience and self-confidence so as to increase their professional commitment (Nesje, 2016). In addition, the students with a bachelor's degree had higher possibilities to engage in other fields than nursing, notably in the metropolitan city, which provided young individuals with various working opportunities. Therefore, it was uncommon for these students to apply for a job not related in nursing. The high turnover rate of these graduates causes a waste of advanced education resources and a stronger workload shortage. Therefore, the medical universities and their nursing schools should pay more attention to the formation of the students' identity on nursing, rather than improving student's knowledge and skills in nursing practice, which is the main current focus of the majority of the universities (Cowan et al., 2005).

The GNSs who had received a scholarship or served as a student leader during their study had higher professional commitment than those who had not. This finding is consistent with the studies suggesting that optimal scholar performance can increase professional commitment (Zheng et al., 2016; Kong et al., 2016). The students who exhibited positive feedback in their academic effort were characterized by high motivation to make engagements in their field and demonstrated positive expectations of their career development. Certain supportive interventions, such as study groups and support sessions were suggested to be effective in improving learning skills (Ooms et al., 2013). These interventions were recommended to indirectly increase professional commitment (Saeedi and Parvizy, 2019). In addition, the students who had experience in acting as student leaders had more opportunities of communicating with nursing managers and instructors, who could help them increase their existing knowledge of the nursing profession. This suggested that the pertinent institution (college or university) should provide more opportunities for the participation of the students in activities that can strengthen the student-instructor communication and should not be limited to the formal class modules.

The data reported in the present study are different from those reported in studies performed in earlier years suggesting that the male nurses had significantly lower professional commitment than the female nurses (Järvinen et al., 2018; Güner, 2015). Therefore, gender did not make a significant effect on professional commitment in the present study. This may be caused by the changed attitudes of society towards male nurses. A high number of male nurses are more willing to get involved in the nursing profession (Christensen et al., 2018; Cheng, 2017).

5.3. Family factors

The attitude of the parents and siblings towards the students' majoring in nursing was the first in order of importance among all independent factors of the GNSs' professional commitment. In addition, 27.7 % of participants selected nursing based on their parents' advice, which suggested that the parents' support was essential for the students' decision making. Family support is an important factor that affects college studies. During the first years of their work, the students are financially and emotionally dependent on their families, notably in big cities where young people are under a lot of stress. When the students have the perception that their families do not support their effort to pursue a major degree in nursing, their motivation on progressing in the nursing profession is decreased. This leads to their intention to quit the profession. The college and university faculty should remain in close contact with the students' families and disseminate the description and development of the nursing profession, both in the enrollment process and following the students' admission via the website and other Internet platforms. The intervention could increase the knowledge of the family members on the advantages of the profession, which can in turn provide positive support and advice for the students.

The present study suggested that the family financial condition did not show significant effects on the professional commitment of GNS, irrespective of their locations (rural or urban), the presence of siblings,

and the parents' educational degrees. This result is different from previously reported findings (Glossop, 2002; Knight et al., 2012) and is attributed to the external environment playing a stronger role than the family environment in influencing the students' commitment to the nursing profession (Cheng, 2017). In addition to the sociodemographic background, the increased social equity resulted in the increased professional commitment of the students based on cognition, attitude, and influence from the family.

5.4. Educational factors

When the three independent variables of educational context were included in the regression analysis, the variable "satisfaction with the clinical instructors' role modeling" indicated the highest importance, suggesting that the clinical instructors had the most important impact on the GNSs' professional commitment among these educational factors. Consistent with this finding, Jack et al. (2017) suggested that the clinical instructors may be more relevant role models than the university academic instructors. In China, the nursing students contact clinical instructors under the following two conditions: One is the full-time internship in the last academic year, and the other is the part-time clinical training matched with the courses in the first two to three academic years. By observing the clinical instructors' working conditions, the students can correct their previous idealistic views and form a more accurate view of their job requirements. The literature indicated that the discrepancies between the theoretical education in the class and nurses' performance made the students possess a sense of incapability and uselessness of their knowledge (Eggertson, 2013; Zou et al., 2014; Brassell-Brian and Vallance, 2002; Safazadeh et al., 2018), notably when they sensed they would independently face the complex and ever-changing clinical environment after becoming a registered nurse. In addition, in the college or university classes, the school instructors had taught them how to be equipped with a sense of responsibility, reputation, and enthusiasm as a nurse; however, in their clinical work environment, the nurses may display negative emotions, such as job burnout, dissatisfaction, and turnover intention. These made the students feel disappointed, thus reducing their professional commitment.

The clinical instructor should be responsible for guiding the students to apply theory to practice, being a positive role model, evaluating safe patient care, and providing constructive feedback for development (Henderson et al., 2010; Skaalvik et al., 2011; Chuan and Barnett, 2012). In China, the clinical instructors take clinical jobs and teach the interns at the same time; therefore, they do not have sufficient time to provide appropriate guidance and support for the students. Although the clinical instructors are busy, they are suggested to try their best to regulate their performance according to the practice guide or regulations and deliver a positive attitude towards their profession. In addition, the qualification of the clinical instructors should include their commitment to the nursing profession and willingness of delivering positive attitudes to nursing students, rather than knowledge and skills (Rebeiro et al., 2015; Flott and Linden, 2016).

A supportive academic environment in the college or university is also important to shape the students' commitment. A previous study indicated that pre-internship professional commitment accounted for the higher degree of diversity of the post-internship professional commitment among nursing students (Zhao et al., 2022). The current study indicated the significant effects of the "academic faculty's belief in the nursing profession" and the "leaders' emphasis on the nursing profession". From the first day in college or university, the students' professional commitment is developed through continuous education and contact with the instructors (Bijani et al., 2019); therefore, the instructors' professional commitment can largely influence the students' professional commitment. Therefore, there is a need for educators to be mindful that they are being observed by students on an ongoing basis and not to underestimate the effects of their behaviors on others. It is necessary to intervene during the training period in order to aid the

students to achieve a realistic perception of the nurses' role (Guerrero et al., 2017). In addition, the students' perception of the nursing profession may be influenced by the academic policy of the university or college. The students could perceive the value of nursing by comparing the working behaviors of the nursing managers with those of other professions. It has been suggested that the managers and staff in the nursing school can disseminate the updated information regarding the education and practice of the nursing profession on the campus, via specific activities and academic forums in order to allow the students and staff of other professions to become familiar with the development of nursing and build a friendly environment in the college or university (Järvinen et al., 2021).

5.5. Social factors

According to EST, social factors interact with other factors, which result in the changes in an individual's professional commitment. Notably, during the COVID-19 pandemic, potential pre-existing problems could be amplified and alter the external environment around the nursing students, thus influencing their cognition and attitude towards the profession (World Health Organization, 2016).

The reason for selecting a nursing major reflects the social perception of the nursing students (Goel et al., 2018). According to the results, the participants who selected the nursing major voluntarily indicated higher professional commitment than those with other reasons. However, only 27.3 % of the participants selected nursing voluntarily. It reflected the common problem the universities in China were faced with, especially the universities with high admission criteria. According to the enrollment policy, the universities could assign the students to the majors they did not apply for. The students may not be admitted to their preferred major since their entrance test scores could be lower than those of other students who applied for the same major, resulting in their decreased satisfaction. In addition, other students applied for nursing on account of the high possibility of employment, notably following the outbreak of the COVID-19 pandemic, resulting in the increased employment need in nursing, which was contradictory to that noted for other professions. These students might select nursing as a compromise, rather than due to internal motivation, which could result in low professional commitment.

Interest is one of the most important drivers of intention to make efforts on studying and working (Goel et al., 2018). The students who voluntarily selected nursing may have been informed of this profession before and may have developed a positive opinion. In China, the majority of the students and their families were not sufficiently informed of other professions, even when the students were already admitted into the university. A previous study suggested that high schools were responsible for helping students learn about their professions and make realistic plans for their careers according to their own interests and talents (Li, 2019). The colleges or universities should disseminate the enrollment information and major introduction earlier when the students are still in high school, rather than during the month the students are working on their university application form. The enrollment criteria should include the willingness of candidates and encourage more students who are willing to choose nursing (McLaughlin et al., 2010). Fortunately, the national surveys suggested that the COVID-19 outbreak improved the attractiveness of medical careers in the Chinese senior school (Zhang et al., 2022; Pei et al., 2022). This may be due to the rapidly increased public recognition and praise for nurses, promoted by the government's and media's dissemination of the nurses' important role in anti-epidemic work and population healthcare work.

Another social factor is the GNSs' perceived nurse-patient relationship. The results indicated that the perception of the improvement in the nurse-patient relationship increases the higher professional commitment they had. Actually, the humanistic and cultural environment is a key element for the job-seekers. In recent years, the nurse-patient relationship has generated enormous publicity, and provoked the thoughts of the nursing staff and students about their profession. The conflicts

between nurses and patients make nurses frustrated, and pose a great challenge for the nursing students. GNSs have completed their internship and have rebuilt a recognition of patient-nurse relationships by using their own experience, rather than by communication with others. A previous study indicated that the variable “stress from taking care of patients” had a negative effect on the students' post-internship professional commitment (Zhao et al., 2022), which is consistent with this finding. The educators should initially highlight the importance of a patient-centered approach to the nursing students and subsequently, teach them communication skills theoretically and practically to obtain an optimal relationship with the patients (Suikkala et al., 2008). The positive feedback during their work with patients could make them feel confident to take this job, and increase their commitment to the profession.

5.6. Limitations

The limitations of the present study include the cross-sectional study design. The level of GNSs' professional commitment was compared with that of other studies. However, it would be better if the comparison was performed prior to the COVID-19 pandemic by using the same sample. A longitudinal study is suggested to be conducted in the future to confirm the causal associations between the COVID pandemic and the change in professional commitment. Moreover, the participants were recruited in Shanghai, which is a city with advanced nursing services. It is suggested that the health care service or the high school education quality differ between locations in China; therefore, a larger sample from different cities is expected to increase external validity.

6. Conclusions

The professional commitment of GNS indicated a moderate level. On the study findings, EST is supposed to provide an appropriate and innovative perspective to understand the relationship between individual development and environmental factors in the context of professional commitment. In addition, it has potential to help nursing educators to identify appropriate interventions to improve students' professional commitment. Future studies on diverse populations are needed to further develop and refine the concept of the theory. The significant predictive factors within different multilevel contexts should be tailored by the nursing educators to improve the students' professional commitment from the recruitment to the internship to pre-graduation instruction, via effective communication, innovative teaching modality, and positive role modeling. The findings also implied that clinical nursing managers should design new targeted nurse recruiting and training programs by understanding the nurses' professional commitment. These strategies are expected to be useful in improving health system responsiveness and resilience in the COVID-19 pandemic.

CRedit authorship contribution statement

Wenzhe Hua: Conceptualization, Methodology, Writing – original draft. **Qiong Fang:** Conceptualization, Writing – review & editing. **Weidong Lin:** Conceptualization, Writing – review & editing. **Zhejun Liu:** Investigation, Visualization. **Weibo Lu:** Investigation, Visualization. **Daqiao Zhu:** Conceptualization, Project administration. **Yinghui Wu:** Conceptualization, Supervision.

Declaration of competing interest

None.

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Appendix A. Supplementary data

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