



# Development of the professional competence and professional self-concept of undergraduate nursing students during the clinical practice period: A cross-lagged panel analysis

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## ABSTRACT

**Aim:** To explore the relationship of the development of professional competence and professional self-concept of undergraduate nursing students during the clinical practice period.

**Background:** Clinical practice is one of the most important aspects of nursing education. Nursing students combine theoretical knowledge, psychomotor skills and emotions in a professional socialization process through clinical practice sessions.

**Design:** A two-time point longitudinal design was performed. A cross-lagged model was employed to analyze the relationship between the development of professional competence and professional self-concept of undergraduate nursing students during their clinical practice period.

**Methods:** A total of 210 undergraduate nursing students were included in this study. The questionnaire was distributed two months and six months after their clinical practice started. Professional Self Concept of Nurses Instrument and Professional Competence Scale for Undergraduate Nursing Students were the two main instruments.

**Results:** Both the professional competence and professional self-concept of Undergraduate nursing students increase at the end of the sixth month compared with the end of the second month after their clinical practice started. The results of the cross-lagged analysis showed that the professional self-concept was partially responsible for the development of professional competence. The effect of professional competence on the development of professional self-concept, in contrast, was not found in this study.

**Conclusions:** Clinical nursing educators should pay greater attention to the development of the professional self-concept of undergraduate nursing students. More attention should be paid to creating a supportive clinical learning environment to facilitate the improvement of undergraduate nursing students' professional self-concept and professional competence.

## 1. Introduction and background

Nursing is a practice-oriented profession. It requires nurses' ability to perform clinical work and demands that nursing students develop the cognitive skills, values, as well as psychomotor and technical skills of caring for patients or clients in a wide range of settings (Immonen et al., 2019). Currently, there is still a lack of a generally accepted explanation of nursing professional competence as it is too abstract (Flinkman et al., 2017). Most researchers define it as the psychological conditions that contribute to the successful completion of nursing practice (Smith, 2012;

Unsworth et al., 2020). Nursing professional competence is formed and developed during nursing activities. It is one of the core issues of nursing education (Lachmann and Nilsson, 2021).

Several types of competencies are required for nurses and nursing students to perform professional activities. Although the workplace has expanded to many types of settings, the clinical setting remains the essential place for nurses and nursing students to develop their professional competence. Therefore, many studies define professional nursing competence as a comprehensive set of competencies based on clinical competence (Immonen et al., 2019; Meretoja and Koponen, 2012;

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Smith, 2012). Clinical competence in nursing is the ability to complete nursing professional practices in clinical contexts. Such competence of nursing students is primarily acquired during clinical practice (M. Yu et al., 2021).

The assessment of nursing students' professional competence may be conducted by faculty. Yet, it may be interfered with by factors other than competence (Burden et al., 2018; Unsworth et al., 2020). There are significant differences between the results of assessments between different operators, such as teachers and nursing managers in hospitals (Numminen et al., 2014). Therefore, many studies have introduced self-rating instruments to evaluate the professional competence of nurses and nursing students. Recently, many tools for evaluating professional competence or clinical competence in nursing have been developed by different researchers according to the purpose and characteristics of nursing education (Charette et al., 2020; Flinkman et al., 2017; Immonen et al., 2019; Lachmann and Nilsson, 2021; Lejonqvist et al., 2016). Lejonqvist et al. (2016) categorized these competencies into three groups, professional practice, clinical skills and reflective practice and cognitive, affective and psychomotor skills. Concerning which scale to employ in a project, besides, the researchers should take into account the study objectives, the characteristics of the study population, the features of nursing education and the nature of the instrument (Charette et al., 2020).

Self-concept is a self-belief about one's physical attributes, personality traits, abilities, behaviors, thoughts, values and roles (Jankowski et al., 2021). Professional self-concept in nursing is correlated with how they view and perceive themselves as nurses (Farhadi et al., 2021). The professional self-concept of nursing students is one of the results of nursing education (Aggar et al., 2021; Chang et al., 2021). It is a fairly persistent self-attitude that can be measured. Several studies have explored the association of nurses' or nursing students' professional self-concept with other psychological characteristics, suggesting that it is associated with features such as attitude, for example, the attitude toward evidence-based nursing and reality shock (Asi Karakaş et al., 2021; Kim, 2020). Professional self-concept may influence the burnout, work-related quality of life, etc. of nurses or nursing students (Farhadi et al., 2021; Goliroshan et al., 2021; Wang et al., 2019). Most studies on professional self-concept are cross-sectional design (Arthur et al., 1999; Asi Karakaş et al., 2021; Kim, 2020; Yao et al., 2021). There are relatively few reports on the development of the professional self-concept of nursing students during clinical practice and the relationship between the development of professional self-concept and professional competence of nursing students.

Clinical practice is one of the most important aspects of nursing education. Undergraduate nursing education in China, which was relaunched in 1983, is a four-year program now. Most undergraduate nursing programs in Chinese universities arrange clinical practice in the last year of the full academic program, that is, the year before their graduation. During this academic year, nursing students no longer undertake theoretical courses systematically. Instead, they engage in clinical practice in teaching hospitals under the supervision of registered nurses. According to the Nurse Ordinance of China that came into effect in 2008, undergraduate nursing students are required to attend a minimum of 44 weeks of clinical practice. Nursing students combine theoretical knowledge, psychomotor skills and emotions in a professional socialization process through clinical practice sessions (M. Yu et al., 2021).

Social cognitive theory suggests that in the social environment, behavior, individual characteristics (beliefs, expectations, intentions, self-concept and other cognitive factors, expectations about the outcome of behavior, etc.) influence each other and serve as mutual determinants, forming a dynamic system with interactive effects (Mahdizadeh et al., 2021). In this interactive system, the degree of interaction between behavior and individual characteristics is dynamic (Elliott et al., 2021). Therefore, this study hopes to describe the relationship between the development of professional competence and the

professional self-concept of undergraduate nursing students during the clinical practice period.

## 2. Methods

### 2.1. Study Design

A two-time point longitudinal design was performed to determine the relationship between the development of undergraduate nursing students' professional competence and professional self-concept during their clinical practice period. The two-wave questionnaires were distributed two months (June–July 2021) and six months (October–November 2021) after their clinical practice started.

### 2.2. Settings and Participants

A total of 210 undergraduate nursing students who practiced in seven tertiary hospitals in Beijing, China was included in this study by a convenience sampling method.

The inclusion criteria for the study participants were: full-time undergraduate nursing students in their final year of undergraduate education, those who were engaged in clinical practice in teaching hospitals at the time of the study; and those who were willing to participate in this study.

The questionnaires were distributed twice, at the end of two months and six months after the undergraduate nursing students started their clinical practice, respectively. The questionnaire was distributed 245 in the first wave and 233 were returned; it was distributed 233 in the second wave and 213 were returned, of which 210 participants were included in the final data analysis. Three questionnaires that could not be identified were excluded.

### 2.3. Instruments

Three instruments were used in this study. General information questionnaire, Professional Self Concept of Nurses Instrument (PSCNI) and Professional Competence Scale for Undergraduate Nursing Students. The general information included the student's gender, age, hospital and current medical department (e.g., internal medicine, surgery, operating room, etc.).

The professional self-concept of undergraduate nursing students was estimated using the PSCNI developed by Arthur (1995). The PSCNI was initially adopted to measure nursing students' professional self-concept. Arthur et al. (1999) had administered the instrument in several countries, including China (Beijing and Hong Kong Special Administrative Region). The Chinese version of the instrument contains five dimensions, namely leadership (four items included), flexibility (seven items), skills (five items), satisfaction (nine items) and communication (five items), with a total of 30 items. The PSCNI scored on a 4-point Likert-type scale. Some of the items are scored in reverse. The score range is 30–120. The authors of the instrument and Chinese researchers reported favorable reliability and validity of PSCNI. It was widely adopted in research on the professional self-concept of nurses and nursing students in China (Leng et al., 2019; Shang and Zhang, 2021). Cronbach's  $\alpha$  in this study was 0.828 and 0.862 in the two waves survey, respectively.

The Professional Competence Scale for Undergraduate Nursing Students was developed by the authors of this paper based on the professional competence scales in literature (Lejonqvist et al., 2016; Meretoja and Koponen, 2012; Unsworth et al., 2020; Xu et al., 2021; S.-Y. Yu et al., 2021) and the descriptions of professional competence indicators according to the National Standards of Nursing Teaching Quality issued by the Ministry of Education of China (Sun et al., 2021). The items of the scale were developed after two rounds of consultation and revision by seven experts with more than 10 years of experience in clinical nursing education. The content validity index at the item level (I-CVI) was 0.857–1. The content validity index at the scale level (S-CVI/Ave) was

0.973. After a previous survey of 171 undergraduate nursing students, Cronbach's alpha coefficient for the scale was 0.936. The scale includes 47 items in seven dimensions, performing the nursing process (11 items), caring for individuals (five items), health education (six items), professional interaction (seven items), management (five items), professional development (six items) and critical thinking (seven items). It was designed on a 4-point Likert scale, with scores of 1–4 being "unable to do", "partially able to do", "mostly able to do" and "completely able to do", respectively. The score range is 47–188. Separately, Cronbach's  $\alpha$  in this study was 0.954 and 0.962 in the two waves survey.

2.4. Data analysis

All statistics were analyzed with SPSS 26.0 (IBM Corporation, Armonk, New York, USA) and the Amos add-on 26.0 (Armonk, New York). Those cases with less than two unfilled items in each of the two scales were considered eligible. Missing values were filled in with the mean value of the current scale. The gender, age, clinical practice hospital and department of the participants were described with frequencies and composition ratios. Professional competence and professional self-concept scores were described using means and standard deviations (SD) and paired *t*-tests were conducted to compare the indicators between the two waves. Pearson correlation coefficient was adopted to represent the correlation between professional competence and professional self-concept. Cross-lagged panel analysis was used to explore the relationship between the development of the professional competence and professional self-concept of undergraduate nursing students over time in the course of clinical practice.

2.5. Ethical consideration

This study was deemed exempt for review by the Institutional Review Board based on that the study met the criteria of (a) being conducted in a normal educational and training environment and (b) involving educational tests (cognitive, judgmental, attitudinal, effectiveness) but no information was recorded about the participants. The study was approved by the nursing authorities of the hospital where it was conducted. Informed consent was obtained from all participants in the study. Participants were notified of the right to withdraw at any time during the study.

3. Results

3.1. General information of the participants

In the present study, 210 undergraduate nursing students with a median age of 22 years (20–25 years) and approximately 3/4 females were investigated in seven hospitals. General information other than age is presented in Table 1.

3.2. Professional competence and professional self-concept scores and their correlations

The results of the study showed that the mean professional competency scores of undergraduate nursing students were 123.63 and 136.32 at two waves, respectively ( $t = 6.51, P < 0.001$ ). The mean professional self-concept scores were 80.74 and 85.01 at the two waves, respectively ( $t = 4.51, P < 0.001$ ). The correlation coefficients between the four variables ranged between 0.325 and 0.643 (Table 2).

3.3. Cross-lagged panel analysis

Fig. 1 and Table 3 present the results of the cross-lagged panel analysis of the professional competence and professional self-concept of undergraduate nursing students during their clinical practice. The path coefficient from professional competence at the end of two months

Table 1  
General information of the participants.

		N	%
Gender	Male	54	25.71
	Female	156	74.29
Age	20	3	1.4
	21	65	31.0
	22	88	41.9
	23	45	21.4
	24	3	1.4
	25	6	2.9
Hospital	A	21	10.0
	B	24	11.4
	C	25	11.9
	D	25	11.9
	E	31	14.8
	F	40	19.0
	G	44	21.0
Department	Medical Ward	44	20.9
	Surgical ward	35	16.7
	Intensive Care Unit	31	14.8
	Operating room	25	11.9
	Obstetrics and Gynecology Ward	18	8.6
	Pediatric Ward	16	7.6
	Outpatient or Emergency Department	16	7.6
	Others	25	11.9

Table 2  
Descriptive statistics and correlation analysis of each time point variable.

		M	SD	1	2	3	4
1	Competence Time 1	123.63	19.28	1			
2	Competence Time 2	136.32	20.67	0.405 **	1		
3	Self-concept Time 1	80.74	9.38	0.489 **	0.367 **	1	
4	Self-concept Time 2	85.01	10.01	0.325 **	0.643 **	0.499 **	1

Abbreviations: M, Mean; SD, Standard deviation  
\*\*  $P < 0.01$

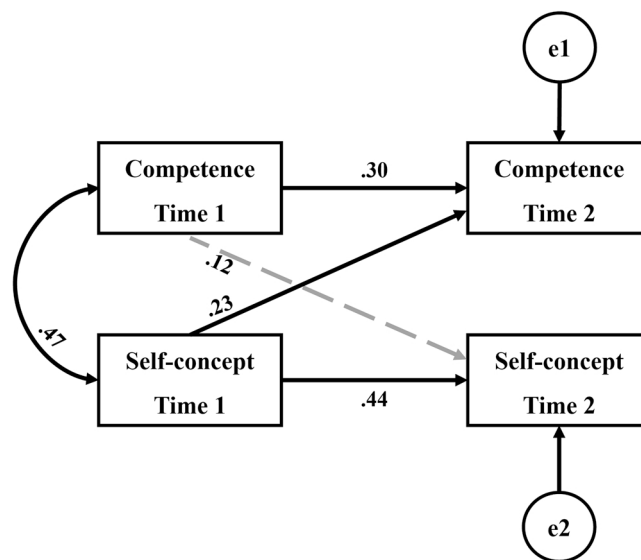


Fig. 1. Overall cross-lagged panel analysis model (Regression coefficients are standardized.).

**Table 3**  
Estimates of standardized regression weights.

			beta	SE	P
Competence T2	←	Competence T1	0.299	0.08	< 0.001
Self-concept T2	←	Self-concept T1	0.444	0.08	< 0.001
Self-concept T2	←	Competence T1	0.116	0.06	0.109
Competence T2	←	Self-concept T1	0.226	0.11	0.003

SE = standard error.

(Time 1) to professional self-concept at the end of six months (Time 2) of clinical practice was 0.116 ( $P = 0.109$ ), which was significantly smaller than that from professional self-concept (Time 1) to professional competence (Time 2) of 0.226 ( $P = 0.003$ ). This result indicated that the professional self-concept of undergraduate nursing students during their clinical practice period could have an impact on the development of professional competence.

## 4. Discussion

### 4.1. Undergraduate nursing students' professional competence and professional self-concept showed an increasing trend during clinical practice

A comparison of the findings with those of other studies confirms that undergraduate nursing students' professional competence is improving with the increase of clinical practice duration (Lima et al., 2016; Pai et al., 2020). This is in line with general pedagogical rules. The improvement of nursing students' professional competence is closely related to the gradual intensification of clinical practice, which means a gradual increase of time (Taylor et al., 2021). In addition, some external factors, such as the objectives and evaluation methods of clinical practice, mostly focus on the evaluation of nursing students' professional competence, like the number and quality of completion of various nursing skills and health assessments. These evaluations also promote the improvement of nursing students' professional competence in clinical practice (Vasli et al., 2021).

The professional self-concept can be developed in the classroom and, more importantly, in the context of professional work context. The professional self-concept showed an increase during the clinical practice period, which may be related to the further deepening of undergraduate nursing students' understanding of the nursing profession in the clinical context. Undergraduate nursing students' professional self-concept of nursing can be formed through at least the following ways: social perception ("mirror self", which is the public evaluation of the nursing student's forthcoming profession), social comparison (comparing the profession they practice with other professions) and self-referencing, which is comparing their future professional behavior against that of others (that means, comparing one's future professional behavior with that of others) (Chang et al., 2021; Diel et al., 2021).

All these approaches can be achieved in clinical practice (Hoeve et al., 2014). Clinical nurse teachers' and other nurse staff's evaluation of nursing students' performance in clinical practice also affects the formation of nursing students' professional self-concept (Bhurtun et al., 2019; Honkavuo, 2020). If undergraduate nursing students are reinforced with the correct professional behavior (e.g., effective observation of the patient's condition), they will be more willing to perform the behavior and develop a positive professional self-concept (McCloughen et al., 2020). Undergraduate nursing students gain a deeper understanding of what nurses do day-to-day in clinical practice. This contributes to the development of their professional self-concept.

### 4.2. The influence of professional self-concept on the professional competence of undergraduate nursing students

Previous findings suggest that the professional attitudes and

competence of nursing students interact with each other (Pai et al., 2020). However, the results of this study only confirmed the effect of professional self-concept on professional competence. This may be explained by the fact that the stronger the professional self-concept, the more enthusiastic the undergraduate nursing students were in their clinical practice. The more involved in the clinical practice, the higher the professional competence.

In contrast, the effect of professional competence on self-concept has not been validated. This may be because nursing students perform more technical and repeated tasks during clinical practice. Their work is supervised by registered nurses. The sense of fulfillment that results from increased professional competence is limited (McPherson and Wendler, 2020). Consequently, professional competence development has little impact on the improvement of professional self-concept.

### 4.3. Limitations

This study included only undergraduate nursing students doing clinical practice in seven hospitals in Beijing, which may have been problematic in terms of representativeness. The questionnaire was administered twice in this study, which failed to reflect the development of professional competence and professional self-concept of undergraduate nursing students throughout the whole clinical practice cycle. Only the relationship between the professional self-concept and professional competence of undergraduate nursing students was discussed in this study. Differences in clinical nursing practice between hospitals and departments were not considered due to the sample size limitations.

## 5. Conclusions

This study investigated the development of professional competence and professional self-concept of undergraduate nursing students during their clinical practice. The results of this study showed that the professional competence and professional self-concept of undergraduate nursing students increased with the time spent in clinical practice. Analysis of the relationship between them revealed that undergraduate nursing students' professional self-concept has an impact on the development of professional competence while professional competence may have little impact on the development of self-concept. This suggests that clinical nursing educators should pay more attention to the development of the professional self-concept of undergraduate nursing students. Hospital nursing managers and nursing faculty should establish a supportive clinical learning environment, such as a friendly atmosphere in the department and an empathic registered nurse as a clinical teacher, to facilitate the improvement of undergraduate nursing students' professional self-concept and professional competence.

### CRedit authorship contribution statement

**Guoyong Yang:** Conceptualization, Methodology, Software, Data curation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Visualization. **Xianxian Zang:** Conceptualization, Methodology, Software, Investigation, Resources, Project administration, Writing – original draft, Writing – review & editing.

### 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.

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