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Research Paper

Associated factors of professional identity among nursing undergraduates during COVID-19: A cross-sectional study

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ABSTRACT

Objectives: Professional identity plays an important role in the long-term development of nurses, and it will change when public health emergency occurs. The objective of this study is to investigate the factors associated with the professional identity of nursing undergraduates in the epidemic of COVID-19.

Methods: A cross-sectional survey design with convenience sampling was used. A total of 3,875 nursing undergraduates were recruited from seven universities across China from March to April 2020. A general information questionnaire was used to collect students' information, and the Professional Identity Questionnaire for Nurse Students was used to survey their professional identity during the early and later stages of the first wave of the COVID-19 epidemic.

Results: The score of professional identity in the later stage (59.49 ± 12.41) was higher than that in the early stage (56.96 ± 12.61). The stepwise regression indicated that several factors were associated with professional identity, including gender, residential area, major, impact of the epidemic on intention to work after graduation, reasons for choosing nursing major and students' scores of professional identity in early stage.

Conclusions: Nursing educators can utilize the positive impact of responding to public health emergencies to increase the professional identity of students. Meanwhile, educators should give those students with lower professional identity more targeted education to cultivate their professional identity after the occurrence of public health emergencies.

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What is known?

- Career satisfaction and the professional identity of nursing undergraduates play an important role in the future career stability and the reduction of turnover rate.
- The professional identity of nursing students changed when public health emergencies occurred.

What is new?

- The score of professional identity in the late stage was higher than that in the early stage of COVID-19.
- Nursing undergraduates' gender, residential area, major (eg. rehabilitation nursing), impact of the epidemic on intention to work after graduation, reasons for choosing nursing and total scores of professional identity in the early stage were associated with their professional identity in the later stage of COVID-19.
- Nursing educators could utilize the positive impact of response to a public health emergency to enhance students' professional identity.

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1. Introduction

Professional identity (PI) is an individual's view of the goal, social value and other factors of the occupation, which is consistent with the social evaluation and expectation of the occupation [1].

Research shows that the PI of nursing students refers to the state of their own identity to the nature and characteristics of nursing work and the perception and identity of their professional cognition, emotion, expectation, will, values and abilities [2,3]. As the backup force of the future domestic nursing team, the career satisfaction and professional identity of undergraduate nursing students play an important role in the future career stability and the reduction of turnover rate [4,5]. Previous studies have shown that the PI of nursing students is related to the factors of satisfaction, professional interest, grade and so on. However, few studies have focused on the PI during public health emergencies [6,7].

According to the former study, nursing students' PI was not high, but it will change when public health emergency occurs. Sun found that only less than 30% of nursing students appreciated nursing work and felt that it was respected. Less than 20% were proud to choose nursing major, 25% of the students regretted choosing nursing major, and nearly 40% would like to work in fields other than nursing after graduation [8]. The previous report showed that the SARS event in 2003 enhanced students' understanding of nursing, further increasing students' professional identity, which indicated that when public health emergencies occur, students' professional knowledge and professional identity were constantly changing [9]. This also demonstrates the significance of education, where students change their PI through practice or experience.

Since the end of December 2019, COVID-19 was first reported in Wuhan, Hubei province [10]. In the front line of fighting against COVID-19, nurses are the most powerful force in the rescue team.

Nursing undergraduates witnessed the important role of medical staff during COVID-19, which might inevitably impact their PI. At the later stage of the first wave of COVID-19, with the decrease of new cases, the epidemic was gradually controlled, and the front-line doctors and nurses gradually returned to their homes. They were not only affirmed and appreciated by Wuhan residents, but also warmly welcomed by their hometown people. Numerous reports about medical staff gave nursing undergraduates the opportunity to feel the sanctity and sublimity of being a medical staff.

Previous studies have reported various factors influencing the PI of nursing students. We intended to explore nursing students' PI during the first wave of the COVID-19 epidemic and the relevant factors that affect their PI to provide a basis for formulating effective strategies to promote nursing students' PI.

2. Materials and methods

2.1. Design

A cross-sectional survey design with convenience sampling was used for this study.

2.2. Participants and settings

Using the convenience sampling method, we selected seven universities in China, and the nursing students in these universities were target participants. The inclusion criteria were: 1) studying in Nursing School/Faculty; 2) full-time undergraduate; 3) willing to participate in this study.

2.3. Measure instrument

The Professional Identity Questionnaire for Nurse Students (PIQNS) was used to measure students' PI. The self-designed general information questionnaire and professional identity scale for nursing students were used to collect the general information. The general information included gender, age, grade, university,

residential area, nation, family monthly income per capita, professional interest, professional satisfaction, work intention, etc.

The PIQNS was developed by Yufang Hao [11], which included five dimensions and 17 items. The five dimensions were professional self-concept, benefit of retention and risk of turnover, social comparison and self-reflection, independence of career choice and social persuasion.

The scale adopts five-level Likert scoring method, with options from "very inconsistent" to "very consistent" scoring 1 to 5. The higher the student's score means the stronger PI. The Cronbach's α coefficient of the questionnaire is 0.827, the half-reliability is 0.842, and the structural validity is good. This questionnaire is currently mostly used for cross-sectional surveys of nursing students' professional identity.

2.4. Procedure

Ethical approval of this study was given by the Biomedical Ethics Committee of Peking University (IRB00001052-20010). The study was conducted during the first wave of the COVID-19 epidemic from March 28th to April 9th, 2020. An online survey platform (<https://www.wjx.cn>) in China was used in this study. We contacted the head or dean of nursing schools and invited them to send the online questionnaire to their students. After explaining the purpose and significance of the survey to nursing students and obtaining their oral consent, the students were asked to complete two identical PI questionnaires simultaneously and voluntarily. One was used to describe their PI in the early stage of the epidemic (January 2020), and another was to describe their PI in the later stage, i.e. the current time they filled in the questionnaire. Questionnaires were anonymous, and confidentiality was committed. The students were also informed that they were free not to answer. Each set of the questionnaire could be submitted if there were no missing options. The exclusion criteria for invalid questionnaires were as follows: questionnaires with obvious regular answers, such as selecting the same option for all items; questionnaires with abnormal answers, such as filling in the residential area as plane; questionnaires with inconsistent responses; questionnaires with identical answers.

2.5. Data analysis

Percentages were used to describe participant's general characteristics and *Mean (SD)* for the PI scores. Paired *t*-test was used to compare the PI scores in the early and late stages. Independent *t*-test and one-way analysis of variance (ANOVA) were conducted to compare differences in total PI score in the late stage between or among different demographic groups. Multiple linear stepwise regression was used to determine associated factors of total PI score in the late stage. Statistical analyses were performed using IBM SPSS Statistics (version 20.0).

3. Results

3.1. Demographic characteristics

A total of 4,498 students were recruited in this study, and 3,875(86.1%) of them submitted valid questionnaires. The mean age of the 3,875 participants was 20.1 ($SD = 1.53$) years, with a range of 15–33 years. There were 467 (12.1%) male students and 3,408 (87.9%) female students. Among which 1,437 (37.1%) were freshmen, 1,014 (26.2%) were sophomores, 938 (24.2%) were junior students, 486 (12.6%) were senior students.

3.2. Professional identity scores of nursing students in different stages of COVID-19

The total scores of PI in the two stages, scores of five dimensions of professional identity were presented in Table 1. Paired *t*-test showed that the total score of PI and the scores of five dimensions in the later stage of COVID-19 were higher than those in the early stage ($P < 0.001$, see Table 1).

3.3. Comparison of total PI score between/among different demographic groups in the late stage of COVID-19

The independent *t*-test and ANOVA analysis results showed that gender, residential area, university, major, grade, the impact of the epidemic on one's intention to work after graduation, family's attitude to clinical care, and whether the students had friends, classmates, or familiar medical personnel involved in fighting against COVID-19 were associated with nursing students' PI score (Table 2).

3.4. Associated factors of PI in the later stage of COVID-19

Multiple linear stepwise regression analysis was conducted with the total PI score in the later stage as the dependent variable and the total PI score in the early stage and the variables with statistical significance in the univariate analysis as the independent variables. Dummy variable coding and hierarchical variable assignment are shown in Table 3. Stepwise regression indicated that the final variables in the regression equation were gender (Female, $\beta = 0.015$, $P = 0.016$), living in the southwest of China ($\beta = 0.018$, $P = 0.004$) or northwest of China ($\beta = 0.029$, $P < 0.001$), majoring in rehabilitation nursing ($\beta = -0.032$, $P < 0.001$), the impact of the epidemic on the intention to work after graduation ($\beta = 0.103$, $P < 0.001$), realizing professional ideal ($\beta = 0.024$, $P < 0.001$), with suitable character ($\beta = 0.013$, $P = 0.048$) and the PI score in the early stage ($\beta = 0.861$, $P < 0.001$) (Table 4).

The total PI scores of female students, students from Southwest or Northwest China, nursing students were higher than that of male students, students from Central China, and students majoring in rehabilitation nursing, respectively. The total score of professional identity in the early stage is proportional to professional identity in the later stage of COVID-19, while the negative impact of the epidemic situation on work intention was negatively associated with it.

4. Discussion

Previous studies showed that the PI of nursing undergraduates in China is relatively low [12,13], and the PI score in this study was in a middle level. Nursing student's future career positioning is not clear enough, and there is also a lack of specific interventions to improve the PI. This is extremely detrimental to the stability and

sustainable development of the nursing team. Therefore, it is very important to explore the status quo and associated factors of nursing students' PI and cultivate positive, active, and stable PI of them.

Reports on public health emergencies found that nursing students' PI increased significantly after the outbreak of SARS [9]. In this study, the total scores of students' PI and the five dimensions of PI increased significantly in the late stage of COVID-19 compared to the early stage; moreover, the PI score was also higher than in former studies [14]. Consistent with the research of Heung [15], in which it was stated that the outbreak of SARS promoted a strong sense of professional identity among nursing students. Nursing undergraduates felt an unprecedented sense of moral responsibility, changed their understanding of nursing work and achieved self-growth [15]. Among various dimensions of the PI, the professional self-concept score increased most in the later stage of the epidemic. The professional self-concept includes the perception of the social role and function of the profession, the practitioner's understanding of the value of life, and the understanding of professional value [16,17]. Studies have shown that, especially when public health emergencies occur, nurses play an important role in fighting against disease, and they are urgently needed [18]. The students will redefine their understanding of the occupational value and career gains by redefining the social role of nurses [19].

In the later period of COVID-19, the positive effect of the epidemic on work intention was positively correlated to the PI scores of nursing students. The stronger the internal interest motivation, the stronger the self-identity. The PI is considered as part of self-identity [20,21]. In addition, the PI scores of nursing students in the early stage of COVID-19 were directly proportional to the scores in the later stage. Considering that the PI score in the early stage was highly correlated with the PI score in the later stage, we included this variable in the multiple linear stepwise regression analysis.

Our results showed that female students have a higher professional identity than male students, consistent with previous research [22]. Browne reported that nursing was seen as a predominantly female profession; nursing was often portrayed as feminine, with males in nursing seen as effeminate [23,24]. Male nursing students might think that nursing lacked a sense of pride and happiness, and part of these students chose to change careers after graduation. They tended to think that nursing could not meet the needs of a male being respected and self-realization. Therefore, not only in China but also in other countries, the proportion of male nursing students was low [25,26]. Under this situation, nursing educators should cultivate male students' professional interests according to their advantages and needs in order to change their traditional concepts for formulating career planning and increasing self-value. According to the theory of social cognitive occupation, the self-efficacy and result expectation of a specific occupation can shape an individual's professional interest and enhance professional identity.

Table 1
Scores of nursing undergraduates' professional identity in the early and late stages of COVID-19 ($n = 3,875$).

Item	Early stage	Late stage	D _{Late-Early}	<i>t</i>	<i>P</i>
Total score of professional identity	56.96 ± 12.61	59.49 ± 12.41	2.53 ± 5.14	30.58	< 0.001
Professional self-concept	19.94 ± 5.48	21.05 ± 5.36	1.11 ± 2.52	27.50	< 0.001
Retention benefits and turnover risks	12.43 ± 3.67	12.92 ± 3.65	0.49 ± 1.45	21.08	< 0.001
Social comparison and self-reflection	10.75 ± 2.30	11.15 ± 2.24	0.40 ± 1.11	22.25	< 0.001
Autonomy of career choice	6.81 ± 1.45	6.92 ± 1.42	0.12 ± 0.82	8.99	< 0.001
Social persuasion	7.05 ± 2.01	7.45 ± 1.94	0.41 ± 1.01	25.00	< 0.001

Note: Data are Mean ± SD. D = difference value.

Table 2
Nursing undergraduates' characteristics and professional identity scores in the early and late stages of COVID-19 (n = 3,875).

Characteristics		n (%)	Early stage			Late stage		
			Mean ± SD	t/F	P	Mean ± SD	t/F	P
Gender	Male	467 (12.1)	55.80 ± 14.76	1.85	0.064	57.96 ± 14.69	2.45	0.015
	Female	3,408 (87.9)	57.12 ± 12.28			59.70 ± 12.05		
Age	<18 years	25 (0.6)	56.72 ± 12.61	0.10	0.924	61.16 ± 10.71	0.68	0.499
	≥18 years	3,850 (99.4)	56.96 ± 12.62			59.47 ± 12.43		
Residential area	Central China	170 (4.4)	54.38 ± 11.89	4.06	< 0.001	57.90 ± 11.92	4.99	< 0.001
	North China	981 (25.3)	58.36 ± 13.29			60.80 ± 13.01		
	East China	1,588 (41.0)	56.44 ± 12.01			58.68 ± 11.86		
	Northeast China	243 (6.3)	56.93 ± 14.47			59.45 ± 14.42		
	South China	342 (8.8)	56.55 ± 11.51			58.51 ± 11.59		
	Southwest China	308 (7.9)	56.27 ± 11.88			59.64 ± 11.83		
	Northwest China	241 (6.2)	58.14 ± 13.87			61.99 ± 13.13		
Ethnic groups	Han	3,534 (91.2)	56.94 ± 12.57	0.37	0.711	59.44 ± 12.40	0.83	0.408
	Others	341 (8.8)	57.21 ± 13.09			60.02 ± 12.44		
Per capita monthly income of family	<2,000 CNY	1,062 (27.4)	56.90 ± 12.44	0.30	0.827	60.15 ± 12.17	1.95	0.119
	2,000–6,000 CNY	2,103 (54.3)	57.03 ± 12.28			59.33 ± 12.03		
	6,001–10,000 CNY	548 (14.1)	57.09 ± 13.73			59.26 ± 13.71		
	>10,000 CNY	162 (4.2)	56.10 ± 14.07			58.01 ± 13.96		
University	University 1	833 (21.5)	56.64 ± 12.46	10.03	< 0.001	58.69 ± 12.36	12.43	< 0.001
	University 2	469 (12.1)	57.21 ± 10.91			59.67 ± 10.72		
	University 3	507 (13.1)	57.17 ± 12.55			59.63 ± 12.08		
	University 4	558 (14.4)	55.89 ± 13.52			58.18 ± 13.39		
	University 5	525 (13.5)	59.69 ± 12.79			62.90 ± 12.06		
	University 6	368 (9.5)	59.04 ± 12.02			62.17 ± 11.59		
	University 7	295 (7.6)	55.65 ± 13.70			58.36 ± 13.33		
Major	Missing	320 (8.3)	53.34 ± 11.86			55.72 ± 12.38		
	Nursing	3,394 (87.6)	57.34 ± 12.46	27.79	< 0.001	59.91 ± 12.19	37.12	< 0.001
	Midwifery	307 (7.9)	56.69 ± 11.06			59.25 ± 11.01		
Reasons for major in nursing	Rehabilitation nursing	174 (4.5)	50.09 ± 15.75			51.68 ± 15.92		
	Character suitable	Yes 996 (25.7)	64.22 ± 11.57	22.39	< 0.001	66.56 ± 10.91	23.12	< 0.001
Grade	Realize professional ideal	No 2,879 (74.3)	54.45 ± 11.97			57.04 ± 11.95		
	Easy employment	Yes 763 (19.7)	65.22 ± 11.55	21.32	< 0.001	67.71 ± 10.47	23.48	< 0.001
	Convenient for yourself or your family to go to the hospital	No 3,112 (80.3)	54.94 ± 12.02			57.47 ± 12.01		
	Forced to transfer to nursing	Yes 2,246 (58.0)	58.68 ± 11.57	9.83	< 0.001	61.22 ± 11.20	10.02	< 0.001
	Others	No 1,629 (42.0)	54.59 ± 13.57			57.11 ± 13.54		
	First year	Yes 1,069 (25.6)	60.09 ± 11.98	9.65	< 0.001	62.62 ± 11.53	9.83	< 0.001
	Second year	No 2,806 (72.4)	55.77 ± 12.64			58.29 ± 12.52		
	Third year	Yes 1,365 (35.2)	52.44 ± 12.09	17.11	< 0.001	55.34 ± 12.28	15.84	< 0.001
	Fourth year	No 2,510 (64.8)	51.75 ± 12.97	5.43	< 0.001	53.95 ± 12.99	5.87	< 0.001
	Fifth year	Yes 164 (4.2)	51.75 ± 12.97	5.43	< 0.001	53.95 ± 12.99	5.87	< 0.001
In internship or not during this epidemic	No 3,711 (95.8)	57.19 ± 12.55			59.73 ± 12.33			
	Yes	40 (1.0)	59.30 ± 16.29	0.92	0.398	61.20 ± 15.59	0.82	0.439
	Yes, the internship was interrupted due to the epidemic	491 (12.7)	57.30 ± 12.30			58.98 ± 12.36		
	Very positive	No 3,344 (86.3)	56.89 ± 12.61			59.54 ± 12.37		
	Relatively positive	Yes 699 (18.0)	65.77 ± 12.70	164.18	< 0.001	68.88 ± 11.38	229.36	< 0.001
The impact of the epidemic on your intention to work after graduation	Relatively negative	1,796 (46.3)	57.13 ± 10.55			60.26 ± 9.94		
	Very negative	No impact 1,088 (28.1)	53.07 ± 12.38			54.55 ± 12.28		
	Strong support	258 (6.7)	50.24 ± 12.21			51.68 ± 12.83		
	Strongly opposed	34 (0.9)	42.59 ± 17.01			42.97 ± 15.83		
Family's attitude to clinical care	Noninterference	787 (20.3)	61.98 ± 13.97	100.20	< 0.001	64.44 ± 13.49	95.59	< 0.001
	Try to change your career	2,675 (69.0)	56.65 ± 11.61			59.12 ± 11.46		
	Ever contact with persons at high risk, suspected or diagnosed with COVID-19	399 (10.3)	49.63 ± 11.79			52.72 ± 12.09		
	Strongly opposed	14 (0.4)	42.71 ± 13.96			44.29 ± 15.53		
Ever care for persons at high risk, suspected or diagnosed with COVID-19	Yes	20 (0.5)	53.25 ± 16.58	1.01	0.327	55.60 ± 16.61	-1.41	0.160
	No	3,855 (99.5)	56.98 ± 12.59			59.51 ± 12.38		
Have any family members involved in the fight against COVID-19	Yes	16 (0.4)	50.31 ± 16.77	1.59	0.132	54.63 ± 18.55	-1.05	0.309
	No	3,859 (99.6)	56.99 ± 12.59			59.51 ± 12.38		
Have any friends or classmates involved in the fight against COVID-19	Yes	195 (5.0)	57.88 ± 13.43	1.04	0.299	60.22 ± 13.34	0.84	0.402
	No	3,680 (95.0)	56.91 ± 12.57			59.45 ± 12.36		
Have any medical staff you are familiar with involved in the fight against COVID-19	Yes	360 (9.3)	59.67 ± 12.47	4.29	< 0.001	62.01 ± 12.21	4.05	< 0.001
	No	3,515 (90.7)	56.69 ± 12.60			59.23 ± 12.40		
Have any medical staff you are familiar with involved in the fight against COVID-19	Yes	1,192 (30.8)	58.39 ± 12.13	4.71	< 0.001	60.89 ± 11.90	4.70	< 0.001
	No	2,683 (69.2)	56.33 ± 12.77			58.87 ± 12.58		

Note: Data are n (%) or Mean ± SD.

Table 3
Dummy variable coding and hierarchical variable assignment.

Independent variables	Assignment or coding
Gender	Male = 0, Female = 1
Residential area	Central China (0,0,0,0,0), North China (1,0,0,0,0), East China (0,1,0,0,0), Northeast China (0,0,1,0,0), South China (0,0,0,1,0,0), Southwest China (0,0,0,0,1,0), Northwest China (0,0,0,0,0,1)
Major	Nursing (0,0), Midwifery (1,0), Rehabilitation nursing (0,1)
The impact of the epidemic on your intention to work after graduation	Very negative = 1, Relatively negative = 2, No impact = 3, Relatively positive = 4, Very positive = 5
Family's attitude to clinical care	Strong support = 1, Noninterference = 2, Try to change your career = 3, Strongly opposed = 4
Do you have any friends or classmates involved in the fight against COVID-19?	No = 0, Yes = 1
Is there any medical staff close to you involved in the fight against COVID-19?	No = 0, Yes = 1
Reasons for choosing your major	Character suitable (No = 0, Yes = 1), Realize professional ideal (No = 0, Yes = 1), Easy employment (No = 0, Yes = 1), Convenient for yourself or your family to go to the hospital (No = 0, Yes = 1), Forced to transfer to nursing (No = 0, Yes = 1)

Table 4
Stepwise Regression Analysis for factors that affected professional identity scores (n = 3,875).

Variable	B	SE	β	t	P
Constant	13.19	0.67	—	19.75	< 0.001
Gender					
Female	0.57	0.24	0.02	2.41	0.016
Scores of professional identity in early stage	0.85	0.01	0.86	119.53	< 0.001
The impact of the epidemic on your intention to work after graduation	1.48	0.10	0.10	15.20	< 0.001
Major					
Rehabilitation nursing	-1.93	0.38	-0.03	-5.10	< 0.001
Residential area					
Northwest China	1.51	0.32	0.03	4.73	< 0.001
Southwest China	0.83	0.29	0.02	2.90	0.004
Reasons for major in Nursing					
Realize professional ideal	0.74	0.21	0.02	3.56	< 0.001
Character suitable	0.38	0.19	0.01	1.98	0.048

Note: R² = 0.85, Adjusted R² = 0.81, F = 2768.59, P < 0.001.

The PI scores of students in Southwest and Northwest China were significantly higher than those in Central China, where the epidemic situation was relatively serious. When the epidemic occurred, people did not know the infectivity and harmfulness of the virus, which would inevitably cause panic. Medical staff still resisted the pressure and stood in the front line of fighting against COVID-19. Therefore, the increase of occupational risk on the nursing staff was inevitable. It was reported that occupational risk and pressure were key factors affecting PI scores [27]. The more serious the epidemic was in the affected area, the greater the psychological pressure medical staff faced [28,29]. Therefore, educators should pay more attention to students from areas where the epidemic was relatively serious and give them more care to stabilize their PI.

This study also showed that the PI scores of students majoring in rehabilitation nursing were lower than those of other nursing students in early and later periods. This might be associated with the fact that rehabilitation nursing, as one of the new branches of nursing, had a relatively low degree of social recognition, more than this, they may think they are not majoring in nursing and their professional activities have little to do with the COVID-19, which affected the students' understanding of this major. Nursing educators should create a good teaching environment, help students realize the importance and practicability of rehabilitation nursing, and improve their interest in learning.

Our study found that the students who believed that nursing could realize their career ideal and those with suitable character scored higher than those who chose not. Worthington also found that the reason for choosing nursing major had a greater impact on students' professional identity; students who believed that nursing

could fulfill their self-worth scored higher on professional identity [30]. Researchers believe that college learning is an important stage of students' career development, and the PI plays an important role in their career development [31,32]. Seaman proposed that the PI is also closely related to understanding the value and meaning of profession [33]. Students have a clear self-awareness of themselves, and the identification of their major is an important factor affecting their professional learning and growth. Therefore, nursing educators should recruit students who are interested and qualified in nursing. At the same time, entrance education is important too, and it can help students discover the value of nursing and enhance their professional interest and recognition.

In addition to the influence of general information, the PI might certainly be related to other associated factors, such as psychology, social support and working pressure [27,34]. This study also verified that the positive effect of the epidemic on work intention was positively related to the PI scores. The promotion of PI of undergraduate nursing students during the COVID-19 epidemic is related to the public support and recognition for nurses. As nursing students, they will undoubtedly pay more attention to the progress of COVID-19 and related reports. It can be said that this epidemic provides a lively classroom for students to understand nursing in-depth and comprehensively and makes students more aware of the value and social responsibility of the nursing profession. Once students become more enthusiastic about their profession, their desire for learning and future jobs will increase.

This study has several limitations. On the one hand, the participated students in our study were recruited from universities of six provinces in China, so the ability of the data to represent the national nursing students may be limited. On the other hand, their

PI at the early stage was collected through self-reported recall; therefore, recall bias was likely existent.

5. Conclusions

The epidemic outbreak has allowed the whole society to understand nursing and realize the importance of nursing truly. For this reason, nurses' social status has been improved. Nursing students have deeply felt the professional value of nursing, so they will be more confident in nursing. However, for some students, the epidemic has made them see the risks of the nursing profession, which may reduce their professional identity. Therefore, nursing educators can utilize the positive impact of responding to public health emergencies to enhance students' PI. More importantly, all nursing practitioners should be committed to developing nursing and improving the quality of nursing services. Thus the whole society will recognize the value of nursing, which will have a positive impact on nursing students' PI.

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CRedit authorship contribution statement

Man Tang: Formal analysis, Writing – original draft, preparation, Writing – review & editing. **Yumie Sun:** Methodology, Formal analysis, Writing – original draft, preparation, Writing – review & editing, Visualization. **Kaili Zhang:** Formal analysis, Data curation, Writing – review & editing. **Ruzhen Luo:** Data curation, Data curation, Investigation, Writing – original draft, preparation. **Yanhui Liu:** Data curation, Investigation. **Hongyu Sun:** Conceptualization, Supervision, Project administration, Writing – review & editing. **Fang Zhou:** Conceptualization, Conceptualization, Supervision, Project administration, Writing – review & editing.

Declaration of competing interest

The authors declare no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijnss.2021.09.005>.

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