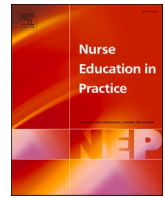




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# Professional identity of Chinese nursing students during the COVID-19 pandemic outbreak: A nation-wide cross-sectional study

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## ABSTRACT

Practicing in unprecedented working environment and fighting against the COVID-19 crisis influenced the image of nursing in the general population, as well as among nurses themselves. This study aimed to describe the sense of professional identity among Chinese nursing students during the COVID-19 outbreak and to explore the relationship between psychological resilience and the sense of professional identity in this cohort. A nationwide online cross-sectional survey was conducted. Nursing students were recruited from 18 Chinese universities. The 10-item Connor-Davidson resilience scale (CD-RISC-10) evaluated psychological resilience and professional identity was assessed by the Professional Identity Questionnaire for Nursing Students (PIQNS). A total of 6348 respondents had a moderate level of professional identity to nursing (average PIQNS score at  $62.02 \pm 12.02$ ). About 86% of respondents attributed the response to the COVID-19 pandemic in elevating the nursing image. Psychological resilience was the strongest contributor to professional identity ( $\beta = 0.371$ ,  $P < 0.001$ ). There was a high level of professional identity among Chinese nursing students during the COVID-19 crisis. Policy support and courses to enhance psychological resilience are critical to sustain professional identity among nursing students.

## 1. Introduction

In December 2019, Wuhan, China experienced the novel coronavirus disease (COVID-19) outbreak, which subsequently became a pandemic, severely challenging the healthcare system worldwide (Kang et al., 2020a). The extraordinary work of healthcare providers, especially nurses who are at the frontline, affected their well-being (Cao et al., 2020; Greenberg et al., 2020; Kang et al., 2020a). Knowledge from responses to previous health crises, such as the Ebola response (McGillis Hall and Kashin, 2016) and the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) crisis (Kim and Choi, 2016), demonstrated that fighting public health threats influenced self-concept among nurses and the public image of nursing, as a whole.

## 2. Background

### 2.1. COVID-19 and impact on healthcare providers

One of the most challenging aspects of the response to the COVID-19 outbreak is the enormous demand befalling on the medical workforce and healthcare resources. In January 25, 2020, almost all healthcare providers in Wuhan, the epicenter at that time, had been working tirelessly and continuously for one month (Kang et al., 2020a). To effectively address this public health crisis in Wuhan, 42,600 medical workers (28,600 were nurses) were dispatched by May 12, 2020 to support the response in the virus-hit Hubei Province (Xinhua, 2020). Aside from clinical care, nurses were also involved in hospital and human resources management, public health education and mental health support (Wang, et al., 2020).

In the early phases of the response, healthcare providers were at the frontlines without clear understanding of the epidemiology of the virus,

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with inadequate protection, leading to overwhelming mental stress (Kang et al., 2020a). As the affected cases increased, medical workers were overloaded with cases and worked overtime, aggravating challenges to their psychological and physical health (Cao et al., 2020). Studies indicated that more than 60% of medical and nursing staff in Wuhan demonstrated mild to severe mental health disturbances during the pandemic (Kang et al., 2020b). Around the globe, the feeling of hopelessness and helplessness were also reported among trainees, young staff and experienced medical workers (Shaw, 2020).

## 2.2. COVID-19 and professional identity of healthcare students

Portrayals of nurses as an ultimate professional in prior crisis like the Ebola response through media coverage, affected public image of the nursing profession (McGillis Hall and Kashin, 2016). It was reported that the COVID-19 pandemic enhanced the professional identity of nursing among Chinese nurses (Li et al., 2020). For nursing students, their professional identity are often acquired and enhanced during their nursing education and through their interactions with senior healthcare providers (Johnson et al., 2012). Stetson et al. (2020) announced that challenges created by COVID-19 can shape the medical students' professional identity formation (e.g., how learners come to think, act and feel like a healthcare provider). A qualitative study conducted in Indonesia medical students presented that medical learners participating in health education or volunteer service to help prevent the pandemic showed increased professional identity (Findyartini et al., 2020). Similar findings were also obtained among Chinese nursing students during the COVID-19 response (Nie et al., 2021). Identifying factors affecting professional identity is crucial to implement effective strategies to improve students' professional well-being during these unprecedented times (Chandratre, 2020).

## 2.3. Public image, self-concept and professional identity of nursing

Although nursing has been an autonomous profession for a long time and it has achieved great progress through practice, education and research, stereotypes that nurses work repetitively, routinely, as subordinates to doctors are common in many parts of the world (Holroyd et al., 2002). Public image of nursing is worse in the Chinese society due to several cultural and educational factors. In the traditional Chinese culture, caring or serving were commonly provided by people from lower social status (Guo et al., 2017). From 1949 to 1979, Chinese nursing education emerged the isolation stage when bachelor nursing education was suspended until the 1980s, while Master and Doctoral education were started later in the 1990s and 2010s, respectively (Lu et al., 2018). So inherently, nurses were characterized as a group with low educational level in China.

The Social Identity Theory argues that self-concept of nurses can be derived or influenced by public image (Ten Hoeve et al., 2014). So, strong belief in their public image can boost the nurses' self-concept. This statement was supported when lower social status and respect, as well as heavy workload and physical burden from shift work were associated with low self-concept among Chinese nurses (Feng et al., 2017).

Professional identity among nurses refers to the individuals' positive attitude towards the nursing profession with the intention to fully practice the nursing skills and responsibilities learned from professional training (Hao, 2011). Public image and self-concept significantly contribute to the development of professional identity among nurses (Cingel and Brouwer, 2021). Due to the low public image and self-concept of nursing, professional identity among Chinese nursing students is often reduced. First, few high school students are willing to study nursing after taking the National College Entrance Examination (NCEE) (Zhang and Petrini, 2008). In the Chinese education system, total scores from the NCEE determines which university to apply and what major academic area to study. Students with higher NCEE scores

often are admitted in prestigious universities and most sought after major academic areas. Each student applicant are required to rank three to five universities and academic majors of interest. These applications are reviewed and passed around by different universities and areas of specializations. Applicants with less NCEE scores are often transferred to less prestigious universities or less popular academic majors. Often times, students admitted to the nursing program have more likely lower NCEE scores, had ranked low in the application process, and/or have transferred from other academic majors (Hao, 2011).

## 2.4. Psychological resilience and professional identity among nursing students

Resilience is defined as the ability to bounce back or to cope successfully despite adverse circumstances (Hart et al., 2014). A resilient nursing student can use personal protective factors to successfully navigate perceived stress and adversities (Stephens, 2013). Studies revealed that psychological resilience was related to better psychological well-being and competencies for nursing students (Orkizagirre-Gomara et al., 2020; Ríos-Risquez et al., 2018). Stress coping courses to facilitate psychological resilience helped students deal with the inevitable sources of stress in nursing education (Onan et al., 2019).

## 2.5. Aims

So in this study, we aimed to (1) assess the professional identity of Chinese nursing students during the COVID-19 pandemic; (2) identify the association between psychological resilience and professional identity during crisis in this cohort.

## 3. Methods

### 3.1. Design and recruitment

This study is a nationwide cross-sectional study among nursing students enrolled in several Chinese Universities using the STROBE guideline for cross-sectional studies. Due to the pandemic outbreak, web-based online survey was conducted to reduce in-person interaction. There is evidence that social media can be the best recruitment option for hard-to-reach population, especially for observational studies (Topolovec-Vranic and Natarajan, 2016). Therefore, an anonymous electronic survey questionnaire was distributed via an online survey platform (Wenjuanxing, accessed by [www.wjx.cn](http://www.wjx.cn)) using a social media service (Wechat). We contacted the administrative faculty from 18 universities with schools of nursing across China via Wechat who subsequently forwarded the questionnaire link to potential respondents via Wechat groups for their classes. The survey participation was voluntary and each participant logged in by unique social media account and IP address allowing study participants to respond to the survey questionnaire only once. The system would remind respondents of missing responses before submission and only full completed questionnaires were allowed to submit.

### 3.2. Participants

The survey was conducted from March 8 to 16, 2020. Students from 18 universities across China who met the following criteria were included in this study: (1) currently enrolled in a School of Nursing; (2) stayed in China during the pandemic outbreak; (3) able to read Chinese and willing to participate. Students at vocational education level and foreign students were excluded. The inclusion and exclusion criteria were stated in the content of the invitation to participate link. A total of 6,348 respondents were retrieved from the survey platform.

### 3.3. Data collection

#### 3.3.1. Demographic variables

The first section of the survey questionnaire involved questions related to socio-demographic variables, including gender, educational level, location of the university, ranking of nursing as a preferred course in the NCEE application, reason for studying nursing, a question whether their parents were medical workers. Previous studies argued that financial situation was a contributor to psychological resilience and career planning (Ertekin Pinar et al., 2018; Buerhaus, 2018), so we collected the monthly expenditures of respondents to evaluate their financial situation.

#### 3.3.2. Impact of COVID-19 pandemic on image of nursing

To explore the impact of the COVID-19 crisis on the nursing profession from the perspective of Chinese nursing students, one single question was asked "How do you think the COVID-19 pandemic outbreak had an impact on the nursing profession?" (1 = positive influence, 2 = not much influence, 3 = negative influence).

#### 3.3.3. Psychological resilience

The 10-item Connor-Davidson resilience scale (CD-RISC-10) was applied to evaluate the psychological resilience among Chinese nursing students. The CD-RISC-10 is 10 item-scale, derived from the original 25-item CD-RISC. The Chinese version have been well documented in the assessment of resilience in undergraduate students, adolescents, earthquake victims and clinical patients with good reliability and validity (Cronbach's  $\alpha$  values > 0.9) (Cheng et al., 2020; Wang et al., 2010). The Cronbach's  $\alpha$  of CD-RISC 10 in this study was 0.961.

#### 3.3.4. Professional identity

Professional identity among Chinese nursing students was assessed using the Professional Identity Questionnaire for Nursing Students (PIQNS). This instrument was developed by a Chinese nursing researcher, Yufang Hao (Hao, 2011) and is widely used in China to measure professional identity among Chinese nursing students with Cronbach's  $\alpha$  at 0.827 (Wang, 2018, 2019). The Cronbach's  $\alpha$  of PIQNS for this study is 0.947. It is a 17-item measurement with 5-point Likert rating from 1 (not true at all) to 5 (true nearly all the time), where item-12 is reversely scored. Higher summed total scores indicate better professional identity.

### 3.4. Ethical consideration

This study was approved by the university's ethical committee. An informed consent was obtained before access to the survey questionnaire was granted. The survey was anonymous and no identifiable information were obtained.

### 3.5. Data analysis

Frequencies and percentage distribution were used to describe socio-demographic variables and Mean  $\pm$  SD were reported to describe the responses obtained from the CD-RISC-10 and PIQNS. Independent sample *t*-tests, one-way analysis of variance (ANOVA) tests and Welch ANOVA analyses were used where appropriate (to account for equal or unequal variance) to compare mean differences in total score of the two scales between groups. Post-hoc analyses were conducted to test the difference between two groups. For study variables which satisfied equal variance, Bonferroni post-hoc analysis was used, while for variables that did not satisfy equal variance, Games-Howell analysis was used. Pearson correlation analysis was conducted to test the relationship between CD-RISC-10 and PIQNS scores. Multiple liner regression model was performed to explore factors related to professional identity. Data were analyzed by SPSS 22.0. All the statistic tests were two-sided with an alpha level of 0.05.

## 4. Results

### 4.1. Sociodemographic data

Most respondents in this study were female (90.4%) and undergraduate students (98.6%). Approximately, 14.4% of the participants studied in Wuhan City, Hubei Province, the epicenter of the COVID-19 pandemic outbreak, 54% studied in Hubei Province, outside Wuhan City and 31.6% studied in other provinces across China. Most of the respondents ranked nursing as their first choice (69.7%) in their NCEE applications, while only 6.2% were transferred to nursing from other courses. As for their motivation in studying nursing, 48.4% chose nursing by their own interest and 40.9% were recommended by their parents. Approximately, 97% of respondents said their parents were not medical workers. Monthly expenditures of respondents were mostly around 500–999 yuan (US\$70–140, 39.2%) and 1000–1499 yuan (US \$140–200, 43.1%) (Table 1).

### 4.2. The impact of COVID-19 outbreak on the image of nursing

About 86% of the participants thought COVID-19 positively influenced the image of nursing, while 4.1% regarded the impact as negative (Table 1). Post-hoc analysis (Appendix Table 1) revealed that participants who regarded COVID-19 contributed to a positive impact on the image of nursing had the highest CD-RISC-10 and PIQNS scores ( $P < 0.001$ ).

**Table 1**  
Socio-demographic characteristics of respondents.

Social-demographic characteristics	Number	%
Total	6348	100
Gender		
Male	611	9.6
Female	5737	90.4
Educational Levels		
First-year	1765	27.8
Undergraduates		
Second-year	1613	25.4
Undergraduates		
Third-year	1905	30
Undergraduates		
Fourth-year	920	14.5
Undergraduates		
Fifth-year	56	0.9
Undergraduates		
Master Students	81	1.3
Doctoral Students	8	0.1
Location of University		
Hubei-Wuhan	915	14.4
Hubei-Outside Wuhan	3426	54
Outside Hebei	2007	31.6
Ranking of nursing at <sup>a</sup> NCEE application		
First-choice	4422	69.7
Second-choice	884	13.9
Third-choice or later	649	10.2
Transferred to nursing	393	6.2
Reason for studying nursing		
Own interest	3072	48.4
Parents' recommendation	2598	40.9
Other reasons	678	10.7
Parents' Job position		
Medical worker	193	3
Non-medical worker	6155	97
Monthly expenditures of student		
Less than 500 yuan	434	6.8
500–999 yuan	2489	39.2
1000–1499 yuan	2734	43.1
1500–1999 yuan	523	8.2
2000–2499 yuan	112	1.8
More than 2500 yuan	56	0.9
COVID-19 impact on nursing image		
Positive	5505	86.7
Non	581	9.2
Negative	262	4.1

<sup>a</sup> NCEE: National College Entrance Examination

### 4.3. Psychological resilience

The average score of CD-RISC-10 was  $35.41 \pm 8.29$  (Min-Max: 10–50) (Table 2). Gender ( $P = 0.696$ ) and knowing whether parents were medical workers or not ( $P = 0.489$ ) had no statistical significance with psychological resilience. CD-RISC-10 score was significantly associated with the respondents' educational level ( $P = 0.002$ ) and the location of university ( $P < 0.001$ ). Highest CD-RISC-10 scores were from fourth and fifth year undergraduate Chinese nursing students ( $36.32 \pm 7.83$ ,  $36.32 \pm 7.85$ ). Post-hoc analyses results comparison (Appendix Table 1) showed that fourth-year undergraduates scored better than first- and second-year undergraduates in CD-RISC-10. Compared with

**Table 2**  
CD-RISC-10 and PIQNS scores according to social demographic characteristics.

Characteristics	<sup>c</sup> CD-RISC-10 Scores	<sup>d</sup> PIQNS Scores
Total	$35.41 \pm 8.29$	$62.02 \pm 12.02$
Gender		
Male	$35.27 \pm 9.17$	$60.59 \pm 13.96$
Female	$35.42 \pm 8.19$	$62.17 \pm 11.79$
<sup>a</sup> T	-0.390	-2.703
P value	0.696	0.007
Educational Levels		
First-year Undergraduates	$35.02 \pm 8.25$	$61.18 \pm 12.10$
Second-year Undergraduates	$35.09 \pm 8.25$	$62.00 \pm 11.77$
Third-year Undergraduates	$35.60 \pm 8.52$	$63.19 \pm 11.96$
Fourth-year Undergraduates	$36.32 \pm 7.83$	$61.70 \pm 11.93$
Fifth-year Undergraduates	$36.32 \pm 7.85$	$60.45 \pm 14.91$
Master Students	$35.19 \pm 9.10$	$58.19 \pm 12.47$
Doctoral Students	$31.00 \pm 11.29$	$60.00 \pm 19.49$
<sup>b</sup> F	3.583	6.163
P value	0.002	< 0.001
Location of University		
Hubei-Wuhan	$36.34 \pm 8.42$	$62.61 \pm 12.86$
Hubei-Outside Wuhan	$34.78 \pm 8.34$	$61.96 \pm 11.94$
Outside Hebei	$36.05 \pm 8.06$	$61.86 \pm 11.77$
F	21.713	1.177
P value	< 0.001	0.308
Ranking of nursing at NCEE application		
First-choice	$35.71 \pm 8.30$	$63.20 \pm 11.95$
Second-choice	$34.94 \pm 8.15$	$60.81 \pm 11.03$
Third-choice or later	$34.57 \pm 8.34$	$58.83 \pm 11.83$
Transferred to nursing	$34.49 \pm 8.33$	$56.78 \pm 12.75$
F	6.656	55.634
P value	< 0.001	< 0.001
Reason for studying nursing		
Own interest	$36.54 \pm 8.34$	$66.27 \pm 11.13$
Parents' recommendation	$34.35 \pm 8.07$	$58.77 \pm 11.07$
Other reasons	$34.36 \pm 8.28$	$55.25 \pm 12.45$
F	55.822	435.514
P value	< 0.001	< 0.001
Parents' work position		
Medical worker	$35.87 \pm 9.30$	$59.32 \pm 13.78$
Non-medical worker	$35.40 \pm 8.26$	$62.10 \pm 11.96$
T	0.693	-2.780
P value	0.489	0.006
Monthly expenses of student		
Less than 500 yuan	$34.20 \pm 9.00$	$63.92 \pm 11.73$
500–999 yuan	$35.42 \pm 8.04$	$62.72 \pm 11.83$
1000–1499 yuan	$35.37 \pm 8.19$	$61.54 \pm 11.65$
1500–1999 yuan	$36.07 \pm 8.57$	$60.16 \pm 13.37$
2000–2499 yuan	$35.88 \pm 10.32$	$60.54 \pm 14.49$
More than 2500 yuan	$39.14 \pm 9.91$	$59.95 \pm 17.07$
F	3.817	7.265
P value	0.002	< 0.001
COVID-19 impact on nursing image		
Positive	$35.81 \pm 8.13$	$62.81 \pm 11.70$
Non	$32.87 \pm 9.14$	$56.64 \pm 12.87$
Negative	$32.65 \pm 8.33$	$57.45 \pm 12.75$
F	43.373	79.550
P value	< 0.001	< 0.001

<sup>a</sup> Independent samples *t*-test

<sup>b</sup> One-way analysis of variance or Welch ANOVA analysis

<sup>c</sup> CD-RISC-10: The 10-item Connor-Davidson resilience scale

<sup>d</sup> PIQNS: Professional Identity Questionnaire for Nursing Students

undergraduates, master ( $35.19 \pm 9.10$ ) and doctoral students ( $31.00 \pm 11.29$ ) had lower CD-RISC-10 scores, but the difference was not significant. Students who studied in Hubei Province, outside of Wuhan, scored lowest in CD-RISC-10 ( $34.78 \pm 8.34$ ) ( $P < 0.001$ ). Students who chose nursing by their own interest had the highest score in CD-RISC-10 ( $36.54 \pm 8.34$ ) ( $P < 0.001$ ). Similarly, students who ranked nursing as their first choice obtained higher CD-RISC-10 scores ( $35.71 \pm 8.30$ ) than those who did not rank nursing in their top three program choices or those who transferred to nursing ( $P < 0.05$ ). Compared with respondents with the highest monthly expenditures (more than 2500 yuan,  $39.14 \pm 9.91$ ), participants with the lowest monthly expenditures (less than 500 yuan,  $34.20 \pm 9.00$ ) obtained worse CD-RISC-10 scores ( $P = 0.009$ ).

### 4.4. Professional identity

The average PIQNS score was  $62.02 \pm 12.02$  (Min-Max: 17–85) (Table 2). Location of the university was not statistically related to PIQNS scores ( $P = 0.308$ ). Female students and knowing whether parents were non-medical workers were related to higher PIQNS scores ( $P < 0.05$ ). Educational level, reasons for studying nursing, ranking of nursing at NCEE application and monthly expenditures were significantly associated with PIQNS scores ( $P < 0.001$ ) (Table 2). Post-hoc analyses results (Appendix Table 1) showed that third year undergraduate Chinese nursing students scored the highest PIQNS scores ( $63.19 \pm 11.96$ ). The difference in the third year undergraduate students' PIQNS scores were significant when compared with PIQNS scores from master students ( $58.19 \pm 12.47$ ,  $P = 0.005$ ) and first-year undergraduate students ( $61.18 \pm 12.10$ ,  $P < 0.001$ ). Students who chose nursing by their own interest also scored highest in PIQNS ( $66.27 \pm 11.13$ ), while those who chose nursing for other reasons scored the lowest ( $55.25 \pm 12.45$ ). Similarly, participants who ranked nursing as their first choice in their NCEE application had the highest PIQNS scores ( $63.20 \pm 11.95$ ), while those who transferred to nursing had the lowest PIQNS scores ( $56.78 \pm 12.75$ ). As for monthly expenditures, respondents with less than 500 yuan (US\$70) in monthly expenditures had the highest PIQNS scores ( $63.92 \pm 11.73$ ).

### 4.5. Factors affecting professional identity

Pearson correlation analysis indicated a positive significant relationship between CD-RISC-10 and PIQNS scores ( $r = 0.408$ ,  $P < 0.001$ ) (Table 3). Psychological resilience increased as professional identity increased. Multiple linear regression results revealing factors related to professional identity are listed in Table 4. Gender had no significant relationship with professional identity in the regression model. Psychological resilience had the strongest significant contribution to professional identity ( $\beta = 0.376$ ,  $P < 0.001$ ). Students with better psychological resilience, who were in second to fourth year, studying in the Hubei Province, ranked nursing as their first choice, studying nursing by their own interest, whose parents were not medical workers, monthly expenditures were lower than 1500 yuan and regarded COVID-19 as a positive influence on nursing image, identified strongly with the nursing profession ( $P < 0.05$ ).

**Table 3**  
Pearson correlation between CD-RISC-10 and PIQNS scores.

		<sup>b</sup> PIQNS
<sup>a</sup> CD-RISC-10	r	0.408
	p	< 0.001

<sup>a</sup> CD-RISC-10: The 10-item Connor-Davidson resilience scale

<sup>b</sup> PIQNS: Professional Identity Questionnaire for Nursing Students

**Table 4**  
Multiple linear analysis of the factors related to professional identity.

Items	$\beta$	T	P
Gender			
Male	Reference		
Female	-0.011	-0.992	0.321
Educational Levels			
Master Students	Reference		
First-year Undergraduates	0.062	1.434	0.152
Second-year Undergraduates	0.096	2.264	0.024
Third-year Undergraduates	0.127	2.852	0.004
Fourth-year Undergraduates	0.082	2.336	0.020
Fifth-year Undergraduates	0.004	0.278	0.781
Doctoral Students	0.013	1.153	0.249
Location of University			
Outside Hebei	Reference		
Hubei-Wuhan	0.048	3.826	< 0.001
Hubei-Outside Wuhan	0.050	3.691	< 0.001
Ranking of nursing at NCEE application			
First-choice	Reference		
Second-choice	-0.033	-2.994	0.003
Third-choice or later	-0.051	-4.567	< 0.001
Transferred to nursing	-0.016	-1.214	0.225
Reason for studying nursing			
Own interest	Reference		
Parents' recommendation	-0.253	-22.396	< 0.001
Other reasons	-0.223	-16.201	< 0.001
Parents' work position			
Non-medical worker	Reference		
Medical worker	-0.033	-3.107	0.002
Monthly expenditures of students			
1500–1999 yuan	Reference		
Less than 500 yuan	0.085	6.042	< 0.001
500–999 yuan	0.095	4.704	< 0.001
1000–1499 yuan	0.058	2.864	0.004
2000–2499 yuan	0.004	0.359	0.719
More than 2500 yuan	0.001	0.066	0.947
COVID-19 impact on nursing image			
Positive	Reference		
Non	-0.100	-9.288	< 0.001
Negative	-0.054	-5.029	< 0.001
Psychological resilience	0.371	34.086	< 0.001

## 5. Discussion

### 5.1. Key results

Approximately 86.7% of Chinese nursing students regarded COVID-19 pandemic outbreak as a positive impact on the image of nursing. The total average scores of CD-RISC-10 and PIQNS indicated that increased psychological resilience was significantly associated with increased tendency to identify with the nursing profession among Chinese nursing students.

### 5.2. The impact of COVID-19 pandemic on nursing image

It is encouraging that 86.7% of nursing students thought positively of the pandemic's influence on the public image of the nursing profession. Students who studied in the Hubei Province (the epicenter at that time) and regarded COVID-19 as a positive influence on the nursing image perceived better professional identity of nursing, suggesting that the bravery and tremendous efforts of nurses in fighting the COVID-19 pandemic are highly recognized by nursing students and the general public. Nurses constituted most of the medical labour force dispatched to the Hubei Province during the initial surge of COVID-19 cases; fearlessly and tirelessly working to provide high quality care. Media coverage and governmental efforts to recognize the work of nurses during the pandemic response improved the visibility of nurses and highlighted the profession, consequently promoting the image of nursing to the general population (Kagan et al., 2015; Ten Hoeve et al., 2014). As COVID-19 became the focus of media coverage, social media

platforms further contributed to the establishment of positive nursing image (McGillis Hall and Kashin, 2016). In China, nurses now have the opportunities to be present in national venues such as the recent government invitation extended to the president of the Chinese Nursing Association to introduce the nurses' efforts and contributions in disease control during a Press Conference of the Joint Prevention and Control Mechanism of the Chinese State Council. Nurses are also now frequently interviewed by influential media to share their experiences working in isolation units. These opportunities should be promoted to improve the image of nursing around the globe (Kalisch et al., 2007).

### 5.3. Professional identity of nursing among Chinese nursing students

Professional identity has been widely investigated worldwide, especially related to its role in student retention. In this study, professional identity among nursing students was at a moderate level, based on the total average PIQNS score ( $62.02 \pm 12.02$ ). Similar results were observed with studies from Sydney, Australia (Worthington et al., 2013) and Western Turkey (Kantek et al., 2017). Most previous studies done in the past three years in China reported lower levels of professional identity among undergraduate nursing students in Dalian City ( $47.94 \pm 15.34$ ) (Wang, 2018), Anhui Province ( $54.07 \pm 9.07$ ) (Wang, 2019) and Hunan Province ( $58.11 \pm 0.48$ ) (He Liya and Xiao, 2017), as well as among nursing interns in the Tianjin Province ( $57.29 \pm 11.51$ ) (Leng Yanan et al., 2019).

MacIntosh (2003) stated that professional identity among nurses is a developing process influenced by professional socialization. Major crisis like the COVID-19 pandemic, which disrupts all facets of human life, can definitely shape the identity of specific professions involved in the response (Stetson et al., 2020). In our study, almost 90% of participants perceived the pandemic as a positive impact on the nursing image, which is an opportunity to invest efforts in sustaining this increased self-concept towards nursing, solidifying confidence and trust to the professional identity of nursing.

### 5.4. Psychological resilience and professional identity

Psychological resilience was positively related to professional identity and made the strongest significant contribution in the regression model, indicating that better psychological resilience was a predictor of increased professional identity among nursing students in China during the COVID-19 crisis. In the literature, resilience reflected one's ability to adapt or cope successfully despite adversities (Hart et al., 2014). Individuals with lower psychological resilience were more likely to report post-traumatic syndrome disorders in a sample of Chinese earthquake victims (Wang et al., 2010). Similarly, psychological resilience was critical for nursing students to adjust to workplace challenges during their clinical nursing practice (Tian et al., 2019). Medical students assigned to trauma or emergency settings without preparation frequently reported moral injury (Greenberg et al., 2020). In our study, COVID-19 was an unprecedented emergency to nursing students who witnessed a large volume of affected cases countered by the huge sacrifice from nurses. Their experiences during this crisis enable the students to adapt and cope well with these challenges, to develop a growing recognition and appreciation of the nursing profession.

### 5.5. Factors affecting professional identity

Consistent with many studies on professional identity among nursing students, the reason for studying nursing was crucial to professional identity (Worthington et al., 2013; Zhang and Petrini, 2008). Better professional identity was described among students who studied nursing based on their own interest and who reported nursing to be their first choice in the school entrance applications. Students who transferred to nursing from other majors had lower professional identity with nursing. Nursing has not always been considered as a good career in China due to

its perceived low social status, earning low income and dealing with a heavy workload (Feng et al., 2017). Therefore, cultivating a positive public image of nursing can attract competent students during the NCEE application process to improve the professional recognition of nursing.

An interesting finding in this study was how higher monthly expenditures of students was related to better psychological resilience but worse nursing professional identity. Better professional identity was obtained from students with monthly expenditures lower than 1500 yuan. In line with a prior study, midwifery students with higher monthly income had better psychological resilience (Ertekin Pinar et al., 2018). According to Buerhaus (2018), financial strain is a vital predictor of career choice. Nurses with lower monthly income were more likely to work in rural area to provide healthcare service for underserved population. Students in China tend to make career choices, based on financial abilities. Rich students tend to select more reputable professions at college entrance applications or transfer to popular majors for further study (Zhang and Petrini, 2008).

In this study, job positions of parents were significantly related to professional identity of students. Chinese nursing students whose parents were medical workers had low professional identity to nursing. A previous study confirmed that experiences with teachers, clinical mentors and senior colleagues play a pivotal role in the development of professional identity (Johnson et al., 2012). A Chinese study reported that medical documentaries highlighting the complicated clinical practice environment and difficulties in taking care of patients created a conflict between the students' expectations and reality, decreasing their professional identity to nursing (Guo et al., 2017). Therefore, parents who are medical workers and who are suffering from psychological and physical distresses related to their work had a negative impact on the students' identification of being a nurse.

In the regression model, second to fourth year undergraduate students perceived better professional identity compared with master students. MacIntosh (2003) stated that expectations of future work was a factor influencing the process of professional identity development. Doctoral and master nursing students definitely have higher expectations in terms of promotion, social status, income and personal achievements. However, most studies indicated that nursing was characterized by the lack in challenge, creativity and opportunities for promotion (Girvin et al., 2016). While many developed nations offer opportunities for nurses to work independently such as nurse practitioners who can write prescriptions as part of their extended scope of practice (Lockwood, 2020), Chinese nurses often practice in hospital settings, with rare nurse specialists in primary care centers, nursing homes and other healthcare-related institutions. Experienced and senior nurses in China often shift to administrative position instead of getting promotion in professional tracks (Zhan et al., 2019). Hence, Chinese nurses pursuing advanced degrees are uncertain about their future promotion, development and potential accomplishments, explaining their lower identity to nursing.

### 5.6. Strengths and limitations

To the best of our knowledge, this is the first study to investigate the professional identity and psychological resilience among Chinese nursing students during the COVID-19 pandemic outbreak. Online survey was used to recruit a large number of participants from all over China to improve the diversity of the study sample. However, limited by the cross-sectional design, we are not able to explore the causal effect of the COVID-19 crisis on professional identity. Since it was an open online survey among targeted participants, the response rate and reason for refusal were not reported in this study, which should be considered when interpreting the results.

### 5.7. Implementation for nursing policy, practice and education

Strategies to promote the public image and self-concept of nursing

are crucial to increase the students' recognition of nurses as professionals. At the national level, policy support to expand the scope of nursing practice, provide various tracks for nursing development and promotion and enable more nurses to progress in their career are the most effective approaches to address the challenges related to recruiting high caliber nurses of the future (Zhan et al., 2019). Individual nurses and nursing organizations should make full use of social media and platforms to make their voices heard to promote the positive contributions of nurses in everyday life, breaking the stereotype of nurses perceived in certain cultures (Kagan et al., 2015). At the university level, introduction of nursing profession to high school students may be useful to boost the interests of young students to be a nurse and choose a nursing career in the future. Special courses focused on cultivating educational and moral resilience (Wald and Monteverde, 2021), as well as enhancing professional identity should be considered in the nursing curriculum (Kantek et al., 2017). Inviting senior nurses to share their experiences in responding to healthcare crisis might contribute to professional identity to nursing among students.

## 6. Conclusion

Our study identified an increased level of professional identity among Chinese nursing students during the COVID-19 pandemic. Psychological resilience played a significant role in professional identity development. It is critical to improve the public image and self-concept of the nursing profession to promote professional identity among nursing students to ensure an inspired and a proud future nursing workforce.

### Conflict of interest

All authors declared no conflict of interest.

### CRediT authorship contribution statement

Study concept and design: Zeyu Zhang, Wenning Fu, Chong Tian, Jing Mao; Acquisition of data: Zeyu Zhang, Fengzhi Zhang, Bing Zhao; Analysis and interpretation of data: Zeyu Zhang, Wenning Fu, Chong Tian; Drafting of the manuscript: Zeyu Zhang, Wenning Fu; Critical revision of the manuscript for important intellectual: Leorey N. Saligan, Jing Mao; Final approval of the version to be submitted: Leorey N. Saligan, Jing Mao.

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### Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.nepr.2021.103040](https://doi.org/10.1016/j.nepr.2021.103040).

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