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Effectiveness of a professional identity promotion strategy for nursing students during the COVID-19 pandemic: A quasi-experimental study

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Abstract

Aim: To evaluate the effectiveness of a professional identity promotion strategy (PIPS) on nursing students' professional identity and resilience.

Methods: This study was a quasi-experimental study with a random cluster sample of 103 sophomore undergraduate nursing students. One hundred students answered the questionnaires at both baseline and follow-up (51 of 53 in the intervention group and 49 of 50 in the control group). Intervention and control groups underwent 5 months PIPS and standard professional education from May 2 to September 27, respectively. Participants completed the professional identity questionnaire for nursing students (PIQNS) and Connor–Davidson resilience scale (CD-RISC). Data were collected at baseline (T0), after the intervention (T1) and 3 months after the intervention (T2), and analyzed using the Chi-squared test, Fisher's exact test, and repeated-measures analysis of variance.

Results: There were no significant differences between the two groups ($p > .05$) regarding demographic questions, professional identity, or resilience at baseline ($p > .05$). Significant differences were found in professional identity between groups ($p < .001$), measurement times ($p = .026$), and in the interaction between groups and measurement times ($p = .018$) from T0 to T2. Significant differences were found in resilience between groups ($p < .001$), measurement times ($p = .007$), and in the interaction between groups and measurement times ($p = .035$) from T0 to T2.

Conclusions: The PIPS program improved nursing students' professional identity and resilience. Further long-term effectiveness of the program needs to be tested with implementation through various forms of mobile technology.

KEYWORDS
COVID-19, nursing students, professional identity, resilience

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Pan Wang and Hai-Man Wang contribute equally to this paper and should be considered as co-first author.

1 | INTRODUCTION

Nurses, the largest provider group in China's healthcare system, hold a key role in quality care delivery and patient recovery. As at the end of 2020, the number of registered nurses in China reached 4.70 million and reached 3.35 nurses per 1,000 population (National Health Commission, PRC, 2021). However, there is a certain gap between the national minimum healthcare workforce requirement of 4.45 per 1,000 population (World Health Organization, 2020), while nurse shortages remain and, in fact, are exacerbated (Y. Zhang et al., 2017). Concurrently, coronavirus disease 2019 (COVID-19) highlights that there is a significant and persistent gap in the number of nursing professionals in China (Bai et al., 2021). Furthermore, nurses in China are also faced with the dilemma of a high turnover rate, strong turnover intention, and low job satisfaction. In previous studies, 40.9% ($n = 1473$) of nurses were dissatisfied with their current employment (J. Liu et al., 2019), 24.9–71.8% of registered nurses had the intention to leave their current employment (Guo et al., 2019; Y. Zhang et al., 2017), and 33.2% of registered nurses left their job in the course of a 3-year longitudinal study (Y. P. Zhang et al., 2019).

Professional identity is closely connected with job satisfaction, turnover intention, and turnover behavior of nursing staff (Jung & Yoo, 2020; Niskala et al., 2020). Professional identity is defined as an individual's views on the goals, social values, and other factors of the profession (Nie et al., 2021), and the formation of professional identity is the result of the comprehensive interaction of individual internal and external factors (Y. H. Liu et al., 2011). Individuals with high professional identity could enhance the cohesion of the nursing group (Kiri & Catherine, 2018). However, nurses with low professional identity tend to attribute unpleasant experiences to external factors, particularly when they encounter difficult work problems, which produce negative thoughts and probably lead to loss of interest and motivation in nursing; and eventually, they may leave the profession (Ning et al., 2019).

Nursing students, as the reserve force of the nursing profession, and their professional identity undeniably affects the stability of nursing teams (Xu et al., 2019). If students enter nursing with low professional identity, they have low job satisfaction and high turnover intention, which may accelerate their demission (Jung & Yoo, 2020). Nursing students' professional identity is formed during the period of professional education (Jung & Yoo, 2020; Sorrell & Ibrahim, 2020). At this university, the professional education of nursing students mainly develops from the sophomore year. Professional identity education should take place at this time (X. K. Zhang & Liu, 2016). However, traditionally, the Chinese nursing education system has committed to the development of theoretical knowledge and practical skills of nursing students, with little attention being paid to professional identity education (Ding et al., 2020). It is even worse with the enrollment of undergraduate nursing students having expanded rapidly in nursing colleges in China since 1999 (You et al., 2015). Therefore, it is important to promote nursing students' positive professional identity.

A recent scoping review of 46 studies evaluated the effect of various pedagogical practices and methods on professional identity, and the results indicated that nursing theoretical knowledge and practical skills were the most common components of professional identity addressed with intervention studies (Simmonds et al., 2020), However, overemphasizing the social value, function, and process of learning a role may cover up the complexity of being a nurse (Benner, 2011). Therefore, pedagogical practice should take the establishment of professional identity as the explicit goal. Jung and Yoo (2020) developed a systematic career efficacy enhancement program for nursing students and examined the long-term effects on career decisions, career identity, career preparation behavior, and career efficacy. Some attention has been given to exploring various measures to improve professional identity among nursing students. A study by Xu et al. revealed that cognitive intervention is effective in improving professional identity and self-efficacy of undergraduate intern nursing students ($p < .05$) (Xu et al., 2019). Ning and Li revealed that group psychological intervention has a positive impact on the professional identity and resilience of nursing students ($p < .01$) (Ning et al., 2019). Ding et al.'s research revealed that empathy clinical education can enhance empathy and communication skills and the professional identity in children's nursing students ($p < .001$) (Ding et al., 2020). However, most of these studies focus on improving the professional identity of nursing students only using internal factors (Cao & Chen, 2021; Ning et al., 2019). Research grounded more profoundly in professional identity theory and combined internal and external factors is rare. Educators need more evidence to support the role of programs combined with internal and external factors in improving nursing students' professional identity.

Broaden-And-Build Theory (BABT) (Fredrickson, 2004) provides an effective method to improve the professional identity of nursing students via two key concepts, resilience to cope well and positive experience, as well as the reciprocal effects between the two (Xu et al., 2019). Resilience is an enduring personal resource that can be built through positive experience and drawn on in subsequent moments (Fredrickson, 2004). Positive experiences

can widen the array of thoughts and actions that come to mind; importantly, broadened thinking increases the likelihood of finding positive meaning in consequential events. Finally, people transform themselves and become creative, knowledgeable, resilient, socially integrated, and healthy. According to BABT, professional identity is influenced by positive experiences and enduring personal resources (Y. Zhang et al., 2021).

Nursing has been defined as a profession with a low academic level, low social status, and high workload in China over the past few decades (Lai et al., 2006; Z. Zhang et al., 2021). However, the outbreak of COVID-19 provided an opportunity for nurses to project a good professional image. The media portrayed nurses as respectable, self-sacrificing, and heroes in harm's way (Nie et al., 2021). Currently, nurses in China had the chance to be present at the national level. For example, the Chinese government invited the director of the nursing department of Peking Union Medical College Hospital to introduce nurses' battles and contributions at the National Press Conference (General Office of the State Council, PRC, 2020). In addition, the public image of nurses and the nursing profession changed from humdrum and disreputable to lofty and valorized (Mohammed et al., 2021). A cross-sectional study indicated that almost 90% ($n = 5505$) of nursing students perceived COVID-19 as having an affirmative impact on the image of nursing (Z. Zhang et al., 2021), which may lead to positive experiences for nursing students.

Based on BABT and Bandura's Self-Efficacy Theory (Bandura, 1977; Fredrickson, 2004), we guided nursing students to perceive changes in the nursing profession after COVID-19, including public image, social attitudes and national policy and so on, and to provide opportunities for sufficient reflection and understanding on the nursing profession. We hypothesized that the intervention based on the changes in the external environment would lead nursing students to acquire positive experiences and to improve their professional identity.

2 | METHODS

2.1 | Study design

This study used a repeated measurement intervention with a quasi-experimental design. The professional identity promotion strategy (PIPS) was delivered to the sophomore nursing students at a nursing college over a 7-month period from March to September 2020. The outcome measures were collected before the initiation of the intervention (T0), immediately after the last intervention (T1), and at 3 months post-intervention (T2).

2.2 | Setting and sample

The study was conducted at a nursing college of a public medical university in Hefei, China. In the Chinese education system, undergraduate nursing education is divided into two levels: diploma and bachelor's degree. According to the level of admission, it takes 3 or 5 years to obtain a diploma and 4 years to obtain a bachelor's degree. Nursing students in this study were all bachelor's degree students. The School of Nursing at this university has 12 classes of sophomore students. All classes are undergraduate nursing classes with the same curriculum and teaching schedule. There are approximately 25–30 students in each class. Using the random cluster sampling, four classes were selected by random group sampling and randomly divided into an intervention group (two classes) and a control group (two classes). Due to the intervention involved in the study, a blinded method was applied. Students did not know whether they were in intervention group or control group. To reduce the occurrence of measurement bias, the data collectors and data analysts were not involved in the implementation of the intervention and the generation of the assigned serial numbers. The authors and participants did not know each other, either. The inclusion criteria were as follows: (1) a full-time sophomore undergraduate nursing student; (2) had never participated in the professional identity intervention; (3) was informed of the details of the study and agreed to participate. The exclusion criteria were as follows: (1) students who had to withdraw midway for any reason; (2) students who missed two interventions or more without reason.

According to Liu et al.'s (2017) research, the average professional identity questionnaire for nursing students (PIQNS) score was 62.29 ± 3.28. After implementing PIPS, the professional identity score was expected to reach 64.54 points, assuming that $\alpha = .05$ and $1\text{-}\beta = .9$. According to the formula $n_1 = n_2 = 2 * [(\mu_\alpha + \mu_\beta)/(\delta/\sigma)]^2 + 1/4\mu_\alpha^2$, a total of 90 nursing students were needed. Considering a dropout rate of 10%, 100 nursing students participating in this study were considered appropriate.

2.3 | Intervention group

The strategy was developed by five nursing experts, two nursing education experts, and one psychologist. These experts have a great amount of experience in the fields of nursing student education, career planning, and psychological nursing. The principal investigator (SW L) experienced in education conducted the intervention.

In the first stage, assessing the need for intervention, we conducted a survey on the professional identity of

TABLE 1 Contents of promotion strategies for professional identity

Session	Topics	Main contents	Activity	Guide channel
1	Orientation and forming relationships	• Orientation • Introducing myself • Recognizing the significance of participating in this program • Completing an informed consent form • Watching a video: nurses actively participate in the fight against COVID-19	• Presentation • Lecture • Watching a video	• VE • EA
2	Understanding COVID-19 and nurses	• Introducing "pandemic whistle-blower" • Introducing the development of COVID-19 • Understanding the critical role that nurses play in protecting people's health and saving lives • Watching a video: Heroes in harm's way	• Lecture • Presentation • Watching a video	• VE • VP
3	Sharing the professional perceptions of frontline nurses	• Establishing a mentoring relationship • Knowing professional self-protection during the pandemic • Understanding the frontline medical environment • Understanding the daily work of frontline nurses • Listening to the frontline nurses' consciousness on fighting the pandemic • Nursing career Q&A	• Lecture • Presentation • Q&A	• PA • VE • VP • EA
4	Experience changes in administrative support	• The Chinese Nursing Association advocates the development of high-quality nursing after COVID-19 • Increasing investment in nursing research funds in different hospitals and universities • Awarding the National "May 1" Labor Medal to outstanding frontline nurses • Frontline medical staff have the priority right to appraise professional titles • Watching a video: Nightingale's spirit shines in the COVID-19 battle	• Lecture • Presentation • Watching a video	• VP • EA
5	Experience changes in the public	• Experiencing changes in public attitudes toward the nursing profession after the pandemic • Paying tribute to medical staff • The public spontaneous care for nursing staff • Watching a video: the heroes are also "ordinary people" • Q&A: is there any change in the attitudes of the people around you toward the nursing industry?	• Presentation • Q&A • Feedback • Watching a video	• VP • VE • EA
6	Experience changes in national administration	• Knowing nursing legislation • Knowing the Basic Medical and Health Law	• Lecture • Presentation	• VE • VP

TABLE 1 (Continued)

Session	Topics	Main contents	Activity	Guide channel
		• Understanding health policy: Healthy China 2030 • Understanding new national policy subsidies: for all health workers • Watching a video: How can we better care for frontline medical staff?	• Watching a video • Q&A	
7	Positive professional perception	• Professional identity and professional perception • Vertical and horizontal career comparisons • Stress management in the nursing field • Knowing how to maintain professional self-esteem • Watching a video: Please do not call me waiter	• Lecture • Presentation	• VE • VP
8	Enjoying your career	• Calculation of life's working time: less than 10% • Understanding the healthy career mindset of nurses • Development potential: positive vocabulary, frame breaking, and meaning changing frame • A lecture on creating your career vision • Watching video: Praise yourself • Announcement of career commitments	• Lecture • Presentation • Watching a video • Group game • Feedback • Q&A	• VE • PA

Abbreviations: EA, emotional arousal; PA, performance accomplishments; Q&A, questions and answers; VE, vicarious experience; VP, verbal persuasion.

579 nursing students in 2017 and found that the total professional identity score was 53.36 ± 9.57, which was lower than the results of Xu et al. (2019) and others in China. The current status of nursing students' professional identity is extremely worrying. We deemed it was applicable to perform the PIPS systematically for nursing students in this context.

In the second stage, constructing the intervention, the PIPS was designed following evidence-based, preliminary survey results, nursing education experts' suggestions, and BABT and Self-Efficacy Theory. Through preliminary interviews and a literature review, we found the frequency of intervention which nursing students preferred was once a week (42.85%), for a duration of 6–8 weeks (71.42%), and a length of 1–2 hours of courses (57.14%). Therefore, the program comprised eight sessions once a week with one topic per week, and each session took 60–90 minutes.

The level of personal self-efficacy was mainly improved through performance achievement, vicarious experience, verbal persuasion, and emotional arousal (Bandura, 1977). The aim of the study was to improve nursing students' professional identity. The program composition included new insights, knowledge, and experiences of changes in attitudes toward the nursing profession by the public and society. This program also allowed nursing students to discuss their career arrangements and exchange feedback. Besides expert lectures and presentations, interactive learning was facilitated via a game. The designed questions and answers (Q&A), videos, and feedback were placed at the end of each intervention in order to enhance their understanding of the interventions (Table 1).

In the third stage, implementing the intervention, a preliminary study was conducted during six sessions for six nursing students in the same grade as the participants for 90 minutes per week from March 22 to April 26, 2020. From May 2 to September 27, 2020, the intervention group implemented the PIPS and the standard professional course and adjusted the intervention according to the feedback of the nursing students during the implementation process.

2.4 | Control group

Students in the control group were provided the normal standard professional course online, including an explanation of theoretical knowledge, as well as a practical training video. The details include: three clinical practice

skills lectures (e.g., hand hygiene, electrocardiogram monitoring, oral care, etc.); three theoretical courses synchronized with the courses of this semester; one excellent graduate experience sharing lecture and one nursing research lecture. After data collection and analysis, we offered the PIPS to the control group to extend them the same potential benefits of the program.

3 | MEASURES

The outcome measures were related to professional identity. The study used two instruments: the PIQNS and the Connor–Davidson resilience scale (CD-RISC).

3.1 | Demographic questions

The demographic information collected by the pretest questionnaire included students' baselines, including gender, age, one child in their family, birth location, part-time experience, class ranking, access to COVID-19 information, frequency of browsing information, and time for browsing information (hours).

3.2 | Primary outcome

The primary outcome composed of professional identity. Professional identity was evaluated using the PIQNS compiled by Hao (2011). This tool is comprised of 17 items in five dimensions using a five-point scored Likert scale scored from 1 = "not at all" to 5 = "highly agree". Final scores can range $17 \sim 85$, with higher scores indicating better professional identity. The Cronbach's α of the scale in the original manuscript was .827, and here it was .934.

3.3 | Secondary outcome

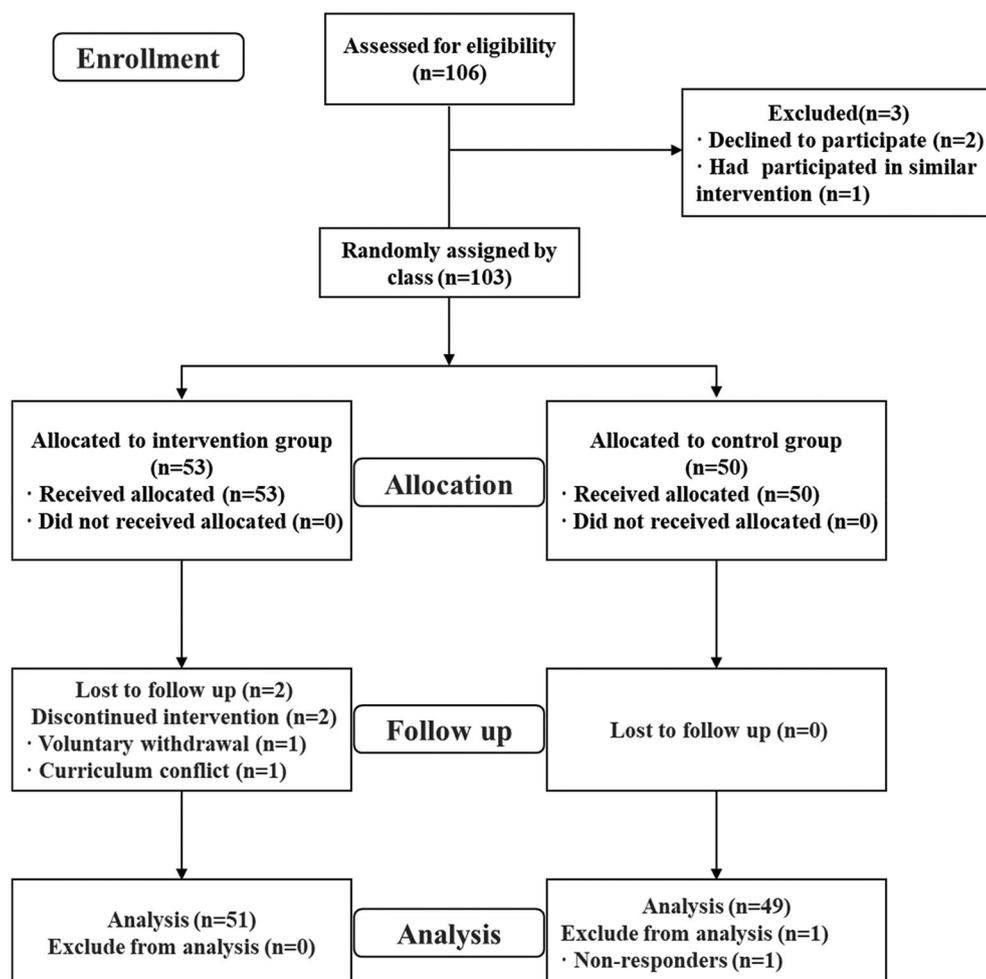The secondary outcome composed of resilience, and it was evaluated using the CD-RISC compiled by Connor

FIGURE 1 Consolidated Standards of Reporting Trials (CONSORT) flow diagram of the study

TABLE 2　Demographic characteristics of participants ($N = 100$)

Variables	Category	Total ($N = 100$) n (%) or mean (SD)	Exp. ($n = 51$) n (%) or mean (SD)	Cont. ($n = 49$) n (%) or mean (SD)	χ^2	p
Gender	Male	16 (16)	8 (15.7)	8 (16.3)	0.008	.930
	Female	84 (84)	43 (84.3)	41 (83.7)		
Age, y		19.99 (0.93)	19.80 (0.92)	20.18 (0.91)	-1.898[a]	.058
1 child in family	Yes	27 (27)	13 (25.5)	14 (28.6)	0.120	.729
	No	73 (73)	38 (74.5)	35 (71.4)		
Birth location	Town	52 (52)	25 (49)	27 (55.1)	0.370	.543
	Countryside	48 (48)	26 (51)	22 (44.9)		
Part-time experience	Yes	64 (64)	35 (68.6)	29 (59.2)	0.967	.325
	No	36 (36)	16 (31.4)	20 (40.8)		
Access to COVID-19 information	Actively acquired	86 (86)	44 (86.3)	42 (85.7)	1.769[b]	.719
	Passively acquired	10 (10)	4 (7.8)	6 (12.2)		
	Inadvertently acquired	3 (3)	2 (3.9)	1 (2)		
	Others	1 (1)	1 (2)	0 (0)		
Frequency of browsing information	0-2 times	41 (41)	16 (31.4)	25 (51)	4.014[b]	.134
	3-5 times	54 (54)	32(62.7)	22 (44.9)		
	6-10 times	5 (5)	3 (5.9)	2 (4.1)		
Time for browsing information, hr	$t \leqq 0.5$ hr	52 (52)	22 (43.1)	30 (61.2)	4.427[b]	.130
	$0.5 < t \leqq 1$	46 (46)	27 (52.9)	19 (38.8)		
	$1 < t \leqq 2$	1 (1)	1 (2)	0 (0)		
	$t > 2$	1 (1)	1 (2)	0 (0)		
total		100 (100)	51 (100)	49 (100)		

Abbreviations: Cont., control group; Exp., experimental group.
[a]Rank sum test; SD; standard deviation.
[b]Fisher's exact test.

TABLE 3　Homogeneity test of the dependent variables ($N = 100$)

Variables	Exp. ($n = 51$) mean (SD)	Cont. ($n = 49$) mean (SD)	t or z	p
PIQNS (total)	3.58 (0.49)	3.51 (0.61)	0.645[a]	.520
Professional self-concept	3.54 (0.56)	3.47 (0.70)	0.577[a]	.565
Remaining benefits and leaving risks	3.51 (0.56)	3.42 (0.76)	−0.962[b]	.336
Social comparison and self-reflection	3.75 (0.58)	3.63 (0.68)	−1.157[b]	.247
Autonomy of career choice	3.37 (0.56)	3.42 (0.55)	−0.150[b]	.881
Social persuasion	3.79 (0.68)	3.70 (0.74)	−0.633[b]	.527
CD-RISC (total)	2.42 (0.44)	2.40 (0.60)	0.192[a]	.848
Tough	2.45 (0.46)	2.43 (0.62)	0.307[a]	.760
Optimism	2.43 (0.47)	2.45 (0.63)	−0.259[b]	.795
Self-improvement	2.21 (0.50)	2.11 (0.63)	−1.492[b]	.136

Abbreviations: CD-RISC, Connor–Davidson resilience scale; Cont., control group; Exp., experimental group; PIQNS, professional identity questionnaire for nursing students; SD: standard deviation.
[a]t test.
[b]Rank sum test.

TABLE 4 Effects of intervention on the professional identity and resilience between the two groups (N = 100)

Variables	Group	Time			Group	Time	Group*time	Difference (T1-T0)		Difference (T2-T0)	
		T0 Mean (SD)	T1 Mean (SD)	T2 Mean (SD)	F (*p*)	F (*p*)	F (*p*)	Mean (SD)	T (*p*)	Mean (SD)	Z (*p*)
PIQNS (total)	Exp. (n = 51)	3.58 (0.49)	3.91 (0.45)	4.01 (0.61)	27.728 (<.001)	3.729 (.026)	4.113 (.018)	0.33 (0.66)	2.330 (.022)	0.43 (0.74)	−2.563 (.010)
	Cont. (n = 49)	3.51 (0.61)	3.49 (0.50)	3.50 (0.65)				−0.02 (0.80)		−0.01 (0.96)	
CD-RISC (total)	Exp. (n = 51)	2.42 (0.44)	2.74 (0.55)	2.81 (0.45)	15.068 (<.001)	5.032 (.007)	3.423 (.035)	0.32 (0.71)	2.201 (.030)	0.40 (0.62)	−2.056 (.040)
	Cont. (n = 49)	2.40 (0.60)	2.42 (0.47)	2.44 (0.59)				0.02 (0.67)		0.05 (0.89)	

Note: Statistical analysis: repeated-measures analysis of variance.

Abbreviations: CD-RISC, Connor–Davidson resilience scale; Cont., control group; Exp., experimental group; PIQNS, professional identity questionnaire for nursing students; SD, standard deviation; T0, before intervention; T1, immediately after intervention; T2, 3 mo after the intervention.

and Davidson ([2003](#)), and translated into Chinese (Yu & Zhang, [2007](#)). This tool is comprised of 25 items in three dimensions using a five-point Likert scale scored from 1 = "never" to 4 = "always". Final scores can range $0 \sim 100$, with higher scores indicating better resilience. The Cronbach's α of the scale in the original manuscript was .89; here, it was .950.

3.4 | Data collection

Before the intervention (T0), the general characteristics, professional identity, and resilience of both the intervention group and the control group were measured. The data analysis of the anonymous data was performed by two authors (Yr L and Qy Q) who did not participate in the distribution of the students or the implementation of the intervention. Due to COVID-19, all data were collected through Wenjuanxing (www.wjx.cn). To determine whether the effect of the PIPS would last 3 months after the intervention, professional identity and resilience were examined in both the intervention and control groups immediately after the last intervention (T1) and at 3 months post-intervention (T2).

3.5 | Data analysis

Data analysis was performed with the SPSS 23.0 statistics program (IBM Corp., Armonk, NY, USA). This study analyzed demographic characteristics through descriptive statistics. The Chi-squared, rank sum, and Fisher's exact tests were applied to compare the homogeneity of the two groups. The normal distribution of the variables, such as professional identity, resilience, and each dimension of these two scales, was confirmed using the Shapiro–Wilk test. The independent *t* test and rank sum test were used to analyze the homogeneity of the variables between the two groups as only some variables satisfied the conditions for normality. Repeated-measures analysis of variance (ANOVA) was conducted to verify the effectiveness of the PIPS. Mauchly's sphericity test was conducted to confirm the homogeneity of the variance, and the variances of all variables satisfied the requirements of Mauchly's sphericity test (professional identity: $W = 0.969$, $p = .216$) (resilience: $W = 0.985$, $p = .489$). A $p < .05$ was considered to be statistically significant.

3.6 | Ethical considerations

The study was approved by the university's Ethics Committee (2021H011). An email containing detailed information about the study objectives and procedures was

sent to all nursing students in the four selected classes, and they were invited to participate. Volunteer participants were asked to return an informed consent form signed by themselves. The protected anonymous information was only used for this research.

4 | RESULTS

4.1 | Participants

We invited 106 nursing students from four classes to participate in this study, and 103 nursing students responded and agreed to participate. The effective response rate was 97.2%. All nursing students answered the questionnaire at baseline. Two students in the intervention group were absent at post-intervention (T1) data collection. One student in the control group was absent at 3 months post-intervention (T2) data collection, and 100 (94.3%) answered the questionnaire at baseline, post-intervention, and 3 months post-intervention (51 of 53 [96.2%] in the intervention group and 49 of 50 [98%]) (Figure 1). There were no significant differences in baseline demographic information (Table 2). The majority were female (84%) and the mean age was 19.99 years.

4.2 | Effectiveness of the PIPS

The homogeneity test for professional identity and resilience showed no between-group significant differences at baseline (Table 3). In the results of repeated-measures ANOVA, in comparing the intervention and control groups, the participants' professional identity and resilience both indicated significant differences. Participants' professional identity and resilience showed a significant change effect over time (F = 3.729, p = .026; F = 5.032, p = .007, respectively). Concerning group and time interaction effect, participants' professional identity and resilience showed statistically significant differences (F = 4.113, p = .018; F = 3.423, p = .035, respectively). Concerning group effect, participants' professional identity and resilience also showed statistically significant differences (F = 27.728, p < .001; F = 15.068, p < .001, respectively) (Table 4).

The results of this study indicated that, compared with the control group, the participants in the intervention group showed a significant increase in professional identity (p = .022) and resilience (p = .030) after the intervention (T1). Moreover, significant differences were still noted for professional identity (p = .010) and resilience (p = .040) at the 3 months post-intervention (T2) (Table 4).

5 | DISCUSSION

The aim of our study was to evaluate the PIPS related to professional identity in nursing students. We developed the PIPS, which included new insights, knowledge, and experience of the changes in public and social attitudes toward the nursing profession. The PIPS was designed to improve nursing students' professional identity and resilience to promote the delivery of health care. Overall, the results of our study indicated promising outcomes that the PIPS is effective at improving the professional identity of nursing students.

The results of our study are not surprising given that previous research demonstrated that intervention is effective in promoting professional identity and professional self-efficacy (Xu et al., 2019).

However, most of the previous studies start by changing the internal cognition of nursing students to improve their professional identity. For example, Xu's study started from internal factors to guide students' positive professional cognition and correct negative cognition (Xu et al., 2019). Ning et al.'s research focuses on changes in internal factors, exploring the positive emotions and subjective happiness experience of nursing students to enhance their professional identity (Ning et al., 2019). In methodology, both studies discuss the relationship between cognition and behavior. However, when external factors changed, how internal and external factors work is still ambiguous. Therefore, we discussed the impact of the PIPS that combine internal and external factors on the professional identity of nursing students. Undoubtedly, the COVID-19 pandemic is a crisis that poses a great threat to the healthcare industry and has had enormous impacts on economic and social development (Cheng et al., 2020). However, our research indicated that the changes in social and public attitudes toward the nursing profession caused by COVID-19 offered more opportunities than risks in improving nursing students' professional identity.

Professional identity is enhanced by "social status", "interaction with experience", "correct professional perception" and "positive experience" (Johnson et al., 2012). The PIPS improved professional identity by allowing nursing students to establish mentoring relationships with frontline nurses in Hubei. This is important since nursing students' professional identity is shaped by exposure to the role model in the professional field, and the role model appears to have the capacity to influence their professional behavior, understanding of the nursing profession, and professional values (Antonia & Ma, 2015; Gibson et al., 2010). The PIPS may help nursing students recognize the critical role that nurses play in protecting people's health and saving lives and promoting changes in their professional attitudes by encouraging them to

experience the changes in the public image and the promotion of the social status of nurses (Zhang et al., 2021). This program also provides nursing students with professional information, career comparisons, and career arrangements to develop a correct perception of the nursing profession (Jung & Yoo, 2020). Moreover, researchers suggested that further research should implement resilience-promoting skill as "protective" within professional identity formation (Wald, 2015). Therefore, we fostered a positive professional identity and resilience of nursing students through optimizing their career mentality and developing the power of the mind to conquer dilemma.

In our study, an interesting phenomenon was observed in the intervention group regarding the scores of the "benefit of retention and risk of turnover" dimension of the PIQNS, which were significantly improved. Previous cross-sectional researches on professional identity indicated that the score in this dimension was at a low level relative to the other dimensions (Xu et al., 2019), and a study of group counseling intervention for nursing students' professional identity showed that the score in the dimension even decreased after intervention (Di et al., 2018). The findings of these studies are inconsistent, probably because the dimension mainly reflects the influence of external factors on professional identity. In the past, the low social status of nurses in China and the terrible public image may have caused nursing students to have cognitive bias toward the nursing profession, which may reduce nursing students' sense of career benefits and increase their turnover intention (Liu et al., 2019). Currently, nurses have received more public attention, and nursing work has been universally respected and recognized by society (Abuhammad et al., 2021; Mohammed et al., 2021). Emphasizing these changes in our program helped nursing students recognize the critical role that nurses play in controlling the pandemic and the resultant high level of professional prestige, inspired nursing students' feelings of social responsibility and love for the nursing profession (Nie et al., 2021), and finally improving the internal professional identity of nursing students. This is consistent with the internalization of external motivation proposed by self-determination theory.

Self-determination theory proposes that the internalization of external motivation can be promoted when three needs of the individual are met: competence, autonomy, and relatedness (Ryan & Deci, 2000; Sheldon & Prentice, 2019). The PIPS improved competence by giving nursing students sufficient time to reflect on how to successfully fight COVID-19 as a prospective nurse (Ryan & Deci, 2000). Nursing students produce powerful autonomy in the nursing profession by taking pride in the behavior of frontline nurses, and then they feel that they are engaged in the nursing industry due to their own intentions (Ryan & Deci, 2000). Moreover, we enhanced the relatedness of nursing students by guiding them to perceive care, understanding and support from the public, society and state. The PIPS proposed in this study satisfies nursing students' needs for autonomy, competence and relatedness and promotes nursing students to transform the rules and values recognized by society into the rules or values recognized by themselves so as to improve the professional identity of nursing students (Sheldon & Prentice, 2019).

Concurrently, the PIPS is effective in improving nursing students' resilience. This converging evidence indicates that individuals with a high professional identity have stronger intrinsic interest and motivation when confronted with dilemmas and setbacks and are characterized by high resilience (Gail, 2003; Ning et al., 2019). Moreover, individuals with high resilience could fully mobilize protective factors and avoid risk factors in the environment and were much more likely to have a positive perception and positive evaluation of the nursing profession so as to improve professional identity (Julie, 2008; H. Y. Liu et al., 2017). There may be a reciprocal promotional relationship between professional identity and resilience in nursing students. However, the interactive relationship of resilience and professional identity needs to be confirmed in future studies with multicentric research designs, especially with many more participants.

Sophomore nursing students enter university for a short time, and a lack of social experience and limited experience in daily life may leave them with fewer resources to use when confronted with dilemmas or setbacks. In addition, their emotional regulation ability is relatively poor (Li & Hasson, 2020). Resilience training in professional education may produce a more flexible professional identity (Wald et al., 2015). Therefore, it is necessary to incorporate resilience training into nursing humanistic education during professional education (Li & Hasson, 2020). Nursing educators could cultivate undergraduate nursing students' resilience by providing protective factors and "frustration education" (Cleary et al., 2018), which is conducive to maintaining a good physical and psychological state of undergraduates, and to improving resilience and professional identity among nursing students.

6 | LIMITATIONS

This study has several limitations. First, the PIPS program included nursing students in one city only, it is difficult to generalize the study results. Second, all the

outcomes were assessed subjectively by the participants with self-reported outcome measures. Participants may mask their true thoughts or provide socially accepted answers. Further research on objective assessment tools for the effects of PIPS is needed. Third, this study used a quasi-experimental design due to the non-randomization of the participants. Therefore, this may lead to a selection bias. Finally, because of COVID-19, only online teaching is adopted throughout the entire process. Further studies may explore the implementation of the intervention through various forms of mobile technology, such as WeChat applet, and it is recommended that a study analyzing the effects of the program using blended online and offline methods be conducted.

7 | CONCLUSIONS

In conclusion, we developed a systematic professional identity promotion program for nursing students. The program contains valuable data for developing professional education and resilience training for nursing students. We found that the PIPS improved nursing students' professional identity and resilience and ultimately contributed to producing nurses who provide high-quality care. The long-term effectiveness of the PIPS program needs to be implemented, with implementation through various forms of mobile technology.

CONFLICT OF INTEREST
All authors have no conflicts of interest to declare.

AUTHOR CONTRIBUTIONS
Shu-Wen Li: conceptualization, methodology, writing-reviewing and editing, supervision, and funding acquisition. Jing-Fang Hong: conceptualization, methodology. Pan Wang: methodology, and writing - original draft. Hai-Man Wang: methodology, and writing - original draft. Yan-Ran Li: formal analysis, and investigation. Qiao-Yun Qin: formal analysis, and investigation. All authors read and approved the final manuscript.

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