Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Trans-cultural adaptation and psychometric evaluation of the Chinese version of the perceptions of being a registered nurse scale: a cross-sectional survey in China

Yaqin Li
West China Hospital of Sichuan University
Hong Chen
West China Hospital of Sichuan University
Yuexuan Ma
West China Hospital of Sichuan University
Weihao Kong
West China Hospital of Sichuan University
Lingli Li
lilingli2000@126.com

West China Hospital of Sichuan University

Research Article

Keywords: Perceptions of being a registered nurse, PRNS, nursing students, translation, cultural adaptation, psychometric evaluation, reliability, validity, cross-sectional survey

Posted Date: November 16th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11392254/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

Perceptions of being a registered nurse (PRN) refer to a comprehensive understanding of what it means to be a nurse, held by nursing students and clinical nursing practitioners. A positive PRN is associated with professional belonging, smoother transition to clinical practice, and lower burnout risk. Existing instruments for measuring PRN have several limitations, including excessive completion time, non-standard development and cultural adaptation procedures, and incomplete psychometric evidence. The Perceptions of Being a Registered Nurse Scale (PRNS) was recently developed in English, but a validated Chinese version is lacking. This study aimed to translate and culturally adapt the PRNS into Chinese and to evaluate its psychometric properties among Chinese nursing students.

Methods

This two-phase study comprised translation and cultural adaptation of the PRNS, followed by a cross-sectional survey. Phase I followed the guidelines of Sousa and Rojjanasrirat and the Brislin Translation Model, including forward translation, back translation, consultation with the original author, pilot testing, expert consultation, and bilingual testing. In Phase II, nursing students were recruited from nine universities and two colleges in Chengdu and Shenyang through convenience sampling. Data were collected online between February and April 2024. Item analysis, content validity, exploratory and confirmatory factor analyses, and internal consistency were evaluated.

Results

Of 1,133 returned questionnaires, 762 were valid (valid response rate 67.26%). The Chinese version (PRNS-C) comprised 26 items across four dimensions, replicating the original structure. Critical ratio values ranged from 6.152 to 21.472, and all corrected item-subscale correlations exceeded 0.40. The I-CVI ranged from 0.89 to 1.00 and the S-CVI was 0.96. Exploratory factor analysis extracted four factors explaining 68.49% of the total variance, and confirmatory factor analysis showed satisfactory model fit. Composite reliability ranged from 0.834 to 0.967 and average variance extracted from 0.503 to 0.744. Cronbach's α was 0.899 overall and 0.801–0.950 across dimensions. Test-retest reliability (n = 20, two-week interval) was 0.802 (ICC).

Conclusions

The PRNS-C is a psychometrically sound 26-item instrument that provides a validated and reliable tool for assessing PRN among Chinese nursing students, offering a foundation for educational interventions and curriculum improvement.

Clinical trial number:

Not applicable.

Introduction

Perceptions of being a registered nurse (PRN) refers to a comprehensive understanding of being a nurse, held by personnel who are engaging in or preparing for nursing practice, mainly including nursing students and clinical nursing practitioners [1, 2]. Positive PRN is mainly manifested in the following aspects: (a) the most pronounced positive impression of being a nurse, such as being a provider of healthcare-related education, an advocate of patient rights, and a person who saves lives and treats the injured [3, 4], (b) the attributes of being a good nurse involve kindness, compassion, and strong adaptive competence [5], and (c) benefits of being a nurse involve being respected in society [4], acceptable income levels, and clear and promising career prospects [6]. Conversely, an ambiguous or even negative PRN may suggest that nurses are merely waiters/waitresses in hospitals, that most of them are cold and mean, and might face workplace violence [4, 7], have no work-life balance [4, 8], and are socially isolated [4, 9]. Being a nursing student represents not only the starting point of being a nurse, but also a vital period that affects the establishment of a clear, stable, and positive PRN [10]. Firstly, nursing students acquire foundational healthcare knowledge, skills, and theories [11], while developing clinical competence through practices, which helps build confidence in providing nursing care [12]. This foundational stage serves as a start for cultivating a positive PRN and significantly influences their sustained learning motivation [13, 14], as well as their ability to maintain high self-efficacy in learning [15]. Secondly, research has shown that a positive PRN can strengthen nursing students' sense of professional belonging [16], facilitate the transition from students to clinical nurses [17, 18], and reduce the risk of job burnout [19]. Positive PRN can prompt nursing students to learn, establish long-term career planning, and settle down in this profession. However, a negative PRN may lead to a range of adverse outcomes, including exam-oriented learning [20, 21], diminished learning motivation [22], poor adaptation to clinical practice [23, 24], a lack of career planning [25], and even dropout from this profession [26].

A robust and reliable instrument is a fundamental prerequisite for reporting PRN of nursing students. Research on PRN began in the United States in the 1960s [27]. Among various instruments developed to measure this construct, the most widely used scales include the Belgian professional self-image instrument for hospital nurses (BELIMAGE) [28], the Nursing Professional Values Scale-Revised (NPVS-R) [29], and the Nursing Attitude Questionnaire (NAQ) [30]. A review of the dimensions across these three scales reveals that caring [28, 31, 32], competence [28, 31, 32], and professionalism [30, 31] are the most frequently referenced dimensions of this PRN construct. These three scales demonstrate satisfactory reliability and validity [29, 33, 34], yet with certain limitations. For example, the BELIMAGE is particularly time consuming to administer, requiring over 30 minutes to complete as it comprises 52 sections and 279 items [28]. The NPVS-R consists of five dimensions and 26 items. Notably, three of its dimensions, activism (four items), trust (two items), and justice (three items), are primarily concerned

with personal values of the world. These dimensions account for 34.6% of the scale, reflecting a strong emphasis on value-related content at the individual level, which limits its suitability for measuring PRN. Similarly, certain items in the NAQ, such as "Nurses should have a right to strike", may not be fully culturally appropriate for the Chinese context [30, 35]. In contrast, research on PRN in China has emerged only in recent years, primarily using self-developed questionnaires [2, 36–40], and with significant shortcomings. Under Chinese context, the Attitudes toward the Nursing Profession (ATNP) [36], the professional perception questionnaire for nursing students [37], and the nursing professional perception questionnaire [2], have seen several applications in China. Firstly, there is a notable lack of standardized scale development/cultural adaptation procedures, and some non-standard procedures exist, when these questionnaires were developed. For instance, the content validity of the ATNP was calculated solely on expert consultation by a single academic [36]. Additionally, although the questionnaires developed by Luo et al. and Lv et al. reported that they both have conducted expert consultation, interviews by group, and pilot testing, they failed to provide detailed descriptions of these procedures [2, 37]. Secondly, comprehensive psychometric testing was lacking or not reported: although all three scales reported acceptable total Cronbach's alpha for the whole questionnaires (0.87 for Zhang and Petrini, 0.85 for Luo et al., and 0.92 for Lv et al.), none of them provided data on structural validity. The absence of validated and reliable assessment instruments in China makes the measurement of PRN among nursing students particularly challenging.

Recently, Allen et al. developed the Perceptions of Being a Registered Nurse scale (PRNS), which includes dimensions of "nursing professionalism" and "attributes and qualities of a nurse" equals to dimensions of "professionalism" and "competence", items such as "nurses advocate for their patients" and "nurses provide support and reassurance" related to dimension "caring" [4]. The PRNS has also effectively addressed the flaws found above in widely applied international scales and some domestic questionnaires including excessive completion time, lack of or non-standard development/cultural adaptation procedures, and incomplete psychometric properties reported. Regarding the issue of completion time, the 26-item PRNS takes at most 5 to 10 minutes to complete [4]. In terms of lack of or non-standard development/cultural adaptation procedures, the development of PRNS was totally under rigorous processes including literature review, using the "Definition Statement of the Concept of Nursing" as a blueprint and triangulating with three other similar instruments, generated an item pool through the nominal group meetings technique, screened items using tabletop thematic analysis, had content validity evaluated by stakeholders (n = 35), followed by a preliminary review of the data by the researcher and a statistician, a pilot test (n = 81), a test-retest reliability assessment (n = 42), and finally a formal study conducted among 797 nursing students. Lastly, with regard to incomplete psychometric properties reported, the PRNS demonstrates excellent psychometric properties, including a total Cronbach's α of 0.836, all item content validity indices (I-CVIs) exceeded 0.78, an inter-item correlation coefficient of 0.712, $p < 0.001$, and a Bartlett's test of sphericity ($p < 0.05$) and Kaiser-Meyer-Olkin (KMO) value of 0.919 with eigenvalue > 1 [4]. The PRNS comprises 34 items and identifies four dimensions: attributes and qualities of a nurse, factors influencing a nurse's well-being, nursing professionalism, and the role of the nurse [4].

Therefore, this study aims to translate and culturally adapt the PRNS into Chinese contexts, and evaluate its psychometric properties among Chinese nursing students.

Methods

Study design

This study consists of two phases. Phase I involves the translation and cultural adaptation of the PRNS scale. Phase II is a cross-sectional survey using the translated (Chinese-adapted) questionnaire.

Phase I: the translation and cultural adaptation of the PRNS scale

This section describes in detail the translation and cultural adaptation processes of the PRNS into Chinese culture.

The PRNS

The PRNS is a 34-item scale developed in English by Louise Allen [4], including four dimensions of attributes and qualities of a nurse, factors influencing a nurse's well-being, nursing professionalism, and the role of the nurse. Although the original PRNS contains 34 items, only 26 were assigned to the four dimensions, and the remaining 8 items were not dimension-attributed in the original scale. This study translated and validated the 26 dimension-attributed items. The original scale demonstrated excellent psychometric properties, with a total Cronbach's α of 0.836, all item content validity indices (I-CVIs) exceeded 0.78, an inter-item correlation coefficient of 0.712, $p < 0.001$, and a Bartlett's test of sphericity ($p < 0.05$) and KMO = 0.919 with eigenvalue > 1. Items are rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). In its final Chinese form (PRNS-C, see Results), the scale comprises 26 items, and total scores range from 26 to 130, with higher scores indicating better PRN.

Translation and cultural adaptation of the PRNS scale into Chinese culture

We obtained permission from the original author to translate and culturally adapt the PRNS into Chinese (please refer to Figure S1) and the adaptation process followed both the cross-cultural adaptation guidelines proposed by Sousa and Rojjanasrirat [41] and the Brislin Translation Model [42]. The process comprised six steps: forward translation, back translation, consultation with the original scale author, pilot testing, expert consultation, and bilingual testing.

Forward translation

Two master's students (SQH and QG), both were native Chinese speakers who were also fluent in English, independently translated the PRNS from English into Chinese (versions T1 and T2). One student (SQH) majored in nursing, while the other (QG) majored in Chinese language and literature. Neither had prior exposure to the original English version of the scale. The two translations are presented in Table S1. A third master's student majoring in nursing (LZ) and a research team member (YXM) then compared both translations with the original scale item-by-item to ensure semantic equivalence. During this process, cultural adaptation, namely, minor revisions to enhance expression in Chinese, was applied to seven items (Q9, Q15, Q16, Q18, Q20, Q23, and Q30, item numbering follows the original English scale and remains consistent throughout this manuscript). For example, careful consideration was given to selecting culturally appropriate and precise Chinese equivalents for terms such as "job security," "compassionate," and "being respected," with the semantic emphasis of each term weighed. Detailed modifications are highlighted in red in Table S1.

To further cultural adapt and determine on some ambiguous parts found in combining T1 and T2, the researchers (YL, YXM, LLL) and three translators (SQH, QG, LZ) held an online meeting. The meeting was facilitated by YXM, and she outlined the purpose of the meeting at the beginning. She then shared her screen and read each item aloud in both the original English and the translated Chinese versions to guide the group's discussion. Each participant offered their perspectives on the translations. YL participated as an independent third-party consultant, who helped to solve any discrepancies. The meeting would conclude once consensus was reached on every item. The modified Chinese version (T3) is provided in Table S2.

Back translation

Two translators, one doctoral student (XLF) and one master’s student (YLZ), both majoring in nursing, independently back-translated the Chinese version (T3) into English, produced versions B1 and B2. Both translators had overseas study experience and were proficient in both Chinese and English. Neither had prior exposure to the original English version of the scale. The two back-translated versions are presented in Table S3.

YXM and HC compared the two back-translated English versions (B1 and B2) with the original English PRNS, independently. To further cultural adapt and determine some ambiguous back-translation parts found during above comparison, we held another online meeting. In this meeting, we discussed issues raised from ten items (Q3, Q4, Q6, Q9, Q12, Q16, Q20, Q23, Q31, and Q32). The procedures of this meeting were identical to those used during the forward translation phase. Through discussion, the team solved translation issues related to lexical precision, semantic nuances, and expressive fluency. For example, appropriate wording was refined for “social isolation” (Q3), “striving to achieve” (Q4), and “highly resilient” (Q23). A revised version B3 was generated. Detailed modifications are highlighted in red in Table S3, and the synthesized version (B3) is provided in Table S4.

Consultation with original scale author

We invited the original author to conduct an item-by-item comparison between the original English scale and the back-translated English version (B3). The purpose was to ensure content consistency, semantic accuracy, and formatting standardization, as well as to facilitate our cultural adaptation process. The consultation was conducted via email. The author confirmed that all items were consistent in content, accurate in semantics, and standardized in formatting, and she suggested further revisions to three items (Q3, Q4, and Q30) to enhance fluency of expression and contextual integrity. Specifically, the author recommended: changing "work in shift work" to "shift work" in Q3, adding "due to shift work" to Q4, and revising the phrasing to "are caring" in Q30. Following these revisions, the first draft of the Chinese version, PRNS-1, was produced. Further details are provided in Table S5 and Figures S2 and S3.

Pilot testing

The aim of pilot testing was to conduct a preliminary test on the target population using the translated scale, to verify whether the “translated scale” was equivalent to the “original scale” before conducting formal, large-scale testing [41]. Pilot testing typically involves 10 to 40 individuals from the target population [41]. In this study, 20 nursing students (all juniors from a university in Chengdu) were recruited through convenience sampling. All participants provided written informed consent. Participant demographics are presented in Table S6. The Chinese PRNS-1 was applied, with each item accompanied by binary (“Yes” or “No”) response options regarding its clarity, and additional space was also provided for participants to offer comments or recommendations on each item.

Overall, 16 participants (80%) found the PRNS-1 was clear and easy to understand, whereas 4 participants (20%) reported certain items were difficult. Additionally, 12 participants provided suggestions for some items, primarily concerning that we should do some additions of terminology for clarification, add some conceptual definitions, and concerns on precision of wording (e.g., requests for clearer explanations of "psychological resilience", "compassionate", and "unsafe work environment"). In response to these suggestions, the research team made corresponding revisions, resulting in PRNS-2. Detailed modifications are indicated in red font in Table S7. Data from this pilot testing was excluded from the final analysis of this study, as the response format differed from that of the formal survey.

Expert consultation

A single round of expert consultation was conducted via email, as consensus was reached after the first round [41]. This phase aimed to assess the linguistic clarity, importance, and relevance of each item in PRNS-2, thereby facilitating further modification and ensuring content validity [43]. Nine experts participated, all of whom were clinical nursing experts and two of whom were also nursing education specialists, and their demographic details are provided in Table S8.

Overall, the experts considered the scale as clear, relevant, important, understandable, and comprehensive, with satisfactory content validity of I-CVI values ranging from 0.89 to 1.00 and S-CVI of 0.96. Additionally, the nine experts provided specific comments on eight items for further revisions. Four

comments aimed at enhancing semantic precision were fully adopted, including rephrasing “guaranteeing the improvement of care quality” (Q24), removing redundant wording in Q7, replacing “unsafe environment” with “environments with safety risks” (Q6), and adding a clarification of “adaptability” in Q17. Conversely, four comments were not adopted. These comments suggested rephrasing the original item expressions "Nurses work collaboratively with other health professionals" (Q32), "Nurses provide support and reassurance" (Q33), "Nurses care for patients with an individualized perspective" (Q29), and "Nursing assessments influence patient care" (Q34) into “team player,” “emotional supporter,” “guide of plans,” “evaluator of disease”, for Q32, Q33, Q29, and Q34, respectively, to maintain consistency with the original scale. These adjustments resulted in the final PRNS-3, and detailed modifications are indicated in red font in Table S9.

Bilingual testing

This phase aimed to assess the conceptual, semantic, content, and structural equivalence between the original English PRNS and the Chinese PRNS-3 [41]. Ten nursing students were recruited by convenience sampling from a university in Chengdu, and both the university and the ten participants met the inclusion and exclusion criteria of this study. The participants in this bilingual test were entirely different from those in the pilot study, and all were proficient in both Chinese and English. The sample included one sophomore, six juniors, and three seniors. Demographic details are presented in Table S10. In this test, participants compared each item between the original English PRNS version and the Chinese version (PRNS-3), rating each item in both versions to identify any discrepancies in meaning, clarity, or comprehension, and the items were randomly ordered to minimize order effects. The Pearson correlation coefficient between the total scores of the two versions was 0.81 ($p < 0.01$). Furthermore, a paired t-test revealed no statistically significant difference in mean scores between the original and translated versions ($t = 1.68$, $p > 0.05$). These findings demonstrated a high level of consistency between the two versions, supporting their conceptual, semantic, content, and structural equivalence, and further details are provided in Tables S11 and S12.

Phase II: cross-sectional survey using the translated (PRNS-3) questionnaire

In this phase, the cross-sectional study employed a two-stage sampling strategy: institutions were selected via convenience sampling, while nursing students within each included institution were recruited by cluster convenience sampling. Convenience sampling was first used to include universities offering bachelor’s nursing programs and colleges offering associate degree nursing programs, in Chengdu (Southwest China) and Shenyang (Northeast China), based on researchers’ convenience. Subsequently, cluster convenience sampling was used to recruit nursing students from each selected institution. Data were collected from February to April 2024. This study was approved by the Ethics Committee of West China Hospital, Sichuan University (Approval No. : 2023(2013)), and written informed consents were obtained from all included participants.

To identify eligible institutions, two researchers (YXM and HC) first consulted the China Higher Education Student Information Network (CHSI; https://www.chsi.com.cn/), a government-affiliated database providing the most comprehensive directory of higher education institutions in China. Using this source, we obtained a list of all universities and colleges offering nursing programs at the bachelor's or associate degree level in Sichuan and Liaoning provinces. From this list, nine universities offering bachelor's programs (five in Chengdu and four in Shenyang) and two associate colleges (both in Shenyang) were selected based on institutional accessibility. Further details of included institutions are provided in Table S13.

Subsequently, the research team contacted the administrators of the included institutions, including deans of nursing schools or teaching affairs coordinators, using phone numbers obtained from the official institutional websites. Two researchers (YXM and HC) explained the purpose, methodology, significance of the study, and anonymity of data to these administrators. After obtaining their oral informed consents, the team obtained contact information of the class advisors of nursing students at all year levels (freshman to senior) from the administrators.

Our research team consisted of nine members: scale development experts (YQL and LLL), research assistants (YXM and HC), and translators (SQH, QG, LZ, XLF, and YLZ).

Sample size estimation

For cross-sectional studies employing scales, a sample size of five to ten times the total number of scale items is generally recommended [44, 45]. Accordingly, we set the sample size of participants at ten times the total number of items for each of the two subsamples (EFA and CFA), yielding 520 cases. To account for an anticipated 10% invalid response rate, the required sample size was calculated as 572 participants.

Data collection

Data were collected online using Wenjuanxing (https://www.wjx.cn/), an open-access survey platform. Two researchers (YXM and HC) first contacted class advisors at the five participating institutions in Chengdu to schedule survey dates. On the scheduled days, the researchers met with class advisors and potential participants (nursing students) in classrooms to explain the study's purpose, methodology, significance, anonymity of data, and emphasizing the voluntary nature of participation and the right to withdraw at any time.

Participants were then guided to access questionnaires via a quick response (QR) code shared through class WeChat or QQ groups, which redirected them to the Wenjuanxing platform. An electronic informed consent form was presented first, with a mandatory reading period of at least 10 seconds before participants could provide their consent. Only after providing informed consent could participants proceed to the questionnaire.

The questionnaire consisted of a demographic survey and the PRNS-3. Participants were instructed to respond based on their own situations, with no right or wrong answers. To ensure data quality, all questions were set as mandatory, and each internet protocol (IP) address was restricted to one response. For quality control, questionnaires completed in less than 180 seconds were excluded, as pilot testing indicated that the typical completion time ranged from 180 to 480 seconds. Additionally, responses exhibiting repetitive or patterned sequences (e.g., “11111” or “12345”) were also removed based on pilot testing results, which confirmed that valid responses did not follow such predictable patterns.

When surveying the six participating institutions in Shenyang (four universities offering bachelor’s programs and two colleges offering associate degree programs), three to four trained survey administrators were onsite in each institution, to facilitate and ensure the quality of survey, as well as act as coordinators between the institutions and the research team. To minimize potential inter-rater bias, all administrators received standardized training covering recruitment procedures, study objectives, methodology, the voluntary nature of participation, anonymity of data, participants' right to withdraw, standard explanation of each item, and questionnaire completion instructions, prior to this survey. The subsequent survey procedures were identical to those described above for the institutions in Chengdu. Throughout the data collection period, survey administrators provided daily progress updates to the research team via WeChat to ensure ongoing data quality and integrity.

Inclusion and exclusion criteria of the participants

Inclusion criteria: (1) full-time nursing students pursuing a bachelor’s or associate degree; (2) adequate communication skills in Chinese; (3) voluntary participation and informed consent.

Exclusion criteria: (1) questionnaires completed in less than 180 seconds (automatically timed by the Wenjuanxing platform), and (2) responses exhibiting consistent patterns such as selecting the same option for all items (e.g., “11111”) or following a fixed sequence (e.g., “12345”).

Data analysis

Item analysis

This study employed both the critical ratio method and the correlation coefficient method to assess the discrimination and homogeneity of scale items, respectively. For the critical ratio method, participants were ranked by total scale score, with the top 27% classified as high-scoring group and the bottom 27% as low-scoring group. Independent t-tests were then conducted to compare the mean scores of each item between the two groups. Items with a critical ratio value < 3.00 or a non-significant p value ($p > 0.05$) were considered to have poor discrimination and were removed. For the correlation coefficient method, the corrected correlation between each item’s score and the total scale score of its corresponding subscale was calculated. When the corrected correlation coefficient for an item was less than 0.30 [46, 47], the item was deleted in this study.

Content validity

This study employed expert consultation to assess the content validity of the scale. Nine experts were invited to rate the relevance of each item of the Chinese PRNS-2 using a 5-point Likert scale (1 = not important, 5 = very important). The I-CVI was calculated as the proportion of experts who rated each item 4 or 5 [48–50], and the scale-level content validity index (S-CVI) was the average of all I-CVIs. Content validity was considered acceptable when I-CVI > 0.78 and S-CVI > 0.90 [48].

Construct validity: EFA

This study employed both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to assess the construct validity of the scale. The sample (n = 762) was randomly divided into two subgroups, one subgroup for EFA (group A, n = 381) and the other for CFA (group B, n = 381), using the random number table method in SPSS 26.0.

EFA was conducted using principal component analysis with varimax rotation, and components with eigenvalues > 1 were extracted. A KMO value exceeding 0.50 and a significant Bartlett's test of sphericity ($p < 0.05$) indicated that the data were suitable for factor analysis [51]. Construct validity was considered acceptable if all item loadings were ≥ 0.50, no cross-loading exceeded 0.40 on more than one factor, and the cumulative variance explained was ≥ 50%.

Construct validity: CFA

Following EFA, CFA was performed to validate the scale's structure. Model fit was assessed using the following criteria: chi-square/degrees-of-freedom ratio (χ^2/df) < 5, comparative fit index (CFI) ≥ 0.90, root mean square error of approximation (RMSEA) < 0.08, normed fit index (NFI) and Tucker–Lewis index (TLI) ≥ 0.90, and standardized root mean square residual (SRMR) < 0.08 [4, 52, 53].

Convergent validity was assessed by calculating the average variance extracted (AVE) and composite reliability (CR), with thresholds of AVE > 0.50 and CR > 0.70 [54]. Discriminant validity was tested using the AVE square root method. Discriminant validity was supported when the square root of the AVE for each factor exceeded its correlations with all other factors.

Reliability analysis

Cronbach's α coefficient was calculated to assess the internal consistency of the scale and its dimensions. Internal consistency reflects the extent items within the same dimension are correlated with one another. A Cronbach's $\alpha > 0.70$ was considered acceptable [55]. Test-retest reliability was assessed in a subsample of the formal survey participants who completed the PRNS-C twice with a 2-week interval. The intraclass correlation coefficient (ICC, two-way mixed effects model, absolute agreement) was calculated, with values of 0.75 or higher considered good [56].

Statistical analysis

Data were analyzed using IBM SPSS 26.0 and AMOS 26.0. Descriptive statistics, including means ± standard deviations (M ± SD), frequencies, and percentages (%), were applied. Preliminary item reduction was conducted using two methods: (a) the critical ratio method, which retained items with a CR value ≥ 3.00 and significant between-group differences ($p < 0.05$) [57], and (b) corrected item-subscale correlation analysis, which removed items with correlation coefficients below 0.30 [46, 47]. The psychometric properties of the scale were evaluated through validity and reliability tests. Validity was assessed in terms of content validity and structural validity. Content validity was quantified using the item-level content validity index (I-CVI) and scale-level content validity index (S-CVI), with values of 0.78 or higher for I-CVI and 0.90 or higher for S-CVI considered acceptable. Structural validity was examined via EFA and CFA. Reliability was evaluated through internal consistency, using Cronbach's α coefficient, with a value of 0.70 or higher indicating acceptable reliability [55]. For all statistical tests, a two-tailed p-value of less than 0.05 was considered statistically significant.

Results

In this study, nine universities offering bachelor's programs in nursing (five in Chengdu and four in Shenyang) and two colleges offering associate degree programs in nursing (both in Shenyang) were included, and further details are provided in Table S13. A total of 1,133 questionnaires were returned. Of these, 47 were excluded because their completion time was less than 180 seconds, and 324 were excluded as a result of repetitive response patterns (e.g., "11111" or "12345"), leaving 762 valid questionnaires for analysis (valid response rate: 67.26%).

Demographics

The participants were predominantly female (87.80%) and most (91.21%) were aged 18 to 22 years old. Juniors represented the largest proportion (40.55%), followed by sophomores (29.92%). Notably, the majority (90.03%) had prior clinical practicum or internship experience. Further details are presented in Table 1.

Table 1
Demographics of all participants included in this study (*n* = 762)

Variables	Descriptor	*n*	Percentage (%)
City	Chengdu	534	70.08
	Shenyang	228	29.92
Education level	Bachelor's degree	678	88.98
	Associate's degree	84	11.02
Gender	Male	93	12.20
	Female	669	87.80
Age (years old)	18–22	695	91.21
	23–30	67	8.79
Academic year	Freshman	141	18.50
	Sophomore	228	29.92
	Junior	309	40.55
	Senior	84	11.02
Prior clinical practicum or internship experience	Yes	686	90.03
	No	76	9.97

The Chinese version of the PRNS

The formal Chinese version of the PRNS (PRNS-C), which is also called PRNS-3 in this study, comprises 26 items distributed across four dimensions, replicating both the dimensional structure of the original scale and the items included in each dimension (see Table S14).

Item analysis

The critical ratio method revealed statistically significant differences ($p < 0.01$) between the top 27% high-scoring group and the bottom 27% low-scoring group for all items. Critical ratio values ranged from 6.152 to 21.472, indicating excellent item discrimination. Subsequently, corrected item-subscale correlations were calculated for all items, all of them exceeded 0.40, well above the recommended cutoff of 0.30 [46, 47], confirming good item-domain alignment. Consequently, no items were excluded at either stage, and a total of 26 items were retained for the PRNS-C. Detailed results are presented in Table S15.

Content validity: expert evaluation

The I-CVI of the PRNS-C ranged from 0.89 to 1.00, exceeding the threshold of 0.78 [48], and the S-CVI was 0.96, exceeding the recommended threshold of 0.90, indicating excellent content validity [48]. Demographic details of the participating experts are provided in Table S8.

EFA

EFA was conducted on group A (n = 381). The KMO value was 0.905, and Bartlett's test of sphericity was significant (χ^2 = 7628.013, df = 325, p < 0.001), indicating that the data were suitable for EFA. Using the eigenvalue-greater-than-1 criterion, a four-factor structure comprising 26 items emerged, explaining 68.49% of the total variance. All items demonstrated adequate factor loadings exceeding 0.50, with no substantial cross-loadings (> 0.40 on more than one factor) observed [51]. Further details are presented in Table 2.

Table 2
Results of EFA (*n* = 381)

Items	Factor 1	Factor 2	Factor 3	Factor 4
Q23 Nurses are resilient	0.886			
Q22 Nurses are good listeners	0.879			
Q24 Nurses improve patients' quality of care	0.848			
Q21 Nurses are good communicators	0.838			
Q19 Nurses are kind and caring	0.836			
Q20 Nurses are respectful	0.830			
Q16 Nurses are ethical	0.796			
Q7 Nurses support each other	0.782			
Q17 Nurses are adaptable	0.744			
Q18 Nurses are empathetic	0.719			
Q29 Nurses care for patients with an individualized perspective		0.893		
Q28 Nurses are health educators		0.885		
Q34 Nursing assessments influence patient care		0.872		
Q33 Nurses provide support and reassurance		0.870		
Q32 Nurses work collaboratively with other health professionals		0.856		
Q31 Nurses advocate for their patients		0.795		
Q30 Nurses prioritize care		0.741		
Q13 Nurses have diverse career opportunities			0.823	
Q15 Nurses are respected by the community			0.787	
Q12 Nurses are well paid			0.762	
Q14 Nurses are leaders			0.718	
Q9 Nursing offers job security			0.669	
Q8 Nurses are required to work shifts including weekends, and public holidays				0.810
Q6 Nurses work in unsafe environments (for example: physically, emotionally and culturally)				0.806

Items	Factor 1	Factor 2	Factor 3	Factor 4
Q4 Nurses find it difficult to achieve work-life balance				0.799
Q3 Nurses experience social isolation due to shift work				0.685
Explained variance (%)	26.689	20.581	11.324	9.896
Cumulative variance (%)	26.689	47.270	58.594	68.490

CFA

Group B (n = 381) was used for CFA. The model fit indices were χ^2/df = 1.883, RMSEA = 0.048, SRMR = 0.051, CFI = 0.966, NFI = 0.930, and TLI = 0.962. Convergent validity was assessed using composite reliability (CR) and AVE. CR values ranged from 0.834 to 0.967, all exceeding 0.70, while AVE values ranged from 0.503 to 0.744, all exceeding 0.50, indicating satisfactory convergent validity. Furthermore, the square root of the AVE for each dimension exceeded its correlations with the other dimensions, demonstrating excellent discriminant validity. The AMOS path diagram is provided in Fig. 1, further details are presented in Tables 3 and 4.

Table 3
Convergent Validity of the Chinese Version of the PRNS

Factor	Items	*Estimate*	*CR*	*AVE*
Factors influencing a nurse's well-being	Q3	0.762	0.838	0.567
	Q4	0.820		
	Q6	0.785		
	Q8	0.631		
Nursing professionalism	Q9	0.783	0.834	0.503
	Q12	0.645		
	Q13	0.706		
	Q14	0.652		
	Q15	0.750		
Attributes and qualities of a nurse	Q7	0.831	0.967	0.744
	Q16	0.896		
	Q17	0.792		
	Q18	0.855		
	Q19	0.854		
	Q20	0.898		
	Q21	0.857		
	Q22	0.868		
	Q23	0.868		
	Q24	0.902		
Role of the nurse	Q28	0.889	0.934	0.670
	Q29	0.867		
	Q30	0.631		
	Q31	0.756		
	Q32	0.826		
	Q33	0.838		

Note: Estimate = standardized factor loading; CR, Composite Reliability; AVE, Average Variance Extracted

Factor	Items	*Estimate*	*CR*	*AVE*
	Q34	0.891		
Note: Estimate = standardized factor loading; CR, Composite Reliability; AVE, Average Variance Extracted				

Table 4
Discriminant validity (*n* = 381)

FNWB	FNWB	NP	AQN	RNR
	0.753			
NP	-0.220***	**0.709**		
AQN	-0.005	0.191**	**0.863**	
RNR	0.278***	0.165*	0.372***	**0.819**
Note: *p < 0.05, **p < 0.01, ***p < 0.001; ns, p ≥ 0.05; FNWB: factors influencing a nurse's well-being; NP: nursing professionalism; AQN: attributes and qualities of a nurse; RNR: role of the nurse. Bold values show the square root of the AVE for each of the four dimensions.				

Reliability

The overall Cronbach's *α* of the PRNS-C was 0.899, and the Cronbach's *α* coefficients for the four dimensions, factors influencing a nurse's well-being, nursing professionalism, attributes and qualities of a nurse, and the role of the nurse, were 0.801, 0.814, 0.950, and 0.943, respectively. All Cronbach's *α* coefficients exceeded 0.70 [55, 58], indicating satisfactory internal consistency. Test-retest reliability was satisfactory, with a Pearson correlation of 0.799 and an ICC of 0.802 (95% CI [0.563, 0.917], $p < 0.001$) between the two administrations.

Discussion

In this study, nine universities and two colleges were included through convenience sampling, which covers a broader range of institutions and enhances sample representativeness of this study compared to other similar studies. For instance, a systematic review of 29 studies on ethical sensitivity instruments revealed that 15 of 16 cross-cultural adaptation studies included only a single university or hospital [59]. Similarly, another systematic review encompassing 21 studies on instruments measuring nursing students' evidence-based practice ability showed that 11 out of 12 cross-cultural adaptation studies recruited participants from only a single university [60].

We received 1,133 returned questionnaires, of which 762 were valid (valid response rate of 67.26%), which was lower than similar studies, which might primarily be due to the larger sample size and more stringent quality control measures implemented in this research. For comparison, Wang reported a

91.11% valid response rate (410 valid responses out of 450) in their introduction and cross-cultural adaptation of the Sense of Belonging in Nursing School scale into Chinese culture [61], while Liang reported a 94.0% valid response rate (329 valid responses out of 350) on their introduction of the Career Crafting Assessment Scale into Taiwan culture, China [62].

Demographics

In this study, nursing students pursuing bachelor's degrees accounted for a markedly higher proportion (88.98%, *n* = 678) than those pursuing associate degrees (11.02%, *n* = 84), a distribution consistent with China's educational development in recent years and long-term planning of ratio for nursing professionals. Data indicate that the proportion of nurses holding bachelor's degrees in China increased from 8.7% in 2010 to 32.7% in 2022 [63]. Although associate degree nurses currently constitute the largest share nationwide, the educational structure is undergoing rapid transformation driven by the National Nursing Development Plan (2021–2025). It is also worth noting that in developed coastal regions such as Shanghai, the proportion of registered nurses holding a bachelor's degree or above had reached 50.02% by the end of 2024 [64]. At the same time, this trend aligns with China's planning for the ratio in educational level of nursing profession. According to the National Nursing Development Plan (2021–2025), China will place greater emphasis on increasing the proportion of undergraduate nursing students while reducing the proportion of junior college nursing students in future nursing talent cultivation [65]. Additionally, this study included nursing students across all academic years from both bachelor's and associate programs, and we tried our best to ensure representativeness and sample diversity. Including both educational levels enhances the scale's applicability to both current and future nursing populations.

Female participants constituted the majority of the sample in this study (87.80%). This gender distribution is consistent with an integrative review of 27 studies, which confirmed that nursing remains a female-dominated profession [66]. In terms of grade distribution, although somewhat imbalanced, it was consistent with the typical distribution among nursing students, with juniors accounting for the largest proportion (40.55%), followed by sophomores (29.92%), freshmen (18.50%), and seniors (11.02%). This pattern is similar to those observed in Tang et al.'s study on adaptation of the Sleep Hygiene Index into Chinese culture (freshmen: 20.03%, sophomores: 36.72%, juniors: 29.59%, seniors: 13.66%) [67] and Cui et al.'s study on the adaptation of the Sense of Belonging in Nursing School Scale into Chinese culture (freshmen: 18.2%, sophomores: 41.5%, juniors: 29.7%, seniors: 10.6%) [68]. The relatively low proportion of senior nursing students may be attributed to their engagement in clinical internships [69]. Compared with freshmen and sophomores, senior students possess relatively richer clinical experience and can offer deeper insights into PRN, and the present grade distribution not only aligns with the current grade distribution of undergraduate students in China, but may provide a robust basis for exploring the dynamic evolution of PRN throughout nursing education in the near future. Notably, a high proportion of participants (90.03%, *n* = 686) had clinical internship experience, and this proportion was higher than the 65.87% (*n* = 386) reported in Yang's adaptation study of the Factors Influencing Adherence to Standard Precautions Scale–Student Version into Chinese culture [70]. This

may be attributed to China's nursing education curriculum, and students typically undertake clinical placements after completing their first and second years and complete an intensive clinical internship lasting 8 to 10 months during their fourth year [71].

Overview of the Chinese PRNS-C

The PRNS-C comprised 26 items across four dimensions, replicating the four-dimensional structure of the original PRNS, and all 26 dimension-attributed items retained their original dimension assignment. It maintains high structural consistency with the original scale. This high level of cross-cultural consistency may be attributed to two factors. First, the psychological constructs measured by the PRNS demonstrate strong stability across different cultural contexts. Owing to the globalization of nursing education, the professional nature, requirements, and core values of the nursing profession (such as "nurses are compassionate" and "nurses collaborate with other healthcare professionals") exhibit a high degree of similarity worldwide [72, 73]. Consequently, the dimensions covered by the original scale demonstrate strong applicability within the Chinese nursing context. Second, the research team strictly adhered to established scale translation and cultural adaptation procedures, in the meantime, a great deal of time and effort was also devoted to refining the details of each step, and this might have contributed to this consistency.

Validity of the PRNS-C

The PRNS-C demonstrates excellent content validity. The I-CVIs ranged from 0.89 to 1.00 and the S-CVI was 0.96, all exceeding the generally accepted criteria (I-CVI > 0.78, S-CVI > 0.90) [48]. The results of this study are similar to those of the original and Turkish versions, further confirming the good content validity of the PRNS-C. For example, I-CVI values consistently exceeded 0.78 in the development of the original scale in Australia [4]. Additionally, Coşkun's study, which introduced and tested the psychometric properties of the PRNS in Turkey, yielded an I-CVI of 1.00 and an S-CVI of 0.95 [74].

The PRNS-C also demonstrated excellent construct validity. First, EFA extracted four factors with eigenvalues > 1, jointly explaining 68.49% of the total variance, exceeding the recommended threshold of 50% [75, 76]. All item factor loadings exceeded 0.50 with no significant cross-loadings, indicating sound explanatory power and stability of the four-factor structure. Second, CFA yielded excellent model fit indices (χ^2/df = 1.883, RMSEA = 0.048, CFI = 0.966, TLI = 0.962), with all indices meeting or exceeding recommended standards [53, 77]. Compared with the Turkish version of the PRNS (χ^2/df = 2.56, RMSEA = 0.070, CFI = 0.910) [74], the fit indices in this study were more favorable.

The superior model fit of the PRNS-C in the CFA, compared with the Turkish adaptation of the PRNS [74], may be attributed to two key methodological differences: sample size, and the rigorous adherence to the multi-stage translation and cross-cultural adaptation processes. First, regarding sample size, this study employed a substantially larger sample (n = 762) than the Turkish version (n = 252), which enhanced the stability and precision of parameter estimates and contributed to superior model fit. Second, regarding the translation and cross-cultural adaptation process, the Turkish version followed only Brislin's

translation model, whereas this study strictly adhered to both Brislin's translation model and Sousa's cross-cultural adaptation guidelines. Additionally, through multiple rounds of meetings (including the forward translation and back translation stages), the team thoroughly discussed and solved translation discrepancies, ensuring precision in expression and cultural consistency (e.g., cross-linguistic equivalence, equivalence of cross-cultural measurement, and comparable measurement results). Most importantly, we also conducted additional in-depth cultural adaptation through direct consultation with the original scale developer and bilingual testing, which the Turkish version did not include. These more comprehensive actions might have ensured cross-cultural measurement equivalence, which may have contributed to the superior CFA results.

Furthermore, each dimension of the PRNS-C demonstrated sound convergent and discriminant validity. Convergent validity analysis revealed CR values for the four factors ranging from 0.834 to 0.967 (exceeding the 0.70 benchmark), with AVE values ranging from 0.503 to 0.744 (exceeding the 0.50 benchmark) [54], collectively indicating that the scale exhibits strong convergent validity. Discriminant validity analysis revealed that the square root of the AVE for each factor exceeded its correlations with the other factors, confirming strong discriminant validity among the four dimensions.

Reliability of the PRNS-C

The PRNS-C demonstrated excellent internal consistency and reliability. Specifically, the total scale yielded a Cronbach's α of 0.899, and the coefficients for the four dimensions (factors influencing a nurse's well-being, nursing professionalism, attributes and qualities of a nurse, and role of the nurse) were 0.801, 0.814, 0.950, and 0.943, respectively, well above the recommended threshold of 0.70 [55, 78]. These values are comparable to those of the original scale (overall Cronbach's *α* of 0.836) [4] and the Turkish version (overall Cronbach's *α* of 0.925) [74], further supporting the good internal consistency of the PRNS-C.

Limitations

This study recruited nursing students from institutions in Chengdu and Shenyang, but the two-phase sampling method limited the representativeness of both the included institutions for the whole picture of institutions in China offering both bachelor's and associate degree nursing programs, and also for participants included. Future studies should employ more rigorous stratified random sampling strategies (e.g., by geographic region or academic program level) to enhance sample representativeness.

Conclusions

This study successfully introduced and culturally adapted the PRNS into Chinese culture. The PRNS-C comprises 26 items across 4 dimensions and exhibits sound psychometric properties. It provides a validated and reliable tool for assessing PRN and its influencing factors among nursing students in

China, thereby offering a solid foundation for educational interventions, curriculum improvement, and clinical practice.

Abbreviations

PRN
Perceptions of being a registered nurse
PRNS
Perceptions of Being a Registered Nurse Scale
PRNS-C
Chinese version of the PRNS
I-CVI
item-level content validity index
S-CVI
scale-level content validity index
EFA
exploratory factor analysis
CFA
confirmatory factor analysis
CR
composite reliability
AVE
average variance extracted
KMO
Kaiser-Meyer-Olkin measure of sampling adequacy
CHSI
China Higher Education Student Information Network
ICC
intraclass correlation coefficient
RMSEA
root mean square error of approximation
SRMR
standardized root mean square residual
CFI
comparative fit index
NFI
normed fit index
TLI
Tucker-Lewis index

Declarations

Funding

This work was supported by the National Natural Science Foundation of China [grant number: 52373237].

Data availability The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of West China Hospital, Sichuan University (Approval No: 2023(2013)). Written informed consent was obtained from all participants.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Author Contribution

YL conceived and designed the study. YL and HC drafted the manuscript. YM and HC collected the data. HC, YM and WK analyzed the data. LL and YL revised the manuscript critically for important intellectual content. All authors read and approved the final manuscript.

Acknowledgement

We thank the nursing students who participated in this study, Louise Allen for developing the PRNS and authorizing its translation and cultural adaptation into Chinese, and the expert panel and translation team (SQH, QG, LZ, XLF and YLZ) for their contribution to the translation process.

Data Availability

Data availability The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

References

1. Watson R, Deary IJ, Hoogbruin AL, Vermeijden W, Rumeu C, Beunza M, et al. Perceptions of nursing: a study involving nurses, nursing students, patients and non-nursing students. Int J Nurs Stud. 2003;40(2):133–44.
2. Luo P, Sun YM, Zhang JY, Guan RY, Guo JM, Li XP. Investigation and analysis of the specialty recognition among undergraduate nursing students. Chin Nurs Manage. 2005(03):35–7.
3. Asmaningrum N, Tsai YF. Nurse Perspectives of Maintaining Patient Dignity in Indonesian Clinical Care Settings: A Multicenter Qualitative Study. J Nurs Scholarsh. 2018;50(5):482–91.
4. Allen L, Cooper S, Missen K. Perceptions of being a registered nurse (PRN): development and validation of a survey tool. BMC Nurs. 2023;22(1):159.
5. Watson AL. The evolution of professional identity in intensive care nurses during COVID-19 - An interpretive phenomenological study. Intensive Crit Care Nurs. 2024;80:103538.
6. van der Cingel M, Brouwer J. What makes a nurse today? A debate on the nursing professional identity and its need for change. Nurs Philos. 2021;22(2):e12343.
7. Wu Y, Wang J, Liu J, Zheng J, Liu K, Baggs JG, et al. The impact of work environment on workplace violence, burnout and work attitudes for hospital nurses: A structural equation modelling analysis. J Nurs Manag. 2020;28(3):495–503.
8. Polydoropoulou E, Intas G, Platis C, Stergiannis P, Panoutsopoulos G. Investigating Physical Activity Habits and Sleep Disorders in the Nursing Staff of Greece During the COVID-19 Pandemic: A Multicenter Cross-Sectional Correlational Study. Adv Exp Med Biol. 2023;1425:535–43.
9. Bakhsh LS, AlHazmi A, BaMohammed A, Binishaq E, Abdullah G, Bajal R, Emotions. Perceived Stressors, and Coping Strategies Among Nursing Staff in Saudi Arabia During the COVID-19 Pandemic. Cureus. 2023;15(11):e48284.
10. Lin S, Chen S, Tu Q, Xu X, Xie S, Yang B, et al. Barriers and facilitators to the formation of professional identity among nursing students: A four-year longitudinal qualitative study. Nurse Educ Today. 2024;134:106087.
11. den Hertog R, Boshuizen HPA. Learning Professional Knowledge: Bachelor Nursing Students' Experiences in Learning and Knowledge Quality Outcomes in a Competence-Based Curriculum. Vocations Learn. 2021;15(1):21–47.
12. Nair MA, Muthu P, Abuijlan IAM. The Effectiveness of High-Fidelity Simulation on Clinical Competence Among Nursing Students. SAGE Open Nurs. 2024;10:23779608241249357.
13. De Paula RAB, Machado MJLM. Undergraduate Nursing Students' Motivation for Learning. Creat Educ. 2021;12(09):2180–95.
14. Vabo G, Slettebø Å, Fossum M. Nursing students' professional identity development: An integrative review. Nord J Nurs Res. 2021;42(2):62–75.
15. Hashish EAA. The effect of career awareness on perceived career and talent development self-efficacy and career barriers among nursing students. J Res Nurs. 2019;24(3–4):233–47.

16. Pan JD, Ho KY, Liu HL, Huang JY, Zhang XL, Zeng QM, et al. Implementation and effectiveness of a nurse navigation programme based on noddings' care theory in first-year undergraduate nursing students for professional identity and career planning: A quasi-experimental study. Nurse Educ Pract. 2024;75:103900.
17. Graf AC, Jacob E, Twigg D, Nattabi B. Contemporary nursing graduates' transition to practice: A critical review of transition models. J Clin Nurs. 2020;29(15–16):3097–107.
18. Tu H, Liu J, Li F, Lin T, Jin P, Li P, et al. The mediating effect of coping on perceived stress and professional identity among nursing interns: a cross-sectional study conducted in a medical university in China. BMC Psychol. 2024;12(1):682.
19. Wu Y, Chen W, Zhang R, Yang Y, Wang H, Xu Y, et al. The Chain Mediating Roles of Professional Identity and Workplace Social Capital in the Relationship Between Inclusive Leadership and Burnout of Nurses: A Longitudinal Study. J Nurs Manag. 2025;2025:4713030.
20. Aslam MZ, Ajani K, Zahid W, Salim Z, Soomar SM. Academic motivation in undergraduate nursing students: an analytical cross sectional study. J Pak Med Assoc. 2025;75(10):1537–42.
21. Zou L, Xie Z, Tan M, Ou Q, Liao M. The effect of professional identity on nursing academic achievement: the chain mediating effect of general self-efficacy and learning engagement. BMC Med Educ. 2024;24(1).
22. Cilar L, Spevan M. Strategies to improve academic motivation among nursing students. Sestrinski glasnik. 2020;25(2):139–45.
23. Santos APS. Nursing students' errors in clinical learning. Qualitative outcomes in Mixed Methods Research. Rev Bras Enferm. 2019;72(1):170–6.
24. Tang Y, Chen X, Liao Y, Zheng T, Xiao Y, You Y. Status and associations of transition shock among nursing students during clinical practice: A cross-sectional study. PLoS ONE. 2025;20(2):e0313524.
25. Shaver DE, Viveiros JD. Voluntary Attrition Among Traditional Baccalaureate Nursing Students: An Integrative Review. Nurs Educ Perspect. 2024;45(3):150–4.
26. Shamsi A, Peyravi H. Nursing shortage, a different challenge in Iran: A systematic review. Med J Islam Repub Iran. 2020;34:8.
27. Cook TH, Gilmer MJ, Bess CJ. Beginning Students' Definitions of Nursing: An Inductive Framework of Professional Identity. J Nurs Educ. 2003;42(7):311–7.
28. Siebens K, Casterle BD, Abraham I, Dierckx K, Braes T, Darras E, et al. The professional self-image of nurses in Belgian hospitals: a cross-sectional questionnaire survey. Int J Nurs Stud. 2006;43(1):71–82.
29. Weis D, Schank MJ. Development and psychometric evaluation of the Nurses Professional Values Scale–Revised. J Nurs Meas. 2009;17(3):221–31.
30. Toth JC, Dobratz MA, Boni MS. Attitude toward nursing of students earning a second degree and traditional baccalaureate students: are they different? Nurs Outlook. 1998;46:273–8.

31. Weis D, Schank MJ. An Instrument to Measure Professional Nursing Values. J Nurs Scholarsh. 2000;32:201–4.
32. Vanhanen L, Janhonen S. Factors associated with students' orientations to nursing. J Adv Nurs. 2000;31:1054–62.
33. Stadnicka SK, Zarzycka D. Perception of the professional self-image by nurses and midwives. Psychometric adaptation of the Belimage questionnaire. BMC Nurs. 2023;22(1):412.
34. Bolan C, Grainger P. Students in the BN program–do their perceptions change? Nurse Educ Today. 2009;29(7):775–9.
35. Kai C. Legitimacy and the Legal Regulation of Strikes in China: A Case Study of the Nanhai Honda Strike. Int J Comp Labour Law Industrial Relations. 2013:133–43.
36. Zhang MF, Petrini MA. Factors influencing Chinese undergraduate nursing students' perceptions of the nursing profession. Int Nurs Rev. 2008;55:274–80.
37. Lv MM, Chen ZL, Wang H, Liu XD, Zhong K, Ge MY. A Survey on the Current Status of Professional Cognition among 987 Male and Female Undergraduate Nursing Students. J Nursing(China). 2017;24(10):47–50.
38. Zhang J, Wang HH, Ren WH. The professional attitude and employment intention of last-year undergraduate nursing students. Chin J Nurs Educ. 2015;12(05):370–3.
39. Wang LZ, Shao QY, Yu LL. Investigation on career cognition and practicing will among nursing students at late-stage of internship. Chin J Nurs Educ. 2010;7(06):276–8.
40. Liao YJ, Zhao GH, Liu SX, Du MJ. The dynamic changes of professional attitude among baccalaureate nursing students:a review. J Nurs Sci. 2023;38(08):124–8.
41. Sousa VD, Rojjanasrirat W. Translation, adaptation and validation of instruments or scales for use in cross-cultural health care research: a clear and user-friendly guideline. J Eval Clin Pract. 2011;17(2):268–74.
42. Brislin RW. Back-Translation for Cross-Cultural Research. J Cross Cult Psychol. 1970;1(3):185–216.
43. Hong D, Xu Y, Xu F, Jiang Y, Xiang X, Ai Q et al. Development, validity, and reliability testing of a research readiness self-evaluation scale with nurses: A cross-sectional study. Medicine. 2025;104(6).
44. Gunawan J, Marzilli C, Aungsuroch Y. Establishing appropriate sample size for developing and validating a questionnaire in nursing research. Belitung Nurs J. 2021;7(5):356–60.
45. Boateng GO, Neilands TB, Frongillo EA, Melgar-Quiñonez HR, Young SL. Best Practices for Developing and Validating Scales for Health, Social, and Behavioral Research: A Primer. Front Public Health. 2018;6.
46. Lange C, Schmidt R, Hilbert A. Validation of the parent version of the eating disorder examination-questionnaire adapted for children in parent–child dyads with children with and without loss of control eating. J Eat Disord. 2025;13(1).

47. Zhong L, Wang X, Yang W, Feng X. Reliability and validity assessment of the Chinese version of the online learning readiness scale (OLRS) for nursing students. Nurse Educ Today. 2023;128:105884.
48. Polit DF, Beck CT. The content validity index: are you sure you know what's being reported? Critique and recommendations. Res Nurs Health. 2006;29(5):489–97.
49. Tan Y, Xu Y, Liang D, Zhang Y, Cai W, Ren W et al. Cross-cultural adaptation and psychometric properties of the International Consultation on Incontinence Questionnaire Pediatric Lower Urinary Tract Symptoms (ICIQ-CLUTS): a Chinese validation study. BMC Pediatr. 2025;25(1).
50. Alzaben AS, Bawazeer NM. Translation, validity, and reliability of an Arabic version of the short Healthy Eating Index tested in young Saudi adults: a questionnaire-based study. Front Public Health. 2025;13.
51. Lorenzo-Seva U. SOLOMON: a method for splitting a sample into equivalent subsamples in factor analysis. Behav Res Methods. 2022;54(6):2665–77.
52. Lt H, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Struct Equ Model Multidiscip J. 1999;6(1):1–55.
53. Goretzko D, Siemund K, Sterner P. Evaluating Model Fit of Measurement Models in Confirmatory Factor Analysis. Educ Psychol Meas. 2024;81:123–44.
54. Fornell C, Larcker DF. Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. J Mark Res. 1981;18(1):39–50.
55. Bland JM, Altman DG. Cronbach's alpha. BMJ (Clinical Res Ed). 1997;314:572.
56. Koo TK, Li MY. A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. J Chiropr Med. 2016;15(2):155–63.
57. Ye T, Luo J, He M, Chen Y, Grant J, Zhou X, et al. Psychometric evaluation of the Chinese version of Nursing Professional Values Scale (NPVS-3): A quantitative and cross-sectional design. Nurse Educ Pract. 2025;84:104325.
58. Dai Z, Wang J, Ma W. Adaptation and Validation of the Readiness for Practice Instrument for Senior Undergraduate Nursing Students in China. J Nurs Manag. 2023;2023:8345744.
59. Zhou L, Bi L, Wu Y, Wang L, Liu G, Cai E. The psychometric properties of instruments measuring ethical sensitivity in nursing: a systematic review. Syst Rev. 2024;13(1):87.
60. Li H, Wang Y, Xie X, Li Y, Hu J, Du J. Instruments for measuring evidence-based practice ability of nursing students: a COSMIN-based systematic review. BMC Nurs. 2026.
61. Wang JW, Wang M, Gu HH, Xu R, An WH, Yi QF. Translation and validation of the Sense of Belonging in Nursing School Scale. J Nurs Sci. 2025;40(05):84–8.
62. Liang HY, Tu MH, Wang CA, Lin CY, Wu YT. Cultural adaptation and psychometric testing of a traditional Chinese version of the career crafting scale: A study among graduating nursing students. Nurse Educ Pract. 2026;92:104766.
63. National Health Commission of the People's Republic of China. China Health Statistical Yearbook 2023: Peking Union Medical College Press; 2023.

64. Shanghai Municipal Health Commission. Shanghai has 123,100 registered nurses; 2025 Shanghai Good Nurses announced 2025 [Available from: https://www.shanghai.gov.cn/nw31406/20250515/0dcfe6f4f853499183d156ee4925f532.html
65. National Health Commission of. the People's Republic of China. National Nursing Development Plan (2021–2025). 2022.
66. Teresa-Morales C, Rodriguez-Perez M, Araujo-Hernandez M, Feria-Ramirez C. Current Stereotypes Associated with Nursing and Nursing Professionals: An Integrative Review. Int J Environ Res Public Health. 2022;19(13).
67. Tang Z, Li X, Zhang Y, Li X, Zhang X, Hu M, et al. Psychometric analysis of a Chinese version of the Sleep Hygiene Index in nursing students in China: a cross-sectional study. Sleep Med. 2021;81:253–60.
68. Cui YY, Zhang L, zhang D, Fang J, Elizabeth PS. Translation and validation of the Sense of Belonging in Nursing School Scale. J Nurs Sci. 2025;40(02):5–8.
69. Gao LL, Chan SWC, Cheng BS. The past, present and future of nursing education in the People's Republic of China: a discussion paper. J Adv Nurs. 2011;68(6):1429–1438.
70. Yang L, Deng C, Xie J, Han T, Yang Y, Wang W, et al. Cross-cultural reliability and validity of the factors influencing adherence to standard precautions scale - Student version. Nurse Educ Pract. 2026;92:104747.
71. Chan CWH, Tang FWK, Cheng HY, Chow KM, Kwok ZCM, Li C, et al. Effect of simulation-based zoom learning on clinical decision-making among undergraduate nursing students and experiences of students and instructors: A mixed methods study. Heliyon. 2024;10(9):e30039.
72. Baker C, Cary AH, da Conceicao Bento M. Global standards for professional nursing education: The time is now. J Prof Nurs. 2021;37(1):86–92.
73. Dorri S, Abedi A, Mohammadi N. Nursing education in the path of globalization: Promotion or challenge? J Educ Health Promot. 2020;9:269.
74. Coşkun EY, Uğur E, Çelik HY, Karabacak Ü. Hemşire Olma Algısı Ölçeği'nin geçerlik ve güvenirlik çalışması. Mersin Üniversitesi Sağlık Bilimleri Dergisi. 2025;18(2):201–9.
75. Izquierdo I, Olea J, Abad FJ. Exploratory factor analysis in validation studies: uses and recommendations. Psicothema. 2014;26(3):395–400.
76. Zhao Y, Shen X, Mao D, Xu M, Li S, Wang L et al. Reliability and validity of the Chinese version of the Gatos Clinical Test questionnaire in patients with severe dementia. Front Psychol. 2025;16.
77. Souza ACd, Alexandre NMC, Guirardello EB. Propriedades psicométricas na avaliação de instrumentos: avaliação da confiabilidade e da validade. Epidemiol Serv Saude. 2017;26(3):649–59.
78. Xu D, Liu S, Hu W, Li X. Reliability and validity testing the Chinese version of the nursing surveillance scale: a cross-sectional study. BMC Nurs. 2025;24(1).

Figures

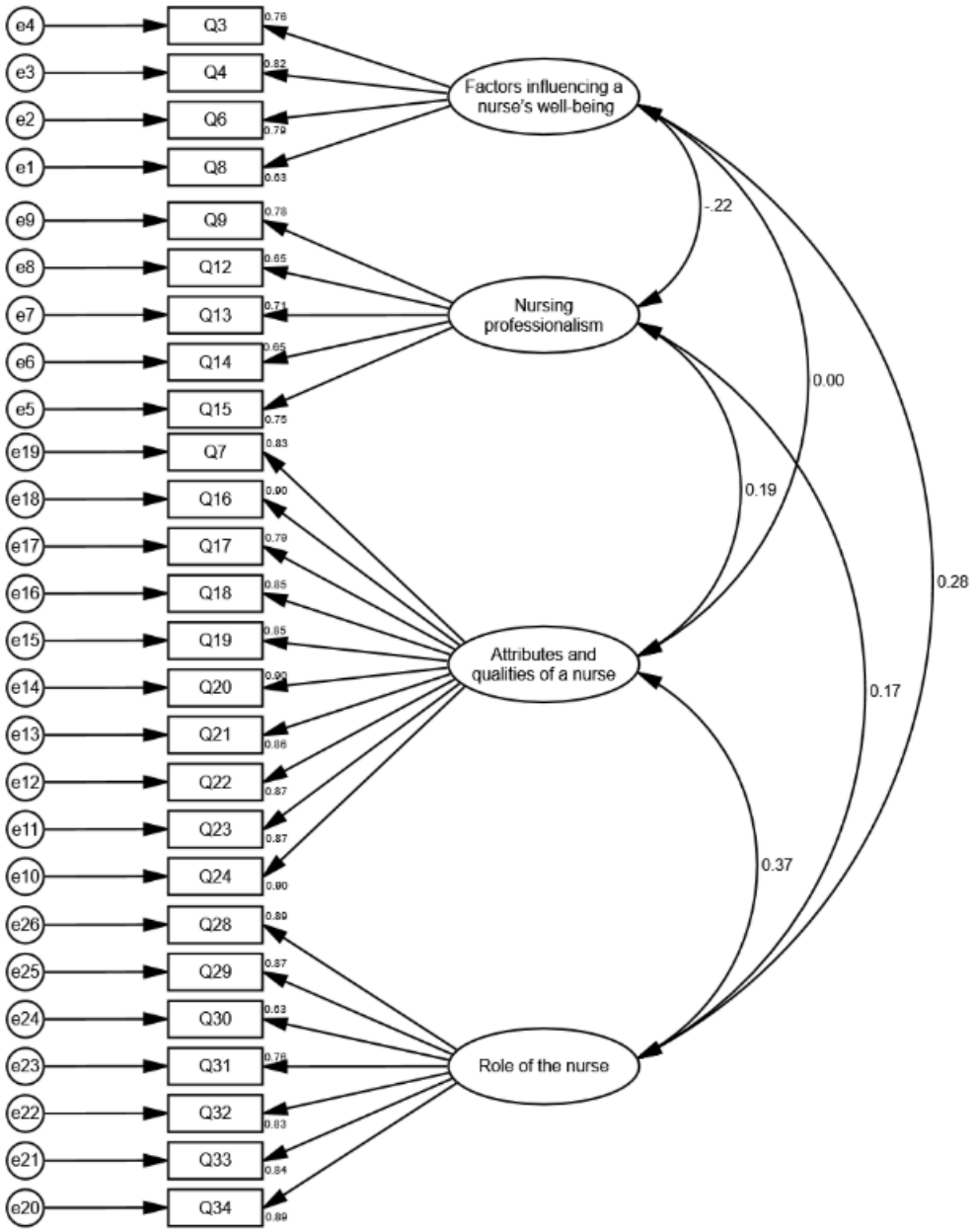


Figure 1

Standardized four-factor model of the Chinese version of the PRNS (*n* = 381).

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Appendix.docx