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Psychometric evaluation of the Chinese version of the nurse turnover intention scale: a translation and validation study

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Abstract

Background Globally, the issue of high nurse turnover rates is prevalent in China. The COVID-19 pandemic exacerbated the attrition rate of nurses. Turnover intention is the most reliable predictor of nurse turnover. However, there is currently a lack of proper evaluation tools in China. This study aimed to translate the Nurses Turnover Intention Scale (NTIS) into Chinese and examine the psychometric characteristics of the Chinese version of the NTIS among clinical nurses in China.

Methods Approximately 418 nurses were recruited from three tertiary general hospitals in Jiangxi, Guangdong, and Zhejiang provinces. This study used Brislin's double-back translation, back-translation, and cross-cultural adaptation methods to translate the scale. Internal consistency, split-half reliability, and test-retest reliability were used to measure the reliability of the Chinese scale version. The validity of the Chinese scale version's content was evaluated *via* the Delphi method. Exploratory and confirmatory factor analyses were carried out to evaluate the construct validity of the Chinese scale versions. In exploratory factor analysis, principal component analysis and maximum variance rotation method were used in this study. In the confirmatory factor analysis, Amos 24.0 software was used for analysis.

Results The NTIS in Chinese has ten elements: a Cronbach α coefficient of 0.864, a Cronbach α coefficient of 0.852∼0.903 for the three dimensions, and a split-half reliability and test-retest reliability of 0.878 and 0.960, respectively. This indicates that the Chinese version of the NTIS has good internal consistency and time stability. The scale-level content validity index (S-CVI) was 0.957, which indicated that the Chinese version of NTIS had good content validity. The total variance contribution rate was 79.055%, and three common factors were identified *via* exploratory factor analysis. The examined three-factor structure was confirmed by confirmatory factor analysis, which confirmed that all fit indices were appropriate.

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Conclusions The Chinese version of the NTIS was appropriate in terms of reliability and validity. This scale can be used to evaluate nurses' turnover intention, and the outcomes can aid nurse management in designing training initiatives and implementing preventive measures to decrease nurse turnover.

Keywords Nurses, Turnover intention, Psychometric properties, Factor analysis, Reliability, Validity

Introduction

Globally, the shortage of nurses and their uneven regional distribution are significant problems. The International Council of Nurses (ICN) presented a report on March 20, 2023, emphasising the severe urgency of the current shortage of nurses. In 2019, a deficit of 3,060 to 10,000 nurses and midwives worldwide significantly impacted mortality rates. Globally, it is regarded as a health emergency [1]. The turnover of people is one of the contributing factors to a shortage of nurses.

The term "turnover intention" denotes an individual's intention or desire to resign from their current position and pursue employment elsewhere [2]. Research has demonstrated [3] that turnover intention is the most reliable predictor of turnover. Therefore, it is essential to judge nursing staff members' willingness to change early and take preventive measures. Social Cognitive Career Theory (SCCT) posits that during the job search process, individuals assess their self-efficacy and outcome expectations, which in turn shapes their career interests [4]. These interests subsequently influence their actual job performance, illustrating the interrelated nature of these factors. Specifically, when nurses experience low self-efficacy or harbor negative outcome expectations, their intention to leave the profession increases. Conversely, a strong interest in their careers is associated with a reduced risk of turnover intention among nurses [5].

According to a cross-sectional study of 10 European countries, the turnover intention of nurses in these countries varies from 5 to 17%, with Germany having the most significant proportion at 17% [6]. The results of a multicenter cross-sectional survey conducted in China indicated that 69.1% of Chinese nurses are contemplating leaving their positions [7]. The post-COVID-19 era has seen a global increase in nurse turnover intentions. Both domestic and international studies indicate that following the pandemic, nurses have experienced heightened work intensity, decreased job satisfaction, and increased levels of emotional exhaustion and job burnout [8–11]. These factors are significant contributors to the escalation of nurses' intentions to leave their positions. Conversely, retired nurses may experience adverse effects on their mental health and job satisfaction [12]. However, the decrease in the number of nurses will result in an increased workload for the remaining nurses at the hospital. This, in turn, may contribute to job stress and a higher turnover rate among the remaining nursing staff [13]. During hospitalization, nurse turnover is significantly associated with increased pressure ulcer rates, incidence of healthcare-associated infections, and a higher mortality rate for patients [14–16]. The turnover of nurses is a costly expense for hospitals. The increased nurse turnover can significantly impact the financial burden on hospitals, leading to higher expenditures on nurse recruitment and training [17]. Thus, it is crucial to evaluate the turnover intention of nurses and implement proactive measures to retain them.

Chen [18] et al. used The Turnover Intention questionnaire (TIQ) to investigate the turnover intention of Chinese nurses. The results showed that the turnover rate of Chinese nurses ranged from 0.64 to 12.71%. The turnover intention of nurses was related to nurses' participation in hospital affairs, age, title and other factors. Liu [19] et al. adopted the Turnover intention scale to investigate the turnover intention of Chinese nurses, and the results showed that the turnover intention was related to whether nurses were single, economic income and job satisfaction. It is worth noting that in the past, the tools were universal and suitable for all professions, not for nurses. Furthermore, many of the previous measurement tools utilized in China were single-dimensional scales that failed to consider important factors such as interpersonal relationships and job satisfaction. Nurse Turnover Intention Scale (NTIS) was developed by Korean scholar Kim et al. in 2013 to evaluate the turnover intention of nurses in Korea. The scale encompasses three key dimensions that influence nurses' turnover intention: job satisfaction, job performance, and interpersonal relationships. By considering these dimensions comprehensively, the study aims to evaluate the complexity of nurses' turnover intention and offer managers more targeted intervention recommendations. Furthermore, the scale has been validated across various cultural contexts, including Korean and Turkish populations, demonstrating good reliability and validity [20, 21]. However, the reliability and validity of the scale in other languages have not yet been examined in the literature. This study seeks to translate the NTIS into Chinese and confirm its validity and reliability among clinical nurses, particularly in light of the high turnover rates in China. The findings of this study will provide a comparative basis with related fields, offering a reference framework for future research and contributing to the development of cross-disciplinary theories and practices. This is the first time that the Korean version of NTIS has been introduced to China through cross-cultural debugging and has been introduced from Job

satisfaction area, job performance area, and interpersonal relationship area to evaluate the nurses' turnover intention. Presently, the NTIS can satisfy the requirements of nursing managers and offer a theoretical basis for developing applicable measures.

Methods

Design and participants

This multicenter cross-sectional study was conducted in China from March 2023 to June 2023. A convenience sampling method was used to recruit 418 nurses from Jiangxi, Guangdong, and Zhejiang provinces. All nurses were randomly selected from three tertiary class A general hospitals in these provinces. The basic rules of factor analysis procedures were implemented to calculate the sample size. Each project requires a minimum of 10 respondents [22]. This scale comprises 10 items, and 100 nurses have been selected. However, questionnaires may not be efficient, necessitating a significant sample size to fulfil the sample size criteria for exploratory and confirmatory factor analyses [23]. A total of 418 nurses were successfully hired. The inclusion criteria for nurses were registered nurses who had worked in the hospital for 1 year or more and had given informed consent to participate in the study voluntarily. The exclusion criteria for nurses are student nurses, rotating nurses, and nurses on sick or maternity leave for more than one week.

Measures

General demographic characteristics questionnaire

The questionnaire on general demographic characteristics was designed after a comprehensive literature review and discussion. It included 11 questions about gender, age, marital status, educational background, professional designation, years of clinical experience, economic status, voluntary choice of nursing profession, etc.

Nurse turnover intention scale (NTIS)

This study used the Nurse Turnover Intention Scale (NTIS) developed by Professor Heejeong Kim et al. [20]. The scale comprised 10 items and was categorized into 3 dimensions: job performance, work satisfaction, and interpersonal associations. Each item was scored on a five-point Likert scale, ranging from 1 to 5. The specific scoring criteria were as follows: very disagree=1, disagree=2, neither negative nor positive=3, agree=4, and very much agree=5. A higher score on the total scale indicates an increased turnover intention, ranging from 5 to 50. The scale's Cronbach's α coefficient was 0.83, and the coefficients of each dimension ranged from 0.74 to 0.80.

Chinese version of the 6-item turnover intention scale

The Chinese version of the 6-item Turnover Intention Scale [24] is used to evaluate the intention to quit, including the possibility of quitting the current job, the motivation to find other employment and the possibility of obtaining external jobs, with a total of 6 questions. In order to evaluate the criterion association validity of the Chinese version of the NTIS, this tool was used as the criterion for this study. The scale was scored using the Likert four-level scoring method, ranging from 6 to 24 points, in which the higher the score, the stronger the resignation intention of the respondent. Kronbach coefficient of the scale was 0.781. This scale is used as the calibration standard in this study.

Procedures

Translation and cultural adaptation

The scale was translated into Chinese, following a translation and cross-cultural adaptation process, with Professor Kim's consent. This study used the Brislin double translation method to change the scale into Chinese [25]. First, the NTIS was translated into Chinese by 2 Chinese professors who majored in English. Two foreign professors, who were native English speakers, back-translated the scale without reading the original scale. Four nursing and three psychology experts were recruited to evaluate the conformity of the translated scale with Chinese language standards and to provide suggestions for improvement. This process resulted in the final Chinese version of the NTIS, which demonstrates strong equivalence to the original scale. To enhance clarity and ensure better alignment with Chinese expressions, the first entry was revised from "When maintaining interpersonal relationships enjoying leisure time is difficult because of a three-shift duty" to "When I don't have time to enjoy my free time with friends and family due to shift work."

In the pre-experiment phase, we recruited 30 nurses through a convenience sampling method and collected data online using a questionnaire application (https://www.wjx.cn/). The nurses completed the questionnaire on their smartphones. Ultimately, the feedback from the nurses indicated that the scale was concise and easy to understand, with an estimated completion time of approximately 2 to 3 min.

Data collection

After the training, the researchers collected questionnaire data from China's Jiangxi, Guangdong, and Zhejiang provinces. A convenience sampling method was used in collaboration with the hospital nursing manager, and 450 nurses were selected. The questionnaire is issued at 8:30 a.m., and the nurse fills it out and takes it back on the spot. In response to the challenging clinical tasks, 22 nurses withdrew to participate in the study.

The remaining 428 were anonymously invited to a specified location to finalize the survey. After eliminating 10 invalid questions, 418 valid questionnaires were retrieved, with a correct answer rate of 97.66%. During the recruitment process, all nurses participated voluntarily and retained the right to withdraw from the study at any stage. Regarding ethical considerations, all participants signed informed consent forms prior to their involvement in the study, thereby demonstrating a comprehensive understanding of the study's purpose, process, and potential risks. Furthermore, anonymization measures were implemented during the data collection process to safeguard the privacy and confidentiality of participants. This study has received approval from the relevant ethics committees and adheres to established ethical norms.

Data analysis procedure

Items analysis

This study analyzed the design using critical rate, correlation coefficient, and internal consistency approaches. The aggregate score for each scale was computed based on the evaluation criteria and organized in ascending order (from lower to highest). The relationship between the top 27% (bottom group) and bottom 27% (top group) was analyzed using a 2 independent sample t-test to determine whether the measures were well discriminative. It is generally believed that when the critical ratio of each item is ≥3 ($p<0.05$), it indicates that the item has appropriate discrimination and can be retained [26]. The relationships between item scales were analyzed and assessed item homogeneity. Items were reasonably homogeneous if the correlation coefficient between each item's score and the total scale score was ≥0.4 [26]. After the removal of the item, the Cronbach's α analysis results indicated that the scale's Cronbach's α value did not increase, which was interpreted as an indication that the item could be retained.

Reliability analysis

Cronbach's alpha coefficient evaluated the internal consistency of the Chinese version of the scale, split-half reliability and test-retest reliability. Approximately 30 individuals were preselected and numbered, with an interval of 14 days between measurements [27]. The scale's stability over time was evaluated by measuring the test-retest reliability of the Chinese version. Reliability was considered reasonable if Cronbach's alpha, split reliability, and test-retest reliability values were all ≥0.70 [28, 29].

Validity analysis

Seven experts were invited to assess the content validity of the Chinese NTIS using the Delphi technique. The panel comprised four nursing specialists and three psychologists, all of whom hold senior positions and possess specialized knowledge in their respective fields. Furthermore, all experts participated in this study on a voluntary basis. Expert responses were documented on a 4-point Likert scale, ranging from 1 (inappropriate) to 4 (very appropriate). Expert judgment determined the item-level content relevance index (I-CVI) and scale-level content relevance index (S-CVI). To identify the I-CVI, divide the total number of experts by the number of experts rated each item as 3 or 4. The S-CVI was calculated as the average of 10 I-CVI items. The actual validity of the transformation scale was considered adequate if the I-CVI≥0.78 and the S-CVI≥0.90 [30]. The underlying factor structure of the Chinese scale was assessed by exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). A total of 418 nurses were randomly divided into two groups: 209 nurses in the EFA group and 209 in the CFA group. A Bartlett sphere test with a statistical significance level of $p<0.05$ and a KMO coefficient>0.60 are the prerequisites for a translational scale suitable for factor analysis [31]. Model fit indices were assessed using Amos 26.0 software for CFA analysis. When the chi-square degrees of freedom (χ2/df)≤3.0, the root mean square error of approximation (RMSEA)≤0.08, the comparative fit index (CFI)≥0.90, the goodness of fit index (GFI)≥0.90, the adjusted goodness of fit index (AGFI)≥0.90, the Tucker-Lewis index (TLI)≥0.90, and the incremental fit index (IFI)≥0.90, indicating a good fit of the model [32–34]. Convergence validity, or aggregation validity, reflects the similarity of different measures that measure the same concept [35]. When composite reliability (CR)>0.700 and average variance extracted (AVE)>0.500, the scale is considered to have good convergence validity [36].

Criterion validity

Criterion validity refers to the relationship between the target tool and other measurement criteria. In this study, the Chinese version of the 6-item Turnover Intention Scale was used as the criterion, and Pearson correlation analysis was conducted on NTIS and its score to evaluate the criterion association validity of NTIS. In this study, we believe that when $r≥0.7$, the scale to be measured has a good correlation with the standard scale [36].

Ethical approval

All nurses were informed of the purpose of the study prior to filling out the questionnaire, participated voluntarily and signed an informed consent form. In order to protect the privacy of participants, all questionnaires were filled in anonymously. All procedures were carried out as per the 1964 Declaration of Helsinki and its amendments. Moreover, this study was approved by the

Table 1 Frequency distribution of demographic characteristics ($n=418$)

Factors	Group	*n*	%
Sex	Male	100	23.92
	Female	318	76.08
Age(year)	≤ 25	48	11.48
	26–29	100	23.92
	30–39	179	42.82
	≥ 40	91	21.77
Marital status	Unmarried	78	18.66
	Married	330	78.95
	Divorced	9	2.15
	Widowed	1	0.24
Education level	Technical secondary school	25	5.98
	Jounior college education	131	31.34
	Undergraduate education	261	62.44
	Postgraduate education	1	0.24
Professional title	Nurse	64	15.31
	Primary nurse	159	38.04
	Nurse-in-charge	162	38.76
	Deputy director, nurse and above	33	7.89
Career(year)	<5	68	16.27
	5–15	219	52.39
	>15	131	31.34
Economic situation	Income less than expenses	124	29.67
	Income equals expense	173	41.39
	Income more than expenses	121	28.95
Status of willingly choosing nursing	No	57	13.64
	Yes	361	86.36
Pattern of work shift	Full-time	74	17.70
	2-shift	48	11.48
	3-shift	205	49.04
	Other modes	91	21.77
Department of work	Medical ward	102	24.40
	Surgical ward	87	20.81
	Outpatient service	42	10.05
	Special departments	187	44.74

Ethics Committee of the Second Affiliated Hospital of Nanchang University.

Results

Descriptive statistics

A total of 418 nurses were recruited, including 100 males (23.92%) and 318 females (76.08%). Among them, 42.82% of the nurses were between 30 and 39 years old, 78.95% of the nurses were married, 62.44% of the nurses had a bachelor's degree, 38.76% of the nurses were currently in charge of nurses, 52.39% of the nurses had worked for 5 to 15 years, and 41.39% of the nurses' current economic status was income equal to expenditure. Approximately 86.36% of the nurses were willingly selected for the nursing profession, while 49.04% reported that the present shift model consisted of three shifts. Additionally, 44.74% of the nurses belonged to specialized departments. Table 1 shows the remaining sociodemographic data.

Table 2 Item analysis for Chinese version of the NTIS

Item	Critical ratio	Correlation coefficient between item and total score	Cronbach´s Alpha if item deleted
Job satisfaction area-1	10.281	0.592	0.859
Job satisfaction area-2	12.340	0.621	0.857
Job satisfaction area-3	15.027	0.682	0.851
Job satisfaction area-4	17.755	0.716	0.848
Job performance area-1	17.010	0.717	0.847
Job performance area-2	22.162	0.771	0.841
Job performance area-3	19.151	0.748	0.844
interpersonal relationship area-1	11.295	0.565	0.860
interpersonal relationship area-2	14.181	0.644	0.854
interpersonal relationship area-3	15.909	0.658	0.853

Table 3 Reliability analysis for Chinese version of the NTIS

The scale and its dimension	Cronbach´s Alpha	Split-half reliability	Test-retest reliability
The NTIS	0.864	0.878	0.960
Job satisfaction area	0.852		
Job performance area	0.903		
interpersonal relationship area	0.903		

Item analysis

The range of the critical ratio for all items was between 10.281 and 22.162, while the correlation coefficient (r) between each item and the overall score ranged from 0.565 to 0.771. The Cronbach's α values for each item, after removing one item at a time, ranged from 0.841 to 0.860. Details are shown in Table 2.

Reliability analysis

The Cronbach's alpha value for this scale was 0.864. The three-dimensional Cronbach's α values for this scale range from 0.852 to 0.903. The conversion scale had a one-half confidence level of 0.878. The retest reliability was 0.960, and 30 nurses were chosen for retesting after 14 days. Therefore, the translated scale had suitable reliability (Table 3).

Validity analysis

Content validity analysis

A panel of seven experts was recruited to assess the translation scale's content validity. The findings indicated that the I-CVI values varied between 0.857 and 1.000, whereas the S-CVI value was 0.957.

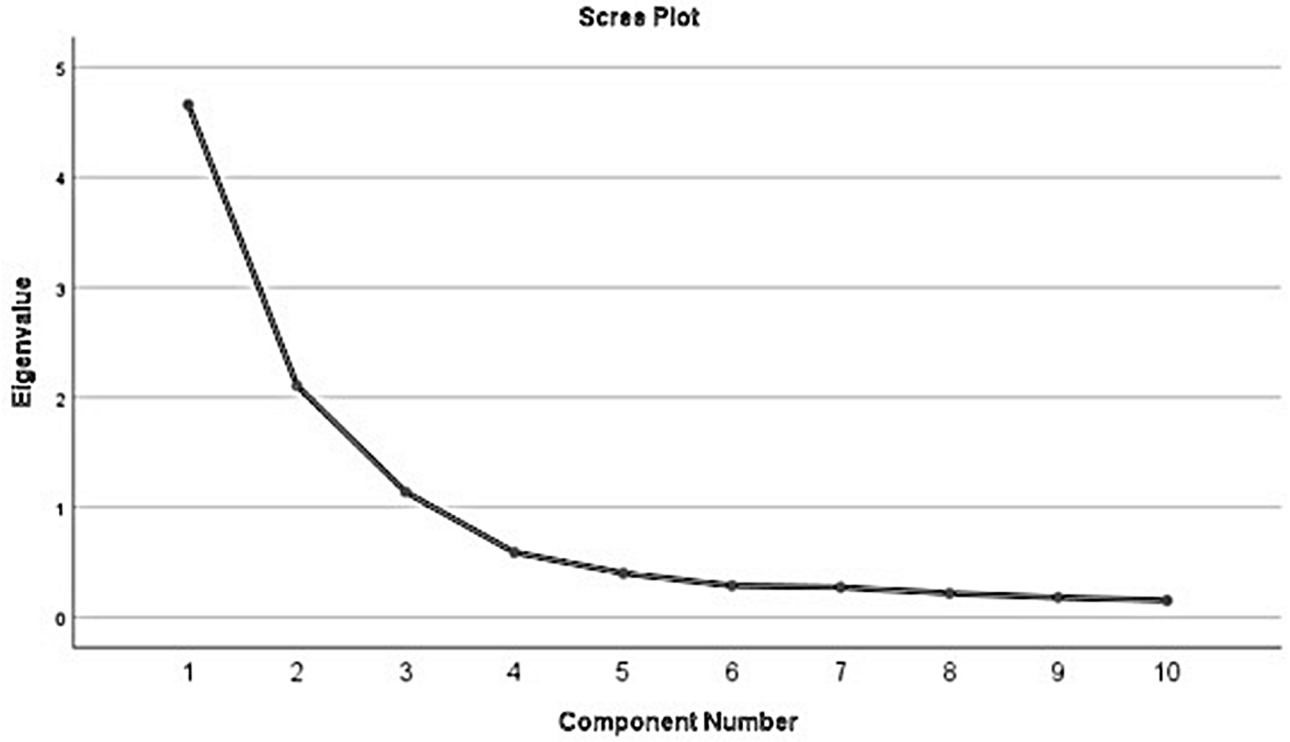

Fig. 1 Screen plot of exploratory factor analysis for Chinese version of the NTIS

Table 4 Factor loadings of exploratory factor analysis for Chinese version of the NTIS

Item	Factor 1	Factor 2	Factor 3
Job satisfaction area-1	0.844		
Job satisfaction area-2	0.898		
Job satisfaction area-3	0.827		
Job satisfaction area-4	0.677		
Job performance area-1		0.806	
Job performance area-2		0.906	
Job performance area-3		0.870	
interpersonal relationship area-1			0.919
interpersonal relationship area-2			0.882
interpersonal relationship area-3			0.811

Exploratory factor analysis

In this study, KMO = 0.821, and Bartlett's sphericity test was statistically significant ($\chi^2 = 1370.072$, $p < 0.001$), indicating that the conversion scale was suitable for factor analysis. A total of 3 factors were extracted with eigenvalues > 1, which accounted for 79.055% of the variance in the data. The scree plot provides more evidence for the existence of a three-factor structure (Fig. 1), as he shows a sharp downward trend from 3. Additionally, the results of the study indicated that all items exhibited factor loadings exceeding 0.4, with no evidence of multi-factor loading. This finding suggests a robust correlation between the scale measurement items and their respective constructs (Table 4).

Confirmatory factor analysis

The confirmatory factor analysis is presented in Fig. 2, confirming the translation scale's three-factor structure. According to the modification index (MI), the original model was revised thrice: e1 and e2, e4 and e6, and e4 and e7. In this study, the χ^2/df value was 2.35, suggesting that the model fits well. A ratio below 3 is generally regarded as indicative of an acceptable fit. The RMSEA was found to be 0.05, further supporting the notion of a good model fit. According to established guidelines, a lower RMSEA value indicates a better model fit. The CFI of 0.92 reflects a strong model fit, as values exceeding 0.90 are typically interpreted as indicative of good fit. In addition, the values of TLI, IFI, GFI, and AGFI are 0.972, 0.982, 0.952, and 0.909, respectively (Table 5).

Convergent validity

In terms of convergent validity, the AVE values for the Job satisfaction area, job performance area, and interpersonal relationship areas are 0.571, 0.646, and 0.755, respectively. The CR values are 0.850, 0.892, and 0.920, all of which meet the established standard criteria [36].

Criterion validity

This study used the Chinese version of the 6-item Turnover Intention Scale as the criterion. Through correlation analysis, the Chinese version of NTIS was highly

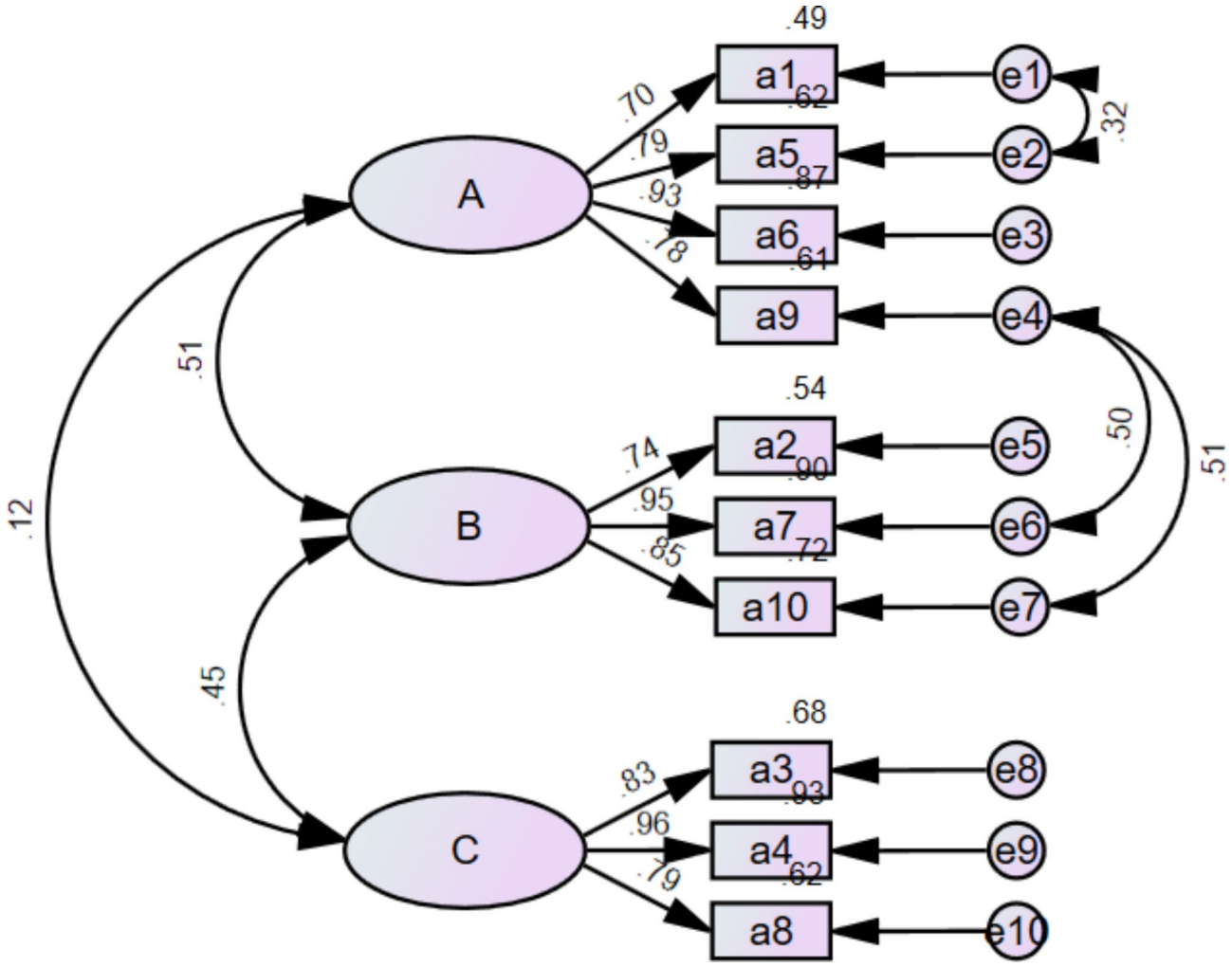

Fig. 2 Standardized three-factor model of the Chinese version of NTIS. **A**: Job satisfaction area; **B**: Job performance area; **C**: interpersonal relationship area

Table 5 Model fit index for Chinese version of the NTIS

Index	Three-factor	Evaluation standard
χ^2/df	1.845	≤ 3.000
RMSEA	0.064	<0.080
CFI	0.982	>0.900
GFI	0.952	>0.900
IFI	0.982	>0.900
TLI	0.972	>0.900
AGFI	0.907	>0.900

correlated with it, and the correlation coefficient was 0.866 ($P<0.001$).

Discussion

Item analysis of the Chinese version of the NTIS

This study used the correlation coefficient, internal consistency, and critical rate methods to conduct design analysis. In this study, the essential ratios of all items in the Chinese version of NTIS ranged from 10.281 to 22.162, all of which were >3.000 ($p<0.05$). This indicates that the scale effectively differentiates between items [26], and each item accurately assesses the turnover intention of various nurses. The correlation coefficients between each item and the China NTIS total score were 0.565–0.771 ($p<0.001$), the correlation coefficients between each item and the scale were medium to high, and the items showed moderate homogeneity [26]. After removing items, Cronbach's α values for each item ranged from 0.841 to 0.860, with none exceeding Cronbach's α of 0.864 for the transformation scale. Therefore, all 10 items of the translation scale were retained [37].

Suitable reliability of the Chinese version of the NTIS

Reliability analysis can aid in evaluating whether the translated questionnaire accurately represents its intended structure [38]. The scale's reliability was measured using internal consistency, split-half, and test-retest reliability. The Cronbach's α value of NTIS in the Chinese version was 0.864, and the Cronbach's α value of the three dimensions of the scale was 0.852 ~ 0.903, indicating that

the scale had good internal consistency, and each item in the scale could consistently assess nurses' turnover intention. The Cronbach α value of the Chinese version of the scale is similar to that of the Korean version but slightly lower than that of the Turkish version [20, 21]. The split-half reliability for the Chinese NTIS is 0.878. The retest reliability was 0.960, and 30 nurses were selected for retesting after 14 days. This implies that the scale maintains a high level of stability over time [29]. Therefore, the Chinese NTIS is a reliable indicator of caregiver-switching intentions.

Suitable validity of the Chinese version of the NTIS

This study aimed to evaluate the accuracy and reliability of the translation scale in terms of its content and structural validity. Seven experts were recruited to review the precision of the Delphi-translated scales. The findings indicated that the I-CVI values varied between 0.857 and 1.000, while the S-CVI values ranged from 0.957. The I-CVI and S-CVI exceeded the content validity thresholds of 0.78 and 0.90, respectively [30]. Exploratory factor analysis identified 3 factors with eigenvalues > 1, which comprised 79.055% of the variance in the data. Each item's factor designation was consistent with the original scale, and the loading of each factor was > 0.4 [20]. However, there are notable differences in the factor loadings of each item on the NTIS between the Chinese and Korean versions. Specifically, the Chinese version exhibits a higher factor loading in the dimension of interpersonal relationship area, whereas the Korean version shows a greater factor loading in the dimension of Job performance area [20]. This suggests that the influencing factors of nurses' turnover intention vary across these two cultural contexts. Confirmatory factor analysis further validated the underlying three-factor structure, consistent with the original scale design. All fit measures were satisfactory in both versions, indicating that the NTIS demonstrated strong structural validity in both languages. In addition, the values of AVE and CR in this study are good, indicating that the scale has a good convergence validity. In terms of criterion validity, The high correlation between NTIS and the Chinese version of the 6-item Turnover Intention Scale also indicates that the Chinese version of NTIS has the appropriate criterion validity. Conclusively, the Chinese version of the NTIS is valid among clinical nurses and has the potential to be further promoted and used.

Limitations and prospects

This study has some limitations. First, bias was expected due to the scale's self-reported character. To mitigate this limitation in future studies, it is recommended to employ a combination of quantitative surveys and qualitative interviews for data collection, thereby enhancing both the richness and reliability of the data. Second, this study comprehensively examined the psychometric characteristics of the Chinese version of the NTIS; however, it did not analyze the factors that influence the turnover intention of clinical nurses. In the future, we can further explore the factors affecting nurses' turnover intention from the perspective of job stress and social support.

Conclusions

The English version of the NTIS was effectively adopted in China after translation and acculturation, and its psychometric characteristics were validated among Chinese clinical nurses. In China, the introduction of the NTIS is essential due to the severe shortage of nurses and the high turnover rate. The Chinese NTIS may evaluate the preparedness for nurse turnover and offer empirical data for nursing management to develop strategies to reduce nurse turnover. It is recommended that further validation of the NTIS be conducted across diverse cultural contexts and medical settings in the future to enhance the external validity of the study.

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Author contributions

WX and XZ completed the research design and writing of this article. XL and YZ sorted out and analyzed the data. CZ and YG suggested and corrected important points in this article. XY and YD played an important role in the data collection of this study. All authors contributed to this article and approved the submitted version.

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Data availability

All data for this study are available from the corresponding authors upon reasonable request.

Declarations

Ethics approval and consent to participate

Each participant signed an informed consent form before the study and remained anonymous on all questionnaires. All procedures were carried out in accordance with the 1964 Declaration of Helsinki and its subsequent amendments. In addition, this study was approved by the Ethics Committee of the Second Affiliated Hospital of Nanchang University.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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