



Validation of the short index of job satisfaction in Chinese nurses: classical test theory and item response theory

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ABSTRACT

Background: The Short Index of Job Satisfaction (SIJS) has demonstrated favorable psychometric properties and has been utilized across diverse cultural contexts. However, no studies adapting the SIJS to China were found. The Chinese version of the SIJS can contribute to a cross-cultural understanding of job satisfaction and provide valuable insight into cross-cultural differences. Purpose. To assess the psychometric properties of the SIJS among Chinese nurse, both classical test theory (CTT) and item response theory (IRT) were used.

Methods: The translation procedure followed the guidelines of the World Health Organization. A convenience sampling approach was used to obtain 636 valid questionnaires. The data collected were evenly partitioned into two equal segments, with one portion allocated for CTT analysis and the other for IRT analysis.

Results: According to classical test theory, the content validity (S-CVI = 0.98), construct validity (AVE = 0.50), and internal consistency reliability (Cronbach's alpha coefficient = 0.76, McDonald's Omega = 0.80) of the SIJS were good. Rasch analysis indicated acceptable item fit (MnSq indices ranging from 0.767 to 1.406 for the INFIT and OUTFIT corresponding to all response categories), item discrimination (p values ranging from 0.060 to 0.831), and item reliability (person separation reliability = 0.708).

Conclusions: The findings of this study demonstrate the favorable reliability and validity of the Chinese version of the SIJS when applied to nurses, as evidenced by both CTT and IRT analyses. By assessing job satisfaction levels using the SIJS, nursing managers can identify employees who may be at risk of burnout or dissatisfaction, allowing them to take appropriate actions to mitigate these issues and promote a positive work environment.

1. Introduction

Nurses play a vital role in the healthcare field, however, there is a growing global shortage (Buchan & Catton, 2023). China has a more serious shortage of nurses, as the density of nurses per 1000 people was 33.045 in 2020, while it was 163.968 in Australia (World

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Health Organization, 2024). Several prior meta-analyses have reported a high prevalence of turnover intention among nurses (Ayalew et al., 2021; Ulupinar & Erden, 2022; Xu et al., 2023), exacerbating the existing shortage of nurses.

Job satisfaction is defined as the level of contentment or pleasure an individual feel towards their job (Ravari et al., 2012). Chinese nurses generally experience moderate job satisfaction (Wu et al., 2018), various factors such as work environment, pay, stress, and work experience significantly influence their overall job satisfaction (Shao et al., 2018; Wu et al., 2018). Job satisfaction has been found to be a major factor in Chinese nurses' intention to turnover (Hu et al., 2022; Zhang et al., 2021), as well as affecting their sickness absence, absenteeism, burnout, intentions to stay and performance at work (Lu et al., 2019). Consequently, the measurement of nurses' job satisfaction becomes crucial. This makes it important to choose the appropriate tool for the assessment of nurses' job satisfaction.

There are a wide array of tools available for assessing job satisfaction, including global scales that gauge overall employee satisfaction, such as the Short Index of Job Satisfaction (SIJS) (Sinval & Marôco, 2020) and the Satisfaction with Job Life Scale (SWJLS) (Neto & Fonseca, 2018). There are facet scales that measure satisfaction with specific aspects of the work environment, such as the Minnesota Satisfaction Questionnaire (Lakatamitou et al., 2020), and the McCloskey/Mueller Satisfaction Scale (Mueller & McCloskey, 1990). Some measurement tools are composite scales, although infrequently employed as an assessment tool, which serve to gauge job satisfaction by computing an average value derived from scores obtained during the evaluation of individual factors (Yanchovska, 2022). The attractiveness of global scale brevity is particularly notable, considering the prior studies that establish a correlation between an excessive length of questionnaires and a decline in data quality (Bowling & Zelazny, 2022).

Given that both the SIJS and SWJLS are global scales consisting of only five items, they are particularly well-suited for large-scale surveys or research studies that prioritize efficient time management. The Cronbach's alpha values for the SWJLS and the SIJS were 0.96 (Neto & Fonseca, 2018) and 0.89 (Sinval & Marôco, 2020), respectively. A high Cronbach's alpha value ($\alpha > 0.90$) indicates potential redundancy of items within a scale (Tavakol & Dennick, 2011). Additionally, the model fitting level of the SIJS (the Comparative Fit Index (CFI) = 1.00) (Sinval & Marôco, 2020) exceeds that of the SWJLS (CFI = 0.97) (Neto & Fonseca, 2018), indicating a superior degree of fit. Therefore, to a certain extent, the SIJS exhibits superior reliability and validity compared to the SWJLS. While global scales with one element are commonly used in China (Li et al., 2020), it is important to acknowledge that single-item satisfaction scales have limitations. One significant limitation is the difficulty, or even impossibility, of estimating the internal consistency or reliability of the construct with only one item. Therefore, the five-item SIJS is a suitable tool for measuring nurses' job satisfaction.

The Index of Job Satisfaction was initially composed of 18 items (Brayfield & Rothe, 1951), and subsequently, a short version consisting of five items was developed (Judge et al., 2000), referred to as the SIJS. It is a self-report scale, in which each item is scored on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Three items are positively phrased (items 1, 2, and 4) and two items are reversed (items 3, and 5). The total score ranged from 5 to 25, with higher scores indicating greater job satisfaction. The SIJS has demonstrated favorable psychometric properties and has been utilized across diverse cultural contexts including Portugal, Brazil, Bangladesh, Jordan, and South Korea (Alrawashdeh et al., 2021; Chowdhury et al., 2023; Hwang & Park, 2022; Sinval & Marôco, 2020). In these contexts, the SIJS has demonstrated satisfactory internal consistency with Cronbach's alpha values ranging from 0.64 to 0.88 (Alrawashdeh et al., 2021; Chowdhury et al., 2023; Hwang & Park, 2022; Sinval & Marôco, 2020). However, the SIJS may not have been translated or validated in Chinese, limiting its accessibility for researchers in China.

Researchers in China may have preferred developing their own measures to assess job satisfaction. In a systematic review on the job satisfaction of urban community health workers in China, more than 60 % of the included studies utilized self-developed questionnaires to measure job satisfaction (Zhang et al., 2016). The adoption of a standardized scale across multiple studies facilitates the comparison and synthesis of findings from a range of investigations conducted within the Chinese context. This method not only enhances the consistency and comparability of research outcomes, but also contributes to a more comprehensive understanding of job satisfaction in the Chinese cultural and work environment. Moreover, it enables cross-cultural comparisons, effectively evaluating job satisfaction across diverse cultural contexts and yielding valuable insights into global similarities and differences. As a global scale, the SIJS, which has demonstrated applicability across diverse cultural and linguistic contexts, has the potential to also be used in the Chinese context.

Although the SIJS has proven to be reliable and valid, its data have solely been validated using classical test theory (CTT). The CTT focuses on the total score obtained in a test and is test- and sample-dependent (Chajewski, 2022). It defines test scores as a function of latent trait true scores, error, and measurement attributes (Chajewski, 2022). While the CTT approach is commonly utilized in psychological measurement, it is not without recognized limitations such as test or sample dependence (Satici et al., 2021). The implementation of item response theory (IRT) can effectively address these potential disadvantages. Unlike CTT, IRT places emphasis on the item-level rather than the test-level (de Ayala, 2009), providing a more comprehensive perspective. Furthermore, IRT models focus on the responses to individual questions instead of the total score obtained in the test (Tsigilis, 2019). Although CTT has its limitations, it still holds value in certain contexts. CTT provides a straightforward and intuitive approach to test development and analysis, making it widely used in many practical settings. By integrating both CTT and IRT, researchers can gain a more comprehensive understanding of test performance and measurement (Petrillo et al., 2015). This integration allows for the examination of the psychometric properties of the test items from different perspectives, enhancing the accuracy and reliability of research outcomes. Therefore, the aim of this study was to assess the psychometric properties of the SIJS among Chinese nurses employing methods based on both CTT and IRT.

2. Materials and methods

2.1. Design

A cross-sectional design was employed for this study, which was conducted in two phases. Phase I involved the translation of the SIJS into Chinese and its subsequent cultural adaptation. Phase II focused on evaluating the psychometric properties of the SIJS among Chinese nurses.

2.2. Phase I: translation and cultural adaptation

The translation procedure followed the guidelines of the World Health Organization (World Health Organization, 2009) and included five stages: 1) Forward translation: Two Chinese native speakers with bachelor's degrees in English independently translated the English version into the Chinese version. The two bilingual scholars hold master's degrees and are employed by universities. 2) Expert panel: A committee comprising seven experts reviewed the draft Chinese versions. The committee consisted of experts specializing in occupational and environmental health, medicinal administration, nursing, epidemiology, translation, and the translators. The experts in this stage possess a master degree or hold the academic rank of associate professor or above, demonstrating their expertise in the relevant field for a minimum of 10 years of professional experience. The expert committee meeting was conducted online. Prior to the meeting, the initial translation versions were distributed to each expert panel member, accompanied by a request for a thorough review and evaluation. The panel of experts engaged in a comparative analysis and in-depth discussion of the two translation versions with the aim of reconciling any discrepancies and generating a harmonized final version during the meeting. 3) Back-translation: Two bilingual scholars, who held master's degrees but were not familiar with the SIJS, independently translated the Chinese version into English. The aforementioned steps of the expert panel were followed until a satisfactory version was reached for the back-translation version. In addition to the initial seven experts, the committee also comprised two bilingual experts who were specifically responsible for back-translation. The experts reached a consensus that the back-translation displayed no significant literal disparities from the original version, affirming that no revisions were needed. 4) Pre-testing and cognitive interviewing: A content validity assessment was performed by nine experts, who possessed an average of 20.5 years of professional experience, hailing from diverse institutions across various cities. The experts specialize in occupational and environmental health, medicinal administration, and nursing. With the exception of one expert, all others held a doctoral degree. According to Blair and Conrad, a sample size of five is deemed sufficient for cognitive interview pretesting (Blair & Conrad, 2011). However, in an effort to enhance problem detection capabilities, this study opted to expand the sample size to seven. Research team members interviewed seven nurses face to face to collect feedback on the pre-final version. The seven nurses selected for this study represented a diverse range of healthcare settings, including hospitals, community medical centers, long-term care institutions, and schools. Their professional experience spans from 1 to 20 years, encompassing roles such as registered nurses, charge nurses, nurse managers, and advanced practice registered nurses. They were encouraged to express any difficulties, ambiguities, or misunderstandings they encountered. Based on the feedback, the Chinese version underwent revisions and was subsequently finalized. 5) Test of the final version: The final version was further tested through an online survey.

2.3. Phase II: psychometric properties test

2.3.1. Participants

A survey was conducted on a convenience sample of nurses from Guangdong Province and Jiangsu Province in southern and eastern China, respectively, as well as from Macau, a special administrative region. The number of nurses in Guangdong, Jiangsu, and Macau is 401,698, 308,650, and 2742, respectively, accounting for 14.1 % of the total number of nurses in China. These regions were selected to capture diverse geographical locations and healthcare contexts. China is geographically divided into southern and northern regions, with Guangdong representing the south and Jiangsu representing the north. Including these provinces enables capturing regional differences within the country. Furthermore, including Macau in our study enriches the diversity and comprehensiveness of our sample, as it holds a distinct position as a special administrative region with unique healthcare policies and benefits.

The inclusion criteria for the nurses recruited in this study were as follows: 1) possession of a valid nurse's license, 2) engagement in nursing work within medical institutions, encompassing hospitals, community health centers, or long-term care facilities located in the above provinces, 3) at least six months of work experience, and 4) demonstrated proficiency in reading and writing Chinese. This study employed three exclusion criteria: 1) nurses who were on leave, 2) nurses who possessed a valid nursing license but were engaged in non-nursing employment, and 3) nurses who did not demonstrate a willingness to voluntarily participate in the study. Regardless of whether psychometric studies employ CTT or IRT, a minimum sample size of 200 participants is recommended (da Silva Nunes & Primi, 2005; Lei & Wu, 2007). Therefore, this study was designed to encompass a targeted sample size of 400 participants.

2.4. Data collection

Three distinct recruitment strategies were implemented to ensure the enrolment of eligible participants in the study. First, collaborative partnerships were established with relevant institutions, including hospitals and professional nursing organizations. These alliances served as critical conduits for disseminating comprehensive information about the research to their respective staff and members, thereby encouraging their active participation. Second, recruitment announcements were disseminated through multiple

channels, encompassing online platforms, internal communication channels within partner institutions, and official media outlets. These announcements provided thorough details regarding the study's objectives, eligibility criteria, and other pertinent information. The aim was to reach a diverse spectrum of potential participants and maximize the study's visibility. Finally, the power of online recruitment was leveraged by utilizing popular social platforms such as WeChat and Facebook. These platforms facilitated enrolment of interested nurses, directing them to an electronic questionnaire platform tailored specifically for this study. Prospective participants were able to access the electronic questionnaire by scanning the QR code on the poster or using the provided link. Data collection for this study was conducted using the most commonly utilized online survey platform in China (<https://www.wjx.cn/>). Upon accessing the platform, participants were required to review the informed consent form and indicate their agreement by clicking the designated "Agree" button before proceeding to the electronic questionnaire. To maintain data integrity, only one response per IP address or device was permitted. Screening questions were employed at the beginning of the survey to further verify participants' suitability based on the study criteria. The data were collected between June and August 2023. After data collection, the research team performed data checking and cleaning to ensure consistency and accuracy. These involved the removal of incomplete or inconsistent responses, elimination of duplicate responses, as well as the merging or collapsing of similar responses. A validated single item, known for its reliability in capturing job exhaustion, was employed to assess the criterion-related validity of the SIJS. The participants were asked to rate how often they felt exhausted or burned out while working as a nurse, using a five-point scale ranging from 1 (never) to 5 (often). This single-item measure has been widely used in previous studies and is known for its reliability in capturing job exhaustion (Chen, 2024; Zang et al., 2022). Single-item measures are time and cost-efficient, making them practical for large-scale surveys and frequent assessments. They reduce the burden on respondents, potentially increasing response rates and data quality (Song et al., 2022). Job exhaustion, a key component of burnout, is closely related to job satisfaction. High levels of job exhaustion are typically associated with lower job satisfaction (Ren et al., 2023), supporting its use in assessing job satisfaction.

2.5. Statistical analysis

The data collected were partitioned into two equal random samples employing the SPSS 22.0 random selection procedure, with one portion allocated for CTT analysis and the other for IRT analysis. The software packages employed for CTT analysis were Jamovi 2.3.28 and SmartPLS 4, while Jamovi 2.3.28 was utilized for IRT analysis.

2.6. Classical Test Theory analysis

The psychometric properties of this study included validity (content validity, concurrent validity, and construct validity), reliability (internal consistency reliability and construct reliability), as well as floor and ceiling effects. The content validity index (CVI), consisting of the item content validity index (I-CVI) and scale content validity index (S-CVI), was applied to determine content validity. If there are more than 6 experts, the I-CVI should not be less than 0.78, and the S-CVI should not be less than 0.9 (Polit & Beck, 2006). Concurrent validity was examined using Pearson's correlation between the SIJS and job exhaustion. The correlation coefficient surpassed 0.30 in absolute value and was statistically significant, indicating acceptable concurrent validity. The assessment of construct validity involved the examination of convergent validity, that is, the average variance extracted (AVE), which must be ≥ 0.5 . A two-week test-retest reliability was assessed using intraclass correlation coefficient (ICC), whereby a value of ≥ 0.7 is generally considered statistically reproducible (Shrout & Fleiss, 1979). The assessment of internal consistency reliability was conducted through the utilization of Cronbach's alpha and McDonald's Omega, whereby a value of ≥ 0.7 is deemed acceptable (McDonald, 2013; Terwee et al., 2007). Construct reliability was assessed by evaluating of the composite reliability (ρ_c), with a threshold of ≥ 0.7 considered as acceptable (Brown, 2006). The adequacy of the model's fit to the sampled data was evaluated by considering several fit indices, including the CFI, Tucker-Lewis index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). A model is deemed acceptable if it meets the following criteria: CFI ≥ 0.90 , TLI ≥ 0.90 , RMSEA ≤ 0.10 , and SRMR ≤ 0.10 (Weston & Gore, 2006). Less than 15 % of participants achieved the lowest or highest score on the SIJS, considering that floor and ceiling effects were absent (Terwee et al., 2007).

2.7. Item Response Theory analysis

This study employed the Rasch Model, a member of the IRT psychometric models, to conduct an analysis encompassing item fit, item difficulty, reliability, and validity. Item fit was assessed using information-weighted fit (INFIT) and outlier-sensitive fit (OUTFIT) mean square (MnSq), with a range of 0.6 to 1.5 considered acceptable (Bond & Fox, 2007). Furthermore, the Wright map was used to visualize the relationship between item difficulty and person ability distributions. The person separation index was employed as a substitute for reliability indices, and it is deemed reliable when the person separation reliability reaches a threshold of 0.7 (Boone et al., 2014). Differential item functioning (DIF) is a form of differential validity. It was utilized to assess the probability of understanding and reacting to an item across individuals of different genders and ages. An item was considered biased if it exhibited a difference exceeding 1.0 logit along with a p-value < 0.05 (Paek & Holland, 2015).

3. Results

3.1. Translation and cultural adaptation

During the forward translation phase, the versions translated by the translators were identical for item 2, item 4, and item 5, while the words translated for item 1, and item 3 were the same but expressed in different syntax. For item 1, the initial translations were “我相当满意目前的工作” and “我对目前的工作相当满意.” The research team reached a consensus to adopt “我对目前的工作相当满意,” which better aligns with common Chinese usage. For item 3, the translations were “每天的工作似乎永远做不完” and “每天的工作似乎都没完没了.” The team chose “每天的工作似乎都没完没了” as the final version, as it is more vivid and conveys a sense of complaint, fitting the item’s negative phrasing. During the back-translation phase, the back-translation version was basically the same as the original version, except that synonyms were used, such as ‘my present job’ in the original version and ‘my current job’ in the back-translation version. During the pre-testing and cognitive interviewing stage, the respondents generally found the questionnaire to be comprehensible, with a satisfactory length and arrangement. The results of the cognitive testing revealed unanimous agreement among participants that each item was well-articulated and easily understood. Additionally, no items were identified as sensitive, biased, or threatening. Table 1 presents all the SIJS items included in both the English version and final Chinese version.

3.2. Characteristics of participants

A total of 636 valid questionnaires (response rate: 74.5 %) were collected, among which 318 were used for CTT analysis and 318 were used for IRT analysis. The samples employed for both CTT analysis and IRT analysis were largely comparable, with the exception that the sample utilized for the IRT analysis consisted of younger individuals. The participants’ characteristics are shown in Table 2.

4. Psychometric assessment of the Short Index of Job Satisfaction

4.1. Classical Test Theory analysis

The SIJS demonstrated favorable content validity, as evidenced by an S-CVI of 0.98 and I-CVI values ranging from 0.98 to 1.0. The SIJS demonstrated acceptable concurrent validity, as evidenced by a correlation coefficient of -0.481 ($p < 0.001$) with job exhaustion. Additionally, the SIJS exhibited acceptable construct validity, with an AVE of 0.50. The test-retest reliability was good with an ICC of 0.882. Moreover, the SIJS displayed good internal consistency reliability, as indicated by a Cronbach’s alpha coefficient of 0.76, a McDonald’s Omega of 0.80, and reliable construct reliability with a rho_c value of 0.78. The model fit statistics showed CFI = 0.91, TLI = 0.90, RMSEA = 0.09, and SRMR = 0.09 indicating good model fit. Neither the total score nor the item scores showed floor or ceiling effects (Table 3).

4.2. Item Response Theory analysis

A satisfactory item fit of the Rating model was indicated by MnSq indices ranging from 0.767 to 1.406 for INFIT and OUTFIT, corresponding to all response categories (Table 4). Several findings are shown in Fig. 1. First, the right panel arranges item difficulties in ascending order, with harder items positioned at the top and easier items at the bottom. Second, the left panel displays person measures distributed according to their abilities, with higher abilities located at the top and lower abilities at the bottom. Third, items 1 and 2 were identified as the least challenging items, whereas item 3 was identified as the most arduous. Fourth, the mean person measure was found to be 0.005 logits above the item calibration mean, indicating that a suitable range of item difficulty aligned with the sample of respondents. The person separation reliability demonstrated adequacy, as indicated by a value of 0.708. No statistically significant differences were found in the responses to the questionnaire items between male and female participants, nor between participants aged 30 years or younger and those over 30 years old (Table 4). This suggests that no DIF was observed for the SIJS items on age and gender.

5. Discussion

To our knowledge, this is the first study to employ a combination of CTT and IRT in the psychometric evaluation of job satisfaction scales. By combining these two theories, researchers can gain a more comprehensive understanding of the underlying structure of job

Table 1
The items of the SIJS in both the English and Chinese versions.

Items	English version	Chinese version
1	I feel fairly satisfied with my present job.	我对目前的工作相当满意
2	Most days I am enthusiastic about my work.	在大多数时候, 我对自己的工作充满热情
3	Each day at work seems like it will never end.	每天的工作似乎都没完没了
4	I find real enjoyment in my work.	我在工作中找到了真正的乐趣
5	I consider my job to be rather unpleasant.	我认为我的工作相当不愉快

Table 2
Participants' characteristics.

Variables	Classical Test Theory (n = 318)		Item Response Theory (n = 318)		χ^2/t	p
	n	%	n	%		
Gender					1.440	0.230
Male	16	5.0	10	3.1		
Female	302	95.0	308	96.9		
Age (mean \pm standard deviation)	38.1 \pm 9.3		34.5 \pm 7.7		5.230	<0.001
Education					2.140	0.343
Associate degree	44	13.8	35	11.0		
Undergraduate degree	262	82.4	275	86.5		
Postgraduate degree	12	3.8	8	2.5		
Marriage					0.884	0.347
Unmarried	51	16.0	60	18.9		
Married	267	84.0	258	81.1		

Table 3
Psychometric properties of the SIJS using classical test theory.

Items	Validity		Reliability			Floor and ceiling effects		
	CVI	AVE	Cronbach's alpha	McDonald's Omega	rho_c	ICC	Floor effect n (%)	Ceiling effect n (%)
1	1.00	/	/	/	/		16 (5.0)	26 (8.2)
2	1.00	/	/	/	/		10 (3.1)	29 (9.1)
3	1.00	/	/	/	/		24 (7.5)	13 (4.1)
4	1.00	/	/	/	/		19 (6.0)	18 (5.7)
5	0.89	/	/	/	/		10 (3.1)	38 (11.9)
Overall	0.98	0.50	0.76	0.80	0.78	0.882	1 (0.3)	3 (0.9)
Model fit	CFI = 0.91 TLI = 0.90 RMSEA = 0.09 SRMR = 0.09							

Note. CVI = Content Validity Index; AVE = Average Variance Extracted; rho_c = Composite reliability; ICC = Intraclass Correlation Coefficient; CFI = Comparative Fit Index; TLI = Tucker–Lewis index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual.

Table 4
Psychometric properties of the SIJS using item response theory.

Items	Item fit		Reliability	Differential item functioning			
	INFIT MnSq	OUTFIT MnSq	Person separation reliability	Gender		Age (≤30 VS >30)	
				Statistic	p	Statistic	p
1	0.808	0.807	/	1.155	0.561	1.760	0.415
2	0.785	0.767	/	1.836	0.399	2.370	0.306
3	1.387	1.406	/	5.616	0.060	2.250	0.325
4	0.838	0.840	/	0.417	0.812	1.310	0.520
5	1.206	1.228	/	0.369	0.831	4.450	0.108
Overall	/	/	0.708	/	/	/	/

Note. INFIT MnSq = information-weighted fit mean square; OUTFIT MnSq = outlier-sensitive fit mean square.

satisfaction. The CTT provides a framework for examining the relationship between test scores and latent traits, while IRT allows for the estimation of individual item characteristics, such as difficulty and discrimination (de Ayala, 2009). By considering both perspectives, researchers can refine their understanding of the scale's psychometric properties and make more informed decisions regarding its validity and reliability. The findings of this study demonstrate the favorable reliability and validity of the Chinese version of the SIJS when applied to nurses, as evidenced by both CTT and IRT analyses. Furthermore, this study is believed to be the first to investigate the presence of floor and ceiling effects in the SIJS. The results indicate that neither a floor effect nor a ceiling effect was observed.

The cultural adaptation process of the scale was essential to ensure its linguistic and conceptual equivalence in the Chinese context. For item 3, the initial translations were “每天的工作似乎永远做不完” and “每天的工作似乎都没完没了.” Given the cultural context and the need to capture the sentiment accurately, the team chose “每天的工作似乎都没完没了” as the final translation. This version is more vivid and conveys a sense of complaint, which is particularly appropriate for item 3 as it is a negatively phrased item. In Chinese culture, the expression “没完没了” is commonly used to describe overwhelming workloads and carries a stronger emotional

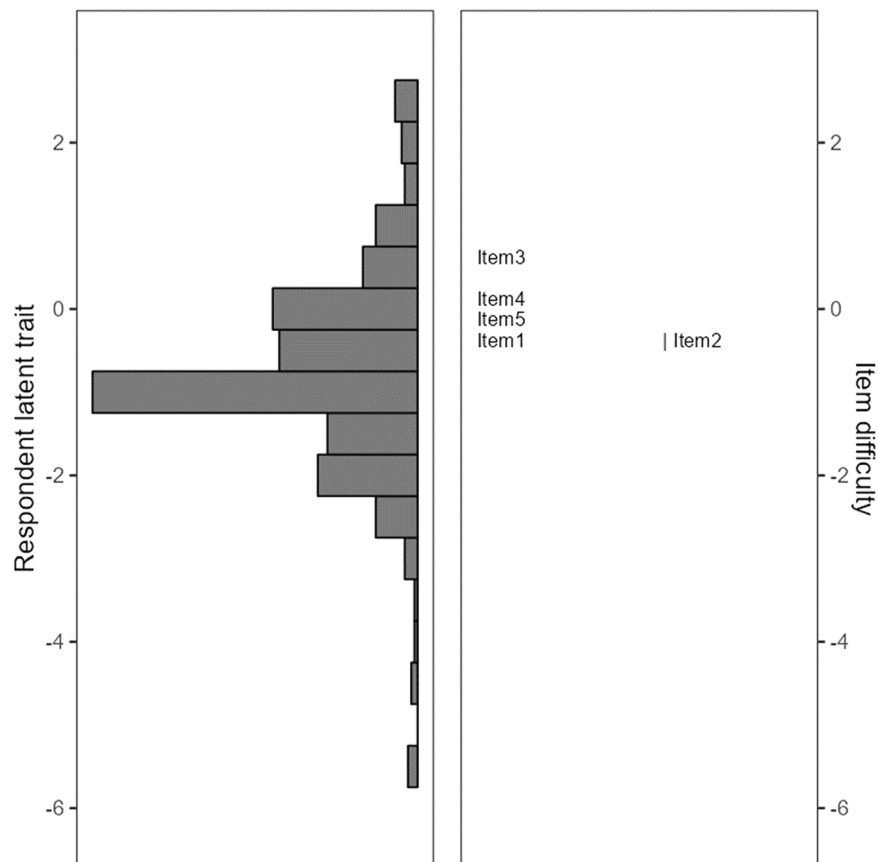


Fig. 1. The Wright map of the Short index of job satisfaction.

connotation compared to “永远做不完”. This choice reflects the importance of capturing the cultural essence of job-related stress and dissatisfaction. These adaptations highlight the importance of cultural sensitivity in the translation process. Language is deeply intertwined with cultural values and expressions, and even minor differences in phrasing can significantly impact the interpretation of survey items (Yu, 2024). By carefully considering the cultural nuances of the Chinese language, the research team ensured that the SIJS items were not only linguistically accurate but also culturally relevant and emotionally resonant for Chinese nurses.

In this study, the dataset was randomly divided into two equal samples for IRT and CTT analyses. Despite this randomization, a statistically significant difference in age remained between the two samples, potentially raising concerns about its impact on the results. However, the psychometric properties of the SIJS were remarkably consistent across both analyses, demonstrating good reliability and validity. This consistency indicates that the age difference between the samples did not introduce significant distortions or biases into the results. Moreover, the item showed no DIF on age. This finding is particularly noteworthy given the diverse demographic characteristics of the nursing workforce in China. Age has been previously identified as a potential factor influencing job satisfaction, with younger and older nurses often experiencing different work-related stressors and satisfaction levels (Aloisio et al., 2021). Nevertheless, our results suggest that the SIJS is capable of accurately capturing job satisfaction across different age groups. This robustness underscores the SIJS's versatility as a reliable and valid instrument for measuring job satisfaction, regardless of the age distribution within the sample. This makes it a valuable tool for both research and practice.

The findings of this study indicate that the Chinese version of the SIJS exhibits satisfactory levels of internal consistency reliability, construct reliability, and person separation reliability. Specifically, the Cronbach's alpha coefficient and McDonald's Omega value for the Chinese version of the SIJS were determined to be 0.76 and 0.80, respectively. These values closely resemble those obtained when the SIJS was administered to Jordanian doctors (Cronbach alpha = 0.81) (Alrawashdeh et al., 2021), although they are lower than the values observed among Brazilian workers (Cronbach alpha = 0.86) and Portuguese workers (Cronbach alpha = 0.90) (Sinval & Marôco, 2020). Conversely, the Chinese version of the SIJS demonstrated greater reliability than did the Bangladeshi version for registered nurses (McDonald's Omega = 0.64) (Chowdhury et al., 2022). Furthermore, the rho_c coefficient for the Chinese iteration of the SIJS was determined to be 0.78, indicating a relatively lower value compared to the rho_c coefficients observed among Brazilian workers (rho_c = 0.87) and Portuguese workers (rho_c = 0.90) (Sinval & Marôco, 2020).

The reliability of the SIJS may be influenced by various factors, such as the diversity of occupations and job characteristics within the nursing field. Different nursing roles may have unique factors that contribute to job satisfaction, potentially impacting the reliability of the SIJS. For example, nurses working in critical care units may have different levels of job satisfaction than those working in

general ward settings (Sharma et al., 2020). Additionally, reliability values can also be influenced by the context and healthcare systems in different countries or regions. Variations in organizational culture, work conditions, and healthcare policies can affect job satisfaction levels (Penconek et al., 2021), consequently impacting the reliability of the SIJS. This study did not show a higher level of consistency reliability than previous studies; however, the reliability of the Chinese version of the SIJS was supported by a variety of psychometric methods, including the Cronbach alpha, McDonald's Omega, Rho_c, and person separation reliability. In general, the Chinese version of the SIJS demonstrates a reasonably level of reliability among nurses. The reliability statistics for the SIJS have been found to differ across occupations and only nurses were involved in this study; therefore, future studies should consider other occupations when evaluating the Chinese version of the SIJS.

The results of this study suggest that the Chinese version of the SIJS demonstrates acceptable levels of construct validity. In comparison to the CTT, the IRT provides a more comprehensive assessment of the psychometric properties of the scale, including item hierarchy, redundancy, and gaps (de Ayala, 2009). An examination of the estimates of item difficulty revealed that certain items may be redundant within the Chinese cultural context. For instance, item 1 (I feel fairly satisfied with my present job) closely resembled item 2 (Most days I am enthusiastic about my work). Consequently, one of these two items should be considered for removal to enhance the efficiency of the tool and improve tool efficiency (Bass et al., 2020). It was also observed that certain gaps were evident between item 3 and item 4. Further items may be necessary to bridge these gaps and include the entire spectrum, enhancing the discernment of respondents' abilities. Further study is needed to examine the potential impact of removing redundant items and including necessary items on the practical application of the SIJS, as well as how it may affect the interpretation of conclusions and decision-making by users.

This study analyzed floor and ceiling effects to measure the content validity and responsiveness of the Chinese version of the SIJS. No floor or ceiling effects were observed for either the individual items or the total score. The absence of floor and ceiling effects highlights the strength of the measurement instrument, affirming its suitability for capturing the range of responses and facilitating accurate assessments of the construct under investigation (Maggino, 2023). This study employed DIF analysis to provide additional evidence regarding the validity of the Chinese version of the SIJS. The identification of DIF plays a crucial role in safeguarding scale validity, as it allows items that exhibit bias to be identified and eliminated. The results of this study suggest that no DIF was observed for the SIJS items. The analysis of DIF in this study was based on gender; however, the gender ratio of the respondents participating in this study exhibited a significant imbalance. The validity of the Chinese version of the SIJS should be further explored by recruiting more male participants in future studies.

Furthermore, the participants exhibited a lower level of endorsement for item 3 (Each day at work seems like it will never end), whereas they demonstrated the highest level of endorsement for item 1 (I feel fairly satisfied with my present job) and item 2 (Most days I am enthusiastic about my work). One possible explanation is the implementation of initiatives aimed at improving working conditions and reducing nurse burnout. In recent years, there has been an increased emphasis on promoting a healthy work-life balance and addressing the challenges faced by nurses in China (Zhang et al., 2021).

). Another factor could be the advancement of technology and automation in healthcare. The integration of digital systems and electronic medical records has streamlined administrative tasks, enabling nurses to allocate their time more efficiently (Bingham et al., 2021). The automation of routine tasks has the potential to reduce the burden on nurses.

5.1. Implications for nursing management

By establishing the validity of the SIJS in Chinese nurses, this study provides a reliable instrument for assessing job satisfaction among this population. This is essential for nursing management as it can inform policy decisions, interventions, and strategies to enhance job satisfaction and overall employee well-being. For nursing management, the validation of the SIJS provides valuable information about factors that contribute to job satisfaction among nurses. By understanding the factors that influence job satisfaction, such as work stressors, job autonomy, and job rewards, managers can implement targeted interventions to improve nurse satisfaction. Furthermore, the SIJS can be a valuable tool for nursing organizations to monitor and evaluate job satisfaction levels over time. The regular measurement of job satisfaction can provide valuable insights into the effectiveness of organizational policies, practices, and interventions. This information can help nursing leaders make informed decisions that enhance the quality of care and promote a positive work environment for nurses.

6. Limitations

There were some limitations in this study. First, while this study adhered to the World Health Organization's guidelines in translating the SIJS, it is important to acknowledge a potential limitation of the forward-backward translation approach. This method may excessively prioritize literal translation, potentially neglecting the crucial aspect of accurately conveying the intended meaning of the survey item in a manner that is both comprehensible and appropriate for the target audience. Therefore, other better translation methods, such as TRAPD (Vujcich et al., 2021) might be tested in the future. Second, this study used convenience sampling, recruiting participants from specific hospitals and healthcare institutions in three regions of China. Although this approach enabled us to gather data from a large sample of nurses, it may limit the generalizability of our findings. Nurses from other regions, healthcare settings, or with different levels of experience may have distinct perceptions of job satisfaction, suggesting that our results may not be representative of the broader nursing population in China. Future research should consider more diverse and representative sampling methods, such as stratified random sampling, to enhance the external validity of the findings. Third, despite the similarity between the demographic characteristics of the participants included in this study and the general situation of Chinese nurses, the proportion of

male nurses is very low in China, so there are very few male participants in this study, which limits the applicability of the findings to male nurses. Therefore, future investigations should aim to incorporate a larger male sample size in order to conduct a more comprehensive psychometric assessment of the Chinese version of the SIJS.

7. Conclusions

The Chinese version of the SIJS has been effectively translated and culturally adapted for implementation in China, with its psychometric attributes duly validated among nurses. This validated tool, comprising a mere five items, holds significant value as a resource for researchers, organizations, and policymakers aiming to expeditiously evaluate and comprehend the levels of job satisfaction among nurses.

Ethics approval and consent to participate

This study received ethical approval from the Research Management and Development Department of Kiang Wu Nursing College of Macau (No. REC-2022.1102) and adhered to the principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants. Upon accessing the platform, participants were required to review the informed consent form and indicate their agreement by clicking the designated "Agree" button before proceeding to the electronic questionnaire. The participants were involved in this study in an anonymous and voluntary manner, with the option for participants to withdraw from the study at any point without experiencing any negative consequences to their personal interests.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used Poe and Wordtune in order to improve the readability and language of the manuscript. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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Consent for publication

Not applicable.

Availability of data and materials

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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CRediT authorship contribution statement

Lai Kun Tong: Writing – review & editing, Writing – original draft, Methodology, Funding acquisition, Conceptualization. **Yue Yi Li:** Writing – review & editing, Writing – original draft, Methodology. **Yong Bing Liu:** Writing – review & editing, Methodology. **Mu Rui Zheng:** Writing – review & editing, Methodology. **Guang Lei Fu:** Writing – review & editing, Methodology. **Mio Leng Au:** Writing – review & editing, Project administration, Conceptualization.

Declaration of competing interest

The authors declare that they have no competing interests.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.ijnnsa.2025.100321](https://doi.org/10.1016/j.ijnnsa.2025.100321).

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