

Translation and validation of the Chinese version of the Study Interest Questionnaire in health care students

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Research Article

Keywords: Translation, Validation, Study Interest, Health care students

Posted Date: January 13th, 2023

DOI: <https://doi.org/10.21203/rs.3.rs-2441543/v1>

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Abstract

Background: Considering interest's galvanizing effects on students' learning, many researchers have devoted themselves to exploring methods and factors influencing students' interest in learning. However, there is currently no measurement for assessing health care students' interest in professional learning in China. The study aimed to translate the Study Interest Questionnaire (SIQ) and examine its psychometric properties among Chinese health care students.

Methods: The translation and cross-cultural adaptation rigorously followed the modified Brislin's model. A cross-sectional survey was conducted using the Chinese version of the SIQ (CV-SIQ) and purposive sampling was employed to select health care students. The validity of the CV-SIQ was assessed through content validity and construct validity. Reliability was determined by analyzing internal consistency and test-retest reliability.

Results: A total of 1066 participants were included in the analysis. The item-level content validity index (CVI) ranged from 0.9 to 1.0, and the scale-level CVI was 0.96. In the Exploratory factor analysis, four factors with eigenvalues above 1 were identified, accounting for 63.809% of the cumulative variance. In the confirmatory factor analysis, the CMIN/DF was 4.49, GFI was 0.90, IFI was 0.90, and CFI was 0.90. The Cronbach's α coefficient of the CV-SIQ was 0.813, and those of the four factors were 0.862, 0.842, 0.777, and 0.731. Thirty-one participants were invited to sign the scale after two weeks. The intraclass correlation coefficient of the CV-SIQ was 0.784, and that of items ranged from 0.70 to 0.869.

Conclusions: The CV-SIQ, including 18 items, contains 4 dimensions: emotion, knowledge, value, and engagement. The CV-SIQ exhibited satisfactory validity and reliability and can be applied for measuring health care students' learning interest in China. With the aid of this scale, teachers can gain a better understanding of health care students' learning interests, thereby maximizing their learning effects through appropriate content and methods.

1 Background

Interest is a key motivational variable that refers to a person's predisposition to engage in particular objects (topics, activities, and ideas) [1, 2]. The development of interest can be divided into four phases: triggered situational interest, maintained situational interest, emerging individual interest and well-developed individual interest [1, 2]. When interest is triggered, individuals are more willing to process the information they find interesting and to learn more deeply through detailed descriptions that relate the new information to existing schemas [1, 2], while interest is well developed, individuals demonstrate positive affect, the ability to allocate attention, persistence in learning, and greater knowledge of the topic [2, 3]. Consequently, interest plays a crucial role in improving students' learning state and quality [4], and it has always been a great concern of educators. According to a multiple prediction design study involving 518 students, learning interest is a powerful predictor of future academic achievement [5], which is

similar to Rösler's findings [6]. In addition, learning interest has been found to positively correlate with learning satisfaction [7], self-efficacy [8] and critical thinking [9].

Considering interest's galvanizing effects on students' learning, many researchers have devoted themselves to exploring methods and factors influencing students' interest in learning [10]. To improve students' interest in learning, it is essential to understand their level of interest [10]. An appropriate measure of interest can provide teachers with critical information about topics, courses, and tasks, so that they may adjust their teaching strategies accordingly to ensure best outcomes. Nevertheless, the problem is that the measurement of learning interest in China is still in the initial stage of exploration. Current measurements are mostly one-dimensional, lack a fundamental theory on which to develop, and do not provide valid and reliable information [11]. Even among the measurements with reliability and validity verification, most of them focus on measuring primary and middle school students' interest in certain subjects (such as mathematics, English, chemistry, etc.) [12, 13]. Ge [12] revised the Physical Education Situational Interest Scale (PESIS) and tested its reliability and validity in 2005. The adjusted PESIS proved to be both reliable and valid and could effectively measure the situational interests of high school students in sports. In 2019, Luo et al. [13] developed and validated the Academic Interest Scale for Adolescents (AISA) in the Chinese education context. The study concluded that the Chinese version of the AISA was effective for measuring academic interest in Chinese adolescents across different subjects (e.g., math, English, or Chinese), times, genders, and grades. However, there is currently no measurement for assessing health care students' interest in professional learning in China [11].

The Study Interest Questionnaire (SIQ) was originally designed by Winteler & Sierwald [14] and has been revised twice [15]. The most recent version of the SIQ was developed to evaluate specific components of interest based on educational interest theory [16]. A total of 18 items are included in the recent version and primarily address students' enjoyment and value of subjects and activities [16, 17]. Each of the items is rated on a Likert scale between 1 (not at all true) and 4 (completely true) [17]. Items 1, 2, 5, 7, 9, 10, and 11 are reverse coded, and a higher total score indicates a higher level of interest in the student's field of study [17]. Since the Cronbach's alpha coefficient of the questionnaire was 0.90 and factor loadings ranged from 0.36 to 0.68 on the factors 'interest' and 'cognitive competence', the reliability and validity of this SIQ were deemed satisfactory in German college students [16, 17]. In 2006, Bråten et al. translated the SIQ into Norwegian and tested the psychometric properties [18]. The Norwegian version of the SIQ has been proven to be a reliable scale (Cronbach's alpha coefficient = 0.82) and has been widely used to measure the learning interests of Norwegians [18]. The SIQ was also translated into a Croatian version, and the Cronbach's alpha reliability coefficient for it was 0.91 [19]. In addition, some researchers created their own scales based on the items of SIQ [20, 21]. According to the SIQ, Pravešić [21] developed their scale to examine the direct and indirect effects of interest, motivation, and behavior on self-regulated learning in Indonesia. Hidalgo-Blanco [20] relied on the SIQ to create their own items to assess the dimension of interest in nursing studies, and the results revealed that their scale was of acceptable reliability and validity in Spain. Considering the satisfactory reliability and validity of the SIQ and the fact that it has a very broad application globally [22, 23], the current study aims to translate the SIQ and examine its psychometric properties among Chinese health care students.

2 Methods

To maintain semantic consistency with the most recent version of the SIQ, the translation and cross-cultural adaptation rigorously followed the modified Brislin's model [24]. A cross-sectional survey was conducted using the Chinese version of the SIQ (CV-SIQ) and purposive sampling was employed to select health care students.

2.1 Translation and cross-cultural adaptation

The process included the following steps: (1) Forward translation: the SIQ was independently translated from English into Chinese by two bilingual translators working in China. Subsequently, a committee made up of the two bilingual translators and five college teachers from different professional backgrounds proofread and approved the draft. (2) Backward translation: two other bilingual translators working in the UK translated the draft SIQ back into English, blind to the original SIQ. Then, another committee with two native English speakers, two bilingual translators working in the UK, five college teachers from different professional backgrounds and one English education expert, reviewed the back-translation against the original to check for any linguistic errors. (3) Cross-Cultural Adaptation: A panel of ten experts were invited to appraise cultural and semantic equivalency in accordance with their professional knowledge and work experience. Each of these experts holds a doctorate, and they specialize in various fields, including biology, Chinese medicine, clinical medicine, geriatrics, pharmacy, nursing, psychology, physical therapy, and psychiatric. The translational relevance of each of the 18 items of the questionnaire was graded on a 4-point scale (1 = 'totally different' and 4 = 'equivalent'). After the experts reached a consensus on all items, a pilot study was conducted involving 3 health care students to evaluate the fluency, readability, and comprehensibility of the items. Any inappropriacy was modified according to the received feedback and formed the final Chinese version of the SIQ (Supplementary 1).

2.2 Participants and settings

Higher education in China includes junior college education, undergraduate education, and graduate education. The inclusion criteria for participants were health care students who were currently enrolled in higher education in China and who volunteered to participate. The exclusion criteria for participants were health care students who were unable to read and write Chinese.

Purposive sampling was employed. For a more representative sample, three provinces from eastern, central, and western China were selected, taking into account their levels of economic development and educational resources. Furthermore, considering that the internationalization level of higher education in the two special administrative regions (SAR) of China (Hong Kong and Macao) is much higher than that of other provinces [25], SAR should be chosen as a study location. The study included samples from Jiangsu Province in the east, Hunan Province in the center, Sichuan Province in the west, and Macau SAR. For factor analytic studies, Comrey and Lee [26] recommended collecting samples of at least 500 observations whenever possible. Accordingly, the sample sizes for exploratory factor analysis and confirmatory factor analysis were 506 and 560, respectively.

2.3 Procedures

The study coordinator in each province was responsible for promoting the study on social media in that province. Several promotional materials, including posters containing QR codes for the e-questionnaire, were created by the research team. Before responding to the survey, participants must read the informed consent form and click the 'Agree' button. The same device can only answer the questionnaire once to avoid the same respondent filling it in again. Data were collected between January 20 and 26, 2022.

2.4 Statistical Analysis

All data were input into Microsoft Office Excel 2016 software, and statistical analysis was performed using IBM SPSS Version 25.0 and AMOS version 22.0. Demographic characteristics (such as age, gender, number, etc.) were analyzed through descriptive statistics. A p value < 0.05 was considered to be statistically significant [27].

The validity of the SIQ was assessed through content validity and construct validity. Content validity refers to the accuracy and consistency of the content measurement compared to the content to be measured and is usually appraised by the content validity index (CVI) [28, 29]. The item-level CVI (I-CVI) was calculated from the total number of answers rated 3 or 4 divided by the number of answers, and the scale-level CVI (S-CVI) was calculated as the mean of all I-CVIs. I-CVI > 0.7 and S-CVI > 0.90 were deemed to be of good content validity [28]. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed to assess the construct validity of the Chinese version of the SIQ. Prior to EFA, the Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity were computed to determine the appropriateness of the data [30, 31]. In cases where the KMO value was greater than 0.60 and Bartlett's test of sphericity was significant, the data were suitable for factor analysis [30, 31]. For EFA, principal component factor (PCA) analysis and varimax rotation were used [32]. To detect the number of potential underlying factors, the following criteria were considered: eigenvalues > 1 , scree plot visual inspection, factor interoperability and proportion of total variance explained by extracted factors combined [32, 33]. Factor loadings were supposed to be greater than 0.4. With CFA, a robust maximum likelihood method was used to evaluate the model's fitness [34]. The chi-squared values divided by the degrees of freedom (χ^2/df) < 5 , root mean square error of approximation (RMSEA) < 0.08 , goodness-of-fit index (GFI) > 0.90 , comparative fit index (CFI) > 0.90 , and Tucker–Lewis index (TLI) > 0.90 indicated that the model fit the hypothesized model well [35].

Reliability was determined by analyzing internal consistency and test-retest reliability. Cronbach's α coefficient was used to evaluate internal consistency, and a value of > 0.70 indicated satisfactory internal consistency [36]. The intraclass correlation coefficient (ICC) was calculated to determine the test-retest reliability at an interval of 2 weeks, and the minimal acceptable value was set at 0.70 [37].

2.5 Ethical Considerations

In the beginning, permission to translate the SIQ into Chinese was obtained from the original author. Ethical approval for the present study was received from the local ethics committee (REC-2021.801). The

Helsinki Declaration was adhered to throughout the study. Data were used for research purposes only. Participant recruitment started only after they fully understood the purpose of the study and the way the data were collected. Participants have the right to withdraw from the study without any negative effects.

3 Results

3.1 Demographic Characteristics

A total of 1066 participants were included in the analysis, and the demographic characteristics are presented in Table 1. The participants ranged in age from 20 to 24 years, and the average age was 22 ± 5.0 . Female participants accounted for 85.6%. Eighty percent of the participants had an education level of undergraduate or above.

Table 1
Demographic Characteristics of Participants (n = 1066).

Variables	EFA	CFA
	(N = 506)	(N = 560)
	n (%)	n (%)
Age (mean, standard deviation)	22.2 (5.1)	22.0 (5.8)
Gender		
Female	445 (87.6)	467 (83.4)
Male	63 (12.4)	93 (16.6)
Education		
Junior college	136 (26.9)	149 (26.6)
Undergraduate	274 (53.6)	300 (53.5)
Graduate	99 (19.6)	111 (19.8)
Location		
Jiangsu	135 (26.7)	170 (30.4)
Hunan	119 (23.5)	120 (21.4)
Sichuan	127 (25.1)	170 (30.4)
Macao	125 (24.7)	130 (23.2)

3.2 Validity

3.2.1 Content validity

The I-CVI of the Chinese version of the SIQ ranged from 0.9 to 1.0, and the S-CVI was 0.96, revealing that the content validity of the Chinese version of the SIQ was satisfactory (Table 2).

Table 2
I-CVI for the Chinese version of the SIQ

Items	I-CVI
1. Working with the subject matter and problems of my major is not truly among my favorite activities.	0.9
2. I do not like to talk much about the subject matter related to my studies.	0.9
3. After a long weekend or vacation I look forward to getting back to my studies.	1.0
4. Being involved with my major puts me in a good mood.	1.0
5. I prefer to talk about my hobbies rather than about my major.	1.0
6. When I am in a library or bookstore, I like to browse through magazines or books having to do with topics related to my major.	1.0
7. Many areas within my major do not mean anything to me.	0.9
8. It was of great personal importance to me to be able to study this particular subject	1.0
9. To be absolutely honest, I feel sometimes rather indifferent toward my major.	0.9
10. The subject matter of my major has in fact very little to do with my self-realization.	0.9
11. Compared to other things that are of great importance to me (e.g., hobbies, social life), my studies are of markedly less significance to me.	0.9
12. Working with particular subject matter is more important to me than leisure and amusement.	1.0
13. Even before I started studying, my current major was important to me.	0.9
14. I'm certain that studying my major has a positive influence on my personality.	1.0
15. If I had enough time, I would work more intensively with certain aspects of my studies, even if they had nothing to do with any course requirements.	1.0
16. I am confident that I have chosen the major that corresponds to my personal preferences.	1.0
17. Even before coming to college I voluntarily spent time thinking about the subject matter of my major (e.g., read books, went to lectures, had conversation with others).	0.9
18. I chose my major primarily because of the interesting subject matter involved.	1.0

3.2.2 Construct validity

The construct validity of the SIQ was evaluated by EFA and CFA. The KMO value was 0.886, and Bartlett's sphericity was statistically significant ($\chi^2 = 4086.727$, $P < 0.001$), indicating that the data were suitable for

factor analysis. In the EFA, four factors with eigenvalues above 1 were identified, accounting for 63.809% of the cumulative variance. A scree plot displaying the eigenvalues vividly is shown in Fig. 1. Factor loadings are presented in Table 3. Factor 1 consisted of seven items that describe students' feelings about their major, labelled 'Emotion'. Factor 2 consisted of three items that describe students' understanding of their major, so named 'Knowledge'. Factor 3 consisted of four items that describe the worth of their major for students, so named 'Value'. Factor 4 consisted of four items that describe students' involvement of their major, so named 'Engagement'. Based on the preset criteria, no item was removed. Consequently, the four-factor model was examined by CFA. The results of CFA are shown in Fig. 2. The initial model was modified according to the Modification Indices. In the revised model, the CMIN/DF was 4.49, GFI was 0.90, IFI was 0.90, and CFI was 0.90, indicating that the model fit the data well. The construct validity of the CV- SIQ was satisfied.

Table 3
Factor analysis results for the Chinese version of the
SIQ (N = 506).

Item	Factor 1	Factor 2	Factor 3	Factor 4
Q9.	.816			
Q11.	.795			
Q10.	.772			
Q2.	.755			
Q1.	.739			
Q7.	.736			
Q5.	.528			
Q18.		.861		
Q17.		.808		
Q16.		.743		
Q14.			.779	
Q13.			.714	
Q8.			.584	
Q15.			.571	
Q3.				.812
Q12.				.732
Q4.				.559
Q6.				.442

3.3 Reliability

The Cronbach's α coefficient of the CV-SIQ was 0.813, and those of the four factors were 0.862 (Emotion), 0.842 (Knowledge), 0.777 (Value), and 0.731 (Engagement), indicating that the internal consistency of the CV-SIQ was satisfactory. Thirty-one participants were invited to sign the scale after two weeks. The ICC of the CV-SIQ was 0.784, and that of items ranged from 0.70 to 0.869, which are shown in Supplementary 2. All the ICCs were greater than 0.70, suggesting that the test-retest reliability of the C-SIQ was good.

4 Discussion

The evidence is mounting that health care student interest in learning results in better learning outcomes [7, 8]. Consequently, to take targeted measures to improve health care students' interest in learning, it is necessary to understand their current situation first. In the present study, the SIQ was translated into Chinese, and the psychometric properties were determined in the context of Chinese culture. The CV-SIQ, including 18 items, contains 4 dimensions: emotion, knowledge, value, and engagement. The findings showed that the CV-SIQ was of satisfactory validity and reliability and can be used to assess health care students' interest in learning their majors effectively. With the aid of this scale, teachers can gain a better understanding of health care students' learning interests, thereby maximizing their learning effects through appropriate content and methods.

Similar to the original and the Norwegian version of the SIQ [16, 18], the CV-SIQ contained 18 items. The translation and cross-cultural adjustment did not alter the original structures of the SIQ; only a few items were modified to make them more easily understandable in Chinese. According to the present findings, the S-CVI of the CV-SIQ was greater than 0.90, demonstrating that the content validity of the CV-SIQ was satisfactory [28]. The CV-SIQ maintains semantic consistency with the original SIQ, which may be partly due to the strict following of the guidelines of the theoretical model in the process of translation and cross-cultural adaptation [24]. On the other hand, it may also be that experts in various fields provided professional advice during the adjustment process.

In the EFA, four factors were identified, and the indices, including CMIN/DF, GFI, IFI, and CFI, all met the standard, indicating that the CV-SIQ has good construct validity [35]. What is noteworthy is that the original version of the SIQ was unidimensional, which is different from the present findings. The inconsistent results may be related to the inconsistent methods of construct validity analysis. The unidimensional original version of the SIQ was obtained based on factor and Rasch analyses [38], while the four-dimensional CV-SIQ was generated only by the factor analyses. This application of PCA relies on a specific magnitude, which is available from an ordinal scale, while Rasch analyses based on item response theory (IRT) complement classical test theory (CTT) by providing detailed analysis of how items work within scales and whether their summed score is valid [38]. In the future, analysis methods based on IRT could be considered to optimize the CV-SIQ.

In terms of reliability, the Cronbach's α coefficients of the scale and the four dimensions were all greater than 0.70, indicating satisfactory internal consistency of the CV-SIQ [36]. The Cronbach's α coefficient of the CV-SIQ was roughly equal to that of the Norwegian version but slightly lower than that of the original version. Participants, language, social structure, and social cultures in different countries may lead to some distinctions between the different versions in internal consistency. Regarding the test-retest reliability, all the ICCs were greater than 0.7, suggesting that the test-retest reliability of the CV-SIQ was good [37]. The ICC of the original SIQ was 0.67 [16], which was lower than that of the CV-SIQ. The various retest times may partly explain these differences. In the present study, thirty-one participants were invited after two weeks, while the original SIQ was retested after two years [16]. At present, there is no unified standard for the retest time. Future studies can further explore the influence of time on the retest reliability of CV-SIQ.

There were several strengths in this study. First, to the best of our knowledge, this is the first time that translation and cross-cultural adaptation of the SIQ has been conducted in the Chinese context. Second, the process of translation and cross-cultural adaptation strictly followed the guidelines of the theoretical model. Third, the CV-SIQ has great validity and reliability. There are also some limitations in this study. First, participants were recruited from only three provinces and one special administrative region of China, and they may not provide a representative sample in China. Second, a statistical screening of items was conducted in this study based solely on classical measurement theory. In the next phase, methods based on other theories will be integrated.

5 Conclusions

The CV-SIQ, including 18 items, contains 4 dimensions: emotion, knowledge, value, and engagement. The CV-SIQ exhibited satisfactory validity and reliability and can be applied for measuring health care students' learning interest in China. With the aid of this scale, teachers can gain a better understanding of health care students' learning interests, thereby maximizing their learning effects through appropriate content and methods.

Declarations

Ethics approval and consent to participate

This research was approved by the Research Management and Development Department of Kiang Wu Nursing College of Macau (No. REC-2021.801) and conducted according to the Declaration of Helsinki. It was a completely voluntary, anonymous, and unrewarded study. The participants read and agreed to the informed consent before starting to fill in the questionnaire. In order to assured voluntariness, participants could withdraw at any time without losing benefits. Anonymity was guaranteed by not collecting any personal identification information (such as names). Confidentiality was ensured by storing data on a computer protected by a password known only by the researchers.

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.

Competing interests

The authors declare that they have no competing interests.

Funding

This work was supported by a research grant from Higher Education Fund of Macao SAR Government (HSS-KWNC-2021-01). This funding source had no role in the design of this study and will not have any role during its execution, analyses, interpretation of the data, or decision to submit results.

Acknowledgements

Not applicable.

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Figures

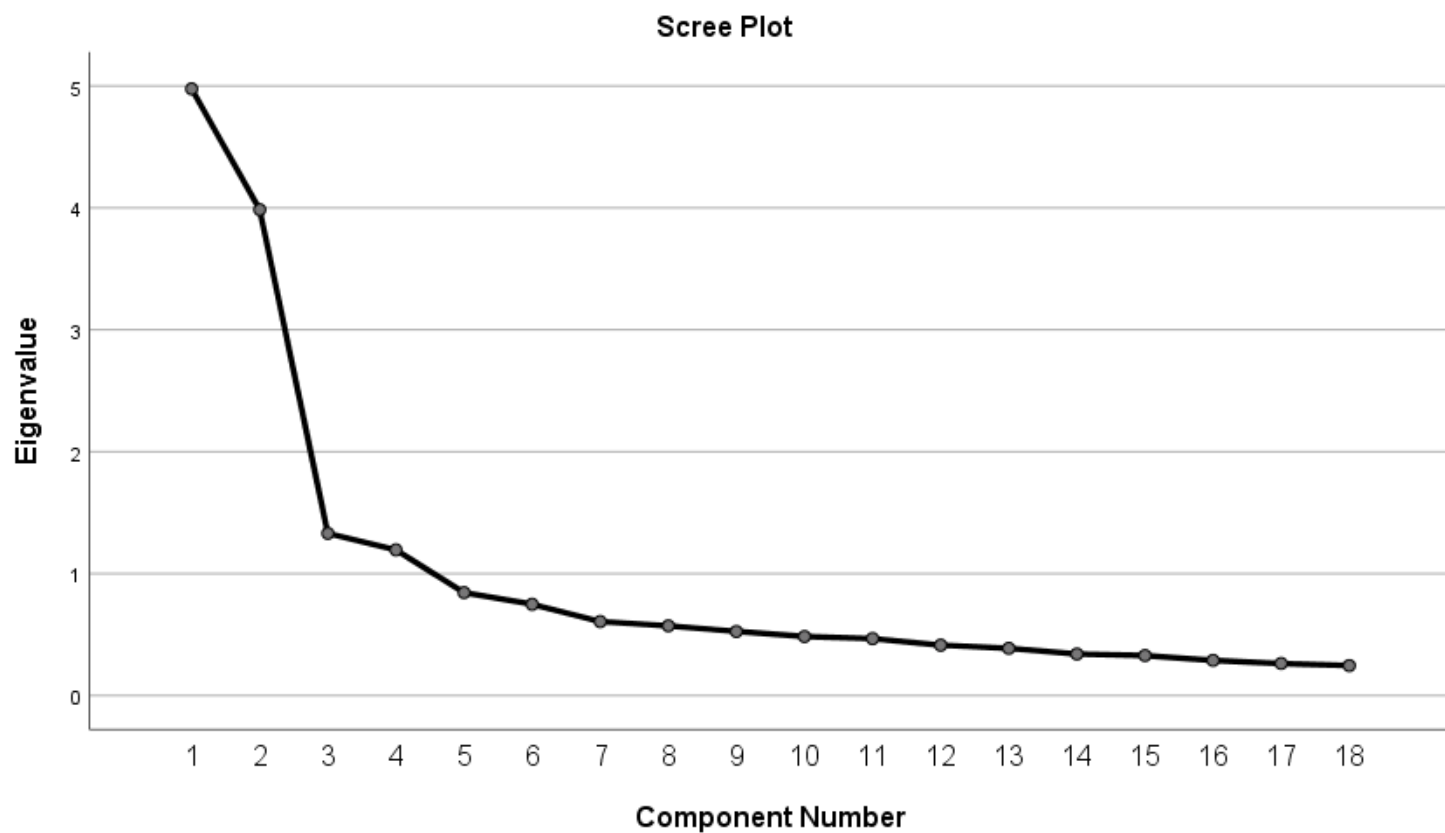


Figure 1

Scree plot of the Chinese version of the SIQ

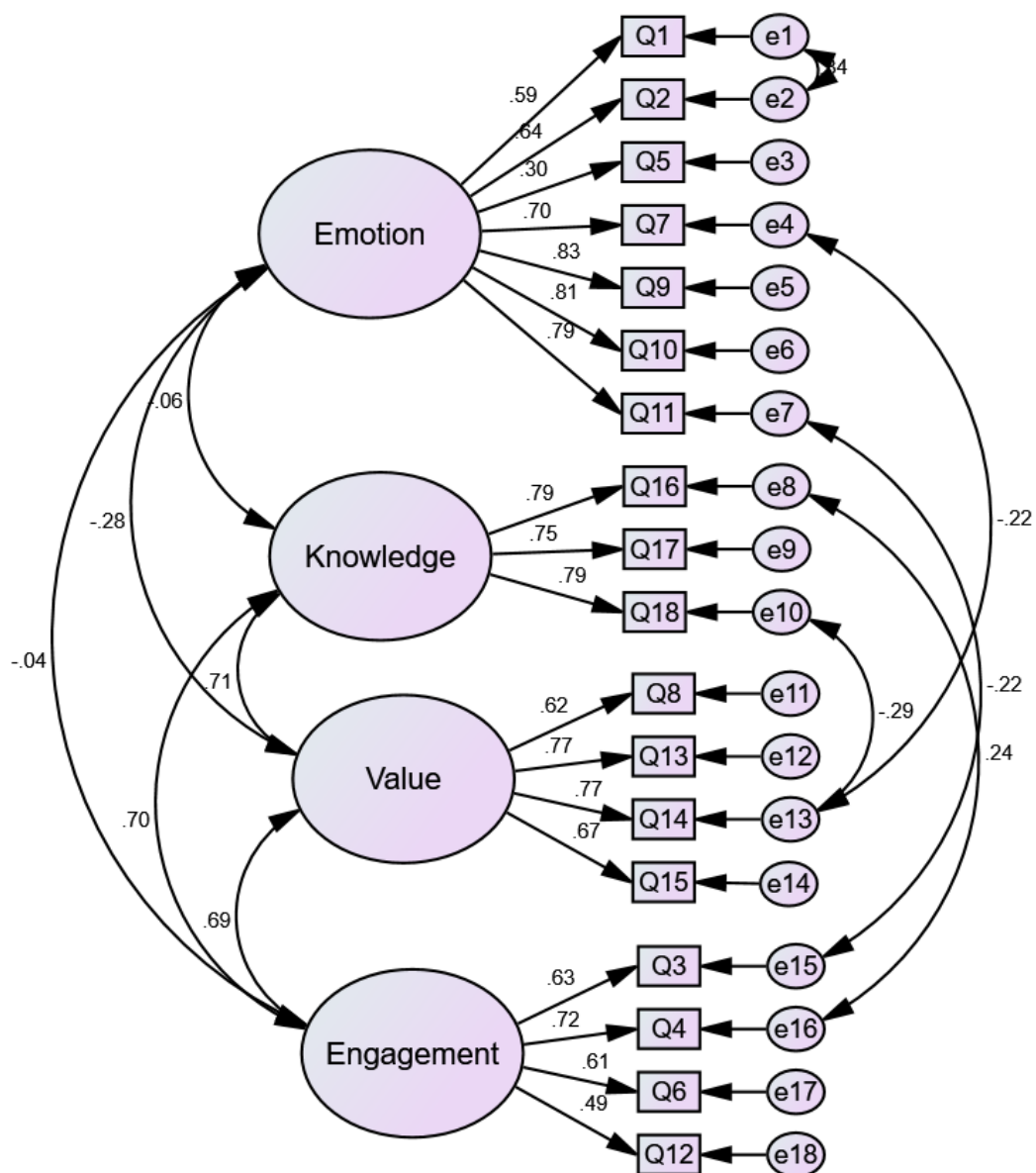


Figure 2

A confirmatory factor model of the Chinese version of the SIQ (N =560).

Supplementary Files

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