

Cross-cultural Validation and Psychometric Testing of the Debriefing Experience Scale (DES): A Cross-sectional Study

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Abstract

Background: The Debriefing Experience Scale (DES) is a tool that is used to explore nursing students' subjective experiences during a debriefing. Information obtained from completed scales can be used to help determine best debriefing practices. No Chinese version of the scale has been found verifying reliability and validity.

Methods: The Chinese DES was completed by 34 undergraduate (second year) nursing students after debriefing six separate simulation scenarios. Eight experts were consulted to determine the content validity of the scale. Critical ratio method, Cronbach's alpha and the correlation coefficient and factor analysis were used for data analysis.

Results: 200 cases were included in the analysis, it showed that the simplified Chinese version DES scale held a good potential to discriminate nursing students' experience of the debriefing.

Conclusions: The simplified Chinese DES scale was effective in evaluating the experience of debriefing. A larger sample size and multicenter research is needed to confirm these findings.

1. Introduction

Simulation-based education is a teaching strategy that can improve clinical competency of health care professions [1, 2]. Jeffries [3] described the three phases of simulation as pre-briefing, scenario and debriefing. The final phase is debriefing which is the act of reviewing critical actions that unfolded during the course of a simulation scenario [4]. Through debriefing, faculty and students can reflect on the simulation experience from a variety of perspectives, exchange feedback and review performance errors [5, 6]. Debriefing is considered as a vital factor in simulation-based education which can provide opportunities to improve clinical performance [7, 8, 9, 10], because the quality of the debriefing determines the effectiveness of simulation education [11]. In order to determine the quality and best practices for debriefing, various instruments have been developed [12, 13, 14, 15, 16].

As debriefing is conversational, bidirectional, interactive and reflective [17], the experience and evaluation of students in debriefing is important. But there is still a lack of knowledge about the perceptions of students regarding the debriefing experience [15]. Some available debriefing evaluation tools focus evaluate how the debriefer conducts a debriefing [13, 16] but do not focus on the participant experience. Reed [15] developed the Debriefing Experience Scale (DES) to explore nursing students' subjective experiences during debriefing. In Reed's research, a validation study of this scale was carried out with 130 nursing students. The results showed that the internal consistency reliability, measured by Cronbach's alpha, was reported to be 0.93 for the experience scale and 0.91 for the importance scale [15]. The scale has been translated into Norwegian [18] and Portuguese [19], and these translations have shown good psychometric properties and potential for use. There is no report of a Chinese version DES that has been verified for reliability and validity.

This study aimed to translate the DES into a Simplified Chinese version, and determine its reliability and validity.

2. Methods

2.1. Study Design

The study is an instrument adaption with psychometric testing. A cross-sectional study design was used.

2.2. Instruments: Debriefing Experience Scale

The Debriefing Experience Scale (DES) was developed by Reed [15] to measure (a) the experience of students during debriefing and (b) the importance of these experiences to the student. The DES has 20 items which are divided into four subscales. For each item of the DES, study participants were asked to evaluate both the student experience and the perceived importance of the item to the student using a five-point Likert-type rating scale. The experience scale was rated from 1 (strongly disagree) to 5 (strongly agree), including the alternative of not applicable (NA), that is, the statement had nothing to do with the reporting activities carried out. The importance scale was rated from 1 (not important) to 5 (very important).

2.3. Setting

This study was conducted at the School of Health Sciences, Wuhan University, China, which is considered as a demonstration and training center for simulation-based education in nursing. The facilitators were certified as a Simleader by the National League for Nursing (NLN), and have completed the study of standardized training courses developed by the NLN. They include Foundations in Simulation, Debriefing Foundations, Curriculum Integration and Evaluation. Faculties of the nursing program who are facilitators have adopted the International Nursing Association for Clinical Simulation and Learning (INACSL) Standards of Best Practice [20] in implementing simulation-based education. Their debriefings follow the Gather-Analysis-Summary (GAS) model [21], which is a learner-centered process.

The simulation experiences of nursing students in this research study were part of a compulsory baccalaureate nursing course that focused on integration of knowledge in developing clinical skills. Students participated in three simulations related to psychiatric nursing: a client having auditory hallucinations, managing a client who is violent and impulsive, and suicide crisis intervention. These simulations were conducted by SimLeader A. The other three simulations related to medical-surgical nursing and focused on a client having a plaster cast, care of a client in traction and care of a client with complications of a fracture. These were led by SimLeader B. Students were divided into four groups (8–9 students per group) and each group would participate in the six simulations.

2.4. Sample

A convenience sample was used for the study. None of the researchers participated in simulation activities at the nursing school. After an introduction of the research study and its purpose, 34 second

year baccalaureate nursing students agreed to participate in this study. Five were male (14.7%) and 29 were female (85.3%), ranging in age from 19 to 21 years, with an average age of 19.94 ± 0.42 years.

2.5. Procedures and Data Collection

After permission was obtained from the original author, the DES was translated into simplified Chinese based on standardized guidelines [22] including forward translation, back translation, cultural adaptation and pilot testing. A focus interview with one group of the participants was conducted to ensure that participants could understand the meaning of the scale. Data were collected using the translated Simplified Chinese version of the Debriefing Experience Scale. After excluding four invalid questionnaires, 200 cases were included in the analysis, for a return rate of 100%. Testing of items included discrimination and the reliability and validity of the scale. Study procedures are shown in Fig. 1.

2.6. Ethics

This study protocol was approved by the Medical Ethics Committee of Wuhan University School of Medicine in Wuhan, China (NO. 2021YF0002). Participants completed informed consent and were allowed to withdraw at any time. Researchers iterated via oral and written means that confidentiality was maintained, the student's participation would not affect their grade in the course in which the simulations were conducted and their responses to questionnaires would not be shared with faculty leading the simulations.

2.7. Data analysis

Data were analyzed using IBM SPSS Statistics, version 24 (IBM Corporation, Armonk, NY) and Amos Graphics, version 22 (IBM Corporation, Armonk, NY). The critical ratio method was used for discrimination. The scale's total score was sorted according to the level, and the cases were divided into a high score group (top 27%), a low score group (bottom 27%) and other groups. The difference in the average score of items between the high score and the low score groups was obtained by an independent sample t-test (two-tailed probability) to judge whether the item had good discrimination. Cronbach's alpha and the correlation coefficient between each item and the total score of the scale were used to establish the reliability of the experience and the importance scale. Content validity was established by a group of eight experts, including four simulation and medical education experts and four simulation and nursing education experts. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to evaluate construct validity.

3. Results

3.1. Translation and culture adaptation

Experts were consulted to develop the simplified Chinese version of the DES scale, and valuable suggestions and opinions were offered by Dr. Reed, author of the scale. The original scale format was maintained, with some changes such as adding adjectives and qualifiers to improve understanding. As a

result, the word “meaning” in item 4 was changed to “more understanding of the topic”; the word “question” in item 5 was described as “questions arose in the simulation”; the word “problems” in item 7 was described as “clinical problems”; the word “unsettled” in item 12 was deleted as a result of the focus interview. All changes were validated by the eight experts.

3.2. Discrimination

The average score of each item of the experience scale (simplified Chinese version) ranged from 4.16 to 4.64, and the total score ranged from 74 to 100, for an average of 90.61 ± 6.36 . The average score of the high score group (top 27%, $n = 62$) was 97.40 ± 1.83 , and that of the low score group (bottom 27%, $n = 60$) was 82.59 ± 3.70 . The independent sample t-test showed that the difference between the two groups was statistically significant at the 0.05 level ($t = 27.89, p = 0.00$).

The average score of each item in the importance scale (simplified Chinese version) was 4.08 to 4.62 and the total score was from 71 to 100, with an average score of 88.62 ± 7.25 . The average score of the high score group (top 27%, $n = 60$) was 97.02 ± 2.15 , and it was 79.27 ± 2.84 in the low score group (bottom 27%, $n = 55$). The independent sample t-test showed that the difference between the two groups was statistically significant at the 0.05 level ($t = 37.92, p = 0.00$).

3.3. Reliability

Cronbach’s alpha was determined for both the experience scale and the importance scale, with the Cronbach’s alpha for all items in the experience scale as 0.90, and the Cronbach's alpha for all items in the importance scale as 0.92. The subscale, Analyzing Thoughts and Feelings, exhibited an alpha value below that of the acceptable value 0.70 [23]. Alpha values for the experience and importance scale within the Debriefing Experience Scale, and for the subscales, are shown in Table 1.

Table 1

Cronbach’s alpha for the Debriefing Experience Scale

Subscale		Cronbach's alpha experience items	Cronbach's alpha importance items	Number of items in scale/subscale
Learning and Making Connections		0.78	0.81	8
Analyzing Thoughts and Feelings		0.65	0.66	4
Facilitator Skill in Conducting the Debriefing		0.72	0.74	5
Appropriate Facilitator Guidance		0.71	0.75	3
Overall scale		0.90	0.92	20

The correlation coefficient between each item and the total score of the experience scale was 0.48 (item 12) to 0.69 (item 9 & item 18), and it was 0.50 (item 12) to 0.72 (item 18) for the importance scale. The correlation coefficient between the subscales and the total score of the experience scale was 0.82 to 0.92, with that for the importance scale was 0.83 to 0.93. The correlation was significant at the 0.01 level (2-tailed) (see Table 2). The correlation coefficient between any two subscales was greater than 0.59 (0.60 to 0.79), and the correlation was significant at the 0.01 level (2-tailed).

Table 2
Pearson correlation coefficient between each subscale and the total score of the scale

Subscale	Total score of the experience scale	Total score of the importance scale
Learning and Making Connections	0.92	0.93
Analyzing Thoughts and Feelings	0.82	0.83
Facilitator Skill in Conducting the Debriefing	0.86	0.92
Appropriate Facilitator Guidance	0.83	0.85
Correlation is significant at the 0.01 level (2-tailed).		

3.4. Content validity

Content validity was established by a group of eight experts, four males and four females, aged between 32 and 47 years, with an average age of 37.75 ± 5.06 years; five experts had doctoral degrees. They were simulation experts in medical or nursing education and had been working for 3 to 27 (13.88 ± 7.30) years. Each item of the simplified Chinese version of the Debriefing Experience Scale was rated with a Likert-type scale, from 1 (not important) to 5 (very important). The Content Validity Index (CVI) of each item was from 0.83 to 1.00; the CVI of the total scale was 0.94.

3.5. Construct validity

Before conducting the factor analysis, the suitability of the data for the exploratory factor analysis (EFA) was assessed.

Sampling adequacy was determined by the Kaiser-Meyer-Olkin (KMO) test of the experience scale and was found to be 0.91, and the Bartlett's sphericity Test Chi-Square was 1352.87. The degree of freedom was 190, $p < 0.01$, and the anti-image matrix ranged between 0.85 and 0.94.

An initial analysis was run, and three components showed an eigenvalue above Kaiser's criterion of 1, explaining 47.69% of the variance in the data from the experience scale (35.82%, 6.30% and 5.57% respectively). The scree plot showed a clear break after the second component.

An extraction followed by an Oblimin rotation with Kaiser Normalization was conducted. The pattern matrix (see Table 3) showed that Component 1 included twelve items, Component 2 included five items, Component 3 included two items, and item 12 *“Unsettled feelings from the simulation were resolved by debriefing”* was removed by showing a loading value below the acceptable value 0.40 [24]. However, in the structure matrix, several cross-loadings were shown (see Table 4). The result of this analysis was very different from the findings in the original version. No relationship among the groups was established in the EFA, thus it was decided to follow the division established by the original version of the scale.

Table 3
Debriefing Experience Scale: pattern matrix a

	Component		
	1	2	3
Debriefing Experience Scale (one item removed)	1	2	3
Item5: My questions from the simulation were answered by debriefing.	0.74	-0.15	-0.07
Item2: Debriefing was helpful in processing the simulation experience.	0.72	0.14	0.34
Item19: The facilitator provided constructive evaluation of the simulation during debriefing.	0.71	-0.02	0.03
Item10: The facilitator reinforced aspects of the health care team's behavior.	0.68	-0.01	0.08
Item20: The facilitator provided adequate guidance during the debriefing.	0.59	0.21	0.05
Item15: Debriefing provided a means for me to reflect on my actions during the simulation.	0.56	0.07	-0.16
Item9: Debriefing helped me to analyze my thoughts.	0.56	0.07	-0.32
Item8: Debriefing helped me to make connections between theory and real-life situations.	0.54	-0.01	-0.16
Item11: The debriefing environment was physically comfortable.	0.52	0.27	0.28
Item4: Debriefing helped me to find meaning in the simulation.	0.49	0.13	-0.16
Item1: Debriefing helped me to make connections in my learning.	0.44	0.13	-0.40
Item3: Debriefing provided me with a learning opportunity.	0.42	0.12	-0.23
Item17: The debriefing session facilitator was an expert in the content area.	-0.10	0.74	-0.07
Item18: The facilitator taught the right amount during the debriefing session.	0.19	0.68	0.06
Item14: The debriefing session facilitator talked the right amount during debriefing.	-0.02	0.68	-0.14
Item6: I became more aware of myself during the debriefing session.	0.03	0.65	0.14
Item16: I had enough time to debrief thoroughly.	0.13	0.59	-0.04
Item7: Debriefing helped me to clarify problems.	0.24	0.05	-0.61
Item13: The facilitator allowed me enough time to verbalize my feelings before commenting.	-0.01	0.46	-0.59
Extraction method: Principal Component Analysis.			
Rotation method: Oblimin with Kaiser Normalization.			
a. Rotation converged in 10 iterations.			

Table 4
Debriefing Experience Scale: structure matrix

	Component		
	1	2	3
Debriefing Experience Scale (one item removed)	1	2	3
Item2: Debriefing was helpful in processing the simulation experience.	0.72	0.46	0.14
Item19: The facilitator provided constructive evaluation of the simulation during debriefing.	0.70	0.36	-0.14
Item20: The facilitator provided adequate guidance during the debriefing.	0.70	0.52	-0.13
Item5: My questions from the simulation were answered by debriefing.	0.67	0.26	-0.21
Item9: Debriefing helped me to analyze my thoughts.	0.67	0.44	-0.47
Item10: The facilitator reinforced aspects of the health care team's behavior.	0.65	0.34	-0.07
Item15: Debriefing provided a means for me to reflect on my actions during the simulation.	0.64	0.41	-0.31
Item11: The debriefing environment was physically comfortable.	0.60	0.49	0.11
Item1: Debriefing helped me to make connections in my learning.	0.60	0.45	-0.53
Item4: Debriefing helped me to find meaning in the simulation.	0.59	0.42	-0.30
Item8: Debriefing helped me to make connections between theory and real-life situations.	0.57	0.31	-0.29
Item3: Debriefing provided me with a learning opportunity.	0.54	0.39	-0.35
Item18: The facilitator taught the right amount during the debriefing session.	0.54	0.77	-0.12
Item14: The debriefing session facilitator talked the right amount during debriefing.	0.38	0.70	-0.28
Item17: The debriefing session facilitator was an expert in the content area.	0.31	0.70	-0.20
Item16: I had enough time to debrief thoroughly.	0.46	0.67	-0.19
Item6: I became more aware of myself during the debriefing session.	0.35	0.64	0.00
Item13: The facilitator allowed me enough time to verbalize my feelings before commenting.	0.38	0.58	-0.68
Item7: Debriefing helped me to clarify problems.	0.41	0.30	-0.68
Extraction method: Principal Component Analysis.			
Rotation method: Oblimin with Kaiser Normalization.			

Confirmatory factor analysis (CFA) was implemented by using Amos Graphics (version 22). The model followed the division established by the original version. The parameter estimates of the CFA are shown in Fig. 2, CFA of the simplified Chinese version of the DES. The entire standardized factor loading was statistically significant and greater than 0.40. All the items loaded significantly onto their respective factors. The Chi-square degree of freedom ratio (χ^2/df) was 1.65, the comparative fit index (CFI) was 0.91, the root mean square error of approximation (RMSEA) was 0.05, and the incremental fit index (IFI) was 0.91.

4. Discussion

The aim was to translate and validate the Debriefing Experience Scale in a simplified Chinese context. Psychometric tests showed that each item of the experience scale had a good degree of discrimination, so all the items were kept in the simplified Chinese version. The simplified Chinese version DES scale held a good potential to discriminate nursing students' experience of the debriefing. This is consistent with the original version [15], the translated Norwegian version [18], and the Portuguese version [19]. The reliability of the DES scale (simplified Chinese version) was confirmed by the medium to high Cronbach's alpha coefficients as well, except for the subscale "Analyzing Thoughts and Feelings". It was much like the result of the Portuguese version [19]. In the Norwegian version [18], the Cronbach' alpha coefficient for the subscale "facilitator skill in conducting the debriefing" was 0.44 and for the total scale was 0.86. After two items were removed, an improved alpha value of 0.91 and 0.66 was noted for the total scale and the subscale, respectively.

The CVI for the scale was high, indicating that the experts agreed that the items were suitable and relevant to assess the experience of the debriefing and those items have a close relationship with the sense of experience. The correlation coefficient between each item and the total score proved this well.

The result of the EFA showed the translated scale could be divided into three factors, diverging from the original scale. Discrepancy is commonly seen when testing the factor structure of a scale within a different cultural context [22]. Previous researchers indicated the scale would benefit from reducing the subscales [18, 19]. In this study, EFA with Oblimin rotation found a quite unexpected group and item 12 "*Unsettled feelings from the simulation were resolved by debriefing*" was suggested for deletion. There was no apparent connection among the groupings, and it cannot be renamed, so it was decided to follow the division established by the original version as well as the Portuguese version [19]. A possible explanation for this divergence was that facilitators may have emphasized the objectives of the simulation rather than students' emotions.

Overall, there is sufficient reliability and validity evidence to support the use of DES (simplified Chinese version) in Chinese nursing simulation-based education. The researchers believe that the translated DES scale will offer an opportunity to explore the participants' experience of debriefing in a Chinese context. Using the DES (simplified Chinese version) scale in the regular evaluation of debriefing in simulation

courses may make a significant contribution to the development of debriefing after simulation in nursing and medical education in China.

5. Limitations

In this study students participated in six simulations and completed questionnaires following the debriefing phase. The experience of different simulations may result in confusion as some experience may bring back memories from an earlier debriefing that may enhance or reduce the intensity of the experience. Researchers should offer adequate time for students to complete any questionnaires after debriefings.

Another limitation of the current study may be the size of sample, although the sample number in this study was acceptable according to Comrey and Lee [25]. A larger sample could have resulted in a different factor solution by offering an improved subject-to-item ratio [26]. The participants were all from the same school, thus a multicenter research study is needed in the future, but maintaining homogeneity of the simulation and debriefing needs to be considered.

6. Conclusions

The validation process for the simplified Chinese version of the Debriefing Experience Scale showed that the scale was effective in evaluating the experience of debriefing. The result of the EFA suggested the inclusion of fewer subscales. As validity testing is an ongoing process, a larger sample size and multicenter research will contribute to consolidation of the scale's validity.

Abbreviations

DES: Debriefing experience scale

NA: Not applicable

NLN: National League for Nursing

INACSL: International Nursing Association for Clinical Simulation and Learning

GAS: Gather-Analysis-Summary

EFA: Exploratory factor analysis

CFA: Confirmatory factor analysis

CVI: Content validity index

KMO: Kaiser-Meyer-Olkin

CFI: Comparative fit index

RMSEA: Root mean square error of approximation

IFI: Incremental fit index

Declarations

Ethics approval and consent to participate

This study protocol was approved by the Medical Ethics Committee of Wuhan University School of Medicine in Wuhan, China (NO. 2021YF0002). Participants completed informed consent and were allowed to withdraw at any time.

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

BXY, YDX, XYL and QL designed the study and wrote the research protocol. RH, TL, YXF and SR contributed to the translation and validation. YDX, XYL, QL, RH, TL, YXF, DL, YHW and BXY managed the field survey, quality control, and statistical analysis and prepared the manuscript draft. BXY, YHW, DL and SR contributed to the revisions in depth for the manuscript. BXY, YHW and DL supervised the survey and checked the data. All authors contributed to and approved the final manuscript. YDX, XYL and QL contributed equal to this manuscript.

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Figures

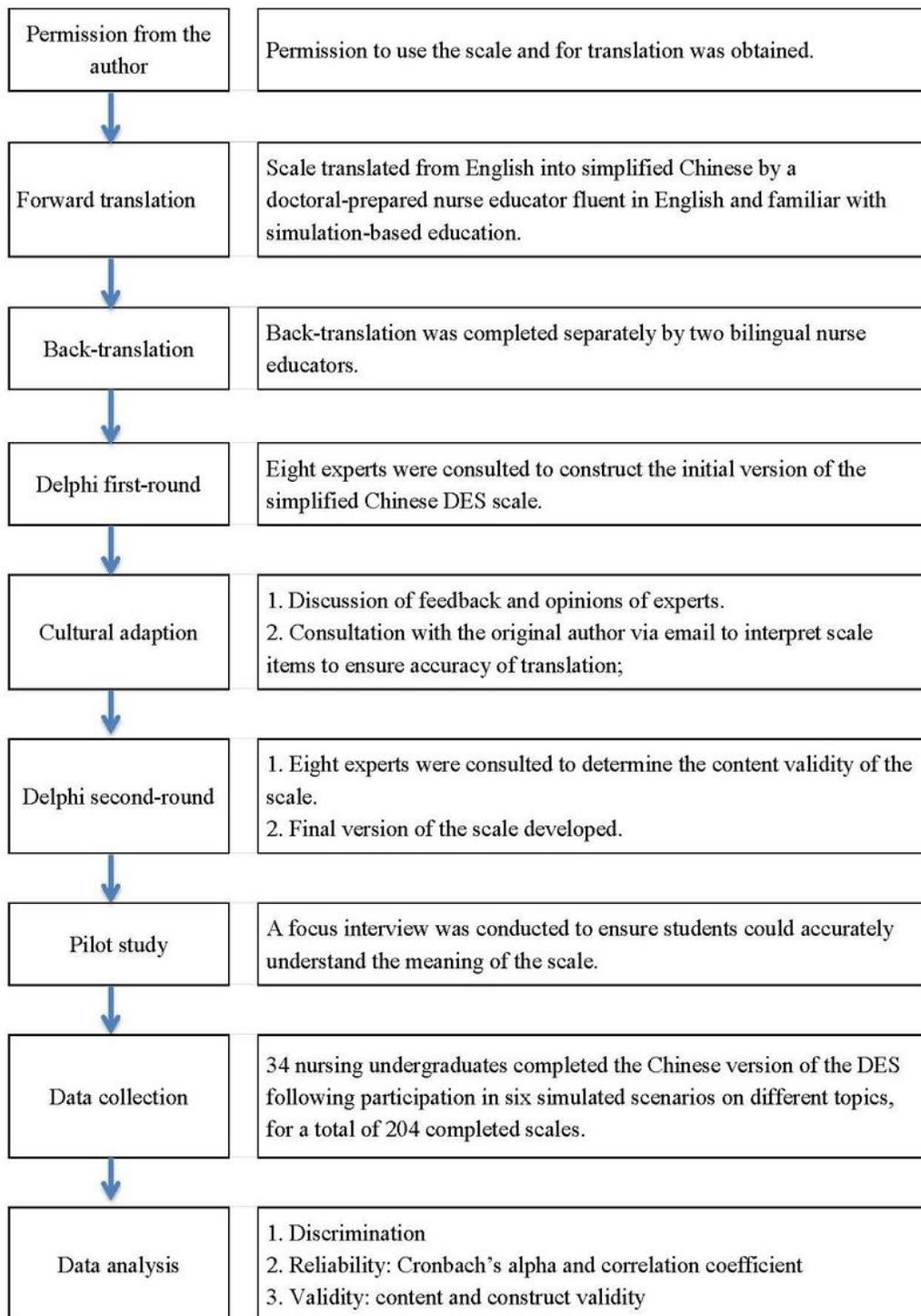


Figure 1

Study procedures

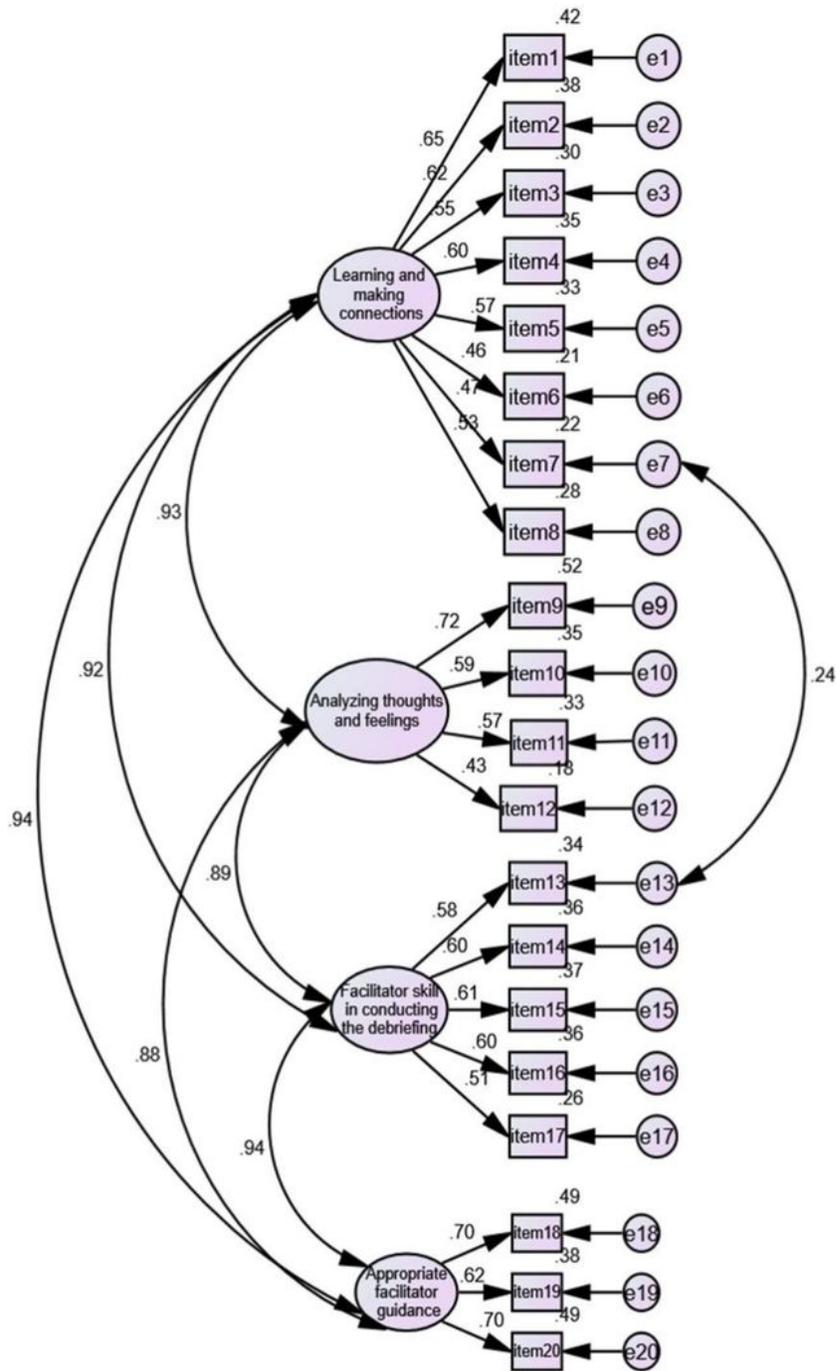


Figure 2

CFA of the simplified Chinese version of the DES