

The Vietnamese Version of the Nursing Critical Thinking in Clinical Practice Questionnaire: Translation and Psychometric Evaluation

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Abstract

Background: Many instruments measure critical thinking ability in nursing education. The Nursing Critical Thinking in Clinical Practice Questionnaire (N-CT-4 Practice) is a new tool to measure the level of critical thinking ability of nurses in a clinical setting. However, no study has evaluated the psychometric properties of the N-CT-4 Practice in Vietnam. Therefore, this study translated and evaluated the validity and reliability of the Vietnamese version of the Nursing Critical Thinking in Clinical Practice Questionnaire (N-CT-4 Practice (V-v)).

Results: The N-CT-4 Practice (V-v) questionnaire retained the meaning of the original English version and was clear, explicit and easy for nurses to understand. The item content validity index of the N-CT-4 Practice (V-v) was 1.0. The Cronbach's alpha for the overall scales was .98. The intraclass correlation coefficient was .81. Confirmatory factor analysis indicated that this Vietnamese version fit the proposed model.

Conclusions: The findings suggested that the N-CT-4 Practice (V-v) has acceptable reliability and validity for Vietnamese nurses in a clinical setting. Nurse managers and educators can use the N-CT-4 Practice (V-v) to measure the level of critical thinking ability of Vietnamese clinical nurses and make international comparisons possible.

Background

Critical thinking has been described from multidisciplinary perspectives, with disparate definitions related to the concepts of cognition, attitude, process, and skills. Many nursing scholars agree that critical thinking is necessary and valuable in nursing education and practice, even though there is no clear consensus on a definition [1-4]. In nursing practice, critical thinking is a cognitive process that represents the competence to apply reasoning with the desire to decrease errors in decision-making [5-7]. Nurses apply critical thinking skills daily to assess, plan and provide quality patient care [8]. In addition, critical thinking ability has been associated with clinical decision-making [9-13], nursing competence [14], nursing processes [15-17], nurse workplace production and problem-solving ability [18], and research utilization [19].

The measurement of the level of critical thinking ability has been a concern of numerous studies in the last several decades [20]. Based on a review of 34 studies, sixteen different tools were identified for measuring the concept of critical thinking. The most commonly used instruments are standardized, such as the California Critical Thinking Disposition Inventory (CCTDI), California Critical Thinking Skills Test (CCTST) [21], Health Sciences Reasoning Test (HSRT) [22], and Watson-Glaser Critical Thinking Appraisal (WGCTA) [23]. However, the review also found that most of the instruments were used in nursing education but not in nursing clinical practice [24].

The Nursing Critical Thinking in Clinical Practice (N-CT-4 practice) questionnaire is a relatively newly developed self-administered questionnaire that was designed to measure the critical thinking ability of

nurses who work in clinical areas. The psychometric testing of the original N-CT-4 Practice questionnaire showed good validity and reliability [20]. However, this questionnaire was not available in Vietnam, which has extensive nursing work in the clinical area. Therefore, this study aimed to translate the English N-CT-4 Practice Questionnaire into Vietnamese (N-CT-4 Practice (V-v)) and to examine its validity and reliability with a sample of Vietnamese clinical nurses.

Methods

2.1 Translation process

The forward- and back-translation process was adopted from principles established in previously published guidelines [25]. The process included 5 steps: (1) the survey was forward-translated into Vietnamese by two independent bilingual translators; (2) a committee approach among the two translators and the bilingual researcher was used to obtain consensus on the final Vietnamese version; (3) the Vietnamese version was blindly back-translated into English by two different independent bilingual translators, and again, the committee approach and consensus were reached on the English back-translation version; (4) the English back-translation version was compared with the original English version by two independent native English-speaking experts. These experts evaluated whether the meaning of these two versions was similar using a five-point Likert scale (*1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree*). If uncertainties and differences could not be resolved, steps 1 through 4 were repeated. (5) The Vietnamese version was sent to three experts who were familiar with the clinical nursing setting. They were asked to judge each item of the instrument for translation and content equivalence using a 4-point Likert scale (*1 = not relevant, 2 = unable to assess relevance; 3 = relevant but needs minor alteration; and 4 = very relevant and succinct*). The proportion of the experts' agreement was used for equivalent assessment of the translated instrument.

2.2 Psychometric evaluation

The validity of the N-CT-4 Practice (V-v) was assessed with both content and construct validity. The method suggested by Lynn (1986) and Polit, Beck and Owen (2007) was used to identify the content validity on the item level content validity index (I-CVI) [26, 27]. Three experts assessed the relevance of each item on a 4-point Likert scale, from (1) not relevant to (4) very relevant. Lynn (1986) stated that the I-CVI must be 1.0 when there were five or fewer experts. The construct validity was evaluated by confirmatory factor analysis (CFA). Model fit was explored with several procedures because different authors have recommended using a number of indicators to identify the fit of models [28, 29].

The reliability of N-CT-4 Practice (V-v) was evaluated by both internal consistency and test-retest reliability. The former was assessed with the Cronbach's alpha coefficient. The scale was considered to display acceptable, good, or excellent internal consistency when this index was more than .7, .8 or .9, respectively. The latter was evaluated by the intraclass correlation coefficient (ICC), and a minimum value of .7 was considered satisfactory [30].

2.3 Participants

The participants were clinical nurses recruited based on convenience from the internal medicine, surgery, intensive care unit (ICU), emergency department (ED), and anesthesiology and recovery departments of three general hospitals located in Can Tho City, southwestern part of Vietnam. The required sample size was 545, with 5 participants per variable [31], which was treated as one item in the N-CT-4 Practice (V-v) questionnaire. The eligibility criteria for nurses included (1) work as a clinical nurse; (2) 20 years old and above; and (3) full-time employment. All working nurses in these departments were invited to participate in this study. Nurses absent during data collection were excluded.

2.4 Ethical considerations and study procedure

This study adhered to the ethical principles in congruence with the Declaration of Helsinki [32] and was permitted ethical approval by the ethical review board of the first author's institution.

Once approved, the researcher contacted three hospitals and obtained a name list of nurses from each hospital. The research group contacted and invited these nurses to participate in this study. The research participants were provided both verbal and written information relating to the purpose, benefits and risks of research as well as procedures to assure anonymity, confidentiality, and voluntary participation to potential subjects. Once they agreed, the consent form was signed, and a questionnaire was sent to them directly. It took approximately 20 minutes for participants to complete the N-CT-4 Practice (V-v) questionnaire and provide demographic characteristics.

2.5 Instruments

The N-CT-4 Practice questionnaire was developed by Zuriguel-Pérez (2017) and based on the theoretical model of Alfaro-LeFevre (2016). It was a specific tool developed to measure the level of critical thinking ability of nurses in clinical practice environments. This scale has 109 items with a 4-point Likert response format (1 = never or almost never, 2 = occasionally, 3 = often and 4 = always or almost always). There are four dimensions: personal characteristics (Prs, 39 items); intellectual and cognitive abilities (Int, 44 items); interpersonal abilities and self-management (Atg, 20 items); and technical abilities (Tcn, 6 items). The total score ranges between 109 and 436, and the levels of critical thinking are categorized as low level (score < 329), moderate level (score between 329 and 395), and high level (score > 395). By expert evaluation, the original results from 399 clinical nurses had an I-CVI of .85, a total Cronbach's alpha coefficient of .96, and an ICC of .77. The goodness-of-fit indices in CFA were $\chi^2/df = 1.95$, RMSEA = .055, SRMR = .65, CFI = .629, and TLI = .621, indicating that the N-CT-4 Practice was in keeping with the four-dimensional model proposed by Alfaro-Levre [20].

2.6 Statistical analysis

SPSS for Window version 22.0 (IBM Corp., Armonk, NY, USA) was used to analyze the data. Descriptive statistics were used to summarize the characteristics of the participants. The I-CVI was calculated to assess the content validity of the N-CT-4 Practice (V-v) using Microsoft Excel. CFA was conducted using

AMOS version 22.0 to evaluate construct validity. The goodness-of-fit of the model was assessed by using the indices and criteria: chi-square test (χ^2 ; nonsignificant). Because chi-square is sensitive to sample size, we evaluated the goodness-of-fit index based on the ratio between chi-square and the degrees of freedom (χ^2/df ; < 3), the root mean square error of approximation (RMSEA; $< .06$), the standardized root mean square residual (SRMR; $< .08$), the comparative fit index (CFI $> .95$ is a good fit), and the Tucker–Lewis index (TLI $> .95$ is a good fit; $0 < TLI < 1$ can be acceptance) [28, 29]. The Cronbach’s alpha coefficient was used to evaluate the internal consistency, and a value of $\alpha \geq .7$ was acceptable. The ICC was used to assess the test-retest reliability for a 2-week period, and the value of ICC $\geq .7$ was satisfactory [30].

Results

3.1 Characteristics of participants

The questionnaire was completed by 545 clinical nurses. Overall, the majority were female (71.4%), and half of nurses were married (50.5%). The age and years of work experience ranged from 21-60 years (median = 29) and 1-41 years (median = 5), respectively. Most of the nurses had diplomas and associate degrees (73.9%), followed by bachelor’s and graduate degrees (26.1%). The present working areas of the samples were internal medicine (38.5%), surgery (33.4%), and critical care units (28.1%).

3.2 Translation equivalence

All three bilingual experts conducted rating independently, and the results showed that the N-CT-4 Practice (V-v) questionnaire retained the meaning of the original English version and that the language used in the Vietnamese version was clear, explicit, and easy for nurses to understand. The original English version and the back-translated English version were compared by two native English speakers. They strongly agreed and agreed that the back-translated version preserved the equivalent meaning of the original English version for all items (I-CVI = 1.0). Only one item of the back-translated English version needed to be modified. Specifically, the English version was “I recognize my own emotions”, and the back-translation was “I recognize my emotion”. Emotions are plural, meaning more than one emotion. These experts suggested modifying it. However, nouns in Vietnamese do not distinguish singular or plural, so the two sentences mentioned above have the same meaning in Vietnamese language.

3.3 Reliability

The overall Cronbach's alpha coefficient of the N-CT-4 Practice (V-v) was .98, showing excellent internal consistency [30, 33]. The Cronbach's alpha for the four subscales ranged from .86 to .97, indicating the good reliability of each subscale. The ICC for the N-CT-4 Practice (V-v) was .81, and the ICC for the four subscales ranged from .76 to .86 ($p < .001$), indicating good stability for the 2-week period (table 1).

Table 1. Reliability and construct validity of the Vietnamese and original English versions

Value	N-CT-4 Practice (V-v)				N-CT-4 Practice			
	Cronbach's α	ICC	CFA		Cronbach's α	ICC	CFA	
Total score	.98	.81	χ^2/df	2.87	.96	.77	χ^2/df	1.95
Subscale: Prs	.95	.86	RMSEA	.059	.89	.70	RMSEA	.055
Int	.97	.76	SRMR	.063	.94	.77	SRMR	.65
Atg	.95	.80	CFI	.73	.86	.84	CFI	.629
Tcn	.86	.84	TLI	.72	.78	.76	TLI	.621

Note: Prs: Personal dimension; Int: Intellectual and cognitive dimension; Atg: Interpersonal and self-management dimension; Tcn: Technical dimension; RMSEA: Root mean square error of approximation; SRMR: Standardized root mean square residual; CFI: Comparative fit index; TLI: Tucker Lewis index

3.4 Content validity

The N-CT-4 Practice (V-v) questionnaire had an excellent item level content validity index (I-CVI = 1.0), indicating that all items were scored as acceptable. However, the three experts suggested that the N-CT-4 Practice (V-v) should be shorter to help nurses focus their attention and maintain concentration while answering the 109 items.

3.5 Construct validity

All the values for estimated parameters for the model were statistically significant in all cases ($p < .001$), consistent with what was expected. None of the variances or correlations revealed values considered to be unsuitable to the extent that the proposal would be invalidated. However, the modification indices recommended that the fit would be better when the residuals between items 7 and 8, 16 and 17, 20 and 21, 38 and 39, 40 and 41, 47 and 48, 49 and 50, 78 and 79, 94 and 95, and 108 and 109 were correlated. The

graphic representation (path diagram) of the model is shown in Figure 1. Convention dictates that squares declare measured variables (e.g., i1 is item 1 in the N-CT-4 Practice (V-v) questionnaire) and that circles indicate latent variables (e.g., personal dimension, intellectual dimension). The value that is revealed with the single-headed arrows between the circles and the squares shows the factor loading; the double-headed arrows show the correlations between pairs of variables. CFA reported that the correlation between the pairs of variables in the model—personal and intellectual, personal and interpersonal, personal and technical, intellectual and interpersonal, intellectual and technical, and interpersonal and technical—was .76, .68, .59, .87, .80, .86, respectively ($p < .001$), indicating that four dimensions of the model are adequate.

The results of the chi-square test showed that the assumption of a perfect model needed to be rejected ($\chi^2 = 16569.06$; $p < .0001$), indicating that the fit of the data to the hypothesis of a perfect model was not entirely satisfied. The adjusted indices based on covariance showed optimal values: $\chi^2/df = 2.87$, RMSEA = .059, SRMR = .063, although the incremental measurement indices produced values below the level of good model fit: CFI = .73, and TLI = .72 (table 1). Overall, the findings of the goodness-of-fit indices indicated that the structure of the proposed questionnaire is acceptable.

Discussion

The N-CT-4 Practice questionnaire is a new scale used to measure the level of critical thinking ability of nurses in their daily practice, and both the Spanish and English versions show good psychometric properties [20]. This is the first translation to obtain the Vietnamese version of the N-CT-4 Practice and verify its psychometric properties. The results showed that the N-CT-4 Practice (V-v) questionnaire has satisfactory psychometric properties. Overall, the N-CT-4 Practice (V-v) had good translation equivalence, good and excellent internal consistency, and excellent I-CVI. It has similar goodness-of-fit indices in CFA values to the original English version.

The process of forward- and back-translation was performed fluently in this study, and we only slightly modified the content of some items (items 15, 31, 81, and 83). Particularly, item 15 changed the phrases of “khó khăn để vượt qua” to “thách thức để vượt qua”; item 31 changed the words “càng lớn” to “càng nhiều”; item 81 changed the phrases “làm thế nào để tôi trau dồi nó” to “cách thức tôi đã tìm hiểu”; and item 83 changed the words “cơ quan” to “tổ chức”. The findings of the I-CVI suggested that all items were scored as satisfactory.

Regarding the reliability of the questionnaire, the total Cronbach's alpha coefficient had excellent qualities ($\alpha = .98$), which was similar to the values in the original English version ($\alpha = .96$). All four subscales also had good and excellent internal consistency (ranging from .86 to .97), which was consistent with the original English version (ranging from .78 to .94). Moreover, the findings of test-retest reliability for the overall scale (ICC = .81) and the four subscales (ranging between .76 and .86) indicated that the N-CT-4 Practice (V-v) possesses good stability over time, which was consistent with the original English version [20, 34].

In this study, the results from a CFA on data from 545 clinical nurses indicated that the psychometric properties of the N-CT-4 Practice (V-v) questionnaire are satisfactory. Specifically, most of the values used to evaluate the goodness-of-fit are satisfactory ($\chi^2/df = 2.87$, RMSEA = .059, SRMR = .063, and TLI = .72). However, the value of CFI was only close to the appropriate level [29]. These findings are similar and somewhat better than those for the original English version, which reported a very high SRMR value (SRMR = .65 > .08) (table 1). These findings also confirmed that the N-CT-4 Practice (V-v) questionnaire is consistent with the 4-Circle Critical Thinking Model of Alrafo-LeFevre (2016), which was the theoretical basis of the N-CT-4 Practice questionnaire. Therefore, the psychometric properties of the N-CT-4 Practice (V-v) questionnaire are satisfactory and can be applied to examine the level of critical thinking ability in Vietnamese clinical nurses.

A limitation of this study was that the samples were recruited from three public hospitals in the southwestern part of Vietnam and may not fully represent all nurses in Vietnam. However, the large sample size did represent the availability of this tool in Vietnam in general.

Conclusions

In summary, the current study provides evidence that the N-CT-4 Practice (V-v) questionnaire has acceptable reliability and validity and can be used to assess the level of critical thinking ability in Vietnamese clinical nurses. Therefore, nurse managers and educators can apply this scale to assess the level of critical thinking ability of clinical nurses in the future.

The use of the N-CT-4 Practice (V-v) questionnaire supplies a valuable opportunity to evaluate critical thinking ability in nursing practice and produce additional opportunities for cross-cultural comparison studies between Vietnamese and other countries. Thus, further exploration and training associated with critical thinking can be achieved by using this valid instrument.

Abbreviations

CFA: Confirmatory Factor Analysis; CFI: Comparative Fit Index; ICC: Intraclass correlation coefficient; I-CVI: the Item Content Validity Index; N-CT-4 Practice: Nursing Critical Thinking in Clinical Practice Questionnaire; N-CT-4 Practice (V-v): The Vietnamese version of the Nursing Critical Thinking in Clinical

Practice Questionnaire; RMSEA: Root Mean Square Error of Approximation; SRMR: Root Mean Square Residual; TLI: Tucker–Lewis Index; .

Declarations

Ethics approval and consent to participate

This study granted ethical approval from the ethics review board of Can Tho University of Medicine and Pharmacy, Can Tho City, Vietnam (No: 1658/QĐ-ĐHYDCT). The informed consent obtained from study participants was written prior to data collection.

Consent for publication: Not applicable

Availability of data and materials

Data of this study is available from the first author on appropriate request.

Competing interests

Authors have no competing interests.

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Authors' contributions

Study design: VTN, HEL; Data collection: VTN; Data analysis: VTN; Manuscript writing: VTN, HEL. All authors read and approved the manuscript.

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Figures

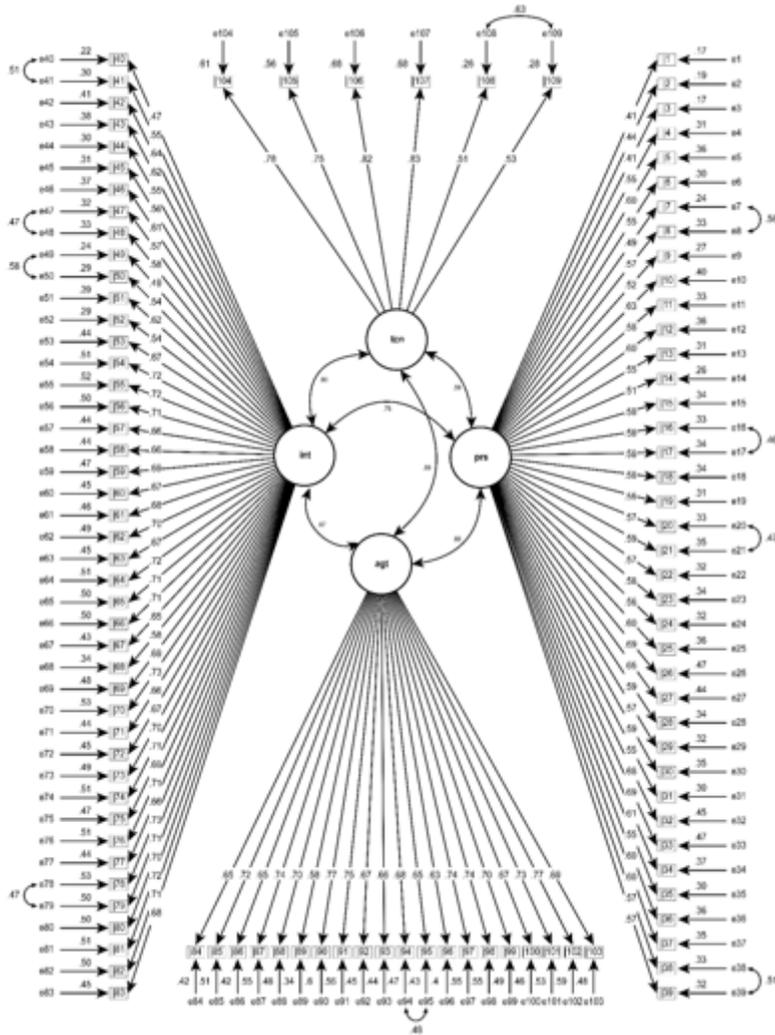


Figure 1

Confirmatory Factor Analysis Model for the N-CT-4 Practice (V-v) Note: I: item; e: error of unobserved variables; prs: Personal dimension; int: Intellectual and cognitive dimension; atg: Interpersonal and self-management dimension; tcn: Technical dimension.