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Research Article

Turkish Validity and Reliability of the Carter Assessment of Critical Thinking in Midwifery (CACTIM)-Student Version

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Abstract: Background: Critical thinking is a cognitive skill that involves analyzing information, making reasoned judgments, and solving problems systematically. Measuring critical thinking in midwifery students play a pivotal role in ensuring the delivery of safe and effective healthcare services. In the context of midwifery practices, where quick and accurate decision-making is crucial, assessing critical thinking skills is essential. This study aimed to translate, cross-culturally adapt, and validate the Carter Assessment of Critical Thinking in Midwifery (CACTIM)-Student Version into Turkish.

Methods: This methodological study was conducted on 214 midwifery students. In this study, Cronbach's α, Item Analysis, Kendall's W test, Explanatory Factor Analysis, and Confirmatory Factor Analysis were used to test the reliability and validity of the CACTIM Student Version.

Results: It was found that Cronbach's α was 0.84. Explanatory factor analysis yielded a 25-item structure with four factors with an eigenvalue exceeding 1, explaining 53.808% of the total variability, and factor loading between 0.33-0.66.

Conclusion: According to the best scientific recommendations, the Turkish version of the CACTIM-Student Version (four subscales, 25 items) has adequate psychometric properties.

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1. Introduction

Midwifery is a profession in which human relations are intense by nature. Midwives are in constant interaction with the individuals and the health care team during care practices. In these interaction environments, midwives encounter some situations that require critical thinking and woman-centered clinical decision-making for women and their families to receive better quality care during care practices. Critical thinking helps midwives to overcome these situations. For this reason, it is an indispensable part of midwifery care practices [1, 2].

Critical thinking is the process of thinking, analyzing, and impartially evaluating all information obtained to make decisions. In other words, critical thinking reveals assumptions, biases, and beliefs that affect clinical reasoning [3, 4]. The use of critical thinking skills during midwifery practice enables midwives to make correct and defensible decisions and to solve the problems encountered quickly and effectively [5, 6]. Moreover, critical thinking improves evidence-based midwifery practice [1, 7].

Today, the aim of higher education is to provide society with a workforce with 21st-century skills such as collaboration, critical thinking, communication, and creativity. Critical thinking is a very important skill needed in the 21st century for students to develop their intellectual capacity and promote multi-perspective thinking [8]. Therefore, it is important and prioritized to develop the critical thinking skills of midwives during undergraduate education. In previous studies, critical thinking levels of midwifery students were generally found to be at low and medium levels [9-13].

In Türkiye, there is no specific tool to measure the critical thinking skills of midwifery students. Instead, general critical thinking scales (e.g., California Critical Thinking Disposition Scale, Critical Thinking Disposition Scale, etc.) are used. A measurement tool that will help to reveal the critical thinking skills of students objectively and comprehensively, that can be applied in a short time and easily interpreted is extremely necessary. This study was conducted to determine whether the "Carter Assessment of Critical Thinking in Midwifery (CACTIM) - Student Version Scale" [14], which is specific to midwifery students, is a valid and reliable measurement tool for Turkish midwifery students.

2. Methods

2.1. Study aim, design, and participants

This study was conducted as a methodological type. The study was aimed to examine the reliability and validity of the Carter Assestment of Critical Thinking in Midwifery (CACTIM) - Student Version. This study was conducted in a midwifery department of a university between October and December 2019. It recommends that the number of samples must be between 5 and 10 times the number of items [15]. The study was conducted with a total of 214 students. The midwifery students were selected randomly from second-, third-, and fourth-year students who volunteered to participate students and participated in clinical practice for at least one semester.

2.2. Translation Procedure

The language adaptation of the CACTIM-Student Version was completed with the back-translation method [16]. Firstly, the original questionnaire was translated from English into Turkish by three experts to ensure language and content validity. In the second step, the translated text was then translated back into the original language. Each translated text was administered to 10 different experts. Thereafter, another translation from the target language back to the source language was

carried out to compare with the original text. A pilot study was achieved with a group of 10 students. Students who participated in the pilot study were not included in the main study.

2.3. Data collection instruments

The student information form was used to collect the participants' characteristics. The original questionnaire was developed by Carter et al., (2017) and, consists of 25 items and four subscales. The questionnaire is in the 6-point Likert style (1= Strongly Disagree; 6=Strongly Agree). The Cronbach α of the original questionnaire was determined to be 0.92 [14].

2.4. Statistical analysis

The data were transferred to the computer with the LISREL 8.8, and SPSS 22.0 package programs, and psychometric analyses were made. In this study, Cronbach's α, and Item Analysis were used to test the reliability of the CACTIM-Student Version. Kendall's W test was calculated to determine whether the questionnaire's content was valid. The Explanatory Factor Analysis was applied to test the construct validity of the questionnaire, and the Confirmatory Factor Analysis was used to examine the relations between the questionnaire factors.

2.5. Ethics statement

Firstly, permission was obtained from the questionnaire developer. This study has been approved by the Sivas Cumhuriyet Üniversitesi non-interventional clinical research ethics committee (2019-03/50). All participants' written consents were obtained. Every stage of the study was completed in accordance with the Helsinki Declaration.

3. Results

3.1. Study Group

The mean age of students was 20.64±1.38 (min:18-Max:30); 98.6% of them were female 97.2% of the students were high school graduates, and 69.2% of the students lived in the dormitory. 37.9% of the students attend the 2nd grade, 34.1% attend the 3rd grade and 28.0% attend the 4th grade.

3.2 Reliability analysis

Firstly, the item-total score correlations of the 25-item questionnaire were evaluated. The item-total score correlation coefficients of the remaining items were found to vary between 0.33 and 0.66, and the questionnaire items were adequate to represent the questionnaire in the Table 1. After the item analysis, the total scale has a Cronbach's alpha of 0.84. The subscales "seeks information", "reflects on practice subscale," "facilitates shared decision-making subscale" and "evaluates practice subscale" have Cronbach's alpha of 0.67, 0.74, 0.72, and 0.63, respectively.

Table 1. Distribution of CACTIM-Student version outline according to item total point correlation

Subscale	Item	Mean- Standard deviation	Corrected item-total correlation	Cronbach's alpha if item deleted
Seeks information subscale	i7	5.40-0.82	0.316	0.843
	i8	5.52-0.65	0.484	0.840
	i9	5.59-0.64	0.497	0.839
	i10	5.44-0.68	0.449	0.840
	i11	5.16-0.93	0.352	0.844
	i12	5.36-0.69	0.611	0.835
	i20	5.21-0.88	0.333	0.849
Reflects on Practice subscale	i15	5.42-0.66	0.482	0.840
	i16	5.62-0.56	0.512	0.840
	i17	5.10-0.73	0.371	0.843
	i22	5.41-0.69	0.514	0.838
	i23	5.41-0.68	0.488	0.839
	i24	5.39-0.65	0.493	0.839
	i25	5.67-0.51	0.401	0.843
Facilitates shared decision-making subscale	i1	5.60-0.56	0.395	0.843
	i2	5.70-0.48	0.412	0.843
	i3	5.41-0.67	0.460	0.840
	i4	5.26-0.73	0.532	0.837
	i5	5.25-0.81	0.440	0.840
Evaluates practice subscale	i6	3.64-1.58	0.447	0.874
	i13	5.20-0.73	0.579	0.836
	i14	5.22-0.91	0.309	0.846
	i18	5.21-0.77	0.397	0.842
	i19	5.12-0.80	0.539	0.837
	i21	5.44-0.66	0.431	0.841

3.2. Validity analysis

The Kaiser-Meyer-Olkin (KMO) test=0.836, Bartlett's Test ($\chi 2$= 1634.196, df=300, p=0.000) was found to be significant for the CACTIM-Student version, and it was decided that the data were suitable for factor analysis. The Kendall's W Test was used to determine whether the CACTIM-Student version is valid in terms of content, and it was found that there were no statistical differences between expert opinions (Kendall's W=0.274; p=0.074; p>0,05).

The Explanatory Factor Analysis (EFA) was made to test the construct validity and to determine the factors of the questionnaire. After analyzing, a 4-factor structure that had an eigenvalue above 1 and, explained 53.808% of the variance, emerged (Factor 1: 29.096, Factor 2: 9.619, Factor 3: 8.911, and Factor 4:6.182). The eigenvalues of the factors were found to be Factor 1: 6.636, Factor 2: 2.193, Factor 3: 2.032, and Factor 4:1.410. A four-factorial structure was tested depend on the original version for the confirmatory construct validity of the CACTIM-student version. These factors were named "seeks information", "reflects on practice subscale," "facilitates shared decision-making subscale" and "evaluates practice subscale" in the Table 2.

Table 2. The results of explanatory factor analysis of CACTIM-Students version

Subscale	Item	Factor load	Eigenvalue	Variance
Seeks information subscale	i7	0.346		
	i8	0.568		
	i9	0.535		
	i10	0.539	6.636	29.096
	i11	0.346		
	i12	0.662		
	i20	0.436		
Reflects on Practice subscale	i15	0.538		
	i16	0.590		
	i17	0.362		
	i22	0.570	2.193	9.619
	i23	0.502		
	i24	0.537		
	i25	0.445		
Facilitates shared decision-making subscale	i1	0.537		
	i2	0.482		
	i3	0.504	2.032	8.911
	i4	0.583		
	i5	0.514		
Evaluates practice subscale	i6	0.431		
	i13	0.612		
	i14	0.336	1.410	6.182
	i18	0.357		
	i19	0.582		
	i21	0.476		

Based on the EFA, the questionnaire that had a 4-factor structure was tested with the Confirmatory Factor Analysis (CFA). In the study, $X^2/df = 2.269$, and the data fit of the model was found to be adequate. It was found that there was an agreement between the model and the observed data in terms of Goodness-of-Fit Index values, and the validity and reliability study of the questionnaire for Turkish showed an acceptable level of fit. RMSEA was calculated as 0.077. The CFI and TLI were 0.91 and 0.90, respectively in Table 3.

Table 3. Fit indexes of the model

	X^2/df	RMSEA	SRMR	NFI	CFI	GFI	AGFI	IFI	TLI
Four-factor model	2.269	0.077	0.94	0.85	0.91	0.81	0.77	0.91	0.90

4. Discussion

After the Turkish validity and reliability study of the CACTIM-Student version, our findings showed that the scale met the criteria in terms of language, content, construct validity, and reliability and that the scale could be easily used on Turkish midwifery students. After the analyses, the original form of the scale was preserved, and no changes were made to the scale items.

Validity is the degree to which the measurement tool can measure the feature it is expected to measure without confusing it with other variables. Kendall's W Test is performed to determine the content validity of a questionnaire. It is aimed at determining whether there is agreement between expert opinions [17]. No significant differences were detected in the study in terms of expert opinions (Kendall's W>0,05). In questionnaire studies, if the KMO value is above 0.60, and the Bartlett test is significant, it is accepted that the sampling is adequate, and the data are suitable for Factor Analysis [17, 18]. The KMO was above 0.60, and Bartlett's Test was found to be significant for the CACTIM-Student version in the study, and it was decided that the data were suitable for factor analyses.

Item analysis is made to determine the contribution of the items making up the questionnaire to the total score of the questionnaire and to find to what extent they are related to the entire questionnaire. item-total-score correlation explains the relationship between the scores that are obtained from the items and the total score of the test [18]. There are various evaluations for the lower limit of the correlation coefficient (r). According to Buyukozturk [17], the item-total score correlation must be positive and greater than 0.30. In the present study, the 25 items that had a correlation coefficient above r=0.30 were found.

The Explanatory Factor Analysis (EFA) was made to test the construct validity and determine the questionnaire's factors [19]. Regardless of the sign of factor loadings, a loading value of 0.60 and above is considered high; Load values between 0.30 and 0.59 are defined as medium levels [20]. When the factor weights are examined, the lowest weight in Factor 1 is 0.346 and the highest weight is 0.662; In Factor 2, the lowest weight is 0.362, the highest weight is 0.590; In Factor 3, the lowest weight is 0.482, the highest weight is 0.537; and in Factor 4, the lowest weight was found between 0.336 and the highest weight was 0.612. In this study, after analyzing, a 4-factor structure that had an eigenvalue above 1 and explaining 53.808% of the variance.

The Confirmatory Factor Analysis (CFA) is used in questionnaire development and validity analyses and aims to evaluate the accuracy of a structure determined by EFA. How well the models established with the CFA explain the obtained data is determined by the Goodness-of-Fit Indices. Goodness-of-fit tests are the steps at which the decision to accept or reject the model is made. Depending on the degree of freedom, the low Chi-Square value ($\chi 2/SD$) of 5 or fewer shows that the data fit of the proposed type is adequate [18]. In our study, $\chi 2/SD = 2.269$, and the model's data fit was found to be adequate. With the CFA, the fit index values of the questionnaire were found to be within the "acceptable" range.

The reliability criterion which is also known as Cronbach's alpha is used to evaluate the internal consistency of a Likert-type questionnaire. The Cronbach alpha coefficient is a measurement of the internal consistency and homogeneity of the items on a questionnaire. A Cronbach alpha coefficient below 0.40 shows that the questionnaire is not "reliable", and if it is between 0.80-1.00, it shows that the questionnaire is "highly reliable" [16, 18]. In the present study, the Cronbach Alpha Coefficient of the 25-item questionnaire was calculated to be 0.84, and it was decided that the Internal Consistency of the questionnaire was highly reliable.

5. Conclusion

The CACTIM-Student Version is a valid, reliable, and culturally adapted instrument that preserves its original structure for Turkish midwifery students. This provides a much-needed, specific, and objective tool to assess critical thinking skills in Turkish midwifery education, enabling educators to identify, monitor, and foster these essential competencies. Its application can significantly contribute to developing a midwifery workforce equipped with strong critical thinking abilities, ultimately leading to higher quality, woman-centered care.

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Limitations: Owing to its single-centered nature, the results cannot be generalized to all midwifery students.

References

[1] A. G. Carter, M. Sidebotham, and D. K. Creedy. International consensus definition of critical thinking in midwifery practice: A Delphi study. Women Birth, 35(6): e590–e7, 2022.
[2] N. Kaya and B. Cesur. Ebe Liderliğinde Kaliteli Bakımın Kalbi İletişim. Gece Kitaplığı, Ankara, 2020.
[3] C. Berg, R. Philipp, and S. D. Taff. Scoping Review of Critical Thinking Literature in Healthcare Education. Occup Ther Health Ca, 37(1):18–39, 2023.
[4] L. Martí-Bonmatí. Embracing critical thinking to enhance our practice. Insights Imaging, 14(1), 2023.
[5] K. Hatherley and E. Kitson-Reynolds. A critical analysis of a tripartite clinical decision involving a student, midwife and client. British Journal of Midwifery, 30(12):706–12, 2022.
[6] E. Özbudak and Z. Koç. Hemşirelik uygulamalarında eleştirel düşünmenin önemi. Sağlık ve Toplum, 31(2):38–48, 2021.

[7] K. M. Patricia, C. Kabwe, M. M. Wamunyima, M. M. Margaret, and J. L. Dianna. Evidence based practice and critical thinking in nursing education and practice: A scoping review of literature. International Journal of Nursing and Midwifery, 14(4):65–80, 2022.
[8] S. Prapulla, S. M. Patra, K. Subramanya, and B. Uma. Techniques for Strengthening 21st Century Learners' Critical Thinking Skills. Journal of Engineering Education Transformations, 36(Special Issue 2):512–8, 2023.
[9] G. Arslan, M. Evğün, A. Aynaci, D. EroğLu, B. Dülegöz, M. Altiner, et al. Ebelik Öğrencilerinin Eleştirel Düşünme Eğilimlerinin Belirlenmesi: Bir Üniversite Örneği. *Fenerbahçe Üniversitesi Sağlık Bilimleri Dergisi*, 2(1):312–20, 2022.
[10] G. Demirci, A. Şolt, H. Kahyaoğlu Süt, and S. Hür. Çalışan Ebeler İle Ebelik Öğrencilerinin Eleştirel Düşünme Eğilimleri. Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi, 10(1):88–97, 2021.
[11] I. Ghazlane, K. Marnoufi, J. Daaif, and B. Touri. The relationship between critical thinking skills, portfolio models and academic achievement of Moroccan midwifery students. Journal of Educational and Social Research, 12(5):20–32, 2022.
[12] F. Rashidi Fakari, M. Tafazoli, and S. Dadgar. The relationship between critical thinking disposition and self-esteem in midwifery students. Strides in Development of Medical Education, 15(1):e84987, 2018.
[13] E. Solmaz and Ö. Alparslan. Ahlaki Duyarlılığın Eleştirel Düşünme Becerisi Üzerine Etkisi: Ebelik Öğrencileri Örneği. Artuklu International Journal of Health Sciences, 3(2):159–66, 2023.
[14] A. G. Carter, D. K. Creedy, and M. Sidebotham. Critical thinking skills in midwifery practice: Development of a self-assessment tool for students. Midwifery, 50:184–92, 2017.
[15] V. D. Sousa and W. Rojjanasrirat. Translation, adaptation and validation of instruments or scales for use in cross-cultural health care research: a clear and user-friendly guideline. J Eval Clin Pract, 17(2):268–74, 2011.
[16] C. Çapık, S. Gözüm, and S. Aksayan. Kültürlerarası Ölçek Uyarlama Aşamaları, Dil ve Kültür Uyarlaması: Güncellenmiş Rehber. Florence Nightingale Journal of Nursing, 26(3):199–210, 2018.
[17] S. Buyukozturk. Sosyal bilimler için veri analizi el kitabı. Pegem, Ankara, 2015.
[18] Y. Karagoz. SPSS AMOS METU uygulamalı biyoistatistik. Nobel Akademik Yayıncılık, 2021.
[19] F. Kilic and I. Koyuncu. Examination of Scale Adaptation Studies in Terms of Structure Validity. Pegem Citation Index, North America, 2017.
[20] O. Çokluk, G. Şekercioğlu, and Ş. Büyüköztürk. Sosyal bilimler için çok değişkenli istatistik: SPSS ve Lisrel uygulamaları. Pegem Akademi, Ankara, 2012