The validity and reliability study of the Turkish version of the evidence based practice evaluation competence questionnaire

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ABSTRACT

Introduction: Identifying the competence of nursing students in evidence-based practice in nursing is important in planning education to train nurses to know, apply and improve evidence-based practice.

Purpose: To perform a validity and reliability study for the Turkish version of the "Evidence-based Practice Competence of Nursing Students" questionnaire.

Design: This methodological study was conducted with 199 undergraduate nursing students in a university located in eastern Turkey, between April 1 2014 and February 4 2016. Written permission of the authors, relevant institutions and the students' verbal consent were obtained before administering the questionnaire. The Evidence-based Practice Evaluation Competence Questionnaire (EBP-COQ), developed by Ruzafa-Martinez in Spain, was used for data collection. The 5-point Likert-type scale includes 25 items and three subscales.

Results: The opinions of eight experts were consulted to test content validity, and the content validity index was found to be 0.93. In the factor analysis of the scale, the KMO index was 0.856, and Barlett's sphericity test yielded the results, $X^2 = 2174.93$, df = 300 and $p = 0.000$. Cronbach's alpha coefficient was found to be 0.826. The scale's goodness of fit index (AGFI) is 0.755, and its ratio of chi-square statistic to degrees-of-freedom was (X2/df) 2.416 (X2 = 657.364 df = 272). Its root mean square error of approximation (RMSEA) was 0.076, its Tucker-Lewwas index (TLI) 0.902, and its comparative fit index (CFI) value was 0.926.

Conclusion: It was determined that the Turkish version of the scale is a valid and reliable tool for determining the competence of students in evidence-based practice.

1. Introduction

Evidence-based nursing practice (EBP) is the development, implementation and evaluation of effective interventions in nursing through the application of the scientific principles of nursing (Burns and Grove, 2010). The development of evidence-based practice is being accelerated by increasing professional and public demand for accountable safety and quality improvements in health care (Stevens, 2013).

The strategic position of nursing students is influential in the adoption of EBP. It is necessary to understand students' knowledge, attitudes and usage patterns of evidence-based practice to be able to develop effective strategies for evidence-based practice curricula. Furthermore, understanding the underlying factors is useful in developing teaching strategies for effective evidence-based practice (Brown et al., 2010). The rising expectations for evidence-based quality improvement require that nurses possess clearly defined EBP competence to function with confidence in their healthcare roles (Laibhen-Parkes, 2014).

Scales have been developed to measure the competence of nurses in evidence-based practice. Studies of the opinions and attitudes of nurses and nursing students towards evidence-based practice have gained momentum worldwide (Majid et al., 2011; Melnyk et al., 2008; Ruzafa-Martinez et al., 2013; Upton and Upton, 2006). Determining how nursing students' evidence-based practice competence develops will determine the direction of course content and programs. Statistics, research and evidence-based courses at every education level are expected to increase the competence of nursing students. There is a need for a scale to assess the extent to which this expectation is realized. A scale was developed in Spain in 2013 to determine the competence of nursing students in evidence-based practice by an extensive analysis of their attitudes about the relevant concepts. It includes knowledge, skill and attitude dimensions for evidence-based practice (Ruzafa-Martinez et al., 2013).

This study was carried out with undergraduate nursing students in Turkey to assess the reliability and validity of the evidence-based practice competence questionnaire developed by Ruzafa-Martinez et al. (2013). No tool for assessing this competency has been developed in Turkey. The development of this scale will contribute to the assessment and improvement of evidence-based practice in nursing

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education in Turkey. The hypotheses tested in this study were: "The Turkish form of the scale is a valid measurement tool," and "The Turkish form of the scale is a reliable measurement tool."

2. Method

2.1. Design and Setting

This methodological study was conducted with the undergraduate nursing students in a university located in eastern Turkey, between April 1 2014 and February 4 2016.

2.2. Sample of the Study

A convenience sample of students in a nursing program who attended a research course and who consented to participate in the study were included in the research. All students including undergraduate students in third and fourth years who took the course of research and evidence in nursing were invited to participate in the study. Of them, 22 undergraduate students were not included in the study because they did not want to participate. Hence, 199 students (90%) were included in the study.

2.3. Data Collection Instruments

An introductory information form, which had 4 items, was used to determine the demographic characteristics of participants (age, gender, educational status and marital status). The Evidence-based Practice Evaluation Competence Questionnaire (EBP-COQ), developed by Ruzafa-Martinez in Spain, was used for data collection (Ruzafa-Martinez et al., 2013). The scale was developed and administered in Spanish. We assessed the validity of the English form of the scale published by Ruzafa-Martinez and adapted it into Turkish. The 5-point Likert-type scale (1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Disagree nor Agree, 4 = Somewhat Agree, 5 = Strongly Agree) includes 25 items and three subscales (Factor 1: Knowledge, Factor 2: Skill, Factor 3: Attitudes). The lowest and highest possible scores on the scale are 25 and 125, respectively. Its negative items are reverse scored. The internal consistency reliability coefficient is 0.92 for the original scale and between 0.52 and 0.80 for the subscale (Ruzafa-Martinez et al., 2013).

2.4. Data Collection

The author administered the questionnaires to each participant between April 2014 and February 2016. The data were collected in the classroom. An introductory information form and the Turkish version of the Evidence-based Practice Evaluation Competence Questionnaire (EBP-COQ-T) took 10 to 15 min to complete.

2.5. Evaluation of Data

The data obtained from both sample populations in the study were evaluated using the SPSS 16.0 and Amos 21.0 software packages. The demographic characteristics of participants were analyzed by using descriptive statistical analyses. Cronbach's alpha coefficients were determined to test the internal consistency of the scale, and exploratory factor analyses, followed by confirmatory factor analysis, were used to test its structural validity.

2.5.1. Research Ethics

Ruzafa-Martinez's permission to use the scale was obtained by email (e-mail date: March 14, 2014). Written approval of the Ethics Committee and written permission from the faculty dean, institute directorate and university rector were obtained. The research's objectives and benefits were explained to the students, and their verbal consent to participate in the study on a voluntary basis was obtained. The students completed the questionnaires without giving their names.

2.6. The Linguistic Validity of the Scale

The scale was initially developed and administered in Spanish. We assessed the validity of the English form of the scale published by Ruzafa-Martinez and adapted it into Turkish. For the linguistic validity, the scale was first translated from English to Turkish by a linguist, and then back-translated by a different linguist, and after corrections based on expert opinions, a linguist compared the final translation of the Turkish version with the original scale. To determine the linguistic equivalency and content validity of the scale, the author consulted expert team members' opinion. The scale's translations were checked by bilingual expert team members involving eight nurse scholars. The scale then was back-translated independently from Turkish to English by another bilingual linguist.

Two researchers created a combined Turkish text by evaluating the most appropriate translation for each of the items. Some of the words and sentences were modified to achieve appropriate, equivalent language and meanings in the Turkish version. The scale was back-translated to English by a linguist and Ruzafa-Martinez, fluent in English, and compared with its original form. Inappropriate expressions were reviewed to ensure linguistic validity.

3. Results

3.1. The Demographic Characteristics of the Participants

The average age of the participants was 22.07 ± 2.14 years. Most of participants (77.9%) were women and (93.5%) single.

3.2. Validity

3.2.1. Content Validity Index

The extent of agreement between the expert team members was assessed using a content validity index. The members evaluated the feasibility and relevance of each item in the scale by rating them from 1 (not relevant) to 4 (very relevant) as follows: 1 = not relevant, 2 = unable to assess relevance without item revision or the item is in need of so much revision that it would no longer be relevant, 3 = relevant but needs minor alteration and 4 = very relevant. Eight team members evaluated the scale items, and the content validity indices (CVI) of the items were found to be between 0.87 and 1.00. The CVI for all items in the scale was found to be 0.93.

3.2.2. Construct Validity

Explanatory factor analysis was used for testing the construct validity of the scale. Bartlett's sphericity test and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy were performed to ensure that the characteristics of the data were suitable for factor analysis. In testing the sample adequacy, KMO value was found to 0.856, and the Bartlett's test result was $X^2 = 2174.93$, df = 300 $p = 0.000$. The scale has three subscales. (Fig. 1).

3.3. Reliability

The scales' item means, standard deviations and Cronbach coefficients were determined. The 25-item scale's Cronbach's alpha coefficient was found to be 0.826 (Table 1).

3.4. Internal Consistency Analysis and Item Analysis

The exploratory factor analysis implied a three-factor structure, explaining 50.93% of the variance in the data. Factor 1 (13 items), attitudes towards EBP, consisted of items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11,
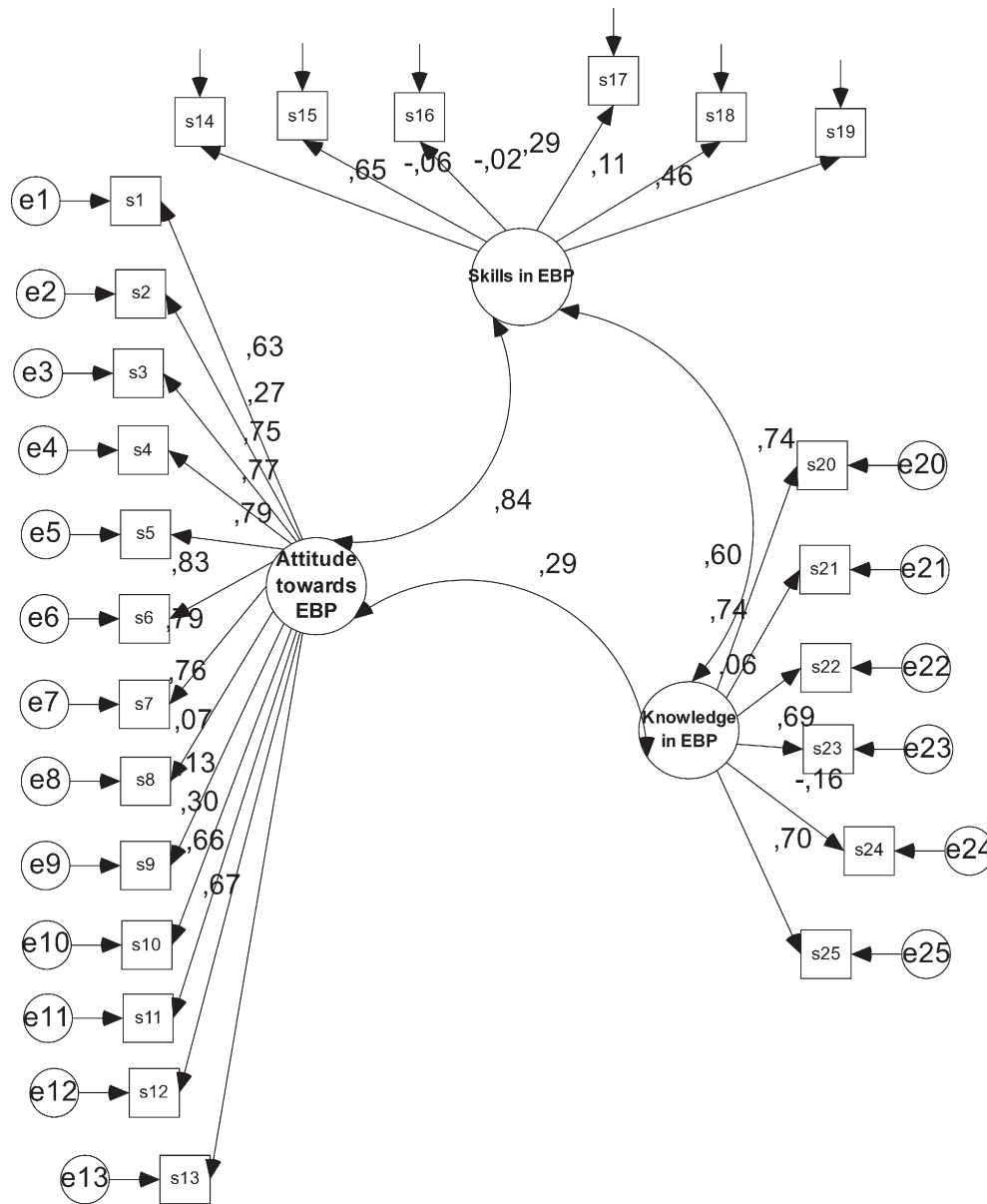
Fig. 1. Items and factors' Cronbach's alpha coefficients.

12 and 13. Factor 2 (6 items), skills in EBP, consisted of items 14, 15, 16, 17, 18 and 19. Factor 3 (6 items), knowledge of EBP consisted of items 20, 21, 22, 23, 24 and 25. Factor analysis showed that factor 1 explains 26.29% of the total variance (eigenvalue 6.321), factor 2 explains 15.31% of the total variance (eigenvalue 3.82), and factor 3 explains 9.33% of the total variance (eigenvalue 2.33).

Table 1 shows the items together with their means and the corresponding Cronbach's alpha values.

Internal consistency of the scale was assessed by Cronbach's alpha. The reliability coefficient for the total scale was 0.826, and alpha coefficients for the subscales ranged from 0.52 to 0.85. Factor-1: "Attitude towards EBP" consisted of 13 items Cronbach's alpha coefficients for this subscale 0.850. Factor-2: "Skills in EBP" consisted of 6 items Cronbach's alpha coefficients for this subscale 0.516, the factor-3: "Knowledge in EBP" consisted of 6 items Cronbach's alpha coefficients for this subscale 0.587 (Table 1, Fig. 1).

The values presented in Table 1 are the raw values obtained by the model without any modification. The models created according to the

exploratory factor analysis and incremental clustering results were tested using confirmatory factor analysis. Confirmatory factor analysis is a method based on the evaluation of fit indices. It demonstrates the coherence between the data and structure. The resulting goodness of fit indexes of the models is shown in Table 2. The chi-square statistic shown in Table 2 is a technique to test the hypothesis that the model complies with the covariance structure of the observed variables. In other words, the chi-square statistic tests the hypothesis that: "there is no difference between the observed covariance matrix and the factor covariance matrix" (Özdamar, 2004).

The chi-square statistic determines the lack of fit index (Stapleton, 1997). Lower test values show that the model fits the observed structure, and higher values show that the model fails to fit the observed structure, i.e., that the model fails to explain the observed structure adequately. However, since the chi-square statistic is a summed statistic, its value increases with the increased number variables. Hence, the ratio of its chi-square statistic to degrees-of-freedom is used. If this value is less than 5, then it is assumed that the model has goodness of

Table 1
Items' Mean Scores and Cronbach's Alpha for The Turkish Version of The Evidence-Based Practice Competence of Nursing Students (EBP-COQ-T) ($N = 199$).

Items	Mean score (X)	Standard deviation (SD)	Cronbach's alpha
1	4.14	0.77	0.815
2	3.54	0.95	0.823
3	4.06	0.83	0.812
4	4.12	0.86	0.810
5	4.05	0.94	0.809
6	4.09	0.86	0.810
7	4.27	0.86	0.811
8	4.02	0.97	0.809
9	3.38	1.21	0.828
10	3.16	1.11	0.827
11	3.54	1.04	0.820
12	3.72	0.99	0.813
13	4.06	0.82	0.812
14	3.77	1.03	0.814
15	3.25	1.83	0.825
16	3.22	0.96	0.824
17	3.93	0.83	0.822
18	3.18	0.99	0.821
19	3.68	0.90	0.821
20	3.06	1.04	0.834
21	3.14	1.00	0.823
22	2.94	1.04	0.829
23	3.29	0.98	0.821
24	2.82	1.05	0.833
25	3.27	0.97	0.821
EBP-COQ-T	89.78	10.60	0.826
Consisted of Items	*Factors*		*Cronbach's alpha*
13 (1.–13. items)	Factor 1(Attitude towards EBP)		0.850
6 (14.–16. items)	Factor 2 (Skills in EBP)		0.516
6 (20.–25. items)	Factor 3 (Knowledge in EBP)		0.587

fit, and if the value is less than 3, then the model is considered to have a very good fit (Byrne, 2013).

3.4.1. Structure Validity

To test the structure validity of the scale, confirmatory factor analysis was done using Amos 16.0 software. The maximum likelihood estimation technique was used in this study.

As a result of the analysis, the ratio of chi-square statistic to degrees-of-freedom (X^2/df) was found to be 2.416 ($\chi2 = 657.364$ df $= 272$). The root mean square error of approximation (RMSEA) was 0.076. The Tucker-Lewis Index (TLI) was 0.902, and the comparative fit index (CFI) value was 0.926. Having higher CFI and TLI values over 0.90 means that that model has a good fit (Table 2).

4. Discussion

Evidence-based practice has been spreading around the world in the curricula of nursing students. Thus, the competence of nurses will develop, and evidence-based practice will become widespread. Certain tools are needed to assess the quality and quantity of courses given for this purpose. This paper assessed whether the Turkish version of the scale is a valid and reliable measurement tool. The aim of this paper was to test the validity and reliability of the scale designed to assess

Table 2
Goodness of fit indices The Turkish Version of The Evidence Based Practice Evaluation Competence Questionnaire (EBP-COQ-T).

Chi-square (X^2)	657.364
Degrees of freedom (df)	272
Chi-square/standard deviation (X^2/df)	2.416
Goodness of fit index (GFI)	0.903
Adjusted goodness of fit index (AGFI)	0.755
Comparative fit index (CFI)	0.926
Tucker-Lewis index (TLI)	0.902
Normalized fit index (NFI)	0.894
Mean square error of approximation (RMSEA)	0.076

the competence of nursing students in evidence-based practice, which have recently begun to be used in Turkey.

Construct validity indicates a scale's ability to measure what it purports to be measuring (Burns and Grove, 2010). To test it, researchers use exploratory factor analysis or confirmatory factor analysis. If the study aims to determine the factor pattern, researchers use exploratory factor analysis. In studies that adapt a scale from another culture, researchers use confirmatory factor analysis. If the model of the unique factor pattern is not confirmed by the confirmatory factor analysis or it does not provide high fit indices, then the researcher may do exploratory factor analysis (Cokluk et al., 2010). Before doing the analysis, the researcher used KMO and Bartlett's sphericity test to check whether the data structure could be converted into factors. The Bartlett's sphericity test was statistically significant ($p < 0.001$). The KMO value was found to be 0.856, and the Barlett's test result was $X^2 = 21.7493$, df $= 300$ $p = 0.000$. These results indicate that the study sample is sufficient.

Reliability means the reliability of the test measurements (Polit and Beck, 2013). In other words, it is the capability of the measurement tool to provide repeatable results (LoBiondo-Wood and Haber, 2014).

The recommended Cronbach's alpha value for a measurement tool is 0.70 (Burns and Grove, 2010). The Cronbach's alpha coefficient of this study is higher than 0.70. The researchers did item analysis and determined that it was not necessary to delete any items since the alpha coefficient did not increase when they were deleted.

The questionnaire consists of 25 items, which are organized into three subscales (attitudes towards EBP, skills in and knowledge of EBP). All items of the instrument are scored with a 5-point Likert-type scale, with higher scores indicating more self-perceived competence in EBP and more positive attitudes towards EBP. The Cronbach's alpha was found to be 0.826 for the entire questionnaire, which indicates that it is internally consistent. Attitudes towards EBP subscale consists of 13 items and has a Cronbach's alpha value of 0.85. Skills in EBP consist of 6 items and have a Cronbach's alpha value of 0.516. Knowledge of EBP consists of 6 items and has a Cronbach's alpha value of 0.587. This result shows that the validity of attitudes factors is moderate for Turkish society. However, the Cronbach's alpha values of skills and knowledge subscale are low. This can be interpreted to mean that Turkish students do not have skills in evidence-based practice, or it may be the results of the inefficacy of learning content in Turkey.

The scales' item means, standard deviations and Cronbach's coefficients were determined. The 25-item scales Cronbach's alpha coefficient was found to be 0.826 (Table 1).

All the items on the scale were clustered into three subscales. This result is similar to that of the original EBP-COQ. These results demonstrated that validity of items in the EBP-COQ Turkish version is acceptable.

The scale has three subscales (Fig. 1). When Ruzafa-Martinez et al. created the Competence in Evidence-based Practice Questionnaire (EBP-COQ), it had three subscales (Ruzafa-Martinez et al., 2013). This study used this three-dimensional form. However, the items on the scale are distributed differently in the sub-dimensions of the Turkish scale. This may have resulted from the fact that the perceptions of knowledge of, skills in and attitudes towards evidence-based practice in Turkey are different from those in Spain. Nursing research and the training content provided to the sample of this study may have influenced the understandability of the items in the knowledge and skills dimensions, causing weaker results than those of studies in other countries. Moreover, Upton & Upton found that nurses perceived themselves to have limited skills in the information technologies required for evidence-based practice skills, research techniques and interpreting the relevant literature (Upton and Upton, 2006). For these reasons, the factor loads of the items about knowledge of and skills in evidence-based practice may have caused the items in the attitudes towards evidence-based practice subscale to have lower results than the Cronbach's alpha. In addition, the participants may have

thought they were incapable of reading and interpreting articles in English.

The models created by the exploratory factor analysis and incremental clustering results were tested using confirmatory factor analysis. The results show that the model has a very good fit. The ratio of the chi-square statistic to degrees of freedom (X^2/df) was found to be 2.41 ($X^2 = 657.36$, df = 272). Regarding chi-square goodness of fit, the scale data is consistent with the original model. However, chi-square is not evaluated by itself. It is evaluated in proportion to the chi-square degree of freedom. Three and lower degrees are favorable, while four and five are accepted as sufficiently consistent. These rates show that the consistency of the scale is favorable. For the Root Mean Square Error of Approximation (RMSEA) value, 0 indicates perfect consistency, and 1 indicates inconsistency. The RMSEA value of this scale is 0.076, which shows that the scale is consistent.

The adjusted goodness of fit index (AGFI) of the scale is 0.755, which is favorable. Its GFI value is above 0.903, which indicates a high level of suitability (GFI:0.903). The normalized fit index (NFI) of the indices was found to be 0.894, which is favorable (Byrne, 2013). Confirmatory factor analysis showed that the suitability of the scale is high.

TLI was 0.902, and CFI value was 0.926. Having especially high CFI and TLI values of over 0.90 means that that the model has a good fit. This information confirms the construct validity of the scale.

5. Conclusion

The EBP-COQ tool assesses self-perceived levels of competence in evidence-based practice. The Turkish version of the scale has a good level of validity and reliability and can be used with nursing students at different levels. A validity and reliability study conducted with Turkish students who have been trained in evidence-based practice will be beneficial to improve the usefulness of the scale.

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