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Psychometrics of nursing and midwifery students attitude scale towards health information and communication technology

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Abstract

Determining the attitude of nursing and midwifery students regarding information and communication technology requires the use of valid tools in this field. Therefore, this study was conducted with the aim of psychometrically determining the attitude scale of nursing and midwifery students towards health information and communication technology in Iran.

180 nursing and midwifery students of Torbat Heydariyeh University of Medical Sciences participated in this research. The study units were selected by random sampling. To collect data, the Persian language version of the attitude scale of nursing and midwifery students towards health information and communication technology was used. To determine the factor analysis of the scale, confirmatory factor analysis was used with LISRES software version 8, and CFI, GFI, NFI, RMSEA and X2/df indices were used to check the goodness of fit of the model. Cronbach's alpha coefficient and SPSS version 16 software were used to check reliability.

The results of confirmatory factor analysis showed that items 11 and 14 were not significant in the Persian scale. After removing the above items, the CFA model was re-fitted. Since CFI, GFI, and NFI indexes were more than 0.9, RMSEA index was less than 0.1, and X2/df was less than 3, the fit of the above model was appropriate. Cronbach's alpha coefficients were 0.7 and confirmed.

The results showed that the health information and communication technology attitude scale for nursing and midwifery students has good validity and reliability. This tool can be used in future studies.

Keywords: midwifery, nursing students, Psychometrics

Introduction

In current health systems, information and communication technology plays an important role in nursing and midwifery education and practice (1). Information and Communication Technology (ICT) is a set of technologies and programs that are used to process, store and disseminate information for a wide range of users and clients (2). Nursing and midwifery students are considered among the future treatment groups of healthcare systems, who must have the necessary knowledge and skills in various professional fields in order to be able to perform their clinical well as a professional duties (3). Therefore, nursing and midwifery students must achieve high levels of competence and ability in using information and communication technology (4). For this purpose, they should be encouraged to use information and communication technology, they should be taught how to use these methods, and more importantly, technology-based education programs should be planned and considered for these students from the beginning of their academic education (5). Finally, these students must be sure that they can use information and communication technology in order to provide their professional duties in a good manner (6).

According to Lee & Clarke, although nursing and midwifery students should have the necessary competence in using information and communication technology, their competences and abilities in this field are discussed (4). Therefore, it is important to determine the attitude of nursing and midwifery students towards information and communication technology, a subject that has been emphasized in different countries (5), and which requires the use of valid tools in this field (4). Although the attitude of physical education students, teachers, and elderly people regarding information and communication technology has been studied in some countries (7-9), however, few studies have been conducted in Iran regarding the attitude of health service workers on health information technology (10, 11). To the best of our knowledge, no study has so far been conducted aiming to investigate the attitude of nursing and midwifery students in the field of information and communication technology. Currently, the lack of appropriate tools to study these concepts among nursing and midwifery students in Iran is an important and fundamental issue. Therefore, in order to cover this information gap, the present study was conducted with the aim of psychometric measurement of nursing and midwifery students' attitude towards health information and communication technology.

Materials and methods

The present study was conducted in a cross-sectional manner with the aim of investigating the factor structure and reliability of the Iranian version of the Information and Communication Technology Attitude Scale for nursing and midwifery students. The statistical population of the present study were nursing and midwifery students in Torbat Heydarieh University of Medical Sciences who were studying in academic year 2018-2019. Since at least 10 people are required for each variable in the factor analysis, 190 people participated, and the final analysis was done using the information of 180 participants.

The main instrument of the study was 19 items first developed by Lee & Clarke in 2015 (4).

The main instrument is the attitude of students in four areas of the value of care through information and communication technology (4 statements), training of information and communication technology skills (6 statements), self-confidence in dealing with information and communication technology (4 statements) and the amount it measures work productivity in the use of information and communication technology (5 terms). The items were rated on a four-point Likert scale (1=strongly disagree, 2=disagree, 3=agree and 4=strongly agree). From the sum of the scores of each item in each

subscale, the corresponding score of the subscale is obtained. The highest score that can be obtained from the mentioned scale is 76 and the lowest score is 19. In this scale, higher scores indicate a stronger attitude towards health information and communication technology. The method of translation was that first, after obtaining permission from the main researcher, the original version was translated back and forth. The content and form validity of the above scale was done qualitatively by 2 IT specialists and 3 nursing and midwifery trainers.

In order to check the appropriateness of the structure of the 4-factor scale of information and communication technology, confirmatory factor analysis was performed using LISREL software version 8. To estimate the parameters of the model, the maximum likelihood method was used, and to check the fit of the model, goodness of fit indices (CFI, GFI, NFI, RMSEA and the ratio of the chi-square statistic to the degree of freedom) was used. It should be noted that if the RMSEA index is less than 0.1, it indicates an acceptable fit and if it is more than 0.1, it indicates a poor fit of the model. If X2/df is less than 0.5, it indicates an acceptable fit, and if it is less than 0.3, it indicates a good fit of the model, CFI, GFI, and NFI indexes greater than 0.9 indicate the appropriate fit of the model. If the standard factor loading of each item in its subscale is less than 0.4, it is suggested to remove it from the model (12). Cronbach's alpha coefficient and SPSS software version 16 were used to check the internal consistency (reliability) of the model.

This article is the result of a research project that was approved by the ethical committee of Torbat Heydariyeh University of Medical Sciences with the code IR.THUMS.REC.1398.006.

Results

180 nursing and midwifery students participated in this study. The average age of the subjects was 21.27 ± 2.06. Most of the participants, 128 (71.1%) were women and the remaining 52 (28.9%) were men. The average total score is 53.97±8.07 and the average subscales of the value of care through information and communication technology, skills training, self-confidence in dealing with information and communication technology and the level of work productivity in use of information and communication technology, were 13.51±2.59, 18.20±3.85, 11.15±1.76 and 11.06±2.76, respectively.

First, in order to ensure the adequacy of sampling, the KMO statistic was calculated. Since the KMO statistic was more than 0.8 (0.85), sampling adequacy was established. Then, Bartlett's sphericity test was used to check the justification of the factorization. Since the null hypothesis was rejected in Bartlett's test of sphericity ($P < 0.0001$), the factorization is justified.

Confirmatory factor analysis was used to investigate the four-factor model of the health information and communication technology attitude scale. The results of the confirmatory analysis showed that since the standard factor loading in questions 11 and 14 was less than 0.4, these questions were not significant in the Persian language version. After removing two questions 11 and 14, the confirmatory factor analysis model was used again. The results of the goodness of fit of the models are reported in Table 1. The results showed that after removing 2 items, the fit of the model improved. The results showed that the NFI, CFI and GFI indexes were more than 0.9 and the RMSEA index was less than 0.1. Also, the chi-square ratio index to the degree of freedom was less than 3. Therefore, the 4-factor model is acceptable in the Persian language version after removing 2 questions.

The results of standardized factor loadings, t values and multiple correlation coefficients are reported in Table 2. In model 2, all items in their respective subscales were significant with 95% confidence. A larger factor loading indicates that the corresponding item is a better indicator of the corresponding subscale. The results showed that items 1, 2, and 3 are better indicators in the subscale of the value of care through information and communication technology. In the subscale

of information and communication technology skills training, other items are better indicators as compared to item 8. In the subscales of self-confidence in dealing with information and communication technology and the level of work productivity in using information and communication technology, the items have almost the same values.

The results of the internal reliability study showed that Cronbach's alpha coefficient in the subscale of care value through information and communication technology was 0.85, in the subscale of training information and communication technology skills, and 0.86 in the self-confidence subscale. In dealing with information and communication technology, it is 0.76 and in the subscale of work productivity in the use of information and communication technology, it is 0.74 and more than 0.7; thus the reliability of the four-factor scale of health information and communication technology attitude scale is established.

Discussion

The main purpose of this study was to translate and psychometrically measure the attitude scale of nursing and midwifery students towards health information and communication technology in Iran. The original version of this tool has four factors and 19 statements. The main tool is students' attitudes in four subscales, including the value of care through information and communication technology (4 statements), information and communication technology skills training (6 statements), self-confidence in dealing with information and communication technology (4 statements) and the level of work productivity in the use of information and communication technology (5 terms) (4).

In order to investigate the four-factor model of the health information and communication technology attitude scale, confirmatory factor analysis was used. According to the results of the standard factor loading in statements 11 and 14, the means were less than 0.4, therefore these statements were not significant in the Persian language version. Therefore, two statements 11 and 14 were removed from the tool and the confirmatory factor analysis model was used again for the final evaluation of the tool with other statement. The results of factor analysis indices showed that after removing 2 items, the fit of the model improved, and therefore, the 4-factor model was confirmed after removing 2 predicates in the Persian language version.

In general, there is no documentation regarding the number of standard statements in a questionnaire, but the questionnaire should have enough statements to measure the researcher's desired concepts, and at the same time, it should not be so long that the respondents get tired. (12). It is for these reasons that providing an instrument with appropriate wording is preferred over one with more wording (13). In addition, reducing the number of expressions of a tool should be done in such a way that the validity of the content of the tool is not damaged (14). Furthermore, for more accuracy of the results, this operation is performed using factor analysis and by the relevant software (15).

Based on the results of the study, the internal reliability of Cronbach's alpha coefficient in all four dimensions of the tool was acceptable.

But in a similar research, the reliability level in the sub-scales related to the value of care, educational skills and self-confidence in facing information and communication technology was more than 0.7 and in the sub-scale of work productivity was less than this value.

In nursing and midwifery education, students use information and communication technology, because this allows them to easily access information needed for care (6). On the other hand, the use of information and communication technology can increase students' interest and self-confidence in these technologies (16). Therefore, in addition to improving health information and communication technology education, nursing educators should focus on strengthening students' attitudes towards health information and communication technology and its use. This study was conducted with the participation of undergraduate nursing and midwifery students. Therefore, the results may

not be generalizable to other academic disciplines and students caring for patients in other clinical settings. Therefore, it is suggested to carry out this study in other courses and fields of study in the future investigations.

Conclusion

The results showed that the health information and communication technology attitude scale for nursing and midwifery students has good validity and reliability. This tool can be used in future studies in this field.

Table 1. Goodness of fit Statistics in two models

	X2/df	RMSEA	NFI	CFI	GFI
Model 1	2.31	0.09	0.89	0.93	0.83
Model 2	2.16	0.08	0.92	0.95	0.86

Table 2. Standardized factor loadings, T values and R2 in two models

		Model 1			Model 2		
Factor		**Standardized Factor loading**	**T-value**	**R2**	**Standardized Factor loading**	**T-value**	**R2**
1	**1**	0.82	12.94	0.67	0.82	12.94	0.67
	2	0.80	12.46	0.64	0.80	12.46	0.64
	3	0.79	12.08	0.62	0.79	12.08	0.62
	4	0.68	9.79	0.46	0.68	9.79	0.46
2	**5**	0.83	13.18	0.69	0.83	13.19	0.69
	6	0.76	11.54	0.58	0.76	11.55	0.58
	7	0.68	9.92	0.46	0.68	9.92	0.46
	8	0.43	5.83	0.18	0.43	5.83	0.18
	9	0.77	11.75	0.59	0.77	11.75	0.59
	10	0.78	12.01	0.61	0.78	12.01	0.61
3	**11**	-0.04	-0.52	0.002	-	-	-
	12	0.79	10.36	0.62	0.78	10.24	0.61
	13	0.78	10.24	0.61	0.78	10.31	10.24
	14	-0.06	-0.72	0.004	-	-	-
4	**15**	0.59	7.40	0.35	0.59	7.38	0.35
	16	0.68	8.81	0.46	0.68	8.80	0.46
	17	0.53	6.63	0.28	0.53	6.64	0.28
	18	0.64	8.11	0.41	0.64	8.13	0.41
	19	0.58	7.34	0.34	0.58	7.34	0.34

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