

RESEARCH METHODOLOGY

Barriers to Research Utilization Scale: psychometric properties of the Turkish version

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Abstract

Title. Barriers to Research Utilization Scale: psychometric properties of the Turkish version.

Aim. This paper is report of a study designed to assess the psychometric properties of the Turkish version of the Barriers to Research Utilization Scale.

Background. The original Barriers to Research Utilization Scale was developed by Funk *et al.* in the United States of America. Many researchers in various countries have used this scale to identify barriers to research utilization.

Methods. A methodological study was carried out at four hospitals. The sample consisted of 300 nurses. Data were collected in 2005 using a socio-demographic form (12 questions) and the Turkish version of the Barriers to Research Utilization Scale. A Likert-type scale composed of four sub-factors and 29 items was used. Means and standard deviations were calculated for interval level data. A *P* value of < 0.05 was considered statistically significant.

Findings. Language equivalence and content validity were assessed by eight experts. Confirmatory factor analysis revealed that the Turkish version was made up of four subscales. Internal consistency reliability coefficient was 0.92 for the total scale and ranged from 0.73 to 0.80 for the subscales. Total-item correlation coefficients ranged from 0.37 to 0.60.

Conclusion. The Turkish version of the scale is similar in structure to the original English language scale.

Keywords: barriers, nursing, reliability, research utilization, Turkey, validity

Introduction

Nursing is a profession and nursing practice should be based on scientific knowledge obtained from research findings (Toktamışoğlu 1995, Kajermo *et al.* 1998, Estabrooks *et al.* 2008). It is essential that factors that facilitate and hinder

utilization of nursing research be identified and that evidence-based standards for nursing practices be established (Marsh *et al.* 2001). It is unclear exactly why there is so little implementation of the available evidence, although a formidable array of barriers has been identified in a number of domains (Funk *et al.* 1995). Several studies have been carried

out to determine the factors that influence research utilization by nurses (Funk *et al.* 1991a, 1991b, 1995, Kajermo *et al.* 1998, Hutchinson & Johnston 2006). Funk *et al.* (1991a, 1991b) led the development of the Barriers to Research Utilization Scale. This scale, which is generally abbreviated to 'The Barriers Scale', has been used in many published studies to elicit nurses' perceptions about barriers to research utilization in the United Kingdom (UK; Dunn *et al.* 1998, Marsh *et al.* 2001, Bryar *et al.* 2003, Veeramah 1995), United States of America (USA; Funk *et al.* 1995), Ireland (Parahoo 2000), Sweden (Kajermo *et al.* 1998), Norway (Hommelstad & Ruland 2004) and Iran (Mehrdad *et al.* 2008).

The rationale behind this research is that, if barriers are adequately identified and measured, strategies to overcome them can be implemented in practical settings, thus improving patient care by assuring that practice is evidence-based. One question that arises, however, is whether or not The Barriers Scale, developed and tested in the USA (Funk *et al.* 1991a), can adequately reflect the perceptions of nurses in Turkey. From this point of view, it is important to assess the psychometric properties of the Turkish version of the Barriers to Research Utilization Scale and bring it to the attention of Turkish researchers and nurse managers in terms of determining the barriers and developing suggestions for solutions. It is expected that when barriers are overcome and nurses' utilization of research is encouraged, the quality of care will increase.

Background

As nursing is a research-based profession, the implementation of research results is an issue of great concern in establishing evidence-based nursing practice and achieving a healthcare service of high quality (Kajermo *et al.* 1998). In nursing, research utilization has been defined as the use of research findings in any and all aspects of one's work as a Registered Nurse (Estabrooks *et al.* 2008). The concept of research utilization emerged in nursing in the early 1970s (Horsley *et al.* 1978). Since that time, many researchers have investigated the barriers to the use of research findings in nurses' clinical practice, and several research utilization models have been incorporated into basic research texts (Funk *et al.* 1991a, 1991b, 1995, Kajermo *et al.* 1998, Stetler 2001).

Research education in nursing in Turkey started in 1955 after the establishment of nursing schools in universities. Research practice in the field of nursing gained momentum with the establishment of Master's degree programmes in 1968 and PhD programmes in 1972 (Khorshid 1996, Bahar 1997, Bayik 2004). Various studies conducted in Turkey have investigated nurses' perspectives regarding carrying out

research, as well as reading and utilizing research (Özdağ & Yurdakul 1996, Taşocak & Kaya 1998, Durmuş *et al.* 2001). Özdağ and Yurdakul (1996) determined that 87.2% of nurses thought that research on nursing is not implementable in practice. In a study by Taşocak and Kaya (1998), it was determined that 56% of nurses had heard about some nursing journals, while only 8.6% used them to solve professional problems. In another study by Durmuş *et al.* (2001), it was determined that 45.7% of the nurses did not carry out research because of work overload and the negative attitudes of managers, while 13.4% did not get involved in research because of lack of knowledge of research methodology.

Therefore, it can be said that, although information based on research is considered to be an important part of nursing practice, professional practices are still guided by traditional methods and rituals, and that nurses do not generally utilize research findings in providing care (Closs & Cheater 1994). The barriers nurses confront have been analysed by qualitative and quantitative studies in many countries (Funk *et al.* 1991a, 1991b, Nolan *et al.* 1998, Parahoo 2000, Bryar *et al.* 2003, Kuuppelomaki & Tuomi 2003). The factors that prevent nurses from implementing research findings include not having enough time; lack of institutional or financial support; insufficient support from colleagues; shortage of personnel and resources; not being able to understand research reports; research that lacks validity and reliability; lack of generalizability of findings; lack of reliability in the interpretation of research findings; lack of knowledge; personal scepticism; and the dependence of nurses on doctors and managers in making changes in clinical practice (Retsas 2000, Rodgers 2000, Clifford & Murray 2001, Parahoo & Mc Caughan 2001, Thompson *et al.* 2001, Estabrooks *et al.* 2002, Bryar *et al.* 2003, Kuuppelomaki & Tuomi 2003, Oh *et al.* 2004, Beverly 2005, Hajbaghery & Salsali 2005).

The Barriers Scale

The 29-item Barriers to Research Utilization Scale was originally developed in the United States of America by Funk *et al.* (1991a, 1991b) at the University of North Carolina. The Scale content was identified and developed from the literature, the Conduct and Utilization of Research in Nursing Questionnaire and informal data collected from nurses (Funk *et al.* 1991b).

The Barriers Scale consists of 29 items relating to barriers to nurses' use of research in clinical practice. Respondents are asked to rate each item on a 4-point Likert-type scale to reflect the degree to which the item is perceived to be a barrier to research utilization (1, not at all; 2, to a small extent; 3, to a moderate extent; 4, to a great extent). A 'no opinion'

response item is also available. The Barriers Scale scores can therefore range from 29 to 116. Based on scores collected using the Scale and using factor-analytic procedures, Funk *et al.* (1991a) identified four factors:

- Factor 1: Nurse – the characteristics of the adopter: the nurse's values, skills and awareness concerning research (N).
- Factor 2: Setting – characteristics of the organization: barriers and limitations related to the setting (S).
- Factor 3: Research – characteristics of the innovation: the quality of the research (R).
- Factor 4: Presentation – characteristics of the communication: the presentation and accessibility of the research (P).

Funk *et al.* (1991a, 1991b) found the Scale to demonstrate high face and content validity, with Cronbach's alpha coefficients of between 0.65 and 0.80 for the four-factor groups and item-total-item correlations from 0.32 to 0.65. In addition, test-retest reliability was carried out for 17 respondents; Pearson's correlations between the two sets of responses ranged from 0.68 to 0.83 (Funk *et al.* 1991a).

Validity and reliability of the Barriers Scale

Kajermo *et al.* (1998) conducted a study to describe Registered Nurses' perceptions of the barriers to and facilitators of research utilization at two hospitals in Sweden using The Barriers Scale. Following factor-analytic procedures, they also identified the following four factors: the adopter, the organization, the innovation and the communication; the factor loadings for each factor group were found to be 0.81, 0.87, 0.86 and 0.83 respectively. However, Dunn *et al.* (1998) used the scale with 316 nurses and identified four similar factors: nurse, setting, research and presentation. Cronbach's alpha for the total scale was 0.85. Factor loadings for the subscales ranged between 0.48 and 0.78. In the study by Retsas and Nolan (1999) to determine the barriers to research utilization for 149 clinic nurses in Australia, three factors were determined. Factor 1 was the usefulness of research to clinical practice (factor loadings: 0.40–0.75). Factor 2 was generating change to practice based on research (factor loadings: 0.48–0.71). The third factor identified was the accessibility of research (factor loadings: 0.43–0.65).

Parahoo's (2000) study on 2600 nurses employed at 23 hospitals in Ireland and organized the items of The Barrier Scale into four factors called 'nurse', 'setting', 'research' and 'presentation'. Mean factor loadings ranged between 0.84 and 0.90. In a study by Oranto *et al.* (2002) to determine the barriers to research utilization among Finnish nurses ($n = 316$), Cronbach's alpha for all items in the scale was found to be 0.91 and the factors were the same as for Parahoo

(2000) (factor loadings: 0.72–0.81). Bryar *et al.* (2003) administered The Barrier Scale to 4501 healthcare personnel and defined four factors: benefits of research for practice; quality of the research; accessibility of the research; and resources for implementation. In the study by Ruland (2004) conducted to determine the facilitators and barriers to research utilization facing Norwegian nurses ($n = 159$), Cronbach's alpha for the factor ranged between 0.67 and 0.74. Mehrdad *et al.* (2008) used The Barriers Scale with 410 hospital nurses in Iran and identified four factors: nurse, setting, research and presentation. Cronbach's alpha for the total scale was 0.89. These data show that validity and reliability tests carried out on the Scale in several different countries have found the factors to be to a large extent similar.

The study

Aim

The aim of the study was to assess the psychometric properties of the Turkish version of the Barriers to Research Utilization Scale.

Methodology

An instrument validation study was carried out in Turkey in 2005.

Sample

The research was conducted with a sample of 300 nurses chosen with simple random and stratified weighted sampling methods at four hospitals, two of which were university-owned, one of which was private-owned and one of which was state-owned. The sample size was considered to be sufficient since it was 10 times the 29 items of the scale (Akgül 1997, Aksakoğlu 2001, Özdamar 2002).

Data collection

The data were collected at the participating hospitals by means of one-to-one interviews. A questionnaire was used for demographic data, in addition to the Barriers to Research Utilization Scale (the Barriers Scale) originally developed by Funk *et al.* (1991a, 1995).

Language adaptation

The back-translation method was used to ensure that the scale was accurately translated into Turkish. The Barriers Scale was first translated from English to Turkish separately

by three staff nurses whose native language is Turkish. Subsequently, it was translated back from Turkish to English by three experts whose native language is English. All translators worked independently and were not associated with the research in any other way. Once these forward and backward translations were completed, the original and back translations of both English and Turkish versions were carefully compared. The translated version was then evaluated by five teaching staff and finally adapted according to the suggestions made.

Ethical considerations

Permission for use of the Barriers Scale was obtained by e-mail from Professor Funk and written approval was obtained at the planning stage of the study from the hospitals' ethics committees.

Data analysis

The Statistical Package for Social Sciences (SPSS, version 15.0) was used to compute frequency and descriptive statistics related to demographic data. Means and standard deviations were calculated for interval level data. Confirmatory factor analysis has been used frequently in recent years as an indicator of the structural validity of scales (Jöreskog & Sörbom 1993, Dunn *et al.* 1998, Stevens 2002). In confirmatory factor analysis, certain variables are selected in accordance with the premises of the theory, and the loadings of these variables for the chosen factors are investigated. The LISREL program (Scientific Software International, Inc., Lincolnwood, IL, USA) was used to complete the factor analysis of the 29 Barrier items. LISREL software includes fit indices in three groups: Chi-Square Goodness of Fit, and Goodness of Fit and Comparative Fit Indices (Kelloway 1998, Jöreskog & Sörbom 1993, Schumacker & Lomax 2004). A *P* value of <0.05 was considered statistically significant.

To assure *content validity*, content analysis was based on multi-expert (Aksakoğlu 2001, Gözüm & Aksayan 2003). Confirmatory factor analysis was carried out for structural equation modelling (Jöreskog & Sörbom 1993, Polit 1996, Dunn *et al.* 1998, Stevens 2002). Factor analysis results were tested by oblique rotation. The Kaiser–Meyer–Olkin (KMO) test was used to measure sample adequacy and the Barlett Test of Sphericity (BS) was used to examine the correlation matrix (Sümbüloğlu & Sümbüloğlu 1998, Aksakoğlu 2001, Özdamar 2002). Means, standard deviations and the range of the adopted scale were calculated and presented as descriptive characteristics. Reliability was assessed using the internal

consistency approach; Cronbach's alpha coefficient was calculated to assess the degree of internal consistency and homogeneity between the items. Pearson's correlation coefficient was used to measure item-scale correlations (Polit 1996, Sümbüloğlu & Sümbüloğlu 1998, Aksakoğlu 2001, Özdamar 2002).

Results

The average age of respondents was 32.20 ± 6.78 , 56.0% were married and 48.7% were nurses with bachelor's degrees. Sixty-three percent were employed at university hospitals, while 30.0% worked in state hospitals and 7% in private hospitals.

Validity analyses

To ensure *content validity*, the final Turkish language version of the instrument was presented for the consideration of eight experts in the field. In accordance with their suggestions, necessary changes were made to the scale items. For example, the Turkish equivalent of 'utilization' has the meaning of 'using in an effective way' (in Turkish, 'etkili biçimde kullanma') and 'benefit from' (in Turkish, 'yararlanma'); therefore 'utilization' was translated as 'benefit from' (in Turkish, 'yararlanma'). Moreover, the premodifier 'nursing' (in Turkish, 'hemşirelik') was added to the name of the scale so that it would be clear that it referred to nursing research. Also, the expression 'research reports' was translated as 'research article' (in Turkish, 'araştırma makalesi') so that it could be more easily comprehended by respondents. The scale form was then given to 20 nurses – 10 students and 10 nurses – who were not included in the main sample, and changes were made in accordance with the feedback that they gave. Nurses who had been involved in the work preimplementation were not included in the final study.

In terms of structure validity, for confirmatory factor analysis, the KMO measure of sampling adequacy value was 0.89 with a statistically significant BS ($\chi^2 = 3384.02$, $P < 0.001$). Two different models developed according to the basic components and factor analysis results were then tested by oblique rotation and confirmatory factor analysis. The first model indicated that items were grouped under four-factor headings: nurse, setting, research and presentation. Table 1 shows the four factors and the factor loadings. The second model indicated four factors with factor loadings between 0.85 and 0.97 uniting in one dimension. Later, since the same variables were analysed in both models, nested model comparisons were made and $\chi^2/\text{degree of freedom}$ (d.f.) ($\Delta\chi^2$) differences of both models were compared and

Table 1 Factor loadings for the four factors of the Barriers Scale according to confirmatory factor analysis for model 1

Item no.	Sub-scale	Factors			
		1	2	3	4
1	Presentation	0.48			
2	Presentation	0.68			
3	Presentation	0.68			
4	Presentation	0.70			
12	Presentation	0.97			
24	Presentation	0.74			
5	Nurse		0.58		
9	Nurse		0.76		
20	Nurse		0.83		
21	Nurse		0.84		
15	Nurse		0.71		
16	Nurse		0.70		
26	Nurse		0.76		
28	Nurse		0.71		
6	Setting			0.64	
7	Setting			0.56	
13	Setting			0.69	
14	Setting			0.79	
18	Setting			0.84	
19	Setting			0.95	
25	Setting			0.87	
29	Setting			0.68	
8	Research				0.78
10	Research				0.69
11	Research				0.79
17	Research				0.88
22	Research				0.86
23	Research				0.85
27*					

*Item 27 is not scored since it did not load on any of the four factors.

GFI, AGFI and Root Mean Square Error of Approximation (RMSEA) goodness of fit indices assessed.

Table 2 shows the goodness of fit indices for first and second models. The χ^2/SD rate was 2.42 for the first model and this was considered to be an indicator of high goodness of fit. The RMSEA is an estimate of the mean difference between the observed and reproduced correlations. An acceptable fit requires a value of <0.08 (Hu & Bentler 1999), and the RMSEA for our data was 0.06. The Goodness of Fit Index (GFI) indicates how well the theoretical model reproduces the observed correlations, and the Comparative

Table 2 Comparison of confirmatory factor analysis results for the two models

Models	χ^2	d.f.	$\chi^2/d.f.$	GFI	AGFI	SRMR	RMSEA
Model 1 (four sub-dimensional structure)	855.39	353	2.42	0.97	0.96	0.06	0.06
Model 2 (second level structural model)	844.78	353	2.39	0.97	0.96	0.06	0.06

GFI, Goodness of Fit Index; RMSEA, Root Mean Square Error of Approximation.

Fit Index indicates how well the model fits the data compared with a null model that represents no relationships among variables. A value of 0.90 or better is required for a good fit, and the values obtained were within the acceptable range (GFI = 0.97 and AGFI = 0.96). When both models were compared, no statistically significant difference was found that would cause one to be superior in terms of goodness of fit indices. Goodness of fit indices were sufficiently high for both models.

Reliability analyses

The standard deviation of the total scale score was 21.97 and the mean total score was 75.13. The total mean item score was 2.59 ± 0.76 , with item 27 having the lowest mean score (2.09 ± 1.48) and item 6 having the highest (3.15 ± 1.14).

The total-item correlation ranged between 0.37 and 0.60. Item 1 had the lowest total-item correlation (0.37) while item 25 had the highest (0.60). Total-item correlation coefficients were statistically significant ($P < 0.001$). Cronbach's alpha coefficient for the general scale was 0.92, while for the factors it ranged between 0.73 and 0.80 (nurse: 0.78, setting: 0.80, research: 0.75, presentation: 0.73).

Discussion

Study limitations

A purposive sample based on a survey of several clinical areas would have been preferable as this would have probably increased the contextual validity of the study, but this was not possible because of lack of resources. In assessing reliability and validity, while the sample of 300 represented some of the diversity of nurses practising in the study location, it was a convenience sample and the confidence in any resulting inferences is therefore somewhat limited.

Scale validity

When factor analysis is conducted, sample adequacy is an important issue. The KMO measure of sampling adequacy was found to be 0.89 with a statistically significant BS

($\chi^2 = 3384.02$, $P < 0.001$). Thus, the data obtained were suitable for factor analysis (Akgül 1997, Özdamar 2002).

The two different models developed were tested using the basic components and factor analysis. The first model indicated that the items were grouped in four factors. The second, alternative, model showing the same four factors uniting in one dimension was also analysed. Subsequently, since the same variables were analysed in both models, nested model comparisons were carried out, χ^2 /d.f. ($\Delta\chi^2$) differences of both models were compared and GFI, AGFI and RMSEA goodness of fit indices were assessed. Provided that the $\Delta\chi^2$ difference test shows statistically significant results and the model with the lower chi-square value meets the critical values expected by other fit indices, it is possible to state that the model which meets these conditions is relatively more valid (Kline 1998).

Degree of freedom is a crucial criterion for chi-square test. When d.f. is high, chi-square has a tendency to yield statistically significant results. Therefore, the ratio of d.f. to chi-square can also be used as a criterion of adequacy in certain cases. Kelloway (1998) states that when the χ^2 /d.f. ratio is < 5 , it can be interpreted as an indicator of good fit. In the first model, the χ^2 /d.f. ratio was found to be < 5 (2.42), and this value was considered to indicate a high goodness of fit. The GFI shows to what extent the model measures the sample variance-covariance matrix and is also accepted as the sample variance revealed by the model. GFI values range from 0 to 1 and, since they are sensitive to sample size, they yield small values in big samples; values equal to 0.90 and above are considered to indicate good fit. AGFI is a GFI value adjusted according to sample size. AGFI values also range between 0 and 1. While 0.95 and above is considered a perfect fit, 0.90 and above is interpreted as a satisfactory fit (Kelloway 1998). In this study, the GFI and AGFI indices of the first and second models were the same, both yielding high fit values (GFI: 0.97 and AGFI: 0.96). The RMSEA is an absolute fit index of the difference between the covariance among the variables observed in the sample and the parameters suggested in the model; in other words, it is an index developed on the basis of the degree of error. In contrast to GFI and AGFI, it is expected to yield values close to zero. Values equal to or smaller than 0.05 are considered perfect, while values equal to 0.08 and below are considered reasonable, taking into consideration the complexity of the model (Kelloway 1998, Schumacker & Lomax 2004). The same RMSEA value (0.06) was obtained for the first and the second models, and was hence considered to be a reasonable value. As the above results indicate, when the two models were compared, no statistically significant difference in

terms of goodness of fit indices was determined that would indicate the superiority of one model over the other. This scale yields not only separate scores for subscales, but also a single score for the whole scale since the goodness of fit indices of the second level CFA model were found to be high.

Consequently, it was determined that both models, when subjected to confirmatory factor analysis, provided valid evidence that the four-factor groups (nurse, setting, research and presentation) determined by Funk *et al.* (1991a) also measured the barriers of nurses to research utilization in Turkey. The Barriers Scale has been tested for validity and reliability in many countries (Dunn *et al.* 1998, Parahoo 2000, Kajermo *et al.* 1998, Marsh *et al.* 2001, Bryar *et al.* 2003, Ruland 2004, Veeramah 1995, Mehrdad *et al.* 2008). Among these researchers, Dunn *et al.* (1998) tested the confirmatory factor analysis of the scale with the EQS method, which is a widely used structural equation modelling software, in a study conducted in England. However, they concluded that this factor model was not compatible with the model proposed by Funk (Dunn *et al.* 1998). Cultural differences or similarities may be responsible for these findings in the factorial structure of The Barriers Scale in the UK, USA and Turkey.

In our study, the mean item score for the Scale was 2.59 ± 0.76 , while the possible range for the items is from 1 to 4 (Funk *et al.* 1991a, 1991b). Based on this finding, it could be stated that nurses generally evaluate the barriers to research utilization as acting to a little or a moderate extent. It was determined that the correlation coefficients of the items had positive, moderate or strong values that ranged from 0.37 to 0.60 (Özdamar 2002, Tavşancıl 2002). When the correlations between the items and total scores for the scale were analysed, they were found to be statistically significant ($P < 0.001$). All items demonstrated a moderate or strong correlation with the total score.

The Cronbach's alpha coefficient of the scale was determined to be 0.92, which indicated that items correlated with each other and served the whole measuring instrument with equal weight. In other words, the scale was homogeneous and the test measurements were reliable (Tezbasaran 1997, Erefe (2002), Gözümlü & Aksayan 2003). In the study conducted by Funk *et al.* (1991a), the Cronbach's alpha values of the subscale items ranged between 0.65 and 0.80. In the study by Dunn *et al.* (1998), Cronbach's alpha was 0.85. In a similar study by Oranto *et al.* (2002) in Finland, Cronbach's alpha for the whole scale was 0.91. It was thus determined that the scale reliability coefficient in our study demonstrates similarities with the findings of studies conducted in other countries.

What is already known about this topic

- Barriers to the implementation of nursing research findings have been determined and standards are established for nursing practice based on evidence.
- There is no scale in Turkey for determining the barriers to research utilization for nurses.

What this paper adds

- There is some evidence of the scale's validity and reliability in measuring the barriers to research utilization in nursing practice within Turkey.
- Confirmatory factor analysis of the Barriers Scale supports the originally developed four-factor structure.

Implications for practice and/or policy

- This version of the Barriers to Research Utilization Scale could be used to the impediments and facilitating factors to research utilization for Turkish nurses.

Conclusion

Our results suggest that the Turkish version of the scale is a valid and reliable instrument for measuring the barriers of nurses to research utilization in Turkey. However, it will be necessary to test its validity and the reliability with larger samples to ensure its generalizability.

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Author contributions

TAB, AU, MA and SO were responsible for the study conception and design. AU, MA and SO performed the data collection. TAB and AU performed the data analysis; and TAB & AU provided statistical expertise. TAB, AU and MA were responsible for the drafting of the manuscript; made critical revisions to the paper for important intellectual

content; and supervised the study. TAB obtained funding; and provided administrative, technical or material support.

Conflict of interest

No conflict of interest has been declared by the authors.

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