Original Research

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Adaptation of the Competencies for Disaster Nursing Management Questionnaire: Turkish Version

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Abstract

Objective: This study aimed to carry out the validity and reliability study for the adaptation of the Competencies for Disaster Nursing Management Questionnaire (CDNMQ), which was developed by Al Thobaity and others in 2016, (https://pubmed.ncbi.nlm.nih.gov/26778698/) to Turkish, and to be able to use in the nursing literature.

Method: This study was conducted in a methodological approach. The scale used in this study was a 10-point Likert scale with 43 items and 3 subfactors. The questionnaire was applied to 450 nurses. The validity and reliability of the scale were evaluated using the exploratory and confirmatory factor analysis. The content validity index was measured within the scope of the internal consistency measurements, and the Pearson's product-moment correlation coefficient was examined for the test-retest.

Results: The content validity index score was found to be 0.98. As a result of the confirmatory factor analysis of the CDNMQ, it was found that the 3-factor structure of the scale was valid and the goodness of fit tests was appropriate.

Conclusion: The findings have shown that the CDNMQ study is similar to the original scale and an adequate measurement tool in determining competencies in disaster nursing management.

Introduction

Disasters such as earthquakes, floods, tsunamis, terrorist incidents, storms, fire, war, and nuclear accidents[1–3] are likely to be a trauma for humans and may cause serious deterioration of the daily and vital functioning of the societies and include natural, technological, or man-made events. Today, the number, diversity, and effects of disasters in the world are increasing gradually, and millions of people can be negatively affected every year.[4–7]

Throughout history, nurses have played an active role in disasters by combining their theoretical and practical knowledge with their health care skills.[7–10] "Disaster Nursing" continues to develop rapidly in the nursing discipline with its knowledge, skills, and competencies in disaster issues. It is stated that the most remarkable challenges regarding the role of nurses in disasters are related to the organizational, managerial, and education system. Disaster nursing aims to be able to actively participate in all stages of disaster relief, including planning and preparation, to be able to make organizational and managerial planning in the event of a disaster, and, ultimately, to provide necessary care to all disaster victims.[11,12] The World Health Organization (WHO) states that competencies should be measured well since effective care can be provided with only a competent health professional, and reports that no health care system should be considered prepared unless the nurse is ready.[13–16]

The present study aims to translate CDNMQ into Turkish and to examine the reliability and validity of the Turkish version of CDNMQ in nursing during clinical practice and to be able to use it in the nursing literature in Turkish culture.

Material and Method

Design

This is a descriptive study that aimed to determine the reliability and validity of the CDNMQ in Turkish nursing, adapt, and validate English version of the questionnaire that was developed by Al Thobaity et al.[14] This research was conducted to carry out a validation and reliability study of the scale and to use it in the nursing literature in Turkey since, upon reviewing the literature, it has been detected that there is no inventory assessing the CDNMQ.

Participants and Setting

This study was conducted at a university and a public hospital between March 2018 and May 2019. The population of research in this study consisted of 553 nurses working in public

hospitals (University Hospital and State Hospital) in the district of Süleymanpaşa, Tekirdag Province. The sample consisted of 450 nurses who agreed to take part in this study.

Data Collection Tools

In this research, the 13-item Personal Information Form and 43-item CDNMQ were used as data collection tools.

Personal Information Form

The form contains 13 items in 2 groups: demographic and professional.

Competencies for Disaster Nursing Management Questionnaire (CDNMQ)

CDNMQ was developed by Al Thobaity et al.[14] as 43 questions in the English to measure nurses' competence in disaster nursing management. As a result of factor analysis carried out during the development research of CDNMQ, Cronbach's alpha was 0.86 for Duties and Responsibilities of Nurses in Disaster Management, 0.98 for Basic Competencies of Nurses in Disaster Management, 0.92 for Barriers to Developing Basic Competencies, and 0.97 for the total. The scale of CDNMQ has been reported to be valid and reliable.[14] The scale consists of 3 sections using the 10-point Likert scale. In the first section, 5 items contain the Nurses' Duties and Responsibilities in Disaster Management; in the second section, 30 items contain the Basic Competencies of Nurses in Disaster Management; and, in the third section, there are 8 items that include the Barriers in Developing Basic Competencies. The first and second sections include 1 point = None and 10 = Very Often, and the third section includes 1 = Strongly Disagree and 10 = Strongly Agree to indicate how many participants agree or disagree with the statements in the scale.

Data Collection

Pre-Application

Research data were obtained by applying a face-to-face questionnaire to nurses working at a university and a public hospital in May 2018 and August 2018, and between September 2018 and December 2018. Preliminary studies are suggested as an opportunity for the researchers (an associate professor in nursing and a specialist in disaster nursing) to guide sampling, discover, and correct potential errors before they become serious and uncorrectable.[17] The ideal number of patients subjects in the preliminary study should represent 10% of the sample.[18,19] While the language adaptation of the CDNMQ was carried out, the back-translation method was used as the most frequently used method to ensure the cultural equality of the scale. Two separate translations from English to Turkish were prepared by 2 linguists who are highly proficient in English. The translations were then examined by the researcher, and a common translation text was created. The translation text was translated from Turkish back to English by a bilingual expert in Turkish and English languages. The Turkish translation of the scale was checked by a Turkish language expert. Following the translation, 15 experts who were associate professors or professors in the field were consulted to compare the scale with the original version and to question the cognitive-conceptual differences between the English and Turkish versions of the scale. Accordingly, after the language validity, expert opinions, and

content validity studies of the CDNMQ, a preliminary study was conducted with a minimum of 45 nurses for the sample of 450 nurses. The Turkish version of the scale agreed upon was applied to 45 nurses as a preliminary study, and no regulation was needed as there was no unclear issue. These 45 nurses sought for the preliminary study were not included in the validity and reliability analysis.

Application

It was found that the parallel form reliability method could not be used for this study, since there was no form equivalent to the Competencies Scale in Disaster Nursing Management. Accordingly, it was decided to use the test-retest method. In the study, the intermittent method was used since nurses can remember their responses because of the shorter intervals in the application of the continuous method and because the method could be applied without any interval. The second application was performed 4 weeks after the first application. The scales in the first application were labeled as Group A: A1, A2, A3, and so forth to A472, and the scales in the second application were labeled as Group B: B1, B2, B3, and so forth to B472. At the end of the questionnaire, the scales were matched as A1-B1, A2-B2, A3-B3, and so forth, to A472-B472. The study, which was performed on 450 nurses in the first phase, was carried out via the test-retest method 4 weeks later on 150 nurses in the second phase.

Data Analysis

While evaluating the study data, in addition to descriptive statistical methods (mean, SD, median, frequency, and rate), Turkish validation of CDNMQ was evaluated using the exploratory and confirmatory factor analysis, the content validity index within the scope of the internal consistency measurements, and the Pearson's product-moment correlation coefficient was examined for the test-retest. When the validation of CDNMQ was completed, evaluations were carried out between descriptive questions and scale scores. In this context, the Shapiro–Wilk test and box plot graphics were used to compare the data and evaluate the normal distribution suitability of the data. The Kruskal–Wallis test was used for intergroup comparisons of non-normally distributed parameters, and Dunn's test was used for post hoc comparisons. In the evaluations, according to the 2 groups, the Mann–Whitney U test was used. The results were evaluated in the 95% CI, and the significance level was $P < 0.05$.

Results

In our study, when the distribution of nurses according to their socio-demographic characteristics was examined, it was determined that the age ranged from 20 to 60 (min–max) years, the average age was 32.41 ± 8.29 years, and most of them were in the 25 to 29 age group; 89.8% of participants were women, 68.9% were undergraduates, and 55.3% were married (Table 1).

Content Validity

While making language adaptation of the scale, the back-translation method, which is the most frequently used method, was used to ensure the scale's cultural equality for the validity of the quality

Table 1. Distribution of the demographic features

		n (%)
Age (years)	*Min–Max (Median)*	20–60 (30)
	Mean ± SD	32.41±8.29
Gender	Male	404 (89.8)
	Female	46 (10.2)
Education status	High school	31 (6.9)
	Associate degree	73 (16.2)
	Bachelor's degree	310 (68.9)
	Master's degree	36 (8.0)
Marital status	Married	249 (55.3)
	Single	201 (44.7)
Number of children	No children	226 (50.2)
	With 1 child	117 (26.0)
	2 or more children	107 (23.8)

of translated research instrument. The language validity of the scale was provided in accordance with the opinions of the experts. The Content Validity Index (CVI) was used to measure the scope validity of the scale. The CVI value for the scale, in general, should be at least 0.80. When the Content Validity Ratio (CVR) values were calculated using a strict method, it was found that all items were above the 0.89 level, which was a sufficient level. When calculating CVR values using the relaxed method, all items were found to be at the 0.98 level. For both methods, the CVI level was found to be higher than 0.80[19] (Table 2).

To measure the applicability of the exploratory factor analysis, the Kaiser–Meyer–Olkin (KMO) test and Bartlett's test of sphericity were examined. In this study, the KMO value of sample adequacy was found to be 0.956 (Table 3). It was determined that this value was an excellent value for KMO and that it was appropriate to analyze the related data group. Bartlett's test of sphericity was used to test whether the correlation matrix was a similar matrix, and this hypothesis was rejected at $P < 0.001$. In the exploratory factor analysis of CDNMQ, it was observed that when varimax rotation was applied and factor analysis was held, questions could be collected under 3 factors. When factor weights were analyzed, the lowest 0.808 and the highest 0.876 were in Factor 1, the lowest 0.546 and the highest 0.876 in Factor 2, and the lowest 0.662 and the highest 0.857 in Factor 3 (Figure 1).

Content Reliability

Cronbach's alpha reliability coefficient was used to measure the internal consistency of the CDNMQ. When Cronbach's alpha values showing internal consistency were examined, they were 0.881 for the sub-dimension of Nurses' Duties and Responsibilities in Disaster Management, 0.981 for the sub-dimension of Nurses' Basic Competencies in Disaster Management, 0.909 for the sub-dimension of Barriers to Developing Basic Competencies, and 0.963 for the total score (Table 4). The findings obtained in this study showed that the scale was found to be highly reliable. The questions in the Competencies Scale in Disaster Nursing Management fit very well with all questions when the Pearson's product-moment correlation coefficient was calculated for the test-retest; the lowest correlation was 0.928 and the highest

correlation coefficient was 0.999. There was no problem with any question concerning the test-retest (Table 5).

Discussion

In our study, when the distribution of the nurses, according to their socio-demographic characteristics, were examined, the majority were in the 25–29 age group. In the study conducted by Park and Kim in emergency department nurses' disaster nursing competence in Korea, the age of the nurses varied between 22 and 49, and the average age was 28.41 ± 5.25 years.[20] In a study conducted by Martono et al. on the perception of Indonesian nurses in disaster management, 59.4% of the nurses were in the 26–32 age range.[21] When this study was compared with other studies, the findings showed that the majority of nurses were similarly in the young age group.[21]

Validity indicates that a measurement tool measures "What," "How much," and "To the point/accurate." Even if the reliability of the measuring tool is determined by appropriate methods, it cannot answer the question of – Can items accurately measure what is intended to be measured for purpose? – since the reliability is related to the stability of the measuring tool. The answer to this question can only be given by validating the scale.[18,19,22–26] In this research, language validity, scope/content validity, and construct validity were examined to evaluate the validity of the scale.[19]

Scope validity is used to assess whether the scale and items in the scale measure the desired concept or whether the subject studied contains strong expressions representing the subject rather than external irrelevant expressions.[19,27,28] The technique frequently used is CVI.[19] The researcher evaluates all expert opinions and removes or reorganizes the scale items that receive 1 to 2 points. If 80% of the scale items are evaluated between 3 and 4 points, the CVI score is set to 0.80. For the scale to be valid, the CVI score must be 0.80 and above.[19,29] CVI technique was used to prove the validity of the content with numerical values and to evaluate them correctly. Opinions of 15 experts were received for the scope validity of the Competencies Scale in Disaster Nursing Management, and the findings showed that the CVI ratio was higher than 0.80 and the content/scope validity of this research was strong.

Factor analysis, which is a frequently used method, evaluates whether the scale items are collected in different dimensions.[19] The factor analysis method is used to reveal the basic structure behind more than 1 variable.[30] Apart from its total score, it is used for sub-dimensional scales, and each sub-dimension is called a factor.[19] Items that have a high relationship in themselves constitute "factors." The main purpose in factor analysis is to ensure the integrity of the subject by clearing the subject to be measured from unrelated variables and to express many items in the scale with fewer "factors."[19,26,29,30]

In the exploratory factor analysis of the Competencies Scale in Disaster Nursing Management, it was observed that our questions could be collected under 3 factors when varimax rotation was applied and kept for factor analysis (see Figure 1). To measure the applicability of the exploratory factor analysis, KMO competence measurement and Bartlett's test of sphericity were examined. Table 3 shows the KMO and Bartlett's test results of the Competencies Scale in Disaster Nursing Management. In our study, the KMO value of sample adequacy was found to be 0.956. This value was found to be excellent for KMO and it was

Table 2. Evaluation results on scope validity

	Not Suitable	Required Much Correction	Required Little Correction	Suitable	CVR$_{strict}$	CVR$_{relaxed}$
S1Item1	0	0	3	12	0.60	1.00
S1Item2	0	0	1	14	0.87	1.00
S1Item3	0	0	1	14	0.87	1.00
S1Item4	0	0	2	13	0.73	1.00
S1Item5	0	0	1	14	0.87	1.00
S2Item1	0	0	1	14	0.87	1.00
S2Item2	0	1	2	12	0.60	0.87
S2Item3	0	0	0	15	1.00	1.00
S2Item4	0	1	0	14	0.87	0.87
S2Item5	0	0	0	15	1.00	1.00
S2Item6	0	0	0	15	1.00	1.00
S2Item7	0	1	0	14	0.87	0.87
S2Item8	0	1	2	12	0.60	0.87
S2Item9	0	0	1	14	0.87	1.00
S2Item10	0	0	2	13	0.73	1.00
S2Item11	0	1	1	13	0.73	0.87
S2Item12	0	1	0	14	0.87	0.87
S2Item13	0	0	0	15	1.00	1.00
S2Item14	0	0	2	13	0.73	1.00
S2Item15	0	0	0	15	1.00	1.00
S2Item16	0	0	0	15	1.00	1.00
S2Item17	0	0	1	14	0.87	1.00
S2Item18	0	0	1	14	0.87	1.00
S2Item19	0	0	1	14	0.87	1.00
S2Item20	0	0	1	14	0.87	1.00
S2Item21	0	0	0	15	1.00	1.00
S2Item22	0	0	0	15	1.00	1.00
S2Item23	0	0	2	13	0.73	1.00
S2Item24	0	0	0	15	1.00	1.00
S2Item25	0	0	0	15	1.00	1.00
S2Item26	1	0	1	13	0.73	0.87
S2Item27	0	1	0	14	0.87	0.87
S2Item28	0	0	0	15	1.00	1.00
S2Item29	0	0	0	15	1.00	1.00
S2Item30	0	0	1	14	0.87	1.00
S3Item1	0	0	0	15	1.00	1.00
S3Item2	0	0	0	15	1.00	1.00
S3Item3	0	0	0	15	1.00	1.00
S3Item4	0	0	0	15	1.00	1.00
S3Item5	0	0	0	15	1.00	1.00
S3Item6	0	0	0	15	1.00	1.00
S3Item7	0	0	0	15	1.00	1.00
S3Item8	0	0	0	15	1.00	1.00
CVI					**0.89**	**0.98**

Table 3. Results of Bartlett's test of sphericity and KMO for Competencies Scale in Disaster Nursing Management

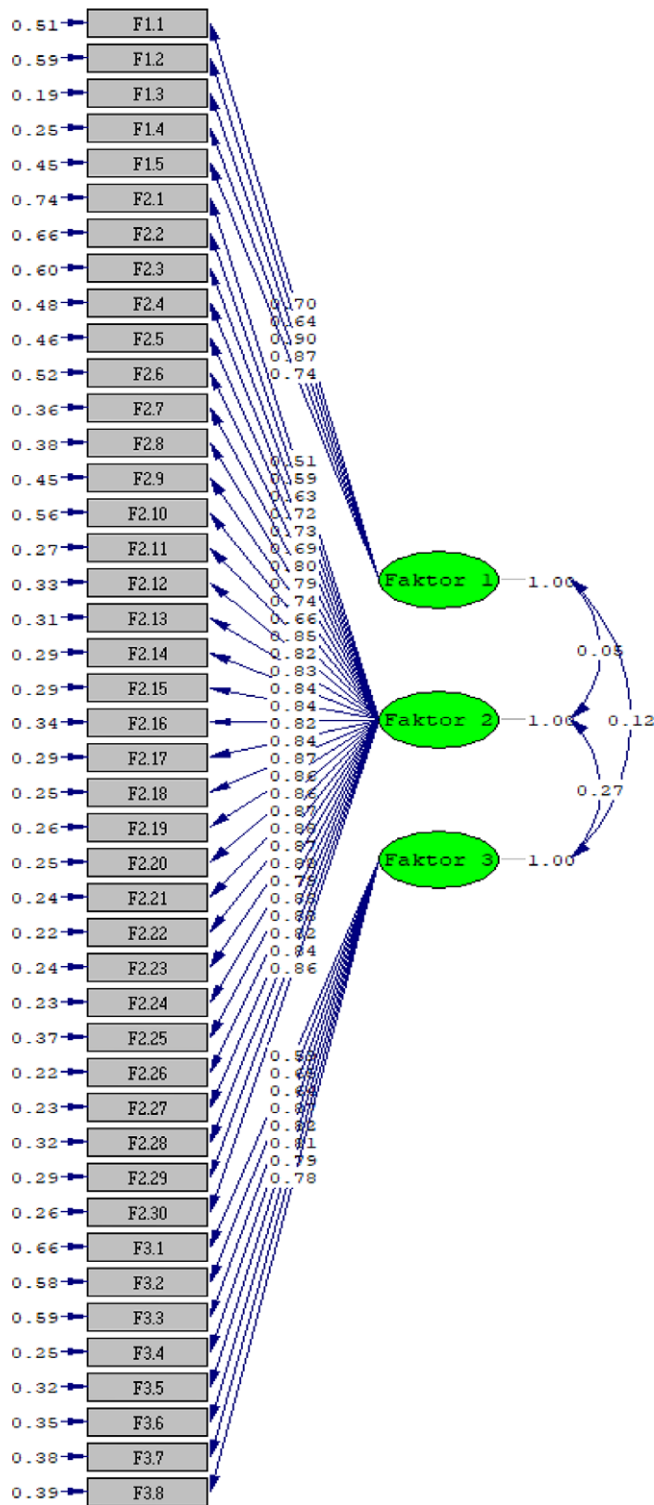| Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.956
Bartlett's Test of Sphericity	Chi-squared	19670.222
	Degrees of freedom	903
	Significance	0.001

Figure 1. Confirmatory factor analysis chart regarding the *Competencies for Disaster Nursing Management Questionnaire*.

Table 4. Reliability value of the Competencies Scale in Disaster Nursing Management

	Number of Questions	Cronbach's alpha
Factor 1 (Nurses' Duties and Responsibilities in Disaster Management)	5	0.881
Factor 2 (Nurses' Basic Competencies in Disaster Management)	30	0.981
Factor 3 (Barriers to Developing Basic Competencies)	8	0.909
Total (Competencies for Disaster Nursing Management Questionnaire)	43	0.963

among the items and shows the suitability of the data for factor analysis.[31]

Reliability is the criterion of stability, adequacy, accuracy, consistency of measurement, equivalence, and determination.[19,30] Consistency in the measurement tool means stability and similar results in repeated measurements, and accuracy shows the ability to determine the correct value of the measurement. The scientific value of an unreliable measuring tool is considered to be low.[18,19,32] Applying the same measurement tool to individuals over different times and the consistency of the individual responses to the measurement tool items show the stability of the measurement tool. Consistency is provided by parallel form reliability or test-retest methods.[18,19,25] It was understood that the parallel form reliability method could not be used in this research due to the lack of a form equivalent to the Competencies Scale in Disaster Nursing Management. Accordingly, the test-retest method was used. In this research, the intermittent method was used considering that the time interval of the continuous method was short or applied without a break and the participants could remember their answers. When the Pearson's product-moment correlation coefficient was calculated for the test-retest, all the questions were observed as being in good agreement and there were no problems concerning the test-retest.

Internal consistency is the reliability method that determines whether the scale items have the ability to measure the same structure and all aspects of the scale in relation to each other.[19,26] Cronbach's alpha reliability coefficient was used in the Competencies Scale in Disaster Nursing Management. When the Cronbach's alpha values showing internal consistency were examined, our scale was found to be highly reliable.

In this context, the acquisition of competencies as well as planning, directing, and coordinating the tasks to be performed during preparation, rescue, first aid, recovery, and reconstruction to prevent disasters or to reduce damages in the pre-disaster period is crucial in terms of increasing the performance level in disasters, obtaining effective results, and reaching the targets. The competencies of nurses who are at the forefront in the event of a disaster should be determined, the trainings to be provided should be planned and practiced in the field, and studies with a larger sample should be performed.

Limitations

Given that this research was applied to only the university hospital and a public hospital nursing, the research is limited concerning the generalization of the findings.

appropriate to carry out an analysis of the relevant data group. Bartlett's test of sphericity was used to test whether or not the correlation matrix was similar to the matrix, and this hypothesis was rejected at $P < 0.001$. This shows us the existence of a relationship

Table 5. The results of test-retest (n = 150)

		r	P
Nurses' Duties and Responsibilities in Disaster Management	S1	0.984	< 0.001**
	S2	0.964	< 0.001**
	S3	0.962	< 0.001**
	S4	0.958	< 0.001**
	S5	0.928	< 0.001**
Nurses' Basic Competencies in Disaster Management	S6	0.987	< 0.001**
	S7	0.976	< 0.001**
	S8	0.962	< 0.001**
	S9	0.990	< 0.001**
	S10	0.988	< 0.001**
	S11	0.988	< 0.001**
	S12	0.995	< 0.001**
	S13	0.995	< 0.001**
	S14	0.988	< 0.001**
	S15	0.987	< 0.001**
	S16	0.990	< 0.001**
	S17	0.998	< 0.001**
	S18	0.996	< 0.001**
	S19	0.995	< 0.001**
	S20	0.983	< 0.001**
	S21	0.995	< 0.001**
	S22	0.993	< 0.001**
	S23	0.994	< 0.001**
	S24	0.991	< 0.001**
	S25	0.977	< 0.001**
	S26	0.995	< 0.001**
	S27	0.996	< 0.001**
	S28	0.998	< 0.001**
	S29	0.988	< 0.001**
	S30	0.999	< 0.001**
	S31	0.999	< 0.001**
	S32	0.982	< 0.001**
	S33	0.989	< 0.001**
	S34	0.995	< 0.001**
	S35	0.995	< 0.001**
Barriers to Developing Basic Competencies	S36	0.954	< 0.001**
	S37	0.958	< 0.001**
	S38	0.970	< 0.001**
	S39	0.969	< 0.001**
	S40	0.953	< 0.001**
	S41	0.952	< 0.001**
	S42	0.958	< 0.001**
	S43	0.962	< 0.001**

Notes: r = Pearson's product-moment correlation coefficient; **P < 0.01

Conclusion

As a result of this research, which was conducted as a methodological and descriptive study to provide a measurement tool to be used to assess the competence of nurses in disaster management, the Competencies Scale in Disaster Nursing Management has been found to be valid and reliable for Turkish society.

Consent to Participate. Written informed consent from each of the participants was obtained for the research.

Conflict(s) of Interest. The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this paper.

Ethical Standards. Permission was obtained from Abdulellah Al Thobaity, who was the key researcher for the development of the scale that was adapted in this study, using e-mail to perform the Turkish validity and reliability study of CDNMQ. To carry out this study, written institution permissions were obtained from the Tekirdağ Provincial Health Directorate with the ethical approval of Tekirdag Namık Kemal University Medical Faculty Non-Interventional Clinical Research Ethics Committee, dated March 29, 2018, and numbered 2018/41/03/14.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/dmp.2021.160

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