

Original Research

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Validity and Reliability Study of the Turkish Adaptation of the Disaster Response Self-Efficacy Scale (DRSES)

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Abstract

Objective: This study aimed to assess the validity and reliability of the Turkish version of the ‘Disaster Response Self-Efficacy Scale (DRSES).’

Method: This is a methodological study to validate the DRSES. Third and fourth grade nursing students participated in the study (n = 340). Construct validity was evaluated by exploratory and confirmatory factor analysis. Reliability was assessed by internal consistency and test-retest reliability. Data were analyzed in SPSS 20.0 (IBM Corp., Armonk, NY, USA) and IBM SPSS AMOS 21.0. (IBM Corp., Armonk, NY, USA).

Results: The content validity was 0.96, Cronbach’s alpha coefficient was 0.94, and the intraclass correlation coefficient for test-retest reliability was 0.95. The exploratory factor analysis revealed that 3 factors accounted for 59.4% of the explained variance. The factor loads ranged between 0.50 - 0.81. The construct validity was good ($\chi^2/df = 2.54$; RMSEA = 0.067; CFI = 0.93; NFI = 0.95; GFI = 0.93; TLI = 0.94; IFI = 0.92; $P < 0.001$).

Conclusions: The results of this study show that the Disaster Response Self-Efficacy Scale is a valid and reliable tool that could be used to determine the nursing students’ disaster response self-efficacy.

Introduction

The World Health Organization (WHO) defines disasters where human life is lost and the environment is endangered as states of emergency.¹ In terms of dealing with disasters, having all health disciplines at the ready in case of disaster is no longer an option but a critically important responsibility. It is because of this that it is vitally imperative that all health professionals are knowledgeable about disaster management, have the critical decision-making skills, as well as the understanding, and attitudes that are needed in emergencies. In considering the circumstances in the world and in Turkey, the conviction that there is a need for disaster and emergency nursing services is rapidly increasing.^{2–4}

Nurses are an integral part of the healthcare workforce that assumes roles in every stage of the disaster cycle and in emergency management. In every stage of emergency management, nurses have a responsibility toward the community they live and work in.^{4,5} All nurses, no matter what their area of specialization, must have the basic competences necessary to prepare for emergencies, protect the community from disaster, and employ their knowledge and skills in the time during and after a disaster.⁴ Nurses must integrate the knowledge, skills, competences, and good judgments required in disaster and emergency nursing and the abilities to fulfill their duties to produce the desired results under varied circumstances.⁶ However, a review of the studies in this context shows that nurses do not feel confident about their abilities to intervene in emergency situations, and that their perceptions of preparing for disasters and their levels of knowledge are inadequate.^{4,5,7,8} The International Council of Nurses (ICN) created a ‘Framework for Core Competencies in Disaster Nursing’ in 2009 for the purpose of training all nurses for disaster readiness and emergency intervention. These competences are part of the guidelines that specifically define the role of nurses in disaster circumstances, leading them in the task of developing a system of disaster training and instruction.⁹

The literature emphasizes that providing nursing students with training in disaster nursing and management has the potential to produce such positive outcomes as reducing mortality rates among individuals and communities that fall victim to disaster as well as diminishing the costs involved in dealing with emergencies.^{4,5,10} It is asserted that disaster nursing and management training together with identifying the effectiveness of such education is an important priority that must not be neglected.¹⁰ An examination of the studies carried out in this context shows that many focus on the indications of disaster nursing competency and on determining the methods and teaching techniques that can form a framework for disaster nursing education.^{11–14} However, the number of studies exploring levels of disaster nursing competency among nursing students is quite limited.^{3,6} In particular, it can be seen that most of the literature

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in Turkey is about education, focusing on the level of students' knowledge, nurses' readiness for states of emergency, and their duties, authorities, and responsibilities in this context.^{15,16} Additionally, there is no evidence in the literature that indicates that any measuring instrument has been developed or is being used in Turkey to assess nursing students' competencies with regard to interventions in an emergency. To ensure that nurses can provide qualified services in disaster situations, their roles and responsibilities, training, and scope of service are matters that must be addressed so that both nurses and nursing students can be evaluated in terms of their readiness and competence in a state of emergency. Valid and reliable tools must be used to make an objective and standardized assessment that will result in determining quality and competence. The aim of this study was to assess in the Turkish culture, the validity and reliability of the 'Disaster Response Self-Efficacy Scale' developed by Li *et al.*⁶

Materials and methods

Design, setting, and sample

The study design was methodological and was conducted in a nursing faculty in a city, in provinces located in the western part of Turkey, between May and June 2019. The study population comprised of 280 3rd-year nursing students and 275 4th-year nursing students (N = 555). The reason for choosing third and fourth grade students is that they have taken courses that include topics such as nursing, triage, infectious diseases and their control, psychological assessment, therapeutic approach, and professional ethical principles in disasters. This study was conducted with 340 students who attended the 2018 - 2019 academic year and volunteered to participate after the purpose of the research was announced. The participation rate was 61.26%.

Research instruments

The study data were collected using the descriptive information form and the Turkish version of the 'Disaster Response Self-Efficacy Scale (DRSES).'

Descriptive Information Form

The form has 4 questions the participating students' age, gender, and year at school, and whether they have received disaster nursing education other than university education.

Disaster response self-efficacy scale (DRSES)

The scale developed by Hong-Yan Li, Rui-Xue, and Qing-Ling in 2017 is composed of 19 items and 3 subscales.⁶ The items are rated on a 5-point Likert scale ranging from 1 to 4 (1 = No confidence at all, 2 = Basically no confidence, 3 = Little confidence, 4 = Basically confident, 5 = Complete confidence). A higher rating was representative of a higher self-efficacy score in disaster response. While the Cronbach's alpha value for the overall scale is 0.91, it is 0.89 for the on-site rescue competency subscale, 0.86 for the disaster psychological nursing competency subscale, and 0.83 for the disaster role quality and adaptation competency subscale.⁶

Data collection

The data were filled out based on self-reporting. Filling out the forms took place at the end of the students' classes, after an appropriate time was chosen based on their class schedule and on a day

that did not coincide with their clinical practice. The process took 10 minutes.

Data analysis

The Statistical Package for the Social Sciences (SPSS) 20.0 (IBM Corp., Armonk, NY, USA) and the 'Analysis of Moment Structures (Amos) 21.0 (IBM Corp., Armonk, NY, USA) statistics package programs were used in the analysis of the data collected. Descriptive sample characteristics are presented as number and percentages.

Test of validity and reliability

The method of translation/back-translation was used in assessing the linguistic validity of the DRSES. Content validity was evaluated by 8 experts with scientific expertise in the field of disaster and disaster nursing. Content validity was assessed by content validity index (CVI) (item-level and scale-level). Item and scale CVIs were evaluated based on the Polit and Beck model.¹⁷ A scale CVI of 0.80 or higher was considered acceptable. The Kendall W coefficient of concordance was used to determine the degree of concordance between the scores of the multiple referees.

To explore and test a model of DRSES, both exploratory (EFA) and confirmatory (CFA) factor analyses were performed. To support dimensionality and interpretation of the factors, EFA was used. Then, a 3-factor model was evaluated through a CFA. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett test of sphericity were used to assess whether the sample was adequate, and the factor correlation matrix was suitable for factor analysis. Principal component analysis (PCA) and varimax rotation was used to count factor loadings. The CFA tested the model fit of the extracted factor model. Multiple model fit indices are recommended that χ^2 /degrees of freedom (χ^2 /sd0.90); Tucker-Lewis index (TLI > 0.90); Incremental fit index (IFI > 0.90).¹⁸⁻²¹

For reliability, Cronbach's α values, test-retest reliability, intra-class correlation coefficient, and paired-sample t tests were used.

Ethical considerations

Permission for the use of the DRSES was obtained via email from Hong-Yan Li. Ethical approval was granted by the Scientific Research and Publication Ethics Committee of Ege University (Date and Number: 28.03.2019-03/23/194). Permission to conduct the study was also obtained from the nursing faculty. The purpose of the study was explained to the students, and the students who agreed to voluntarily participate in the research were included in the study. Moreover, oral and written informed consent was obtained from the students.

Results

Descriptive characteristics of the sample

The average age of the students who participated in the research is 22.55 ± 0.74 , 70.3% are women and 54.6% are fourth grade students. All the students participating in the study stated that the subject of 'disasters nursing' was included in the course content during the nursing education process.

Table 1. Factor loading of the Disaster Response Self-Efficacy Scale (DRSES)

F1		F2		F3	
Item	Factor loading	Item	Factor loading	Item	Factor loading
Item 6	0.74	Item 1	0.81	Item 16	0.76
Item 7	0.73	Item 2	0.79	Item 17	0.75
Item 8	0.70	Item 3	0.71	Item 18	0.73
Item 9	0.67	Item 4	0.66	Item 19	0.69
Item 10	0.62	Item 5	0.54		
Item 11	0.60				
Item 12	0.58				
Item 13	0.55				
Item 14	0.51				
Item 15	0.50				

Validity analysis

Content validity

As a result of expert evaluation, the items of the scale (item 8, item 10, item 16, and item 19) were modified and adjusted. As evaluated by the 7 experts, the I-CVIs range was 0.87 to 1.00 and S-CVI was 0.96. According to the Kendall W test, there was an agreement between the experts (Kendall's $W = 0.367, P = 0.000$).

Construct validity

According to Bartlett's test of sphericity, the KMO was 0.928 and χ^2 was 3790.68 ($P < 0.001$), confirming the suitability of the factor analysis. The PCA was applied to extract common factors and 3 factors whose eigenvalue was above 1.0 were extracted. The first eigenvalue was 9.11, the second was 1.14, and the third was 1.04, which together explained 59.40% of the total variance. Individually, factors 1, 2, and 3 explained 24.3%, 18.4%, and 16.7% of the total variance, respectively. As a result of the Varimax rotation technique, it was determined that the factor loading for the 19 items of the scale ranged between 0.50 - 0.81. According to the results of factor analysis, items between 6 - 15 were included in Factor 1, items 1- 5 were in Factor 2, and items 16 - 19 were in Factor 3 (Table 1).

According to the CFA results, the fit indices were: $\chi^2/df = 2.54$; RMSEA = 0.067; CFI = 0.93; NFI = 0.95; GFI = 0.93; TLI = 0.94; IFI = 0.92; $P < 0.001$. The 19-item 3-factor model of the Turkish version of the scale created can be seen in Figure 1.

Reliability analysis

All item-total correlations were greater than 0.30 (0.54 - 0.72). According to the t-test analysis, the item discrimination power between the group that corresponded to the upper 27% based on total scores, and the group corresponding to the lower 27%, was statistically significant ($P < 0.001$) (Table 2).

Internal consistency and test-retest reliability

The total Cronbach's alpha of the scale was 0.94, and the Cronbach's alphas for the 3 dimensions were 0.89, 0.86, and 0.86. The questionnaires were re-tested 2 weeks after the first round, and the test-retest reliabilities of the 3 dimensions were 0.998, 0.940, and 0.960. The total test-retest reliability of the scale was 0.950 ($P < 0.001$) (Table 3).

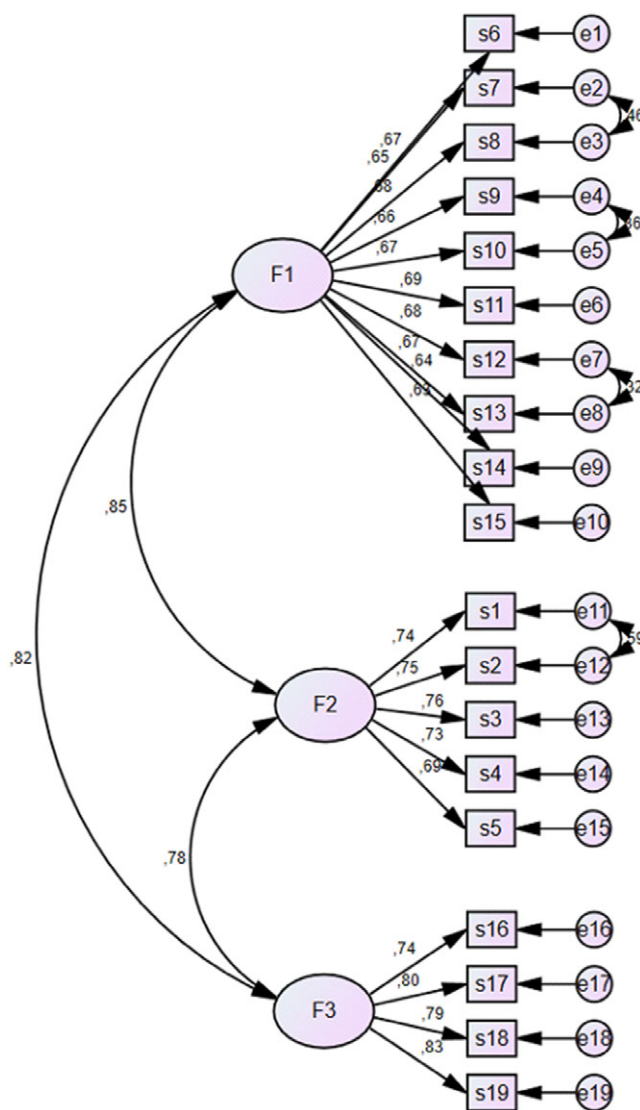


Figure 1. Structural equation model of the Disaster Response Self-Efficacy Scale.

Discussion

The purpose of the study was to examine the validity and reliability of the Turkish form of the Disaster Response Self-Efficacy Scale. The scale, with its 3 sub-scales and 19 items, was found to be a valid and reliable tool to be used in the Turkish culture. The validity and reliability study of the measure thus provided a tool that can be used in Turkey to determine the competence of nursing students in disaster nursing.

The content validity index (CVI) for sufficient content validity is required to be over 0.80. The study showed that the instrument has a high content validity index. Also, testing with Kendall's coefficient of concordance (W) indicated that interrater agreement was moderate.^{22,23} Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were used in the study to examine construct validity. The Kaiser-Meyer-Olkin (KMO) Test and Bartlett's Test of Sphericity were performed prior to the EFA, and it was determined that the sample was sufficient to test construct validity.^{20,24}

The EFA results showed that the 3-factor construct explained 59.40% of total variance. The total variance explained needs to be

Table 2. Item analysis of Disaster Response Self-Efficacy Scale

Item	Item Total Correlations	Item Discrimination Power	
	r	t	P
Item 1	0.681	14.973	0.000
Item 2	0.701	17.542	0.000
Item 3	0.682	16.551	0.000
Item 4	0.608	13.525	0.000
Item 5	0.606	13.194	0.000
Item 6	0.608	13.714	0.000
Item 7	0.656	15.246	0.000
Item 8	0.674	16.317	0.000
Item 9	0.633	14.675	0.000
Item 10	0.663	15.941	0.000
Item 11	0.667	15.622	0.000
Item 12	0.690	15.670	0.000
Item 13	0.655	14.946	0.000
Item 14	0.542	12.107	0.000
Item 15	0.536	12.138	0.000
Item 16	0.627	14.702	0.000
Item 17	0.665	16.322	0.000
Item 18	0.696	20.150	0.000
Item 19	0.721	18.005	0.000

Table 3. Internal consistency and test-retest reliability for the Disaster Response Self-Efficacy Scale

Sub-Dimensions	Items Numbers	Internal Consistency	Test-Retest Reliability	
		Cronbach Alpha	r	P
Search & rescue and psychological assessment self-efficacy	10	0.89	0.998	0.000
Disaster assessment self-efficacy	5	0.86	0.940	0.000
Adaptation self-efficacy	4	0.86	0.960	0.000
Disaster Response Self-Efficacy Scale	19	0.94	0.950	0.000

over 50%.²⁵ Accordingly, the fact that the factor construct of the DRSES explained more than 50% of total variance meant that the items were appropriately representative. Factor loads were examined to understand which item fell under which factor.

The literature suggests that a factor load should be > 0.30 .^{17,26} The factor loads in the study were over 0.50, ranging between 0.50 - 0.81, which means that the items were in agreement with each other and with the factor they were included in.²⁶ There is a difference between our study and the items in the first and second subscales of the original study by Li *et al.* Items 1-11 corresponded to the first subscale (search and rescue self-efficacy) of the original study and items 12-15 to the second subscale (psychological self-efficacy).⁶ Since 6 items in the search and rescue self-efficacy subscale and the items in the psychological assessment self-efficacy subscale fell under the first factor, this collective structure was called the 'Search & rescue and psychological assessment

self-efficacy' subscale. The 5 items collected under the second factor fell under the theme of disaster assessment and therefore was called the 'Disaster assessment self-efficacy' subscale. Since the third factor construct showed consistency with the original study, the original subscale name of 'Adaptation self-efficacy' was maintained. Individuals in societies express their feelings and thoughts differently and exhibit variations in behavior. Even in the same society, in fact, factors such as social structure, education, and technological advances can lead to rapid cultural changes. For example, 1 group of persons may simply be part of a less effective education system, and this would have a significant impact on test performance.²⁷ It may explain the differences in the distribution of the items in the first and second subscales stemmed from educational and cultural differences.

The verification of the 3 -factor construct obtained from the EFA was explored with a CFA, which showed that $\chi^2/df = 2.54$, signifying an excellent fit. The RMSEA value of below 0.08, the CFI, NFI, GFI, TLI, and IFI values of above 0.90 pointed to a good fit.^{18,19,21} In the original study by Li *et al.*⁶ it was found that $\chi^2/df = 2.440$, RMSEA = 0.068, NFI = 0.907, CFI = 0.942. These findings are consistent with the results of the present study. The analyses confirmed the 3 -factor construct, signifying that the instrument is a valid measuring tool.

An item analysis was performed to assess the reliability of the measure, and it was found that total correlations were over 0.40 and discrimination power was statistically significant. These results indicate that the instrument's ability to measure the qualities it is intended to measure is at an elevated level and that its power to discriminate the measured characteristics of individuals is good.²⁸⁻³⁰

Cronbach's alpha reliability analysis showed that the internal consistency coefficients for the overall scale and its subscales were high, pointing to a prominent level of reliability.³¹ The internal consistency analysis performed by Li *et al.*⁶ had revealed a Cronbach's alpha value of 0.91 for the overall scale and values within the range of 0.83 - 0.89 for the subscales. The data found in the original study are like our findings. According to the test-retest analysis, the total score correlations obtained from the first and second measure were statistically significant, indicating a strong correlation.³¹ At the end of their repeated measures, obtained at 2 -week intervals, Li *et al.*⁶ found test-retest reliability to be 0.95 for the overall scale, and between 0.91- 0.95 for the subscales, all statistically significant. These results reveal that scale measures are similar when measures are repeated at determined intervals and that there is consistency between measures. The analyses demonstrated that the scale is a reliable measuring tool.

Conclusion

The findings of our study show that the Turkish form of the Disaster Response Self-Efficacy Scale is a valid and reliable measuring instrument. The use of this scale, whose validity and reliability have thus been determined, will make it possible to plan programs designed to identify the disaster nursing competencies of undergraduate nursing students in Turkey. The results obtained from such efforts will be rendered comparable to the data collected in other countries with this instrument and it will also be possible to offer recommendations regarding the training of nurses for disaster readiness.

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