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Adaptation of the Disaster Literacy Scale to Individuals Aged 60 Years and Older and Exploring its Psychometric Properties

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Original Research

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Abstract

Objectives: This methodological study aimed to adapt the DLS, introduced for individuals aged 18-60 years, to those aged 60 years and older and to determine its psychometric properties.
Methods: We collected the data between December 15, 2021 and April 18, 2022. We carried out the study with a sample of 60 years and older living in the city center of Burdur, Turkey. The sample was selected using snowball sampling, a non-probability sampling technique. We collected the data using a questionnaire booklet covering an 11-item demographic information form and the DLS. We utilized reliability and validity analyses in the data analysis. The analyses were performed on SPSS 23.0, and a P value < 0.05 was considered statistically significant.
Results: The mean age of the participants was found to be 68.29 (SD = 6.36). The 61-item measurement tool was reduced to 57 items by removing a total of 4 items from the scale. We also calculated Cronbach's α values to be 0.936 for the mitigation/prevention subscale, 0.935 for the preparedness subscale, 0.939 for the response subscale, and 0.945 for the recovery/rehabilitation subscale.
Conclusions: As adapted in this study, the DLS-S can be validly and reliably used for individuals aged 60 years and older.

UNESCO defines literacy as "the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts."[1] It is also emphasized in the literature that the concepts of general literacy and disaster literacy are different branches of literacy[2] or that the concepts associated with other types of literacy need to be studied on the basis of health literacy.[3] While health literacy is denoted through many definitions in the literature, the concept of disaster literacy is still in its infancy. It is generally believed that deploying the approaches utilized in health seems appropriate for disaster literacy, just like other types of literacy.[3] Disaster literacy is also defined in the literature under more specific categories, such as natural disaster literacy,[4] disaster prevention literacy,[5] disaster mitigation literacy,[6] and disaster health literacy.[7] Since covering all phases of mitigation, preparedness, response, and recovery, the concept/model of disaster literacy can conveniently be used in studies involving disaster management.[3] Çalışkan and Üner define disaster literacy as "the capacity of accessing, understanding, evaluating, and implementing disaster information to make informed decisions in daily life and follow instructions regarding the mitigation/prevention, preparedness, response and recovery/rehabilitation of a disaster to be able to protect or improve one's quality of life throughout their lives."[8]

The disaster-causing damage that directly or indirectly affects the entire population varies by the characteristics of that population (gender, age, etc.).[9] The rapidly increasing older adult population is more vulnerable to disasters and, therefore, suffers more during disasters than the general population, suggesting that the research on disasters needs to consider innovative approaches for the vulnerable groups in the general population, particularly older adults.[3] Although the literature offers a plethora of studies on the social vulnerability of older adults,[10–12] they seem not to reach a consensus on the conceptual framework, dimensions, and affecting factors of their social vulnerability.[13] In addition to the geographical location, culture, and economic hardship, the moral losses frequently encountered among older adults exacerbate their vulnerability to disasters.[14] Thus, clear, direct, and consistent messages should be conveyed to create disaster literacy at all levels in vulnerable populations. Yet, transmitting such messages seems only possible by first determining the need and then deploying appropriate techniques. Efforts to satisfy one's disaster literacy needs may carry their points thanks to evaluating disaster literacy through various practices (identifying measurement tools and criteria or developing communication materials). The research on measurement, monitoring, and development of disaster preparedness among older adults seems limited in number and content. Nevertheless, it is key to determine and contribute to disaster literacy among older adults to be able to project the

current situation and reduce their vulnerability.[3] Although disaster literacy is considered to be associated with ensuring the safety of older adults in disasters,[3] the literature does not describe any measurement tool oriented to measuring disaster literacy among older adults. Thus, the present study attempted to adapt the Disaster Literacy Scale (DLS), developed by Çalışkan and Üner in 2022, to those aged 60 years and older and to reveal its psychometric properties.

Methods

Design

This methodological study aimed to adapt the DLS, introduced for individuals aged 18-60 years, to those aged 60 years and older and to determine its psychometric properties.

Content Validity

Çalışkan and Üner developed the 61-item DLS for individuals aged 18-60 years to be utilized in the Turkish context.[8] In this study, we investigated whether the scale would be deployed for individuals aged 60 years and older as the "Disaster Literacy Scale – Seniors (DLS-S)." Although the scale is oriented to the Turkish context in both cases, different age groups are targeted in the original study and the current research. In the original study, the authors finalized the scale following the relevant stages of developing a measurement tool (deciding on the structure, generating an item pool, determining the measurement method, preparing the instructions, and resorting to expert opinions for the items).[8] To seek the DLS-S's content validity, we also resorted to expert opinions to explore the suitability of the items for the targeted age group. Accordingly, we submitted the 61-item instrument to a total of 10 experts in various fields via e-mails. The experts were requested to assess the suitability of the items and tick one of the options on an evaluation form: "the item fits the context and should remain in the item pool," "the item is useful but not sufficient," and "the item needs to be removed." Moreover, we spared a blank input box for each item to allow the experts to provide further remarks on the items. While evaluating the forms, we only considered the items for which all the experts ticked the option "the item fits the context and should remain in the item pool." Finally, we calculated the Content Validity Ratio (CVR) and Content Validity Index (CVI) values for each of the items considered "necessary."

Pilot Study

Prior to the research, we went through all the items considering the individuals aged 60 years and older and carried out a pilot study with a group of 20 participants, similar to the designed sample, to test the intelligibility of the items.

Sample

We carried out the study with a sample of 60 years and older living in the city center of Burdur, Turkey. To study the psychometric properties of an instrument, the relevant literature suggests reaching individuals 10 times the number of items in the scale or recruiting a sample size of 300-400 people regardless of the number of indicators per factor.[15] In the literature, a sample size of 400 is also attributed as "good" and 500 people as "very good."[16] Accordingly, we targeted to reach 500 people and collected the data from 550 people considering possible inconveniences on the data (e.g., missing or erroneous responses). Because 22 participants gave consistently repetitive responses to the items, we recruited the responses of 528 participants in the analyses.

The sample was selected using snowball sampling, a non-probability sampling technique. The study included only those living in the city center of Burdur, being 60 years and older, and being able to understand the items and express their thoughts. Additionally, to perform test-retest analysis in the research, we administered the same instrument to 135 participants, who provided their contact information and agreed to participate in the second round of data collection under the same conditions after 2 or 3 weeks of the first round of data collection. The inclusion criteria were that the participants' place of residence was Burdur, they were 60 years of age or older, and they could understand the questions and express their thoughts. The exclusion criteria were that the participants resided outside Burdur province, were under the age of 60, and had difficulty in understanding the questions and expressing their thoughts. In the first sample, 16 people were excluded during data collection. Because the people sampled for the second time were selected from the first sample, all of them were included in the study.

We collected the data between December 15, 2021 and April 18, 2022. After obtaining their verbal informed consent, we distributed a questionnaire booklet to the participants in public places (streets, squares, workplaces, and cafes) in the city center. We helped those having difficulty understanding some parts of the instruments and responded to their questions. Following data collection, those leaving missing items were requested to respond to the missing items.

Data Collection Tools

In this study, we collected the data using a questionnaire booklet covering an 11-item demographic information form and the DLS.

The DLS is a self-report measurement tool designed by Çalışkan and Üner to measure disaster literacy among Turkish individuals aged 18-60 years. The conceptual framework of the instrument covers a 4*4 matrix structure designed as 4 dimensions (mitigation/prevention, preparedness, response, and recovery/rehabilitation) and decision-making and obtaining information about disaster-related practices (access, understand, appraise, and apply the information); therefore, the conceptual framework of this 61-item scale targets 16 domains. Accordingly, the statements in each of these 16 cells of the matrix were designed to measure the capacity of individuals to read, understand, and utilize the information by following the guidelines for the mentioned 4 stages of disasters: mitigation/prevention (items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17), preparedness (items 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, and 33), response (items 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, and 46), and recovery/rehabilitation (items 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, and 61). The items are scored on a 5-point Likert-type scale ranging from 1 (very difficult) to 5 (very easy), and there is no reverse-coded item in the scale. The higher scores on the tool indicate an increased level of disaster literacy. The total score is standardized to take values between 0-50 for ease of calculation; 0 point indicates the lowest disaster literacy level, while 50 points suggest the highest disaster literacy level. According to this formula, the authors determined the cut-off scores for the 4 subscales based on the Standard Deviations (*SD*). Accordingly, 0 - < 30 points refer to inadequate disaster literacy, 30 - < 36 points indicate limited disaster literacy,

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36 - < 42 points show adequate disaster literacy, and 42-50 imply excellent disaster literacy.[8]

Data Analysis

We utilized reliability (internal consistency reliability and test-retest reliability) and validity [CVR, CVI, and Exploratory Factor Analysis (EFA)] analyses in the data analysis. The normality of distribution was checked using the skewness and kurtosis values. The analyses were performed on SPSS 23.0, and a P value < 0.05 was considered statistically significant.

Ethical Considerations

The Ethics Committee of the relevant university granted ethical approval to our study (No: GO 2021/404 dated December 1, 2021), and we obtained verbal consent from the participants. Moreover, we obtained written permission from the developers via e-mail to study the psychometric properties of the DLS in participants aged 60 years or older.

Results

Sample Characteristics

In this study, while 58.0% (306) of the participants were women, 47.9% (253) had primary school education. The mean age of the participants was found to be 68.29 (SD = 6.36).

Validity

We considered CVR and CVI values and the results of the EFA in the scope of the validity analyses of the DLS. Initially, we calculated CVR and CVI values for each subscale to explore the validity of the scale. Accordingly, the 61-item measurement tool was reduced to 57 items by removing a total of 4 items from the scale, 2 items with a CVR of zero (0) or negative (less than zero) and 2 items with a CVR less than 0.62. We also discovered that the CVI values of these 57 items varied between 0.70 and 0.90 ($mean$ = 0.78) and that the construct was statistically significant. Before the EFA, we also considered the presence of a multicollinearity problem in all subscales. Accordingly, we calculated the inter-item correlations to vary between 0.15 and 0.85 for the mitigation/prevention items, between 0.24 and 0.87 for the preparedness items, between 0.42 and 0.88 for the response items, and between 0.36 and 0.85 for the recovery/rehabilitation items. In general, the items yielded moderate inter-item correlations. The lack of high correlations suggested that the instrument did not raise a multicollinearity issue.

Then, we performed EFA to explore the construct validity of the DLS for older adults. As accepted in the original study, we sought that the factor loadings of the items should not be less than 0.50 and that the difference between the factor loadings of any 2 items should be a maximum of 0.15 to avoid overlapping items. The EFA was performed for each subscale following the order in the original study. The findings for the mitigation/prevention, response, and recovery/rehabilitation yielded a 3-factorial structure. Then, we re-examined the distribution of the items in these factors by increasing the number of factors to 4 in the "Factor Analysis: Extraction" section (in accordance with the original study and within the knowledge and suggestion of the corresponding authors). While pre-determining the factors, we accepted the eigenvalue to be 1 for the preparedness subscale; however, the mentioned value was ignored because the number of factors was entered manually for other subscales. We chose the direct oblimin rotation technique, an oblique rotation technique, to obtain more evident factors and discovered that the items were loaded within their own constructs. Accordingly, we found the total variance explained for the mitigation/prevention subscale to be 51.56, for the response subscale to be 59.94, and for the recovery/rehabilitation subscale to be 58.78 (Table 1). In the EFA for the preparedness subscale, we initially obtained a 4-factorial structure, discovered the items to load into their own constructs, and calculated the total variance explained for the subscale to be 89.90 (4 sub-matrix with an eigenvalue greater than 1: access [52.85], understand [17.78], appraise [10.91], and apply [8.35]).

In the EFA, the Kaiser-Meyer-Olkin (KMO) coefficient was calculated to be 0.91 for the mitigation/prevention subscale (P < 0.001), 0.89 for the preparedness subscale (P < 0.001), 0.89 for the response subscale (P < 0.001), and 0.90 for the recovery/rehabilitation subscale (P < 0.001) (Table 1). The communality was accepted as 0.500 for all subscales, and we found no item falling below this value on any of the subscales.

Reliability

We considered item statistics, internal consistency reliability (Cronbach's α), test-retest reliability, and Tukey summable test results for reliability concerns of the DLS-S.

Considering item statistics, we discovered the lowest item-total correlation to be 0.38 in item 10 and the highest item-total correlation to be 0.77 in items 31 and 48. The item-total correlations ranged between 0.38 and 0.73 for the mitigation/prevention subscale, between 0.55 and 0.77 for the preparedness subscale, between 0.62 and 0.75 for the response subscale, and between 0.55 and 0.77 for the recovery/rehabilitation subscale (Table 2).

We also calculated Cronbach's α values to be 0.936 for the mitigation/prevention subscale, 0.935 for the preparedness subscale, 0.939 for the response subscale, and 0.945 for the recovery/rehabilitation subscale (Table 3).

The Tukey summable test results yielded P = 0.721 for the mitigation/prevention subscale, P = 0.004 for the preparedness subscale, P = 0.019 for the response subscale, P < 0.001 for the recovery/rehabilitation subscale, and P < 0.001 for the total score.

Finally, we calculated the test-retest correlations to be 0.789 for the mitigation/prevention subscale (P < 0.001), 0.888 for the preparedness subscale (P < 0.001), 0.685 for the response subscale (P < 0.001), and 0.671 for the recovery/rehabilitation subscale (P < 0.001).

Scoring

Upon calculating the z-scores of the items remaining in the item pool, we determined the cut-off points for the DLS-S as follows: SS - 1 and below, SS - 1 and 0, SS 0 and + 1, and SS + 1 and above. For the concern of the ease of calculation, we standardized the total score using the following formula,[8] which would take a value between 0 and 50:

Formula = Index = (arithmetic average – 1) x (50 / 4)
Index = Index original to the calculated person
Arithmetic average = Average responses to each item
1 = Lowest possible value of the average (causes the lowest index to be 0)
4 = Average range
50 = Highest selected value for the new criteria
The lowest DLS-S score = 0
The highest DLS-S score = 50 (Table 4).

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Table 1. EFA results for the DLS-S

	Rotated components table						Rotated components table				
	Item no	Access	Understand	Appraise	Apply		Item no	Access	Understand	Appraise	Apply
Mitigation/ Prevention	5	0.958				**Response**	34	–0.999			
	2	0.939					35	–0.948			
	1	0.936					36	–0.926			
	3	0.872					41		0.923		
	4	0.868					40		0.919		
	12		0.915				37		0.904		
	10		0.880				39		0.673		
	8		0.846				43			–0.616	
	11		0.804				44			–0.598	
	9		0.804				42			–0.534	
	7		0.786				45				0.953
	13			–0.855			46				0.940
	15			–0.660							
	14			–0.643							
	16				0.896						
	17				0.577						
	KMO test: 0.913, <0.001; Variance Cumulative: 51.569						*KMO test: 0.891, <0.001 Variance Cumulative: 59.949*				
Preparedness	21	0.936				**Recovery**	50	–0.864			
	19	0.934					47	–0.838			
	18	0.907					51	–0822			
	25		0.966				48	–0.735			
	22		0.960				53		0.787		
	24		0.945				54		0.783		
	26		0.922				55		0.752		
	23		0.881				52		0.657		
	28			0.962			58			0.853	
	29			0.953			56			0.853	
	27			0.944			57			0.804	
	30			0.934			60				0.857
	31				–0.965		61				0.845
	32				–0.958		59				0.758
	33				–0.912						
	KMO test: 0.898, <0.001; Variance Cumulative: 89.904						*KMO test: 0.900, <0.001; Variance Cumulative:58.786*				

Discussion

Literacy is known to be directly affected by one's other skills (particularly cognitive skills), the group effect in a specific period (e.g., education may not be offered at consistent quality to all generations due to the radical changes to the education system from time to time), and the period effect (e.g., the entire population's exposure to war or a famine). Independent of time and geographical location, it is not surprising that one's skills vanish with aging, that older generations have lower or insufficient educational attainment, and that older adults are more affected by adverse situations such as war. Regardless of age, literacy is highly variable depending on biological, behavioral, environmental, and social factors. Therefore, there is a need for measurement tools that cover the same age, group, and period effects on literacy and that enable the same population to be comparable at different times and internationally.[17] Recent years have witnessed the introduction of many measurement tools to measure older adults' health literacy[18], health literacy oriented to dentistry practices[19], internet-computer literacy[20], and electronic health literacy.[21] In this sense, the importance and acceleration of research on the literacy of older adults in recent years suggest that it may also be noteworthy to explore their

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Table 2. DLS-S item statistics and reliability values

Sample							
Item	Mean ± *SD**	Item total correlation	Cronbach α value when item removed	Item	Mean ± *SD**	Item total correlation	Cronbach α value when item removed
1	2.85±1.40	0.650	0.979	32	2.82±1.23	0.735	0.979
2	2.74±1.32	0.600	0.979	33	2.76±1.25	0.764	0.979
3	2.90±1.29	0.636	0.979	34	2.67±1.32	0.672	0.979
4	2.78±1.30	0.697	0.979	35	2.65±1.28	0.698	0.979
5	2.80±1.29	0.644	0.979	36	2.67±1.29	0.691	0.979
6[a]				37	3.38±1.36	0.754	0.979
7	3.26±1.19	0.596	0.979	38[a]			
8	3.08±1.21	0.503	0.979	39	2.99±1.27	0.702	0.979
9	3.33±1.28	0.518	0.979	40	3.28±1.43	0.745	0.979
10	3.10±1.17	0.382	0.980	41	3.26±1.39	0.689	0.979
11	2.94±1.18	0.540	0.979	42	2.74±1.31	0.712	0.979
12	3.02±1.07	0.526	0.979	43	2.93±1.28	0.665	0.979
13	2.90±1.31	0.625	0.979	44	3.08±1.37	0.738	0.979
14	2.74±1.29	0.671	0.979	45	3.19±1.21	0.626	0.979
15	3.23±1.36	0.718	0.979	46	3.12±1.30	0.633	0.979
16	2.73±1.30	0.649	0.979	47	2.52±1.31	0.728	0.979
17	3.04±1.44	0.739	0.979	48	2.64±1.29	0.775	0.979
18	2.30±1.24	0.627	0.979	49[a]			
19	2.25±1.15	0.555	0.979	50	2.55±1.21	0.654	0.979
20[a]				51	2.61±1.17	0.710	0.979
21	2.38±1.17	0.555	0.979	52	2.92±1.30	0.717	0.979
22	3.01±1.19	0.578	0.979	53	2.82±1.32	0.737	0.979
23	2.91±1.21	0.679	0.979	54	3.09±1.42	0.762	0.979
24	2.83±1.13	0.547	0.979	55	2.90±1.32	0.730	0.979
25	2.97±1.28	0.578	0.979	56	2.95±1.23	0.730	0.979
26	2.97±1.16	0.611	0.979	57	2.95±1.24	0.746	0.979
27	2.66±1.13	0.659	0.979	58	2.73±1.21	0.715	0.979
28	2.57±1.09	0.653	0.979	59	2.68±1.27	0.651	0.979
29	2.60±1.19	0.641	0.979	60	2.45±1.23	0.551	0.979
30	2.64±1.08	0.653	0.979	61	2.71±1.32	0.572	0.979
31	2.75±1.25	0.774	0.979				

*Standard deviation.
[a]Although the relevant item was included in the DLS, it was excluded from the DLS-S considering CVI and CVR values in this study.

Table 3. Reliability values of the DLS-S items

DLS-S phases	Number of items	Total item correlation	Average item (*SD*)	Skewness/kurtosis	Cronbach α
DLS-S	57	0.38–0.77	2.85(0.25)	–0.15/–0.65	0.978
Mitigation/Prevention	16	0.38–0.73	2,96 (0.19)	–0.22/–0.60	0.935
Preparedness	15	0.55–0.77	2.70 (0.24)	–0.09/–0.74	0.936
Response	12	0.62–0.75	3.00(0.26)	–0.005/–0.72	0.939
Recovery/Rehabilitation	14	0.55–0.77	2.75(0.19)	0.15/–0.54	0.945

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Table 4. Cut-off points of the DLS-S scores and their equivalents in the 50-point system

Average item	Average item values by average	Threshold point ranges in the 50-point system	Approximate point range	DLS-S categories
–1 and below	2.0001 and below	20.001 and below	0- < 21	Inadequate DLS-S
–1 and 0	2.0002 – 2.8401	20.002 – 28.401	21- < 29	Limited DLS-S
0 and +1	2.8402 – 3.7201	28.402–37.201	29- < 38	Adequate DLS-S
+1 and above	3.7202 and above	37.202 and above	38 – 50	Excellent DLS-S

disaster literacy. However, there is a paucity of research on the disaster literacy of older adults in the relevant literature. Similarly, the literature does not offer a measurement tool designed to measure older adults' disaster literacy.

Çalışkan and Üner developed the DLS to measure the disaster literacy of the general population in Turkey (individuals aged 18-60 years).[8] In this study, we explored whether the scale can be utilized in individuals aged 60 years and older and tested its psychometric properties.

Within the validity analyses of the DLS-S, we first submitted the scale to expert opinions. It is often stated that the smallest CVR for a Likert-type measurement tool evaluated by 10 experts should be 0.62 ($P < 0.05$)[22] (0.78 in this study). Following CVR and CVI calculations and expert opinions, we removed a total of 4 items from the scale, 1 from each subscale (item 6 on the mitigation/prevention subscale: Accessing information about the training of disaster volunteers), item 20 in the preparedness subscale: (Accessing the training of first responders to disasters [e.g., police, first-aid personnel, and fire brigade personnel]), item 38 on the response subscale (Understanding the importance of institutions' disaster equipment kits with items such as medicine, medical supplies, food, and clothing), and item 49 on the recovery/rehabilitation subscale (Accessing the information of what units the disaster and emergency management center staff is divided into in a disaster area). We also revised some items upon expert opinions item 17 (Identifying the citizens needing help around before a disaster), item 34 (Accessing evacuation information if relevant institutions raise warnings and alerts about the danger immediately before the start of the disaster), and item 54 (Understanding what the assistance needs of citizens with special needs might be in the aftermath of a disaster). The final version of DLS-S consists of 57 items on a 5-point Likert-type scale.

The findings revealed that the inter-item correlations were all below 0.90, indicating no multicollinearity problem.[22] When it comes to the factor analysis, we did not find any item with a factor loading below 0.32, accepted as the cut-off value, on any of the subscales.[14] The original study accepted the minimum item factor loading as 0.50, and we discovered the factor loadings of all the items in this study were above that value. Because the number of factors was manually passed as "4" for the mitigation/prevention, response, and recovery/rehabilitation subscales in this study, the condition of an eigenvalue of 1 and above in the literature could not be met for these subscales.[23] Such a situation applied only to the recovery/rehabilitation subscale, and the number of factors was passed manually in the original study. Because the factorial structure and number of factors for the scale were clearly explained in the original study, the authors suggested manually passing the number of factors for the mentioned 3 subscales and examining the distribution of item factor loading in this way. Our factor analysis yielded that the items were all clustered under the relevant factors.

For reliability concerns, we initially examined Cronbach's α values and item-total correlations on the DLS-S. The findings revealed that the item-total correlations of all items were above the cut-off value of 0.20[24] and that Cronbach's α values of the subscales were above 0.90.[22] Next, we considered the test-retest reliability coefficients. Accordingly, while we calculated a strong test-retest reliability for the mitigation/prevention and preparation subscales, it remained moderate for the response and recovery/rehabilitation subscales. Thus, our findings overlap with the cut-off points specified in the literature (0.40-0.69 = moderate correlation and 0.70-0.89 = strong correlation).[22]

Similar to the original study, we also attempted to make a standardization for scoring between 0 and 50 points for the ease of comparison of the measurement results. In the standardization, we designed the cut-off points as "inadequate, limited, adequate, and excellent," similar to the original study.[8] Yet, the cut-off points of the standardized scores in the original study were higher than those determined in this study, which may be because older adults may have had difficulties in understanding the concepts of disaster, the scale items may be both too long and high in number, the participants may have become distracted from the scale after a certain period of time, or they may not have wanted to spend a long time with the instrument due to their age.

Some of the limitations uttered in the original study, and even more, also apply to the present study. In the DLS-S framework, the subscales and the sub-indices (access, understand, appraise, and apply) were given one after the other, which may have caused a sorting effect among the participants. Secondly, all of the statements on the scale are positive, which may have hindered testing the response credibility.[8] In addition, disaster literacy is an infant concept that has just started to be discussed in the literature, and there is still no standard/parallel test to measure disaster literacy among older adults. Therefore, we could not test the parallel forms reliability of the DLS-S in this study.

Moreover, the length of the statements on the items, the large number of the items, and the repeated explanation on some items - the prolongation of the filing out the scale - can be considered among other limitations to the study. In addition, the practices reported in some items must be literally performed physically or cognitively. In this regard, the participants thought that they could not perform such practices due to some reasons (e.g., age, physical competence, cognitive competence, or financial competence), which may be another limitation to this study.

Conclusion

While the extent of the effects of disasters varies by country, vulnerable groups suffer disasters the most. In this sense, disaster literacy becomes key among older adults, considered a vulnerable group, in terms of determining their level of preparedness for disasters, drawing the boundaries of the intervention to be initiated by themselves or relevant institutions, and predicting the consequences of disasters on them.

In this study, we explored the use of DLS, designed for the general population, for individuals aged 60 years and older. Accordingly, the

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61-item 5-point Likert-type DLS was found appropriate to individuals aged 60 years and older as the 57-item 5-point Likert-type DLS-S. Similar to the original study, we designed a 50-point scoring system and cut-off points (0 - < 21 points = inadequate literacy, 21 - < 29 points = limited literacy, 29 - < 38 points = adequate literacy, and 38 - 50 points = excellent literacy).

As adapted in this study, the DLS-S can be validly and reliably used for individuals aged 60 years and older. Yet, difficulties in understanding the concepts with technical terms on the scale, beliefs about the inability to perform the practices uttered in the items, short attention span and sudden distractions, and unwillingness to spend a long time responding to the scale items are believed to make administering the scale difficult. We, therefore, recommend introducing brief, clear instruments to measure the disaster literacy of older adults by adhering to the original structure of the 4*4 matrix.

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