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ORIGINAL ARTICLE

Adaptation of the disease-related apathy scale in adults with epilepsy into Turkish: A methodological study

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Abstract

Objective: This study was conducted to culturally adapt the Epilepsy-Related Apathy Scale in Adults with Epilepsy (E-RAS) to Turkish and to assess its psychometric properties in adult epilepsy patients.

Methods: A total of 172 epilepsy patients receiving care at the Neurology clinic and outpatient clinic of Fırat University Hospital from February to July 2023 were included in this methodological investigation. The E-RAS was translated into Turkish, and its content and construct validity were thoroughly examined. Construct validity was assessed through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Reliability was evaluated through item analyses, internal consistency analysis, composite reliability coefficient, and mean explained variance analysis.

Results: The factor loadings of the scale items ranged from 0.66 to 0.89. The fit index values of the scale were $X^2 = 467.09$, df = 245 ($p < 0.05$), $X^2/df = 1.9$, RMSEA = 0.073, CFI = 0.97, RMR = 0.046, SRMR = 0.057, TLI = 0.97, and AIC = 557.09. The Cronbach's alpha coefficients of the sub-dimensions of the scale ranged from 0.880 to 0.992, and the total Cronbach's alpha coefficient was 0.928. The total McDonald's omega coefficient was 0.916, and the McDonald's omega coefficients of the sub-dimensions ranged from 0.880 to 0.947. The Turkish form of the 24-item and 4-sub-dimensional scale was validated without any changes to the original scale form.

Significance: The Turkish adaptation of E-RAS is a valid and reliable instrument for measuring apathy in adult epilepsy patients. Its use in clinical practice is strongly recommended.

Plain Language Summary: The E-RAS scale can be used to assess apathy in adults with epilepsy. The was determined that the adapted Turkish form had a similar structure to the original scale. It was determined that the E-RAS scale is valid and reliable in Turkish culture. The fact that the Turkish adaptation of the scale is similar to the original structure and other adapted cultures is a factor that facilitates its use and acceptance in international comparisons. The scale can be used to assess apathy in adults with epilepsy.

KEYWORDS
adaptation, apathy, epilepsy, patient, psychometric properties

1 | INTRODUCTION

Epilepsy is a neurological disorder that arises from abnormal electrical activity in the brain cells. Epileptic seizures manifest when the regular electrical activity in the brain is disrupted. These seizures can affect individuals' behavior, emotions, and consciousness. Epilepsy is usually treated with antiepileptic drugs.[1] However, behavioral problems such as apathy may occur in some patients despite treatment.[2] Marin defined apathy as a reduction in goal-directed behavior, decreased emotional response, and loss of motivation that occurs as a result of brain injury or neuropsychiatric disorders.[3] Apathy is characterized by decreased interest in the environment and previously pleasurable activities, less emotional expression in interpersonal relationships, decreased enthusiasm, less initiative, and social withdrawal.[4] Apathy is characterized by a decrease in behavior, a lack of motivation to engage in activities, and dependence on others. It can also be seen as cognitive decline, disinterest in acquiring new knowledge or experiences, and a consistently unresponsive emotional state to positive or negative events. Apathy is a common symptom in various neurological disorders.[2,5]

When apathy cannot be controlled, it may cause the patients not to strive for daily activities and to become dependent on others or it may negatively affect the quality of life of patients.[6] Apathy increases caregiver burden[7] and reduces patients' ability to perform social functions and participate in their self-care.[2] In this case, patients' needs for care, including physical, mental, and social care, increase.[8] Therefore, apathy, which occurs in patients due to disease-related cognitive and emotional problems, is currently emphasized.[9] Apathy also affects adherence to treatment.[2,10]

The following factors may be listed among the factors that cause apathy in patients with epilepsy: The Impact of Seizures: Epileptic seizures can disrupt normal activity in the brain, which can affect emotional states. Side Effects of Medication: The antiepileptic drugs used can sometimes cause behavioral effects such as apathy. Damage or Changes in Brain Areas: Epilepsy can cause damage or changes in brain tissue, which can affect emotional control. Psychosocial Factors: Psychosocial factors such as seizures, social isolation, and job loss experienced by patients with epilepsy can also affect apathy.[2] To prevent apathy from adversely affecting patients with epilepsy, it is important to evaluate it correctly and to plan appropriate activities for the individual. The fact that the factors causing apathy are multiple and complex may cause difficulties in the assessment of patients with epilepsy and may make it difficult to create nursing interventions for this.[10] Although apathy has been commonly reported in various neurological diseases,[5] its clinical significance in epilepsy has not been clearly determined and the occurrence of apathy in patients with epilepsy has not been emphasized as an important behavioral problem. In a study, it was reported that apathy score was significantly higher in patients with uncontrolled epilepsy compared to healthy controls and apathy affected quality of life negatively.[2]

It is therefore necessary to have a specific tool to assess apathy in patients with epilepsy.[11] In Turkey, there is no scale that has been validated and reliable in Turkish to assess the apathy experienced by patients with epilepsy in relation to their disease. This study was conducted to adapt the epilepsy-related apathy scale (E-RAS) into Turkish and to test its validity and reliability in the Turkish population.

Key points

- Epilepsy is the most common neurological disorder in adults.
- A special measurement tool is required to detect disease-related apathy in patients.
- E-RAS has an acceptable Turkish validity.
- E-RAS is homogenous and consistent for the Turkish population.
- Healthcare professionals can use the E-RAS to screen for epilepsy-related apathy.

2 | MATERIALS AND METHODS

2.1 | Type of research: This study is a methodological research

2.1.1 | Population and sample of research

The research included individuals diagnosed with epilepsy who were seeking medical care at both the

neurology clinic and outpatient clinic of Fırat University Hospital between February and July 2023. The study's sample was selected from a group of 172 adult patients with epilepsy who met specific inclusion criteria. These criteria included a minimum epilepsy diagnosis duration of 6 months, the absence of psychiatric issues, an age of 18 years or older, and sufficient communication abilities. All participants willingly agreed to participate in the study during the designated period. Based on existing literature, it is recognized that scale adaptation studies typically require a sample size ranging from 5 to 10 times the number of items in the scale.[12,13] Since the Epilepsy-Related Apathy Scale in Adults with Epilepsy consists of 24 items, an initial estimate anticipated a sample size of at least 120 to 240. However, the study ultimately concluded with the active participation of 172 eligible adults with epilepsy who met the inclusion criteria.

2.2 | Instruments

Research data were collected by using "Personal Information Form" and "Epilepsy Related Apathy Scale (E-RAS)" through face-to-face interviews.

2.2.1 | Personal information form

A questionnaire comprising 14 inquiries has been developed by the investigators to elicit data pertaining to both socio-demographic factors and disease-related attributes of the participants. The questionnaire encompasses a spectrum of information, including gender, age, educational status, marital status, place of residence, employment status, income level, family structure, number of seizures within the past year, year of epilepsy diagnosis, seizure type, quantity of medications, utilization of epilepsy-specific medication, and the existence of any additional chronic health conditions.

2.2.2 | Epilepsy-related apathy scale (E-RAS)

Developed in 2021 by Shamsalinia et al.,[11] the E-RAS is an assessment tool that has been specifically designed to measure apathy related to epilepsy in the adult population. E-RAS consists of 24 items. It consists of four subdimensions "Motivation" (F1: items 1–7), "Self-regulatory" (F2: items 8–10), "Cognition" (F3: items 11–15), and "Emotional-effective" (F4: items 16–24). The scale is a 4-point Likert scale and the items are scored as Almost always (1), Frequently (2), Occasionally (3), and Almost never (4) As the score increases in the scale, it indicates that the apathy related to the disease increases. Reverse coded items are 4, 3, 7, 16, 19, 20, 21, and 23.[11] The cumulative score, ranging from 0 to 100, is obtained through a linear transformation using the formula: Transformed score = (Actual raw score - Lowest possible raw score) / (Possible raw score range) * 100.

2.3 | Language validity

In the initial phase, the original scale was translated into Turkish by two language experts. Subsequently, these translations were critically examined by the researchers, leading to the development of the Turkish version.[13] Following the translation process, the scale statements were amalgamated into a unified form. A comprehensive review ensued, involving three Turkish language experts, one scale development specialist, and five field experts. Their collective evaluation focused on the appropriateness of scale items, linguistic validity in Turkish, and cultural relevance, prompting necessary adjustments. Consequently, the scale items were consolidated into a cohesive form. This unified form underwent a reverse translation by a proficient foreign language expert familiar with the original version. A comparative analysis between the original scale and the translated version affirmed the similarity between the Turkish and English renditions.

2.4 | Content validity

A content validity analysis was conducted to assess the content validity of the item content, taking into consideration numerical data as well as language and cultural appropriateness. The analysis results indicate that items with a content validity index (CVI) value exceeding 0.80 are deemed to have sufficient content validity.[14,15] For this study, content validity assessment involved consulting with 5 field experts, and based on their evaluations, the CVI value was determined to be 0.96.

2.5 | Pre-application

To assess the understanding of scale items among adult individuals with epilepsy, a preliminary study was conducted. The 30 participants who took part in the preliminary study were subsequently excluded from the final sample. These individuals were asked to complete the scale and provide feedback on the clarity of each item. It is worth mentioning that no modifications were made to the items based on the feedback received during the preliminary study.

2.6 | Main application

First, consent was obtained from adults with epilepsy to participate in the study and complete the questionnaires. A total of 172 epilepsy patients completed the surveys through face-to-face interviews. To measure the stability of the scale, a test–retest method was used. According to the literature, it is generally recommended to conduct the retest within a range of 15–30 days.[13,16] In this study, the retest was conducted 20 days later.

2.7 | Statistical analysis

The analysis of the data was carried out using Mplus software and SPSS 27. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were employed to illustrate the sociodemographic characteristics of the participants. To compare binary groups, an independent samples t-test was utilized, while a one-way ANOVA test was employed for three-group comparisons. Furthermore, the study utilized both "Exploratory Factor Analysis (EFA)" and "Confirmatory Factor Analysis (CFA)" for detailed analyses. In the EFA phase, item score averages, standard deviations, Kaiser–Meyer–Olkin (KMO), Bartlett's Sphericity Test, and item total correlations were considered. Meanwhile, the CFA involved fit indices and path diagrams. To assess the scale's stability over time, a retest method was conducted. Criteria for validity included a minimum KMO value of 0.60, a significant Bartlett's Sphericity Test, and an eigenvalue of at least one. Additionally, a Cronbach's Alpha value of at least 0.70 was sought. Fit indices such as chi-square/degree-of-freedom ($\chi 2/df$) <2, Tucker Lewis Index (TLI) >0.90, comparative fit index (CFI) >0.90, root mean square error of approximation (RMSEA) <0.08, standardized root mean square residual (SRMR) <0.08, and root mean square residual (PMR) <0.08 were considered.[17–19] Convergent validity was assessed through average variance extracted (AVE) and composite reliability (CR), with criteria of AVE >0.5 and CR >0.8. Additionally, ensuring convergent validity involved verifying CR > AVE and AVE >0.5.[20–22] Divergent validity was evaluated using maximum shared squared variance (MSV) and average shared squared variance (ASV).

2.8 | Ethical considerations

Ethical approval for the study was secured from the university's Ethics Committee, with a documented date of November 30, 2022, and assigned reference number 2022/10. Institutional clearance was further obtained from the hospital chosen as the study site. Moreover, explicit permission was acquired from the original scale owner to adapt the E-RAS scale into Turkish. The research adhered to the ethical principles outlined in the Helsinki Declaration of Human Rights.

3 | RESULTS

The study participants had an average age of 38.90 ± 11.17 years, with a mean diagnosis year of 9.20 ± 8.80 years. Among them, 54.7% were female, 72.7% were married, 57.7% resided in urban areas, and 38.4% held high school degrees. Additionally, 63.4% were unemployed, 64.5% reported income equal to expenditure, and 46.52% experienced 4 or more seizures annually. Focal onset seizures were prevalent in 65.7% of participants, while 64% had no other chronic illnesses. All participants used antiseizure medication, with 66.9% using multiple medications. Notably, no significant differences were observed between these descriptive characteristics and the mean E-RAS score ($p > 0.05$) (Table 1).

3.1 | Validity results

3.1.1 | Content validity

The Turkish version of the scale was evaluated by five experts, who provided their perspectives. The item-based content validity index (I-CVI), derived from expert opinions, ranged from 0.90 to 1.00, indicating a high level of content validity at the item level. Furthermore, the scale-based content validity index (S-CVI) yielded a value of 0.96, affirming a strong overall content validity for the scale.

3.1.2 | Construct validity

Prior to initiating the analysis of construct validity, an assessment was conducted to ensure the sufficiency of the sample size and the suitability of the data set for the analysis. This involved the application of the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's sphericity test. The KMO value, determined to be 0.885, signified a high degree of adequacy for the data, while Bartlett's sphericity test yielded significant results ($\chi 2 = 3326.492$; df: 276; $p < 0.001$).

Exploratory factor analysis

The results of the exploratory factor analysis demonstrated that the scale accounted for 71.20% of the total variance

TABLE 1 Comparison of epilepsy-related apathy scale (E-RAS) mean scores in terms of descriptive characteristics of the participants.

Characteristics	Number ($n=172$)	%	E-RAS mean ± SD	Significance
Gender				
Female	94	54.7	69.74 ± 13.55	$t=1.322$
Male	78	45.3	67.03 ± 13.14	$p=0.188$
Marital status				
Married	125	72.7	67.97 ± 13.59	$t=-0.864$
Single	47	27.3	69.95 ± 12.88	$p=0.389$
Place of residence				
City	82	47.7	68.01 ± 13.39	$F=0.171$
Town	70	40.7	68.71 ± 13.73	$p=0.843$
Village	20	11.6	69.90 ± 14.05	
Educational status				
Literate	13	7.6	68.84 ± 17.10	
Primary education	35	20.3	66.85 ± 15.31	$F=0.677$
Secondary education	39	22.7	71.07 ± 12.79	$p=0.609$
High school	66	38.4	68.59 ± 12.00	
Undergraduate and higher	18	11.0	65.84 ± 13.19	
Working status				
Yes	63	36.6	66.33 ± 12.36	$t=-1.633$
No	109	63.4	69.77 ± 13.85	$p=0.104$
Income status				
Income < expense	35	20.3	67.34 ± 14.32	$F=0.254$
Income = expense	111	64.5	68.58 ± 13.81	$p=0.776$
Income > expense	26	15.1	69.80 ± 10.28	
Family structure				
Nuclear	124	72.1	69.27 ± 11.76	$t=1.192$
Extended	48	27.9	66.56 ± 16.90	$p=0.235$
Number of seizures in the past year				
1	14	8.1	68.71 ± 5.75	
2	24	14	69.16 ± 11.28	$F=1.320$
3	43	25	64.79 ± 12.22	$p=0.265$
4 and more	80	46.5	70.48 ± 15.07	
None	11	6.4	67.09 ± 14.66	
Seizure type				
Focal start	113	65.7	68.68 ± 14.17	$t=0.222$; $p=0.825$
Unknown start	59	34.3	68.20 ± 11.87	
Presence of another chronic disease				
Yes	62	36	69.11 ± 13.07	$t=0.437$; $p=0.663$
No	110	64	68.18 ± 13.62	
Antiseizure medication use			-	-
Yes	172	100		
Number of antiseizure medication use				
1	57	33.1	65.52 ± 13.65	$t=-2.081$
More than 1	115	66.9	70.00 ± 13.07	$p=0.039$
	Mean ± SD			

TABLE 1 (Continued)

Characteristics	Number ($n=172$)	%	E-RAS mean ± SD	Significance
Age (yr)	38.90 ± 11.17		$r=-0.083$ $p=0.281$	
Disease duration (yr)	9.20 ± 8.80		$r=0.079$ $p=0.305$	

Note: *t*: Independent samples-*t* test; F = One-Way Anova $p<0.05$.

TABLE 2 Exploratory factor analysis results of epilepsy-related apathy scale.

Scale items	Communality	Corrected item-total correlations	Cronbach's alpha if item deleted	Mean	Factor load values			
					F1	F2	F3	F4
Item 1	0.805	0.537	0.926	2.61	0.890			
Item 2	0.767	0.526	0.926	2.54	0.867			
Item 3	0.754	0.562	0.925	2.69	0.840			
Item 4	0.808	0.558	0.925	2.72	0.888			
Item 5	0.780	0.646	0.924	2.79	0.833			
Item 6	0.817	0.678	0.923	2.75	0.854			
Item 7	0.654	0.521	0.926	2.63	0.788			
Item 8	0.829	0.552	0.925	2.90		0.833		
Item 9	0.908	0.559	0.925	2.98		0.889		
Item 10	0.876	0.577	0.925	2.94		0.865		
Item 11	0.696	0.574	0.925	3.06			0.707	
Item 12	0.736	0.590	0.925	3.27			0.781	
Item 13	0.682	0.568	0.925	3.20			0.764	
Item 14	0.717	0.503	0.926	3.24			0.820	
Item 15	0.610	0.500	0.926	3.01			0.739	
Item 16	0.627	0.602	0.925	2.75				0.729
Item 17	0.675	0.623	0.924	2.80				0.785
Item 18	0.569	0.581	0.925	2.86				0.663
Item 19	0.662	0.577	0.925	2.84				0.793
Item 20	0.722	0.586	0.925	2.81				0.820
Item 21	0.555	0.450	0.927	2.71				0.736
Item 22	0.629	0.579	0.925	2.94				0.708
Item 23	0.688	0.588	0.925	2.73				0.798
Item 24	0.647	0.623	0.924	2.62				0.759
Eigenvalue					4.016	1.409	2.682	9.106
Explained variance % total = 71.720					16.731	5.871	11.175	37.942

(Table 2). To address the multiple factors present in the scale, the Varimax factor rotation method was utilized. Throughout this process, the cross-loading of scale items was carefully examined, focusing only on factors with eigenvalues greater than 1. The implementation of the Varimax rotation method uncovered the classification of scale items into four separate factors, each with loading values exceeding 0.30 (0.66–0.89). These findings led to the conclusion that the scale consists of four distinct sub-dimensions, comprising a total of 24 items.

3.1.3 | Confirmatory factor analysis

After the Exploratory Factor Analysis, CFA was conducted to support the findings of the sub-dimensions

TABLE 3 Confirmatory factor analysis results.

Fit criteria	Found	Appropriate	Acceptable	Results
x^2/df (CMIN/DF)	1.90	<2	<5	Perfect fit
RMSEA	0.073	<0.05	<0.08	Acceptable fit
CFI	0.97	>0.95	>0.90	Perfect fit
RMR	0.046	<0.05	<0.08	Perfect fit
SRMR	0.057	<0.05	<0.08	Acceptable fit
TLI	0.96	>0.95	>0.90	Perfect fit
AIC	557.09			

Abbreviations: AIC, Akaike Information Criterion; CFI, Comparative Fit Index; RMR, Root Mean Square Residual; RMSEA, Root Mean Square Error of Approximation; SRMR, Standardized Root Mean Square Residual; TLI, Tucker Lewis Index.

in the scale. According to the results of the analyses, CFA fit index values were obtained as follows: $X^2 = 467.09$, df = 245 ($p < 0.05$), X^2/df = 1.9, RMSEA = 0.073, CFI = 0.97, RMR = 0.046, SRMR = 0.057, TLI = 0.96, and AIC = 557.09 (Table 3). Figure 1 presents the PATH diagram created during the confirmatory factor analysis (Figure 1).

3.2 | Convergent and divergent validity

In the current investigation, an assessment of convergent validity was conducted by calculating AVE values for each factor. The resulting AVE values were as follows: "F1 = 0.70; F2 = 0.89; F3 = 0.59; and F4 = 0.57." Furthermore, CR values were computed and yielded the following results: "F1 = 0.94; F2 = 0.94; F3 = 0.88; and F4 = 0.92." To establish convergent validity, it is essential that all CR values associated with the scale exceed the AVE values, with the AVE value itself surpassing the threshold of 0.5, as suggested by Fornell and Larcker.[23] In this study, CR values for each factor were found to be higher than the corresponding AVE values, with AVE values surpassing the critical threshold of 0.50 (see Table 4). To assess divergent validity, it was essential to meet the criteria of the MSV being less than AVE, and ASV being less than MSV. MSV values were determined as "F1 = 0.305, F2 = 0.230, F3 = 0.305, and F4 = 0.220," while the ASV values were identified as "F1 = 0.131, F2 = 0.173, F3 = 0.214, and F4 = 0.116." Furthermore, the correlation values between the factors of the scale were examined (Table 4).

3.3 | Reliability results

To evaluate the reliability of the finalized scale consisting of 24 items, Cronbach's Alpha coefficient was computed. The reliability analysis revealed values of 0.947 for the "F1" sub-dimension, 0.938 for the "F2" sub-dimension, 0.880 for the "F3" sub-dimension, 0.992 for the "F4" sub-dimension, and a Cronbach's Alpha value of 0.928 for the complete scale. Additionally, the omega reliability values were determined as 0.947 for "F1," 0.939 for "F2," 0.880 for "F3," 0.922 for "F4," and an omega reliability value of 0.916 for the complete scale (Table 5). When examining the item-total correlation coefficients of the scale, it was observed that all coefficients exceeded 0.30, ranging from 0.45 to 0.67 (Table 2).

Throughout the course of the study, the correlation values between test–retest measurements, which were conducted 20 days apart on 39 participants to evaluate the temporal consistency of the scale, were as follows: the overall reliability of the scale was r = 0.985, the "F1" sub-dimension was r = 0.965, "F2" was r = 0.943, "F3" was r = 0.948, and "F4" was r = 0.964. These correlation coefficients were found to be statistically significant at $p < 0.05$. Moreover, there was no statistically significant difference between the results of the first and second measurements ($p > 0.05$).

4 | DISCUSSION

In this study, the E-RAS, which was developed to assess epilepsy-related apathy in adults with epilepsy, was translated into Turkish, its psychometric properties were examined, and reliability and validity analyses were conducted. As a result of the study, it was determined that the reliability and validity values of the E-RAS were at an acceptable level.

Content validity is an important procedure in scale development. CVI is the degree to which the instrument has a sample of items appropriate to the construct being measured and assesses how well it covers all relevant parts of the construct it aims to measure.[24] It is stated that the acceptable CVI value is 1 when the number of experts is between three and five.[15] In this study, the CVI value was

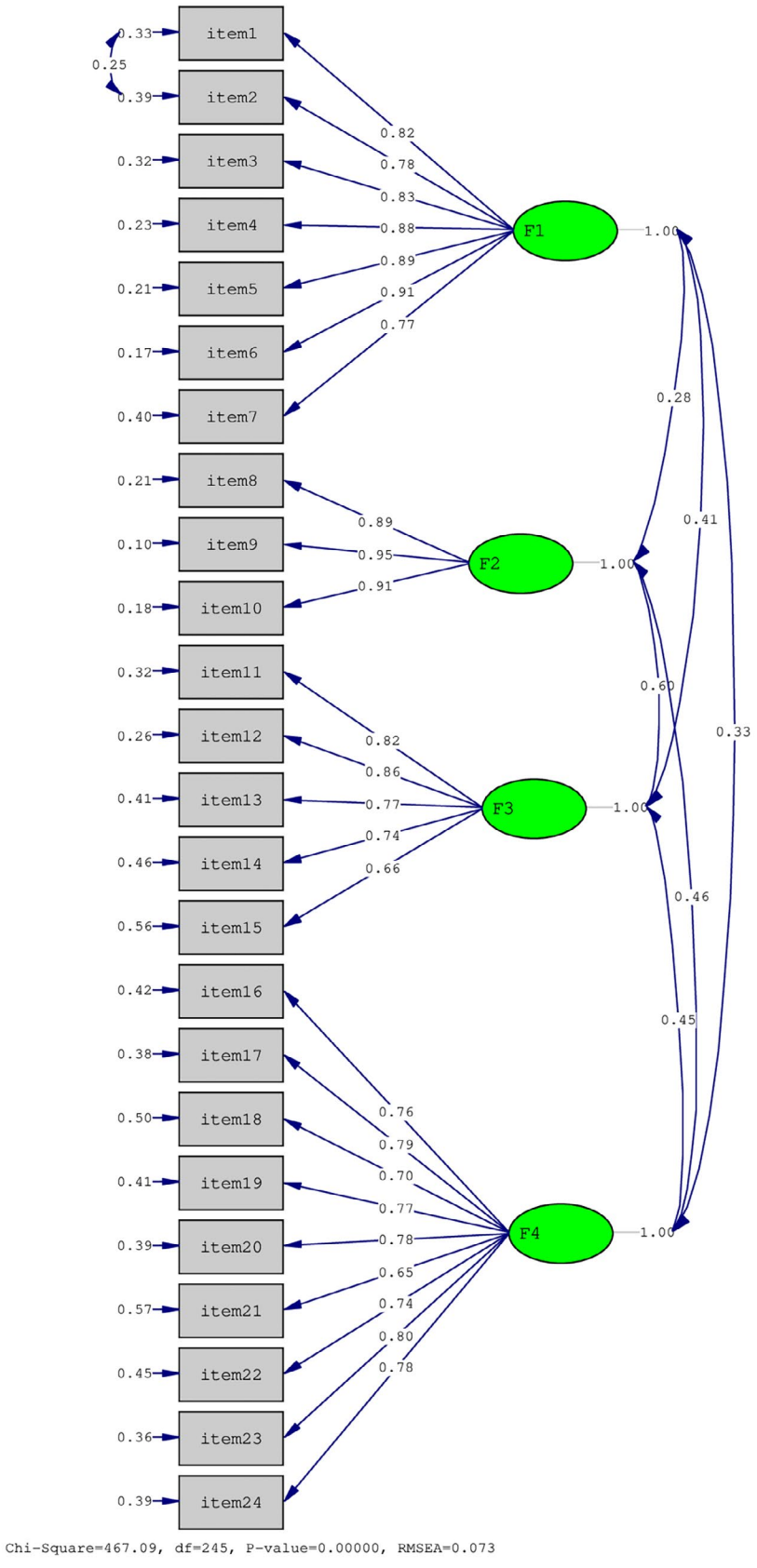

FIGURE 1 PATH diagram regarding the factor structure of the scale.

TABLE 4 Correlation values, convergent, and divergent results.

Scale and sub-dimensions	F1	F2	F3	F4	MSV	ASV	AVE	CR
F1	1				0.305	0.131	0.70	0.94
F2	$r=0.263^{**}$	1			0.230	0.173	0.84	0.94
F3	$r=0.553^{**}$	$r=0.480^{**}$	1		0.305	0.214	0.59	0.88
F4	$r=0.144^{**}$	$r=0.470^{**}$	$r=0.329^{**}$	1	0.220	0.116	0.57	0.92
E-RAS Total	$r=0.681^{**}$	$r=0.664^{**}$	$r=0.750^{**}$	$r=0.761^{**}$	-	-	-	-

Abbreviations: ASV, average shared squared variance; AVE, Average Variance Extracted; CR, Construct Reliability; F, Factor; MSV, maximum shared squared variance.

**Correlation is significant at the 0.01 level (2-tailed).

TABLE 5 Test–retest results, mean scores, and reliability results.

	Scale score means		Analysis results					
Scale and sub-dimensions	First implementation $X \pm SD$	Second implementation $X \pm SD$	*r*	*p*	*t*	*p*	α	Ω
F1	18.25 ± 5.43	18.69 ± 5.14	0.965	0.000	−1.905	0.064	0.947	0.947
F2	8.38 ± 2.39	8.61 ± 2.92	0.943	0.000	−1.389	0.173	0.938	0.939
F3	16.20 ± 3.41	15.97 ± 3.84	0.948	0.000	1.157	0.254	0.880	0.880
F4	22.56 ± 6.99	21.94 ± 7.88	0.964	0.000	1.760	0.086	0.992	0.922
E-RAS Total	65.41 ± 13.16	65.23 ± 13.21	0.985	0.000	0.484	0.631	0.928	0.916

Note: F, Factor; a, Cronbach's alpha coefficients; Ω, McDonald omega coefficient; $p < 0.05$; r = Pearson Correlation Coefficient; t = Paired sample t-test.

0.96 and according to this result, it was determined that the scale met the necessary conditions for content validity. In the study by Shamsalinia et al.,[11] 10 expert opinions were taken and the CVI value was determined to be >0.78.

Whether the data obtained from the study group are suitable for exploratory factor analysis is checked by the KMO test. To apply EFA, the value should be >0.7.[25] In this study, the KMO value was determined as 0.885. Bartlett's test of sphericity examines the entire correlation matrix to determine the adequacy of factor analysis based on determining the correlation between variables. A statistically significant Bartlett test ($p < 0.05$) indicates that there is sufficient correlation between the variables to proceed with the analysis.[26,27] When the results of Barlett's test of sphericity are analyzed, it can be seen that the chi-square ($x^2 = 3326.492$; $p < 0.001$) value is significant. These results show that there is a sufficient relationship to perform factor analysis. In the study by Shamsalinia et al.,[11] the KMO value was 0.728, and Bartlett's test $x^2 = 3154{,}373$ $p < 0.001$.

EFA is a statistical technique used to identify latent variables (factors) underlying observed variables. Exploratory factor analysis determines a factor model or structure for a group of variables. It is used when there is no theoretical information among the scale items, that is when it is not known how many factors there are among the items and which items measure which factors. As the name suggests, EFA helps to clarify the existing structure.[28,29] As a result of the exploratory factor analysis, it was concluded that the scale consisted of four factors similar to its original form and that these factors explained 71.20% of the total variance.[11] Considering that an explained variance ratio between 40% and 60% in multi-factor structures is considered sufficient,[30] it can be said that the variance explained in this study is at a good level. The factor loading values of the items were found to vary between .66 and .89. It is desirable that the factor loadings of the items in a factor are ≥0.45.[30] This can be interpreted as that the items under the related factor measure the related construct. In Shamsalinia et al.,[11] factor loadings ranged between 0.48 and 0.79.

While EFA determines what kind of a construct the measurement tool measures, CFA aims to test the model claimed by the exploratory method in line with some criteria and to test the suitability of the model.[31]

For this reason, CFA was implemented to the scale to find out whether the four-factor structure of the E-RAS scale obtained by EFA would be confirmed in the Turkish sample. The goodness of fit is assessed by using a set of model fit indices that evaluate the relationship between the observed data and the theoretical data that can be expected from the model.[32] Evaluating the goodness of fit of the proposed model, which reflects how well the model fits the observed data in assessing the covariance obtained by the model, is a critical step in CFA.[33] The CFA fit indices obtained in this study are $X^2 = 467.09$, $df = 245$ ($p < 0.05$),

$X^2/df = 1.9$, RMSEA = 0.073, CFI = 0.97, RMR = 0.046, SRMR = 0.057, TLI = 0.96, and AIC = 557.09. An X^2/df ratio of <3 indicates that the model has a good fit value.[34] A RMSEA value between 0.05 and 0.08 is considered a good fit.[32] The goodness of fit value for CFI and TLI indices is >.95.[34] RMR and SRMR values <0.08 correspond to good fit.[14,22] It is also stated that there is no fixed range for the AIC fit index, which is taken as an acceptable or good fit criterion, and that this fit index can take higher values, unlike the fit indices that can take values ranging between 0 and 1.[35] It is stated that the model with the smallest AIC value is the closest model to reality.[36] When the results obtained from this study are analyzed, it can be seen that the model fit of the structure with 24 items and 4 factors is good, as in the original scale.[11]

Convergent validity is the evaluation made to measure the correlation level of multiple indicators that are in harmony with the same construct. To establish convergent validity, the factor of the indicator, AVE, and CR values should be taken into consideration. The value varies between 0 and 1. AVE value must be >0.50 for convergent validity to be sufficient.[37,38] CR > AVE, AVE value of >0.50, and CR value of >0.70 indicate that convergent validity is ensured.[37,39,40] In this study, AVE values were found as F1 = 0.70, F2 = 0.89, F3 = 0.59, and F4 = 0.57, respectively. CR values were found as F1 = 0.94, F2 = 0.94, F3 = 0 .88, and F4 = .92, respectively. When the results were analyzed, it was found that CR > AVE, AVE values were >0.50, and CR values were >0.70, and convergent validity of the scale was achieved.

Discriminant validity, also referred to as divergent validity, consists of "the degree to which a criterion does not correlate with other criteria that are assumed to be divergent."[32] It is stated that the criteria are MSV < AVE and ASV < AVE for divergent validity.[30] In this study, the MSV values were found to be F1 = 0.305, F2 = 0.230, F3 = 0.305, and F4 = 0.220, and the ASV values were found to be "F1 = 0.131, F2 = 0.173, F3 = 0.214 and F4 = 0.116" respectively. When the results obtained are analyzed, it can be seen that the criteria of MSV < AVE and ASV < AVE and divergent validity of the scale are provided. Cronbach α internal consistency coefficients were analyzed for the reliability of the scale. Cronbach α value for the total scale was found to be 0.928. Cronbach α values of the factors of the scale were determined as F1 = 0.947, F2 = 0.938, F3 = 0.880, and F4 = 0.992, respectively. When the reliability values of the scale are analyzed, it can be seen that the results have high internal consistency, that is, they produce consistent data. The internal consistency coefficients obtained for the original form of the scale were F1 = 0.770, F2 = 0.763, F3 = 0.792 and F4 = 0.889.[11] In a dataset analysis, the Cronbach Alpha value range between .90 and 1.00 indicates an excellent level.[34] When the values of the internal consistency coefficients of the Turkish form are analyzed, it can be seen that the values are at an excellent level for reliability. The item-total correlation coefficients of the scale vary between 0.45 and 0.67. In general, an item-total correlation of ≥0.030 is an indication that the items have good discrimination.[30,41] When correlation values are examined, it can be said that the items in the scale are reliable and they aim to measure similar behaviors.

Test–retest reliability is the ability of the scale items to obtain consistent results in different applications and to show invariance over time. In addition, a test–retest reliability coefficient of >0.80 indicates that the test–retest reliability is high.[42] The correlation values observed between the test–retest measurements administered to 39 participants 20 days apart to evaluate the consistency of the scale over time are r = 0.985 for the overall total, r = 0.965 for "F1" sub-dimension, r = 0.943 for "F2", r = 0.943 for "F3", r = 0.948 for "F3", and r = 0.964 for "F4" and they are statistically significant ($p < 0.05$). No statistically significant difference was found between the first and second measurement results ($p > 0.05$). The analysis showed that the responses of the patients to the scale items at two different times were consistent. Therefore, a high test–retest correlation result was obtained in this study. The fact that there is a strong relationship between the measurements of the Turkish adaptation of the E-RAS shows that it is a reliable measurement tool and does not change temporally.

In our study, we compared the descriptive characteristics and mean E-RAS score. However, no significant difference was found between them.

5 | CONCLUSION

In this study, the "Epilepsy Related Apathy Scale in Adults with Epilepsy (E-RAS)" developed by Shamsalinia et al. was adapted into Turkish. It was determined that the adapted Turkish form had a similar structure to the original scale. As a result of this study, it was determined that the E-RAS scale is valid and reliable in Turkish culture. The fact that the Turkish adaptation of the scale is similar to the original structure and other adapted cultures is a factor that facilitates its use and acceptance in international comparisons. The scale can be used to assess apathy in adults with epilepsy.

AUTHOR CONTRIBUTIONS

Gülcan Bahcecioglu Turan: Conceptualization; methodology; investigation; writing—original draft; writing—review and editing; supervision. **Zülfünaz Özer:** Conceptualization investigation; writing—original draft; writing—review and editing; supervision. **Seda Başak:** Conceptualization; investigation; data curation; writing—review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to disclose.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ETHICS STATEMENT

We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

PATIENT CONSENT STATEMENT

The face-to-face survey was conducted with participant approval. No personal or related data were collected or IP addresses were stored. The participants consented to the scientific analysis and publication of the results. Moreover, patients have agreed that the data would be kept for at least 10 years after the end of the survey. After 15 years at the latest, the data would be deleted.

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