Adaptation of the Epilepsy-Related apathy scale to Turkish in adults with Epilepsy: Validity and reliability study

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ABSTRACT

Objective: To test the validity and reliability of the Turkish version of the Epilepsy-Related Apathy Scale (E-RAS) in adults with epilepsy.

Methods: In this methodological study, the E-RAS was translated into Turkish using standard procedures and assessed for content validity by a panel of 8 experts. The draft scale was piloted with 10 people to ensure comprehensibility of the questions. For psychometric validation, the Turkish version of the scale was administered to 209 native Turkish speakers over 18 years of age who had epilepsy for at least 1 year and had been using antiepileptic drugs for at least 1 year.

Results: Exploratory and confirmatory factor analysis was performed for construct validity. Internal consistency analysis yielded Cronbach's alpha reliability coefficients of 0.813 for the whole scale and 0.802–0.864 for the subscales. In exploratory factor analysis, 9 of the original 24 items were removed (factor loadings < 0.30) and the 4 subscales were condensed to 2, called "Motivational and Emotional" and "Self-Regulatory and Cognitive".

Conclusion: The 15-item, 2-dimensional Turkish version of the E-RAS was determined to be valid and reliable for use in adults with epilepsy in the Turkish population.

1. Introduction

Epilepsy is a neurological disease related to neuronal activity and characterized by recurrent seizures [1]. The condition affects 50 million people worldwide [2], with 80 % of those affected living in developing countries [2,3]. People with epilepsy resistant to medical treatment have significantly impaired quality of life and are at increased risk of neuropsychiatric syndromes and suicidal ideation [4]. Apathy is defined as a lack of motivation characterized by decreased action and goal-oriented behaviors [5,6]. It manifests with symptoms such as having fewer or no goals, lack of planning, lack of concern for one's health, emotional indifference, and indifference to important news [5]. After the surgical treatment of epilepsy, levels of apathy decrease because of the reduction in seizures and discontinuation or lowered dosage of medications used [7]. In nursing management, it is important to know effective treatment methods, be familiar with the patient, be able to know and identify personality traits, and cooperate effectively with other team members [8]. The aim of nursing care in people with apathy is to ensure they continue their daily life activities, improve their social interaction and communication, and improve their quality of life using

nonpharmacological treatment methods [9]. Nurses should enhance patients' cognitive, social, and emotional well-being by focusing on the person rather than the disease [10]. When apathy is not adequately managed, quality of life may be affected, leading to social isolation and reduced medication adherence [11,12]. Early recognition of apathy enables the patient's quality of life to be improved with appropriate pharmacological and nonpharmacological treatments [11]. To avoid the adverse effects of apathy, it is important to prepare a treatment program suitable for the individual, with activities that will attract their interest [10]. Apathy is associated with a high risk of suicide, reduced daily activity, less utilization of rehabilitation services, and lower quality of life [12]. The importance of apathy has been acknowledged in many neurological diseases such as stroke, Parkinson's, and dementia, but its importance in epilepsy has not been elucidated due to insufficient research [13]. In our review of the literature, we found no studies investigating epilepsy and apathy together and no scale in the Turkish language to evaluate apathy in people with epilepsy. Therefore, the aim of this study was to adapt the Epilepsy-Related Apathy Scale (E-RAS) to Turkish for use in evaluating apathy in adults with epilepsy in Turkiye.

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2. Methods

2.1. E-RAS

This scale, developed by Abbas Shamsalinia et al. in 2021 to evaluate the state of apathy in adult epilepsy patients in Iran, consists of 24 items in 4 dimensions: motivational, emotional-effective, self-regulatory, and cognitive [14]. The responses are in 4-point Likert format scored 1–4 points. The total scale score ranges from 24 to 96, with a low score indicating less epilepsy-related apathy.

The study sample consisted of patients under follow-up and treatment in the neurology outpatient clinic of Amasya University Sabuncuoğlu Şerefeddin Training and Research Hospital between February and May 2023. Inclusion criteria were being at least 18 years of age, using antiepileptic drugs for at least 1 year, being a native speaker of Turkish, having no communication problems, and being willing to participate in the study. Exclusion criteria were a history of substance use, cognitive or hearing impairment, and desire to withdraw at any stage of the study. Sociodemographic data (e.g., age, gender, marital status, education level) and clinical data (e.g., age at epilepsy onset, time since last seizure, medications used) were collected. For scale adaptation studies, a sample size 5–10 times the number of items is recommended in the literature [15,16]. In addition, a sample of at least 30 is reported to be necessary for test–retest analysis [15]. As there are 24 items in the E-RAS scale, we recruited 240 participants by random sampling. Of these, we excluded 31 participants with missing data (incomplete scale responses) or extreme Mahalanobis distance from the study [17]. As a result, the study was completed with 209 people.

2.2. Ethical Considerations

Written permission to adapt the E-RAS was obtained from the researcher who developed the original scale. Ethical approval for the study was obtained from Amasya University Noninterventional Clinical Research Ethics Committee (E-76988455–050.01.04–80683, 29.06.2022), and institutional permission was obtained in writing from Amasya University Sabuncuoğlu Şerefeddin Training and Research Hospital (E-62949364–774.99, 28.07.2022). Written and verbal consent was obtained from all participants. The study was conducted in adherence with the Declaration of Helsinki.

2.3. Translation of the E-RAS

The E-RAS items were translated from English to Turkish by a professional translator. The translated items were presented to a total of eight experts, including six faculty members and two neurologists, to evaluate their appropriateness. The experts' recommendations were reviewed and content validity index (CVI) values were calculated. After revising the scale items based on the expert feedback, they were sent to two faculty members who are experts in the Turkish language for evaluation of their comprehensibility and grammatic correctness. After this linguistic review, the items were returned to the expert panel for approval. A pilot test was conducted with 10 epilepsy patients to determine the comprehensibility of the items in the target population. As the scale items were considered understandable, no further changes were made.

2.4. Statistical analysis

All statistical analyses were done using IBM SPSS Statistics 23 and IBM SPSS AMOS 23 programs. The study data were expressed using frequency distribution (number, percentage) for categorical variables and descriptive statistics (mean, standard deviation) for numerical variables. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed to assess construct validity, Cronbach's alpha coefficients were determined to assess internal consistency

reliability, Pearson correlation analysis was used to assess the relationship between the scale and factors, and intraclass correlation coefficients (ICC) were used to assess test–retest reliability. $P < 0.05$ was accepted as statistical significance.

3. Results

The 209 participants ranged in age from 18 to 72 years (mean 40.54 ± 14.33 years), 53.1 % were male, 55 % were middle school graduates, 57.9 % were employed, 57.9 % had income equivalent to their expenses, 93.8 % had social insurance, 73.2 % were married, and 72.7 % lived with their spouse. The mean age at epilepsy onset was 18.75 ± 11.44 years, the mean disease duration was 21.57 ± 11.38 years, 47.8 % of the participants had no seizures in the last year, and 38.8 % had their last seizure at least 13 months ago. Over half (56.5 %) of the participants used levetiracetam for medical therapy, 97.6 % knew the drug dose and time of use, 92.3 % used their drugs regularly, and 80 % experience no adverse effects (Table 1).

4. Verification tests

4.1. Validity

4.1.1. Content validity Index

The Kaiser-Meyer-Olkin (KMO) value was found to be 0.805, indicating that the results of factor analysis would be valid. The results of Bartlett's test of sphericity showed that the variables were highly interrelated and the data were suitable for factor analysis (X^2 =

Table 1
Sociodemographic and clinical characteristics of the participants.

Variables	n	%
Age (years), mean ± SD (range)	40.54 ± 14.33 (18–72)	
Gender	Female	98	46.9
	Male	111	53.1
Marital status	Married	153	73.2
	Single	56	26.8
Education level	None	1	0.5
	Primary school	54	25.8
	Secondary school	115	55.0
	University or higher	39	18.7
Employment status	Employed	121	57.9
	Unemployed	88	42.1
Income level	Income less than expenses	51	24.4
	Income equal to expenses	121	57.9
	Income more than expenses	37	17.7
Social insurance	Yes	196	93.8
	No	13	6.2
Lives with	Spouse	152	72.7
	Child	101	48.3
	Parents	46	22.5
	None	11	5.3
Age at disease onset (years), mean ± SD (range)	18.75 ± 11.44 (1–62)	
Disease duration (years), mean ± SD (range)	21.57 ± 11.38 (1–56)	
Seizure frequency in the last year	<1	71	34.0
	≥1	38	18.2
Time since last seizure	0–1 month	41	19.6
	2–6 months	60	28.7
	7–12 months	27	12.9
	≥13 months	81	38.8
Medications used	Levatirasetam	49	23.4
Knowing the drug dose and time of use	Yes	204	97.6
	No	5	2.4
Regular use of medications	Yes	193	92.3
	No	16	7.7
Side effects due to medications	Yes	38	18.2
	No	171	81.8

1372.138, SD = 105, p < 0.001).

4.1.2. Exploratory factor analysis

Nine of the original 24 items were removed from the scale as a result of the factor analysis, resulting in 15 items. Content validity analysis of these 15 items demonstrated loading on 2 factors with all factor loadings above 0.40. The total explained variance was 50.146 %, with 22.927 % of variance explained by the Motivational and Emotional subscale and 27.219 % explained by the Self-Regulatory and Cognitive subscale (Table 2).

4.1.3. Confirmatory factor analysis

CFA was performed to determine whether the original structure of the E-RAS scale would be valid when adapted to Turkish culture.

In the first stage, a first-degree CFA model was created in which the expressions constituting the two latent factors were also included as indicator variables (Fig. 1). As latent variables are not metric, it should be ensured that a value of 1 is assigned to one of the paths drawn from the latent variables (equalization of the factor load to 1) to the observed (indicator) variables or a value is assigned to the variance of the latent variable (usually 1) in order to estimate the parameter values [18].

In the second stage, the *maximum likelihood* method was used when estimating the model to estimate parameters including the errors of the observed variables, the variances of the latent variables, and regression coefficients for the paths between the latent and observed variables (Fig. 2). The maximum likelihood method is frequently used in structural equation modeling and provides reliable results even when the data are not normally distributed.

In the last stage, fit indices were determined for the two-dimensional first- and second-degree CFA models. Model fit values were as follows: $X^2/SD = 2.245$, TLI = 0.900, CFI = 0.920, IFI = 0.921, RMSEA = 0.077, SRMR = 0.070. These values indicated acceptable fit of the two-factor structure of the E-RAS (Table 3). [19–21]The results of EFA and CFA showed that the E-RAS is suitable for use in the Turkish population. (Table 3).

Table 2
E-RAS Factor Loadings.

		Loading	Explained variance (%)	Eigenvalue
Motivational and Emotional Subscale	Item 1	0.780	22.927	3.439
	Item 2	0.726		
	Item 3	0.609		
	Item 4	0.648		
	Item 5	0.597		
	Item 6	0.475		
	Item 7	0.654		
	Item 8	0.673		
Self-Regulatory and Cognitive Subscale	Item 9	0.704	27.216	4.083
	Item 10	0.834		
	Item 11	0.801		
	Item 12	0.618		
	Item 13	0.843		
	Item 14	0.821		
	Item 15	0.616		

4.1.4. Equivalent Item version

Mean scores on the Turkish E-RAS were 20.58 ± 3.79 for the Motivational and Emotional subscale, 21.33 ± 2.99 for the Self-Regulatory and Cognitive subscale, and 41.91 ± 5.23 total (Table 4).

4.2. Reliability

4.2.1. Test-Retest analysis

Test-retest analysis was performed with 30 patients after an interval of 15 days. ICC values were 0.865 (0.716–0.936) for entire E-RAS, 0.965 (0.927–0.984) for the Motivational and Emotional subscale, and 0.855 (0.696–0.931) for the Self-Regulatory and Cognitive subscale, indicating acceptable consistency over time (p < 0.05).

4.2.2. Internal consistency analysis

The revised Turkish scale with 15 items in 2 dimensions had Cronbach's alpha coefficients of 0.802 for the Motivational and Emotional subscale, 0.864 for the Self-Regulatory and Cognitive subscale, and 0.813 for whole E-RAS (Table 5). After revising the number of items, the Cronbach's alpha coefficient varied between 0.792 and 0.809. All Cronbach's alpha values were higher than the generally accepted threshold of 0.70 [22].

5. Discussion

5.1. Validity of the Turkish E-RAS

Validity is the degree to which a tool measures the target construct accurately and without confounding by any other feature [23]. In this study, language and content validity analyses were performed to ensure item validity and EFA and CFA analyses were performed to ensure construct validity of the scale. Language and content validity were first ensured using back-translation and expert panel opinion. A sufficient number of experts are required to determine CVI values. In the literature, this number is stated as 5–40 [23]. If the panel consists of eight experts, the minimum acceptable CVI value is 0.750 [24]. We found the scale-level CVI of the Turkish E-RAS to be 0.78, indicating acceptable panel size. In terms of the study sample, KMO was used to determine whether it was adequate in size and Barlett's test of sphericity was used to determine whether it was suitable for factor analysis. For factor analysis, KMO values higher than 0.80 and 0.90 are considered good and very good, respectively [25]. KMO values between 0.70 and 0.79 are considered moderate, and a value above 0.60 is generally considered acceptable [26]. In this study, the KMO value was 0.805 and the Bartlett test result was $X^2 = 1372.138$ (p < 0.05). In the original scale study conducted by Shamsalinia et al., the KMO value was found to be 0.728, and the Bartlett's test result was 3154.373 (p < 0.001) [14]. This result shows that the variables are significantly interrelated and the data are adequate to perform factor analysis.

The factor loadings of the items in the Turkish E-RAS varied between 0.475 and 0.843. In the literature, it is stated that factor loadings should be 0.30 or higher, with loadings of 0.30–0.59 considered moderate and those 0.60 and above considered high [27]. For the original 4-factor structure with 24 items, the goodness of fit values obtained in CFA were below the thresholds of acceptability. Fit indices were determined for the 4-dimensional first- and second-degree CFA models. Model fit values were as follows: $X^2/SD = 3,781$, TLI = 0,657, CFI = 0,694, IFI = 0,698, RMSEA = 0,108, SRMR = 0,129. These values indicated unacceptable fit of the two-factor structure of the E-RAS. Moreover, the factor loadings of some scale items in this structure were lower than 0.20 and their p values indicated statistical insignificance. For this reason, it was necessary to revise the Turkish version. EFA was then performed for the scale. When the factor number was not set, there appeared to be 7 factors with the items randomly distributed. Therefore, we limited the factor number to 4 as in the original scale, but deemed it necessary to try alternative factor structures due to the weak item loadings, low
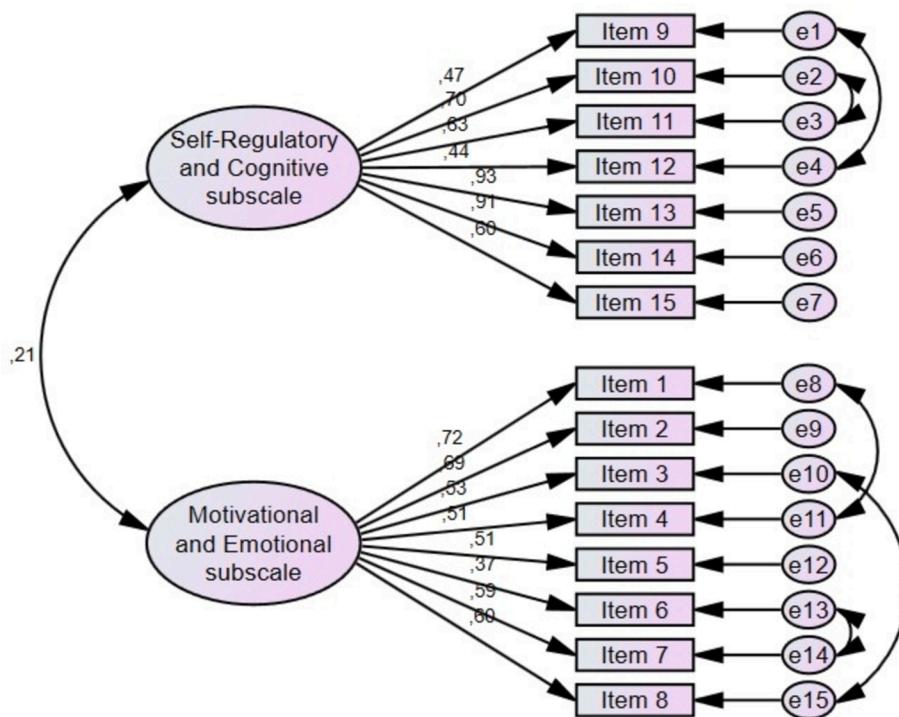
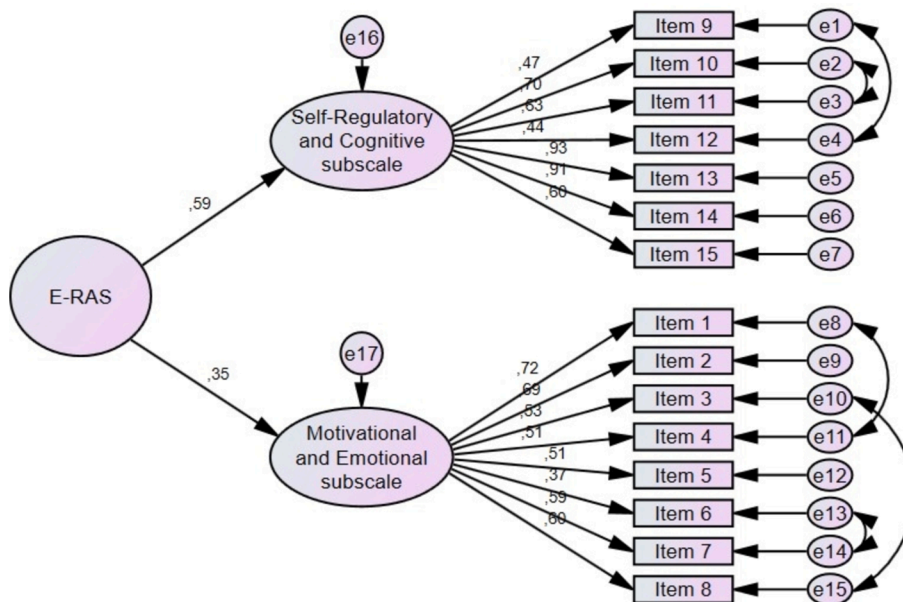**Fig. 1.** 2 dimensional first order CFA model.

Fig. 2. 2 dimensional second order CFA model.

explained variance, and randomness of the item distribution. Based on our results, we reduced the number of items from 24 in total to 8 items in the Motivational and Emotional subscale and 7 items in the Self-Regulatory and Cognitive subscale. In the construct validity analysis of these 15 items, they were found to reduce to two factors with loadings greater than 0.400. This factor structure met the minimum criteria sought for scale validity and reliability.

The strength of the factor structure is determined by the percentage of explained variance. An acceptable value for this rate is between 40 % and 60 % [17]. In the study conducted by Shamsalinia et al., all factor loadings were above 0.424 and the total explained variance of the E-RAS was 48.35 % [14]. In our study, the Motivational and Emotional dimension explained 22.927 % of the total variance and the Self-Regulatory and Cognitive dimension explained 27.219 % of the total variance, for a total explained variance of 50.146 %. As a result, the total explained variance for the Turkish E-RAS was adequate in this study. In the basic components analysis of the E-RAS scale items in the two dimensions, the factor loading value was found to be moderate and high. Therefore, the Turkish E-RAS was assessed as having sufficient construct validity. In confirmatory factor analysis, all model fit index values indicated acceptable fit [19–21].

Table 3
Goodness of fit indexes used in the study and their ranges of acceptability (Comparison of CFA results for 2 subscale).

Index	Good Fit	Acceptable Fit	CFA result (2 subscale)
χ^2/df	$0 \leq \chi^2/df \leq 3$	$3 \leq \chi^2/df \leq 4$	2,245
GFI	$0.95 \leq$ GFI ≤ 1	$0.90 \leq$ GFI ≤ 0.95	0,891
TLI	$0.95 \leq$ TLI ≤ 1	$0.90 \leq$ TLI ≤ 0.95	0,900
IFI	$0.95 \leq$ IFI ≤ 1	$0.90 \leq$ IFI ≤ 0.95	0,921
CFI	$0.95 \leq$ CFI ≤ 1	$0.90 \leq$ CFI ≤ 0.95	0,920
RMSEA	$0 \leq$ RMSEA ≤ 0.05	$0.05 \leq$ RMSEA ≤ 0.08	0,077
SRMR	$0 \leq$ SRMR ≤ 0.08	$0.05 \leq$ SRMR ≤ 0.10	0,070

(GFI: Goodness of Fit Index, TLI: Tucker Lewis Index, IFI: Incremental Fit Index, CFI: Comparative Fit Index, RMSEA: Root Mean Square Error of Approximation, SRMR: Standardized Root Mean Square Residual).

Table 4
Summary of E-RAS scores.

	Mean	SD	Min	Max
Motivational and Emotional subscale	20.58	3.79	12	28
Self-Regulatory and Cognitive subscale	21.33	2.99	15	28
E-RAS Total	41.91	5.23	32	56

Table 5
Cronbach's alpha values of the scale and subscales.

		Item-total correlation	Cronbach's alpha with item removed	Cronbach's alpha
Motivational and Emotional subscale	Item 1	0.553	0.792	0.802
	Item 2	0.394	0.809	
	Item 3	0.362	0.807	
	Item 4	0.439	0.802	
	Item 5	0.34	0.809	
	Item 6	0.339	0.807	
	Item 7	0.546	0.795	
	Item 8	0.495	0.797	
Self-Regulatory and Cognitive subscale	Item 9	0.425	0.802	0.864
	Item 10	0.462	0.801	
	Item 11	0.455	0.801	
	Item 12	0.332	0.809	
	Item 13	0.523	0.798	
	Item 14	0.519	0.798	
	Item 15	0.389	0.804	
Total E-RAS				0.813

5.2. Reliability of the E-RAS

Reliability was assessed in this study using Cronbach's alpha values, Pearson correlation analysis, and test–retest analyses. The Cronbach's alpha coefficient is a value obtained by dividing the variance in a scale item to the variance of the entire scale [28]. There are different values accepted in the literature for this value. Values above 0.90 are generally regarded as excellent, 0.70–0.90 as good, 0.60–0.70 as acceptable, 0.50–0.60 as weak, and 0.50 or lower as unacceptable [29]. The Cronbach's alpha coefficient of the Turkish E-RAS was 0.813 in this study, which is higher than the minimum acceptable value of 0.70 stated in the literature [30]. For the subscales, Cronbach's alpha values were 0.802 for the Motivational and Emotional subscale and 0.864 for the Self-Regulatory and Cognitive subscale. In the study conducted by Shamsalinia et al., the Cronbach's alpha value for the whole scale was calculated as 0.815 [14]. Thus, both versions of the scale demonstrated high internal consistency. After calculating the Cronbach's alpha value of a scale, the item-total correlation coefficient is calculated. The purpose of calculating correlation coefficients is to determine the strength and direction of the relationship between two measured variables [22]. Pearson's correlation coefficient is used to determine the relationship between two variables that are interval measures [31]. A strong and positive item-total correlation indicates that the scale items show similar characteristics and internal consistency is high [30]. In the literature, 0.20 is generally the lowest level accepted. Items with a reliability coefficient of 0.30–0.40 are good, and those with coefficients above 0.40 are considered very good level and reliable [28,29]. In this study, item-total correlations ranged from 0.332 to 0.553, indicating a good level of reliability. Test-retest analysis assesses the ability of a measurement tool to give consistent results and invariance over time [32]. The main drawback of the test–retest method is the time interval between the two tests. A short interval will overestimate reliability because it is easier to remember the questions and previous responses, while a long interval may underestimate the reliability of the instrument because conditions cannot be held constant between the two measurements. Therefore, it has been stated that time interval between test and retest should be no shorter than 2 weeks and no longer than 4 weeks [33]. Moreover, it is reported that at least 30 people must be included in a test–retest analysis [15,31]. In the original scale study, Shamsalinia et al. reported an ICC value of 0.843 (0.773–0.900) for the scale [14]. In our study, 30 patients were retested 15 days after the initial test and we obtained ICC values of 0.865 (0.716–0.936) for entire E-RAS scale, 0.965 (0.927–0.984) for the Motivational and Emotional subscale, and 0.855 (0.696–0.931) for the Self-Regulatory and Cognitive subscale. This indicated positive and significant relationships between the scale, subscales, and items (p < 0.05).

3.2. Limitations of the study

This research is limited to the study date and the sample group with which the study was conducted. Another limitation is that we could not obtain information regarding the epilepsy patients' seizure types.

6. Conclusion

The Turkish version of the E-RAS is a valid and reliable scale that can be used in adults with epilepsy in the Turkish population.

Items and subscales in the Turkish version of the E-RAS

	Almost always	Often	Sometimes	Hardly ever
Motivational and Emotional				
Despite having epilepsy, it is easy for me to pursue my interests/goals.				
Being criticized and rejected by others reduces my motivation to treat my illness.				
I don't care how others communicate with me.				
The new goals and plans I have for my future are not hindered by my illness.				
Being deprived of social rights due to my illness made me angry				

(*continued*)

	Almost always	Often	Sometimes	Hardly ever
and prevented me from continuing my social activities. Uncertainty about the future of my illness has made precautions related to treatment irrelevant to me.My fear of the symptoms of the disease made me feel a kind of alienation. I don't care how others react to my symptoms.				
Self-Regulatory and CognitiveI determine how to engage in health-promoting behaviors (such as exercising, getting enough rest, eating healthy, avoiding alcohol, smoking, and drugs, and avoiding stress) .I actively follow behaviors related to the control of my disease (such as preventing possible injuries during seizures and adhering to the treatment regimen) . I believe that I can actively participate in decisions related to the management of my disease. I know the importance of self-care. I know I have to continue my treatment protocol for the rest of my life.I am aware of the symptoms and consequences of my illness (such as seizures, occupational, educational, and family problems and cognitive problems such as time, place, and person orientation and memory problems) . I know that I need to follow up my treatment in a timely manner and not delay it.				

Ethical Consideration

Written permission to adapt the E-RAS was obtained from the researcher who developed the original scale. Ethical approval for the study was obtained from Amasya University Noninterventional Clinical Research Ethics Committee (Date: 29.06.2022, Approval Number: E-76988455–050.01.04–80683), and institutional permission was obtained in writing from Amasya University Sabuncuoğlu Şerefeddin Training and Research Hospital (Date: 28.07.2022, Approval Number: E-62949364–774.99). Written and verbal consent was obtained from all participants. The study was conducted in adherence with the Declaration of Helsinki.

CRediT authorship contribution statement

Zeynep YANCI: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Eylem TOPBAŞ:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: [Zeynep Yancı If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper].

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