

Psychometric properties of The Clinician Affective Reactivity Index for Assessment of Irritability in a clinical sample of Turkish children and adolescents

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Abstract

Background: No clinician-oriented scale exists to assess irritability in Turkey. This pilot study aimed to evaluate the psychometric properties of the Turkish version of The Clinician Affective Reactivity Index (CL-ARI).

Method: A total of 116 children and adolescents aged between 10 to 17 years (14.1 ± 2.1 years) were recruited from the psychiatric outpatient clinics. The participants completed a set of scales (Strengths and Difficulties Questionnaire [SDQ], Affective Reactivity Index [ARI], Revised Child Anxiety and Depression Scale, Swanson, Nolan, and Pelham, Version IV Scale). Diagnostic interviews were administered to confirm psychiatric diagnoses. Cronbach's alpha was calculated to assess internal consistency. Discriminant validity was further tested using independent sample t-test and Receiver Operating Characteristic curves. Interrater reliability was tested using intraclass correlation coefficients (ICC). Convergent validity was also tested using Pearson's correlation.

Results: Cronbach's alpha values of CL-ARI were 0.919 total score, 0.842 for the temper outbursts score, 0.861 for the irritable mood score, and 0.840 for the impairment score. ICC values for interrater reliability were high for the temper outbursts ($r = 0.993$), the irritable mood ($r = 0.993$), the impairment ($r = 0.917$), and the total score ($r = 0.991$). In the sample, there was a high level of correlation between the self-report ARI-child/parent form and the CL-ARI total and subscale scores. Likewise, moderate-high level of correlations were found between the behavioral SDQ child/parent forms and the CL-ARI total and subscale scores.

Conclusions: This is the Turkish validation of the CL-ARI, a dedicated interview and rating scale to assess irritability in the clinical sample. The results of this study suggest that the Turkish version of CL-ARI has adequate internal consistency and interrater reliability, and sufficient convergent and discriminant validity to be used in research settings.

Keywords: Irritability; children; adolescent; validity; reliability; psychometric properties

Introduction

Irritability is a mood state, defined as having a low threshold of anger in response to frustration, which can give rise to self-harm or harmful behaviors towards others (1). In the field of child and adolescent psychiatry, the concept of irritability has become a remarkable subject regarding its relationship with different developmental dimensions, psychopathologies, and clinical features. Interest in the subject has increased dramatically in recent years (2).

The proportional increase in the diagnosis of bipolar disorder (BD) in children and adolescents has also paved the way for research focusing on irritability (3, 4). In order to prevent overdiagnosis, severe mood dysregulation disorder was defined for youth with chronic irritable mood. Subsequently, disruptive mood dysregulation disorder (DMDD) was classified in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (5).

Importantly, irritability could be seen in the context of many psychiatric disorders during childhood. Therefore, it is accepted as a diagnostic criteria of

various psychiatric disorders, including bipolar disorder, major depressive disorder, persistent depressive disorder, separation anxiety disorder and generalized anxiety disorder seen in children (6). While irritability is considered a mood symptom, it is also a major component of oppositional defiant disorder, consisting of temper outbursts, disruptive behaviors, oppositionality, and annoyance (7).

Irritability could be seen as a part of personality or temperamental traits (8). Unlike anger and aggression, the tendency to be angry and overreact to mild arguments/provocation is a personality trait. The heritability index of irritability seen in children and adolescents is estimated to be approximately 0.3-0.4 (2). On one hand, irritability could be a part of the normal development or a diagnostic criteria for a psychiatric disorder. On the other hand, it also could accompany many other clinical conditions including autism spectrum disorders and attention-deficit hyperactivity disorder (9-11).

Anger is the behavioral component of irritability (12, 13). Considering, irritability is very common in children and adolescents, varying between 3-20% (14), irritability-associated with aggressive behaviors lead to significant reduction in functioning in children and adolescents and their families (15, 16). Accordingly, the need for specific interviews dedicated to measuring irritability in children and adolescents has come to the fore (17). Specifically, clinician-rated tools to assess irritability have the utmost importance in pediatric studies (18, 19). Despite being practical and timesaving, parent- and self-report tools have some limitations (20). Thus, the Clinician Affective Reactivity Index (CL-ARI) is the first semi-structured interview that focuses on pediatric irritability based on the clinicians' ratings on the frequency, duration and severity of anger outbursts and irritable mood seen in children (21). Clinician-rated interviews and scales improved the reliability and consistency of the information provided. Moreover, the development of an instrument that evaluates the various components of irritability is a prerequisite to facilitate further research in this field.

The aim of this study is to make the Turkish validity and reliability study of the CL-ARI, a semi-structured transdiagnostic tool that can be used in children and adolescents in our country. The CL-ARI evaluates anger outburst and irritable mood together with their frequency, duration and severity. Introducing the CL-ARI to the Turkish language also could facilitate the early recognition prevention and the treatment of irritability-related mental disorders in Turkey.

Methods

Translation and adaptation of the scale

First, two child and adolescent psychiatrists who are fluent in both Turkish and English have translated the original scale into Turkish. Second, the researchers studied, restructured, and matched both items from each Turkish form. Third, the Turkish version was then back-translated into English by an independent lecturer in the English Language and Literature Department who was inexperienced with the original CL-ARI (21). The back-translated version compared to the original CL-ARI to confirm the reliability. The latest version of the scale was administered to ten adolescents who were under treatment in the child psychiatry clinic to assess the understandability of items. Authors reviewed and corrected unclear questions.

This translation was compared with the original of the interview by two bilingual child psychiatrists who confirmed the linguistic and content validity of the final version. The study was approved by the Local Ethics Committee of Bursa Uludag University, Faculty of Medicine (Protocol Number: 02.06.2021 / 2021-7/41).

Participants and study sample

One-hundred-sixteen children and adolescents (11–17 years) were included from the outpatient clinics of the Uludag University Hospital between June 2021 - September 2021. The required sample size has been estimated to multiplying the number of items with 10 times (22). When we considered the 11 items in the CL-ARI, it was planned to include at least 110 youths in the study group. Before starting the study authors also contacted the developer of the scale, Simone P. Haller. The procedure and aim of the study were explained to all participants, and written consent were obtained from all voluntary adolescents and their legal guardians. All participants were evaluated by a child and adolescent psychiatrist using a semi-structured interview, the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Now and Lifetime Form (K-SADS-PL) (23). Diagnostic interviews with children and parents were administered by the principal investigators, two senior child psychiatrists (ST and ŞE) and one research assistant (BEY).

The participants completed the Turkish version of the Affective Reactivity Index (ARI) self-report form, the Revised Child Anxiety and Depression Scale – Child Version (RCADS-C) and Strengths and Difficulties Questionnaire (SDQ) child version. Their parents completed the ARI- parent report form, the Turkish version of the Swanson, Nolan, and Pelham, Version IV Scale- Parent form (SNAP-IV), SDQ- parent form and the Revised Child

Anxiety and Depression Scale – Parent Version (RCADS-P).

Inclusion criteria were: i) being diagnosed with any psychiatric disorder as per the K-SADS-PL (23), ii) being aged between 10-18 years, iii) being able to understand and speak Turkish, and iv) giving informed consent to participate in the study. Exclusion criteria involved: i) intellectual disability that hampers the patient's ability to follow the research instructions in the clinical assessment, ii) history of autism spectrum disorders, iii) serious medical or neurological conditions (i.e., genetic syndrome, epilepsy, cranial tumor, metabolic disease, etc.), iv) head trauma (loss of consciousness or brain surgery), and v) uncooperativeness due to psychiatric symptoms (i.e., agitation, mutism, catatonia, etc.). Children who did not give written consent to the study were not included (n = 6). Similarly, eight adolescents having history of autism spectrum disorders and intellectual disability were excluded from the study. Six adolescents with missing data were also excluded.

Instruments

The Clinician Affective Reactivity Index (CL-ARI)

The CL-ARI is a semistructured rating scale assessing irritability over the past week by a trained clinician. CL-ARI is conceptualized around three subscales: temper outbursts (range: 0–27), irritable mood between outbursts (range: 0–8) and impairment (range: 0–15). The scorings obtained in the CL-ARI capture the full spectrum of irritability. It consists of two subscales including temper outbursts (six item), irritable mood (two items) and impairment (three items). Additionally, it involves clinical global impression severity, clinical global improvement and overall functioning scores. Items on temper outbursts and irritable mood subscales encompasses the frequency, duration, and severity of symptoms. Clinical Global Impressions Scale for Disruptive Mood Dysregulation (CGIS-DMDD) is rated based on the clinicians' overall judgment. The reliability (Cronbach's $\alpha=0.89$) and validity of the CL-ARI in children has been previously reported (21).

The temper outbursts subscale assesses the frequency (scored on a 5-point scale between "0=none" and "4=more than one outburst every day") and duration (scored on a 6-point scale between "0=none" and "5=60 min") of temper outbursts. The second subscale assesses the irritable mood which evaluates the frequency (scored on a 4-point scale between "0=none" and "3=four or more days"), duration (only implemented if the irritable mood frequency rating is rated at the maximum level which is "3=four or more days"), and severity (scored on a 6-point scale between "0=not present" and "5=severe") of irritable mood. The third

subscale assesses impairment in three different settings (i.e., family, school and peers) on a 6-point scale (between "0=none" and "5=severe"). Separate interviews are conducted with the parents and children. Clinicians synthesize the data to reach a consensus rating. Three subscales contribute equally to the total score based on the recommended formula below (21).

$$\text{Total score} = \left(\frac{\text{temper observed score}}{\text{total possible subscale score [27]}} + \frac{\text{mood observed score}}{\text{total possible subscale score [8]}} + \frac{\text{impairment observed score}}{\text{total possible subscale score [15]}} \right) / 3 * 100$$

Affective Reactivity Index-Child and Parent Form

The Affective Reactivity Index (ARI) is a scale developed for the evaluation and monitoring of irritability. It has both a parent form and a self-report form for children and adolescents. Stringaris and colleagues created it as a dimensional measure of irritability (19). Evaluating the symptoms of irritability for the last six months, this questionnaire involves six symptom items and the seventh item assesses the impairment in functioning. Ratings are given based on a three-point scale (i.e., "0=not true", "1=sometimes true", "2=definitely true"). The reliability and validity of the ARI in typically-developing children has been reported (19, 24). The Turkish validity and reliability study was carried out by Kocael and colleagues (25). The total ARI score ranges from 0 to 12 as the sum of the first six items.

Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS-PL)

The K-SADS-PL was originally developed by Kaufman et al. (1997) to evaluate psychiatric disorders of children and adolescents (26). The K-SADS-PL has been updated to be compatible with DSM-5 diagnoses, and the recent version of K-SADS-PL was also translated into and validated in the Turkish language (23).

Strengths and Difficulties Questionnaire (SDQ)-Adolescent and Parent Forms

Another scale used to screen for mental problems in children and young people is the SDQ, developed by Robert Goodman in 1997 (27). The questionnaire is currently translated into more than 40 different languages. This questionnaire has a parent and school form for the ages of 4-16, and an adolescent form for the ages 11-16 that the adolescent himself fills. The adolescent form contains the same items as the parent form. The scale was filled in as self-report. SDQ includes 25 questions, some of which question positive and some negative behavioral characteristics. These questions are grouped under five sub-titles; (1) behavioral problems, (2) attention deficit and

hyperactivity, (3) emotional problems, (4) peer problems, (5) social behaviors. As each title is evaluated within itself, the sum of the first four titles gives the total difficulty score (28). Validity and reliability assessment of both parent and adolescent forms in our country was performed by Güvenir and colleagues (29).

Revised Child Anxiety and Depression Scales, Child and Parent Version (RCADS-C, RCADS-P)

The RCADS parent and child form is a 47-item questionnaire designed to evaluate depression and anxiety disorders in children and adolescents according to DSM-IV diagnostic criteria. Response options are based on four-point Likert-type scales (0=never, 1=sometimes, 2=often, and 3=always). Both versions include six subscales (separation anxiety disorder, social phobia, obsessive-compulsive disorder, panic disorder, generalized anxiety disorder, major depressive disorder), as well as a total anxiety score (sum of five anxiety subscales) and total anxiety and depression (internalizing disorder) score (the sum of all six subscales) (30). The Turkish validity and reliability study of the parent and child form of RCADS was performed by Görmez and colleagues (31, 32).

Swanson, Nolan, and Pelham, Version IV Scale- Parent form (SNAP-IV)

This scale, which was developed according to DSM-IV criteria, consists of nine items questioning attention deficit, six items questioning hyperactivity, and three items questioning impulsivity (33). A Turkish validity study has not yet been published, but it is available in Turkey in large-scale sample studies (34). The mean threshold value of 1.5 SD for each item is similar to that in American community-based studies (33, 34).

Data analysis

In order to compare the diagnostic groups in terms of demographic, illness, and treatment characteristics, the ANOVA test was implemented to compare continuous variables, and the chi-square test was used for categorical variables. Cronbach alpha values were used for internal consistency. Intraclass correlation coefficients were calculated for interrater reliability. Item-total score correlation coefficients of the CL-ARI were also calculated for reliability. Correlation between CL-ARI and SDQ/ARI was used to demonstrate convergent validity. Conversely, the correlations between CL-ARI and depression, social anxiety, specific phobia, panic disorder, and generalized anxiety subscales of the RCADS were calculated for divergent validity. Principal Component analysis with direct oblimin

rotation was also used to conduct exploratory factor analysis.

Correlation coefficients were interpreted as low (< 0.30), moderate (0.30-0.49), high (0.50-0.80), and very high (> 0.80). Receiver Operating Characteristic (ROC) curves were performed to compare patients with CGIS-DMDD ≥ 3 and those with a score of CGIS-DMDD < 3 (35). In the CGIS-DMDD, the scores of 3, 4, and 5 refer to “mild”, “moderate”, and “marked” illness, respectively (35). Likewise, in order to conduct discriminant validity of CL-ARI, the student’s t-test was implemented. Cohen’s d was calculated for significant results. In the reliability analysis, $p \leq 0.001$ was selected to reduce the likelihood of type-I error. Data analysis was conducted using SPSS Version 24 (IBM Corp, New York). ROC curves were drawn using the STATA/IC version 16 (StataCorp. 2019, College Station, Texas).

Results

Sample characteristics

The study sample consisted of 116 youth with psychiatric disorder (14.1 ± 2.1 years, 59.5% female). Most of the patients had no family history of psychiatric disorder ($n = 93$, 81.1%). The most common diagnoses were major depressive disorder ($n = 39$, 33.6%), attention deficit/hyperactivity disorder ($n = 34$, 29.3%), obsessive-compulsive disorder ($n = 33$, 28.4%) and generalized anxiety disorder ($n = 31$, 26.7%). Details of the demographic, illness and treatment characteristics of patients are depicted in Table 1.

Reliability measures

Cronbach’s alpha values were 0.919 for the CL-ARI total score, 0.842 for the temper outbursts, 0.861 for the irritable mood, and 0.840 for the impairment subscales. Intraclass correlation coefficients of interrater reliability were high for the temper outbursts ($r = 0.993$), the irritable mood ($r = 0.993$), the impairment ($r = 0.917$), and the total score ($r = 0.991$). Item - total score correlation coefficients were between 0.560-0.829 (Table S1).

Construct validity

A two- factor PCA model with direct oblimin rotation explains 66.5% of total variance (Table 2). Kaiser-Meyer-Olkin measure was 0.848 and Barlett’s test of sphericity was significant at < 0.001 level. Temper outbursts – mild duration (item 2), temper outbursts – moderate frequency (item 3), temper outbursts – severe frequency (item 5), temper outbursts – severe duration (item 6), impairment – school (item 10) and impairment – peers (item 11) were grouped together under factor 1, while temper outbursts – mild frequency (item 1), temper

outbursts – moderate duration (item 4), irritable mood frequency (item 7), irritable mood severity (item 8) and impairment – family (item 9) fell under factor 2.

Convergent validity

In the sample, there was a high level of correlation between the self-report ARI-child/parent forms and the CL-ARI total and subscale scores, and a moderate-high level of correlation between the behavioral SDQ child and parent forms and the CL-ARI total and subscale scores (Table 3). Correlations with measures of other dimensions of psychopathology (symptoms of anxiety, depression, attention and hyperactivity problems) were not significant.

Discriminant validity

To evaluate the discriminant validity of the CL-ARI further, the total scores and subscale scores of the CL-ARI were compared between patients with CGIS-DMDD ≥ 3 (at least mild irritability) and those with CGIS-DMDD < 3 (borderline or no irritability) using the Student's t-test (Table 4). All CL-ARI scores significantly differed between both groups with large effect sizes.

In the ROC analysis of the capacity of the CL-ARI to demonstrate the differentiation between clinically significant (CGI-S ≥ 3) irritability, the area under the ROC curve was 0.800 for the all patients (Figure 1). The optimal cut-of values was found as $\geq 17.45\%$ for the weighted total score (sensitivity=75% and specificity=75%).

TABLE 1. Demographic, clinical, and treatment characteristics of study participants

	Total sample , n = 116
Age, years, <i>M</i> \pm <i>SD</i> (range)	14.1 \pm 2.1 (11-17)
Sex, female, percent	69 (59.5)
Family Status, n (%)	
Married	93 (80.2)
Divorced or separated	23 (19.8)
The number of siblings	2.1 \pm 0.8
Family history of psychiatric disorder	23 (18.9)
Special education, n (%)	8 (6.9)
Psychiatric comorbidities, n (%)	
Attention-deficit hyperactivity disorder	34 (29.3)
Oppositional-defiant disorder	18 (15.5)
Conduct disorder	17 (14.7)
Specific learning disorder	9 (7.8)
Tic disorders	12 (10.3)
Obsessive-compulsive disorder	33 (28.4)
Panic disorder	26 (22.4)
Social anxiety disorder	8 (6.9)
Generalized anxiety disorder	31 (26.7)
Specific phobia	20 (17.2)
Major depressive disorder	39 (33.6)
Eating disorders	3 (2.6)
Post-traumatic stress disorder	7 (6.0)
Enuresis/encopresis	6 (5.2)
Suicide attempt, n (%)	16 (13.8)
Medications, n (%)	
Risperidone	5 (4.3)
Aripiprazole	7 (6.0)
Quetiapine	2 (1.7)
Olanzapine	4 (3.4)
Methylphenidate	10 (8.6)
Atomoxetine	2 (1.7)
Fluoxetine	20 (17.2)
Sertraline	14 (12.1)
Escitalopram	3 (2.6)
Clinical Global Impression – DMDD, n (%)	
Normal or borderline	52 (44.8)
Mild	26 (22.4)
Moderate	20 (17.2)
Marked	18 (15.5)

Notes. ADHD=attention-deficit/hyperactivity disorder; DMDD=Disruptive mood dysregulation disorder; M= Mean; SD=standard deviation

* Different superscripts indicate statistical significance between study groups at $p < 0.05$ level

TABLE 1. Item-total score correlation coefficients and Cronbach's alpha if item deleted values of the CL-ARI

Severity Scale of the CL-ARI *	Item-total score Correlation Coefficient	Cronbach's alpha if item deleted
CL-ARI temper outbursts		
Temper outbursts – mild frequency (Item 1)	0.621	0.915
Temper outbursts – mild duration (Item 2)	0.734	0.910
Temper outbursts – moderate frequency (Item 3)	0.586	0.917
Temper outbursts – moderate duration (Item 4)	0.560	0.918
Temper outbursts – severe frequency (Item 5)	0.668	0.913
Temper outbursts – severe duration (Item 6)	0.640	0.915
CL-ARI Irritable mood		
Irritable mood frequency (Item 7)	0.704	0.911
Irritable mood severity (Item 8)	0.829	0.904
CL-ARI Impairment		
Impairment- family (Item 9)	0.764	0.909
Impairment- school (Item 10)	0.752	0.909
Impairment- peers (Item 11)	0.693	0.912

Notes. CL-ARI= The Clinician Affective Reactivity Index

* Cronbach's alpha=0.932

TABLE 2. Construct validity scores of CLA-RI items by using principal component analysis

Factor loading of items	Factor 1	Factor 2
Temper outbursts – severe duration (Item 6)	0.974	
Temper outbursts – mild duration (Item 2)	0.776	
Impairment- school (Item 10)	0.757	
Temper outbursts – moderate frequency (Item 3)	0.739	
Temper outbursts – severe frequency (Item 5)	0.647	
Impairment- peers (Item 11)	0.614	
Temper outbursts – moderate duration (Item 4)		0.937
Irritable mood frequency (Item 7)		0.705
Temper outbursts – mild frequency (Item 1)		0.689
Impairment- family (Item 9)		0.624
Irritable mood severity (Item 8)		0.592
Total variance explained	56.3%	10.2%
Eigenvalue	6.2	1.1
Cronbach's alpha	0.883	0.875

Notes. Principal Component analysis with direct oblimin rotation; Factor loadings ≤ 0.4 was suppressed

TABLE 3. Pearson correlation coefficients of the CLA-RI subscales and other psychopathology scores within the clinical sample

Clinical sample, n=116	Total CL-ARI score	Temper outbursts	Mood	Impairment
ARI-child form	r=0.66*	r=0.62*	r=0.55*	r=0.64*
ARI-parent form	r=0.65*	r=0.60*	r=0.57*	r=0.62*
Behavioral SDQ-child form	r=0.54*	r=0.54*	r=0.44*	r=0.51*
Behavioral SDQ-parent form	r=0.46*	r=0.49*	r=0.37*	r=0.44*
Total SDQ-child form	r=0.35*	r=0.32*	r=0.32	r=0.32
Total SDQ-parent form	r=0.42*	r=0.38*	r=0.33*	r=0.44*
SNAP-IV (attention deficit)	r=0.22	r=0.24	r=0.16	r=0.22
SNAP-IV (hyperactivity)	r=0.29	r=0.31	r=0.18	r=0.35*
RCADS (generalized anxiety)	r= 0.05	r= - 0.002	r= 0.11	r= - 0.001
RCADS (panic disorder)	r= 0.12	r= 0.01	r= 0.18	r= 0.10
RCADS (specific phobia)	r= 0.08	r= 0.07	r= 0.12	r= 0.01
RCADS (social anxiety)	r= 0.20	r= 0.22	r= 0.22	r= 0.12
RCADS (depression)	r= 0.16	r= 0.10	r= 0.21	r= 0.09

Notes. ARI= Affective Reactivity Index; CL-ARI= The Clinician Affective Reactivity Index, SDQ= Strengths and Difficulties Questionnaire; SNAP-IV= Swanson, Nolan, and Pelham, Version IV Scale; RCADS= Revised Child Anxiety and Depression Scales

*Statistically significant at $p < 0.001$

TABLE 4. Comparisons of study groups (according to on the CGIS scores) on the all scales using student t test

Total scale scores, $M \pm SD$	CGIS-DMDD less than 3, n=52	CGIS-DMDD ≥ 3 , n=64	t-test	p-value	Cohen's d
ARI-child	4.1 \pm 3.6	6.2 \pm 3.9	2.9	0.005	-
ARI-parent	4.1 \pm 3.3	6.7 \pm 3.7	3.9	< 0.001	0.74
Behavioral SDQ-child	2.4 \pm 1.7	3.3 \pm 2.3	2.4	0.018	-
Behavioral SDQ-parent	3.3 \pm 2.3	3.3 \pm 2.5	1.6	0.111	-
Total SDQ-child	19.1 \pm 6.1	21.4 \pm 6.1	2.0	0.045	-
Total SDQ-parent	14.5 \pm 5.7	17.1 \pm 5.6	2.4	0.018	-
SNAP-IV (attention deficit)	10.2 \pm 6.0	11.8 \pm 6.7	1.3	0.190	-
SNAP-IV (hyperactivity)	7.1 \pm 5.5	9.9 \pm 6.7	2.4	0.018	-
RCADS (generalized anxiety)	8.5 \pm 4.8	8.6 \pm 3.8	0.1	0.939	-
RCADS (panic disorder)	8.3 \pm 6.8	8.8 \pm 7.0	0.4	0.695	-
RCADS (specific phobia)	12.3 \pm 6.9	13.6 \pm 5.9	1.1	0.272	-
RCADS (social anxiety)	4.7 \pm 4.2	5.2 \pm 4.0	0.6	0.532	-
RCADS (depression)	4.7 \pm 4.2	5.2 \pm 4.0	0.2	0.854	-
CLARI-Total (%) (weighted)	13.4 \pm 16.4	34.4 \pm 21.3	6.0	< 0.001	1.10
CLARI-Temper outburst score	4.4 \pm 4.1	8.3 \pm 5.0	4.6	< 0.001	0.85
CLARI-Mood score	1.4 \pm 2.1	3.6 \pm 2.4	5.4	< 0.001	0.98
CLARI-Impairment score	1.1 \pm 2.0	4.1 \pm 3.5	5.9	< 0.001	1.05

Notes. ARI= Affective Reactivity Index; CL-ARI= The Clinician Affective Reactivity Index; SDQ= Strengths and Difficulties Questionnaire; SNAP-IV= Swanson, Nolan, and Pelham, Version IV Scale; RCADS= Revised Child Anxiety and Depression Scales

*p values ≤ 0.001 were considered statistically significant

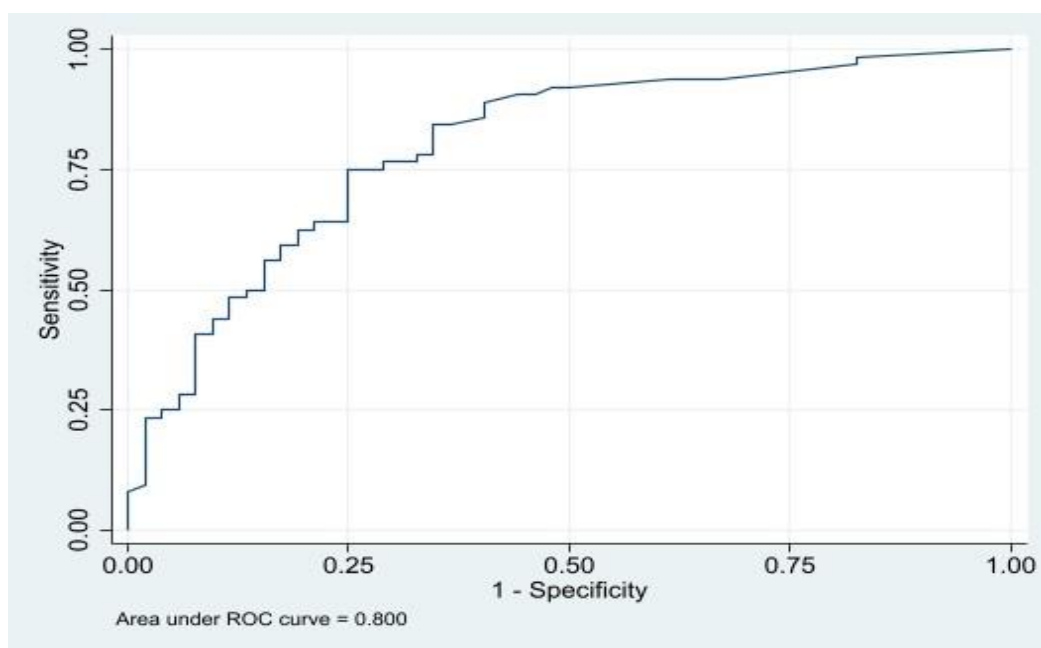


FIGURE 1. Receiver Operating Characteristics (ROC) curve drawn to demonstrate the differentiation between clinically significant (CGI-S ≥ 3) irritability

Discussion

To our best knowledge, after the first testing of the psychometric characteristics of CL-ARI (21), this is the first independent validity study of the CL-ARI in the Turkish language and the child and adolescent psychiatry outpatient clinic. The results of this study showed that the Turkish version had sufficient internal consistency, reliability and sufficient convergent validity to be used in research environments. Altogether, these results validate the good to excellent psychometric properties of the CL-ARI as a valid tool in research settings.

In this study, the adaptation, reliability and validity of Turkish CL-ARI was verified. In line with the original validity research (21), the Turkish version of the CL-ARI yielded high correlation coefficients with child and parent version of ARI. Additionally, behavioral problems measured with SDQ was correlated with the CL-ARI scores. Confirming the divergent validity of the CL-ARI, the association between attention, hyperactivity, anxiety and depression symptoms and the CL-ARI scores were lower.

The level of correlations between the CL-ARI and both parent- and self-report forms of ARI were high. Therefore, it could be suggested that the CL-ARI scores could reflect both informants' reports. Also, in line with the associations between irritability and the impairment in functioning within the clinical sample (36, 37), the impairment subscale was also correlated with total SDQ scores.

In order to confirm the discriminant validity of the CL-ARI, the CL-ARI scores yielded significantly differed between patients who had irritability and those who did not. Overall, these findings supported the use of CL-ARI. Nevertheless, further data is needed to evaluate the improvement after treatment. As irritability becomes more important in research, study designs with repeated measures could provide the data that help clinicians who treat irritability in clinical settings.

Limitations and strengths

The results of our study should be taken into consideration together with its limitations and strengths. Firstly, the test-retest reliability was not evaluated in this study. Second, the study had a cross-sectional design, longitudinal data is lacking. Third, the inclusion of the participants from a single center might have reduced the representativeness of the sample. Likewise, we were not able to evaluate psychometric properties of the CL-ARI in a non-clinical community sample. Despite these limitations, the results of this study showed that the Turkish version of the CL-ARI has good to excellent internal consistency, reliability and sufficient psychometric validity to be used in research settings. The results of

this study will also help clinicians who will measure the effectiveness of treatments, covering various aspects of the irritable mood and temper outbursts. Similarly, we felt that our results contribute to the future research that focuses on the treatment and the follow-up of irritability.

Conclusions

Our study is the validity and reliability study of CL-ARI which is a dedicated interview and rating scale to evaluate irritability in a clinical sample. The results of our study showed that the Turkish version of CL-ARI could be reliably and validly used in research environments. Treatment and follow-up studies will strengthen its use in clinic and research.

Clinical significance

We believe that our study provides a valuable contribution to the literature since the CL-ARI focused on irritability commonly seen in various psychiatric disorders in child and adolescent population. The CL-ARI uniquely provides clinician-oriented interview techniques that assembles various dimensions of the irritability. Our results help clinicians to use the CL-ARI in Turkey.

Conflict of interest

The authors report no conflicts of interest.

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