

Original Research



Screen for Child Anxiety Related Disorders (SCARED)-Child version: validity and reliability assessment among children aged 13-15 years

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Abstract

Introduction: Anxiety disorders is one of the most prevalent psycho-pathological condition among children and adolescents. Screen for Anxiety Related Disorders (SCARED)-Child version is a cross-culturally validated self-administered questionnaire to detect children with anxiety disorders.

Objectives: To assess the validity and reliability of SCARED-Child to identify anxiety among adolescents aged 13-15 years attending government schools (Sinhala medium) in the district of Colombo, Sri Lanka

Methods: The SCARED-Child was culturally adapted, translated to Sinhala and its judgmental validity was ensured. The instrument was validated among 423 adolescents aged 13-15 years in Colombo District by assessing criterion validity using the diagnosis made by a consultant psychiatrist as the gold standard, developing clinically validated cut-off values using ROC curve. The internal consistency and test-retest assessment were used to assess the reliability.

Results: The culturally adapted and translated SCARED-Child (Sinhala version) showed sensitivity of 85.7% (95% CI=74.61, 93.25) and specificity of 91.3% (95% CI=88.0, 94.07) at a cut-off of 36.5, with a high reliability of Cronbach's alpha (0.87) and test-retest correlation coefficient (0.74).

Conclusions & Recommendations: This study revealed that SCARED-Child has a high validity and excellent reliability to identify a child with an anxiety disorder at community setting.

Key words: anxiety disorders, SCARED-Child, Sinhala

Introduction

Anxiety disorders are the commonest psychological problem among children and adolescents (1). This warrants valid and reliable measurements in detection for early interventions. Structured interviews have been used to reliably diagnose anxiety disorders in kids established on DSM IV /ICD-10 diagnostic measures. The most widely used diagnostic schedule is the Anxiety Disorders Interview Schedule for Children and Parents (ADIS-C/P) which follows DSM-IV criteria (2). The main drawbacks of the structured interviews are the requirement of a trained personnel and increased time taken to conduct interviews (3).

There are questionnaires with scales that are in line with the diagnostic classifications. These questionnaires are useful to identify the levels of anxiety as well as the status of anxiety disorders among children and adolescents due to the availability of diagnostic cut-offs. Examples for such self-report questionnaires are Multidimensional Anxiety Scale for Children (MASC) (4), Screen for Child Anxiety Related Disorders (SCARED) (5) and Spence Children's Anxiety Scale (SCAS) (6).

SCARED is used for gauging anxiety symptoms in children and adolescents through a self-assessed questionnaire. It has 41 questions under five domains, namely panic/somatic, generalized anxiety, separation anxiety, social phobia and school phobia. Each question is being rated as per the frequency of which the child experiences each symptom using a three-point Likert scale i.e., zero for almost never, one for sometimes, and two for often. Out of the five domains, four assesses symptoms of anxiety disorders which are conceptualized in the latest DSM-V and one domain i.e., school anxiety, represents a common anxiety problem in adolescence. Adding up of marks assigned for all the questions provides the total score and if it is 31 or more, the adolescents could be having anxiety disorders. This instrument has been validated across the world including China and India to screen children aged 8-17 years. Young children could be screened by using child and parent version and older children with child version alone (5, 7). A meta-analysis has revealed that SCARED contains

psychometric properties that could be used as a cross-cultural screening instrument (8). Also, the SCARED instrument suits into the newest DSM-V diagnosis criteria/ ICD-11, whereas other instruments include conditions that are no longer included as anxiety disorders e.g., obsessive-compulsive disorders in SCAS. Therefore, SCARED tool can be considered as a tool which is in line with latest diagnosis criteria (9-10).

The problem of anxiety in children and adolescents in Sri Lanka is not well studied, owing to the scarcity of valid and reliable tools to detect anxiety. The purpose of this study was to assess the validity and reliability of SCARED-Child instrument to identify anxiety disorders among adolescents aged 13-15 years attending government schools (Sinhala medium) in the district of Colombo, Sri Lanka.

Methods

Authorization to use SCARED-Child for the study was obtained from Boris Birmaher, MD of Child and Adolescent Bipolar Spectrum Disorders Services (CABS), 100 North Bellefield Avenue, office 612 412-246-5788. The steps followed in assessment of validity and reliability are given below.

• Translation

The cultural adaptation was ensured by using 'forward-backward translation method'. The questionnaire was independently translated into Sinhala language by two bilingual translators who were eloquent in both Sinhala and English languages. During this process, special emphasis was given to ensure semantic, conceptual and normative equivalence rather than focusing merely on preserving the literal meaning of each word. Steps were taken to use simple language avoiding technical jargon and long sentences.

A synthesis of the forward translation was produced by an independent reviewer who was fluent in both languages, by reviewing both translations together with the original version. The differences between the original and translated versions were resolved by

reaching consensus. Next, the translated version was back translated into English language by two independent bilingual translators who were totally blinded to the original version of SCARED-Child. An independent reviewer compared the backward translations with the original English version for any inconsistencies or conceptual errors.

- **Assessment of face, content and consensual validity**

Face validity was assessed by the principal investigator (PI) in view of making subjective judgment of whether the measurements are reasonable (11). The original English version had been validated by many investigators in different settings and into different languages; and identified as a valid tool to identify the presence of an anxiety disorder among participants after a thorough scrutiny of items in the instrument and the constructs assessed by each of them, through which the content validity was established by ensuring the inclusion of all the appropriate content in the study instrument (11-12).

The consensual validity of SCARED-Child Sinhala translation was evaluated by a multi-disciplinary panel of experts consisting of four consultant community physicians, four child psychiatrists, two clinical psychologists, two paediatricians and two educationists. Each item of the questionnaire was evaluated by them on its relevance in assessing anxiety, appropriateness of the wording used and acceptability in the local context. Modified Delphi technique was conducted in three rounds. In the first round, each expert was given both the original English version and the forward translation of SCARED-Child (Sinhala version). The experts were instructed to rate each item using a Likert scale, in which one is strong disagreement and five is strong agreement. At the end of each round, the ratings for each item in each aspect and remarks if any, were summarized. Items with a mean score of 3.0 or more in all three aspects, were decided to be retained in the tool. If the score was less than the set score, summarized feedbacks were iterated in the subsequent rounds. Through this process, consensus was reached by the panel of experts to use SCARED-Child Sinhala version as a self-administered questionnaire to

identify children with anxiety disorders.

- **Pre-testing**

The forward translation of SCARED-Child was pre-tested among 20 school children aged 13-15 years in Kalutara District. The average estimated time to answer the questionnaire was around 12 minutes.

- **Assessment of criterion validity**

A cross-sectional study was carried out in three randomly selected mixed schools, each belonging to functional Type 1AB, Type 1C and Type 2 schools from Homagama Education Division in Colombo District, from which 434 students aged 13-15 years were recruited proportionately to the population size of school type. This sample size was calculated using the standard formula and obtained by convenience sampling. A consultant psychiatrist conducted clinical interviews while ensuring confidentiality and privacy. A diagnosis made on each participant on the status of anxiety disorders (i.e., detection of one or more of the DSM-IV defined anxiety disorders) was considered the gold standard. Following this, each participant was given a pre-tested self-administered questionnaire that contained socio-demographic details and the Sinhala translation of SCARED-Child.

In order to discriminate disease from the non-disease participant, a clinically validated cut-off value for SCARED-Child Sinhala version was computed using a Receiver Operating Characteristic (ROC) curve, where different cut-off values were computed for the total score of SCARED-Child Sinhala version against the clinical diagnosis, using Statistical Package for Social Sciences (SPSS) software. The optimal cut-off value was determined by the shortest distance between the point {0,1} and the curve, and was calculated using a formula introduced by Hajian-Tilaki 2013 (13). Once this point was identified, validity measures were determined with 95% CI.

- **Assessment of reliability**

The internal consistency and test re-test method (14) were used to assess the reliability of SCARED-Child

(Sinhala version). Internal consistency was evaluated by computing Cronbach's alpha for individual subscales and for the overall instrument using SPSS software. According to Nunnally's criterion, internal consistency estimates of 0.7 or greater were considered as acceptable (12). The test re-test reliability of the instrument was evaluated by administering the same instrument to a sub-sample of 30 children selected randomly, following an interval of two weeks from the initial administration. A correlation coefficient (Pearson r) of 0.7 or greater was considered as acceptable (15).

Results

In the forward translations, back translation and the consensual-related validation process, no conceptual errors were detected and at the end of the third iteration round, all 41 items of the tool were retained.

The validation study comprised 423 students, giving a response rate of 92.7%. Their characteristics are given in Table 1. The total score obtained by the participants for SCARED-Child ranged from 1 to 66 with a mean of 25.76 (SD=12.14) and a median of 25.0 (IQR=18.0). Of them, 63 were diagnosed to have anxiety disorders, whose scores ranged from 16 to 66 with a mean of 42.8 (SD=8.91) and median of 42.0. Scores of the remaining students ranged from 1 to 52 with a mean of 22.78 (SD=9.98) and a median of 23.0.

Figure 1 shows the ROC curve plotted for different cut-off values of the total score. The area under the curve (AUC) was 0.933 (95% CI=0.895, 0.971), which was close to one. Also, the AUC was different from the diagonal reference line and the difference was statistically significant ($p<0.001$). The optimal cut-off point identified was 36.5 (Table 2). At this cut-off point, the validity parameters of the tool included: sensitivity 87.5% (95% CI=74.61, 93.25%), specificity 91.3% (95% CI=88.0, 94.07%), positive predictive value (PPV) 71.3% (95% CI=63.65, 77.95%), negative predictive value (NPV) 96.3% (95% CI=93.32, 97.91%), likelihood ratio-positive 9.95 (95% CI=7.01, 14.14) and likelihood ratio-negative 0.16 (95% CI=0.09, 0.29).

With regards to internal consistency of the tool, Cronbach's alpha coefficients calculated for subscales of Panic, Generalized Anxiety, Separation Anxiety, Social Anxiety, School Avoidance and for overall scale ranged from 0.66 to 0.86. Results of test-retest reliability are summarized in Table 3.

Discussion

Current study aimed to assess validity and reliability of SCARED-Child (Sinhala version) among adolescents aged 13-15 years attending Sinhala medium schools in Colombo district and to develop clinically validated cut-off values. Similar cut-off values have been developed for this tool in other settings using a similar study methodology where the SCARED-Child score is compared with a psychiatrist's diagnosis of anxiety disorder according to the DSM IV criteria (7, 16-17).

The value which gives best the trade-off between sensitivity and specificity was taken as the cut-off. This has demonstrated good validity with having a higher sensitivity and a specificity. The lowest value of 95% CI for specificity is around 90% and it indicates that this tool is able to identify those who do not have the anxiety disorders very well. Reliability indicators have shown that SCARED-Child is a reliable instrument.

Findings of the current study were comparable with a study conducted in Kerala state, India among 500 children and adolescents aged 11-19 years who were assessed for the status of anxiety disorders, by using a semi-structured interview as per the diagnosis criteria (DSM IV) by an expert in the field as the gold standard. SCARED-Child Malayalam version was applied to all the study participants. ROC curve was drawn to select the most appropriate cut-off for the total score. The AUC for SCARED-Child Malayalam total was 90.0% (95% CI=86, 94%; $p=0.0001$). It was also found to have good diagnostic accuracy parameters at the set cut-off (84.62% sensitivity (95% CI=65.1, 95.5%); 87.36% specificity (95% CI=81.5, 91.9%), 50% PPV (95% CI=34.4, 65.6%), 97.4% NPV (95% CI=93.6, 99.3%), 6.69 positive likelihood ratio (95% CI=5.6, 8.0) and 0.81 negative

Table 1: Characteristics of the Study Sample (N=423)

Characteristic	No.	%
Age (in years to last birthday)		
13	147	34.8
14	276	65.2
Sex		
Male	204	48.2
Female	219	51.8
Ethnicity		
Sinhala	414	97.9
Tamil	3	0.7
Muslim	4	0.9
Burger	2	0.5
Religion		
Buddhist	412	97.4
Hindu	3	0.7
Islam	4	0.9
Christian	4	0.9
Number of siblings		
0	58	13.7
1	196	46.3
2	121	28.6
3	38	9.0
4 or more	10	2.3
Status of chronic physical illness		
No physical illness	387	90.5
Any physical illness	40	9.5
Asthma ^a	24	5.7
Other ^a	16	3.8
Status of mental illness		
Depression	01	0.2
No mental illness	422	99.8
Whether parents are living or not ^b		
Father alive	410	96.9
Mother alive	421	99.5
Category of school		
Type 1AB	279	66.0
Type C	74	17.5
Type 2	70	16.5

a-out of the presence of any physical illnesses

*-Categories are exclusive hence will not add up to 100%

Table 2: Cut-off values with their corresponding values of sensitivity, (1-specificity) and 'd' values

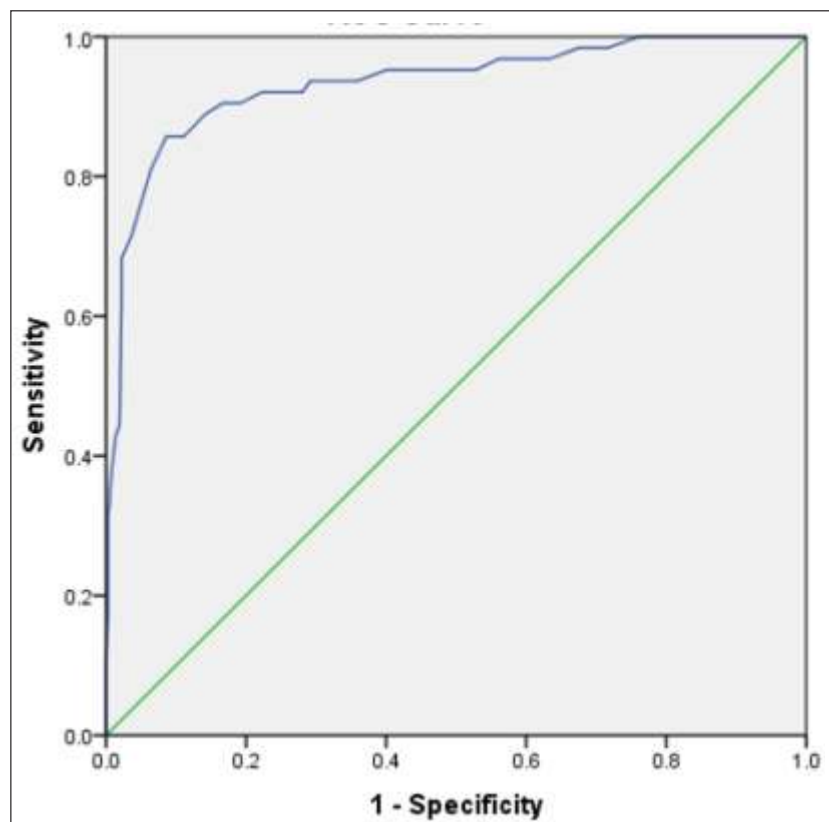
Cut-off value	Sensitivity	(1-Specificity)	d ²
28.5000	.937	.292	0.298
29.5000	.921	.281	0.291
30.5000	.921	.253	0.265
31.5000	.921	.222	0.234
32.5000	.905	.192	0.214
33.5000	.905	.167	0.192
34.5000	.889	.142	0.180
35.5000	.857	.111	0.181
36.5000	.857	.086	0.167
37.5000	.810	.064	0.200
38.5000	.762	.050	0.243
39.5000	.714	.036	0.288
40.5000	.683	.022	0.317
41.5000	.619	.022	0.381
42.5000	.444	.019	0.556
43.5000	.429	.014	0.571
44.5000	.381	.008	0.619
45.5000	.349	.006	0.651
46.5000	.333	.006	0.666
47.5000	.317	.003	0.683
48.5000	.286	.003	0.714

$$d^2 = (1 - \text{Sensitivity})^2 + (1 - \text{Specificity})^2$$

Table 3: Cronbach's alpha reliability (n=423) and test-retest reliability (n=30) of SCARED-Child Sinhala version

Description	No. of items	Internal consistency			Correlation coefficient*
		Cronbach's alpha coefficient	95% CI		
			Lower	Upper	
Panic	13	0.86	0.84	0.88	0.8
Generalized anxiety	9	0.85	0.83	0.86	0.87
Separation anxiety	8	0.77	0.74	0.8	0.88
Social anxiety	7	0.76	0.72	0.79	0.92
School avoidance	4	0.66	0.61	0.71	0.64
Total	41	0.87	0.85	0.89	0.74

* Spearman correlation coefficient was determined as the variables under study had a non-normal distribution and all the correlations were statistically significant at p=0.05

Figure 1: ROC curve for total scores of SCARED-Child Sinhala version among study participants

likelihood ratio (95% CI=0.07, 0.5)) (16). These values were more or less similar to those of the current study.

Two other studies had been done among children and adolescents in the West. One was from the USA in a clinical sample (n=190; age range 9-18 years) having a comprehensive checklist for all DSM-IV diagnostic categories, administered by trained clinicians as the gold standard, together with all the participants completing the SCARED instrument. Following its ROC analysis, the optimum cut-off point was determined by selecting a score i.e., 25 that maximizes diagnostic accuracy with 71% sensitivity and 67% specificity (7). The other study was from Spain by Canals et al. (2012) in a community sample (n=2023; mean age=10.2 years) having a psychiatric diagnosis made by using a structured interview administered by trained clinicians as the gold standard, together with all the participants completing the SCARED instrument. Following its ROC Analysis, the AUC was found to be 0.8 (95% CI=0.75, 0.84). The optimum cut-off point was determined by selecting a score i.e., 25 that

maximizes diagnostic accuracy with 75.9% sensitivity; 68.5% specificity; 43% positive predictive value; and 90% negative predictive value (17). The differences noted between the studies conducted in the West and elsewhere may be due to the differences in the cut-off marks and differences in the expression of symptoms owing to cultural differences. However, in all settings, SCARED-Child was found to be a valid tool.

With regards to reliability, SCARED-Child Sinhala version total scale was found to have a high Cronbach alpha coefficient (0.873). This finding was consistent with other studies conducted across the world in different languages. High internal consistency had been reported in the Chinese (18), Indian (16), Italian (19), Spanish (17), Brazilian (20) and Arabic (21) versions. As for subscales of the tool, the present study revealed that the test re-test correlation coefficients were high (>0.7) for all subscales as well, except the school avoidance subscale which was just below 0.7. All these correlations were statistically significant. These findings were consistent with the validation study conducted in India (16) and China

(18). In line with available global literature, the school avoidance subscale of SCARED-Child had low internal consistency and test-retest correlation coefficient, thus it has only four items and is not belonging to a DSM IV diagnostic category unlike other subscales. This subscale had been included by the developers as it is considered to be an important common clinical entity that is seen both comorbidly and independently from other anxiety disorders (5-6, 8).

Conclusions & Recommendations

The culturally adapted and translated SCARED-Child Sinhala version showed a sensitivity of 85.7% (95% CI=74.61, 93.25%) and specificity of 91.3% (95% CI=88.0, 94.07%) at 36.5 cut-off point. Therefore, it is a valid, reliable and acceptable self-administered instrument to be used as a screening instrument to identify adolescents aged 13-15 with anxiety disorders.

Public Health Implications

- The SCARED Child (Sinhala) has high content, consensual and criterion validity, internal consistency and test-retest reliability with good cultural and conceptual equivalence. It can be recommended for use in community settings by primary healthcare workers to identify children with anxiety disorders.

Author Declarations

Competing interests: The authors declare that they have no competing interest.

Ethics approval and consent to participate: Ethical clearance was obtained from Ethics Review Committee of Faculty of Medicine, University of Kelaniya. Informed written consent was obtained from all the study participants and their parents prior to data collection.

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Author contributions: SD participated in the design of the study, coordinated data collection, and performed the statistical analysis, interpreted the data and drafted the first

version of the manuscript. SS supervised the design of the study and conducted screening of children for anxiety disorders. DS supervised the design of the study, coordinated data collection, and performed the statistical analysis, interpreted the data and drafting manuscript. All authors read and approved the final manuscript.

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