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Reliability and Validity of Urdu Children Anxiety Sensitivity Index (CASI) Scale

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Abstract

Objective. Anxiety sensitivity has been implicated as a trans-diagnostic risk factor for various psychopathologies. Childhood anxiety sensitivity index (CASI) is an eighteen-item self-reported measure of anxiety sensitivity. The present research aimed to translate and adapt CASI into Urdu language, analyze the psychometric properties, factor structure and assess it as a screening scale for anxiety disorders in children.

Method. A cross-sectional research design was used to collect data from 658 participants (age 6 to 17 years; *M*=13.24, *SD*=2.51) by using CASI and Screen for anxiety and emotional related disorders (SCARED) self-report and parent-report.

Results. Exploratory factor analysis yields four factor structure explaining 32.98% accumulative variance. Confirmatory factor analysis supported a three-factor hierarchical factor (χ^2 = 152.52, *df*= 87, χ^2/ *df*= 1.75 RMSEA= .05, *CFI*= .92, SRMR= .05, *AIC*= 218.52). ROC Curve analysis indicated CASI as a potential screening measure for anxiety disorders with a sensitivity of >.80 and specificity of >.58 at a cut score of 20 to 23.

Conclusion. Study findings indicate that Urdu CASI may be used as a screening tool of anxiety disorders in children. Suggestions for further research are proposed in the light of the present research findings.

Keywords. *Anxiety sensitivity, roc curve analysis, trans-diagnostic risk factor, anxiety disorders. mental health, cultural adaptation, casi.*

Introduction

Prevention of mental disorders requires less effort but provides greater benefits to the individual, family and society. Targeting transdiagnostic risk factors is a cost-effective way in this regard. Anxiety sensitivity is a transdiagnostic risk factor for a range of psychopathologies like anxiety disorders, depression, suicidal ideation, and suicidal risk (Leen-Feldner et al., 2005; Lejuez et al., 2006; Lo et al., 2018; Velasco et al., 2016; Zvolensky et al., 2018). Meta-analysis about the relationship of anxiety sensitivity and psychopathology indicates that it is strongly linked to panic disorder, post-traumatic stress disorder, and generalized anxiety disorder and moderately linked to social anxiety, agoraphobia, and obsessive-compulsive disorder (Naragon-Gainey, 2010). Anxiety disorders are the most prevalent mental disorders, having chronic course, acting as a risk factor for future psychopathologies, negatively affecting the development and functionality of children and adolescents (Curry et al., 2004; Hudson et al., 2015). Anxiety disorder prevalence ranges from 10.7% to 17.3% in non-referred children and 3% to 44% in the clinical population of children and adolescents (Bandelow & Michaelis, 2015; Weiss & Last, 2001). Similarly, the prevalence of anxiety and depression in Pakistani children is higher, as 53.2% of children reported experiencing anxiety and depression in Karachi (Ibbad et al., 2022). Assessing and targeting anxiety sensitivity is an effective way to prevent and treat anxiety-related problems in children (Knapp, 2016). For the assessment of anxiety sensitivity, there must be a valid and culturally appropriate scale. To date, no culturally valid scale is available in Pakistan to assess anxiety sensitivity in children.

Anxiety sensitivity is defined as the fear of anxiety related bodily sensations and a belief that these sensations will lead to catastrophic outcomes such as physical illness, social embarrassment, loss of control and mental incapacitation (Reiss et al., 1986). It is the fear of arousal related bodily sensations due to the personal belief that these sensations will produce harmful physical, psychological and/or social consequences. For example, a person having high anxiety sensitivity may be frightened from accelerated heartbeat due to the attribution that it may lead to death (physical), and/or social rejection (social concerns). Anxiety sensitivity appears as a trait-like cognitive characteristic that amplifies the intensity of specific anxiety symptoms and thus builds up the perception of anxiety reactions (Taylor, 1998).

Children who score relatively high on the scale of anxiety sensitivity are prone to expect negative biopsychosocial consequences of experiencing anxiety like heart failure, panic attack, and/or humiliation compared to children with normal anxiety sensitivity (Reiss et al., 2001).

Childhood Anxiety Sensitivity Index (CASI) is a widely used eighteen items self-report instrument used to assess anxiety sensitivity in clinical and non-clinical population of children (Birmaher et al., 1999; Chorpita & Daleiden, 2000). It is a downward extension of the adult anxiety sensitivity index (ASI) for children. CASI has been translated and validated in different languages like Spanish (Fernández-Valdés et al., 2017), and Catalan (Fullana et al., 2003). CASI can be used as a screening tool for anxiety disorders and as an outcome measure in intervention studies for gauging the treatment effects (Schmidt et al., 2008). Existing studies have reported different factors structures of anxiety sensitivity for example, two factors i.e. autonomic and non-autonomic (Deacon et al., 2002), three factors i.e. physical concern, psychological concern, and social concern (Walsh et al., 2004; Wright et al., 2010), and four factors i.e. fear of physiological arousal, fear of mental incapacity, fear of social evaluation, and fear of losing control (Adornetto et al., 2008). The author of CASI analyzed four subfactors hierarchical structure based on a shorter version of CASI of 13 items. Poor and inconsistent items were removed and a final 13 version was tested in a clinical as well as non-clinical sample (Silverman, Wendy et al., 2003). A systematic review of CASI factor structure (Francis et al., 2019) and a meta-analysis of CASI (Noël & Francis, 2011) also point out the presence of a multidimensional construct of anxiety sensitivity in different samples across different countries warranting further studies in different cultures. Recently, there has been a growing trend to study the multidimensional nature of CASI as a transdiagnostic variable for different disorders (Francis et al., 2019; Knapp et al., 2016). Pakistan is a lower- middle- income country with unidentified mental health problems in children. As anxiety sensitivity is a transdiagnostic risk factor for mental health problems, a valid and culturally appropriate scale to measure anxiety sensitivity would help in assessing at-risk children for anxiety disorders and can be utilized in treatment progress.

The objectives of the present study were to translate and adapt CASI in Urdu, to analyze psychometric properties and factor structure of CASI in Pakistani children. In addition, present research also aimed to analyze CASI as a screening tool for anxiety.

Method

The present research was carried out in two phases. In the first phase, CASI was translated and adapted into Urdu language, and in the second phase reliability, factor structure and CASI as a screening scale for anxiety disorders was analyzed.

Instruments

Childhood Anxiety Sensitivity Index (CASI) (Silverman et al., 2003). This scale is an 18 item self-report tool to measure anxiety sensitivity regarding disease concerns, mental concerns, social concerns and unsteady concerns on a three-point scale from 1 to 3. It is a valid instrument for clinical and non-clinical samples of children and adolescents. Cronbach alpha for CASI total score is .87 for clinical and non-clinical samples. The test-retest reliability for two weeks is .76 and .79 for clinical and non-clinical samples. The score ranges from 18 to 54 where higher scores indicate higher anxiety sensitivity.

Screen for Anxiety and Emotional Related Disorder (SCARED) (Birmaher et al., 1999). This scale has a parent version and a self-report version measuring anxiety among children of 8 to 18 years of age. There are 41 items divided into five subscales: Panic/somatic (13 items), generalized anxiety disorder (9 items), separation anxiety disorder (8 items), social phobia (7 items), and school phobia (4 items). For each item, respondents choose the number that best describes how they have been feeling for 3 months at a three-point scale (*0*= not true, 1= sometimes true; 2= often true). Both child and parent versions have good internal consistency (α= .74 to .93). Test-retest reliability ranges from .70 to .90 for five weeks. The sensitivity and specificity of this scale are 71% and 67% respectively. The score ranges from 0 to 82, with a cut score of 30 indicating anxiety. All subscales have their cut scores to indicate the presence of disordered behavior i.e. Generalized anxiety subscale is 9, separation anxiety disorder and social anxiety subscale is 8, panic disorder is 7 and for school avoidance is 3. In the present study Urdu version of SCARED self-report and parent reports were used (Ahmed et al., 2020).

Phase 1: Translation and Adaptation of CASI in Urdu Language

CASI was translated in Urdu by following the guidelines of World Health Organization (World Health Organization, 2010). Written permission to translate, adapt and use the scale was taken from the author. Firstly, three postgraduate students of Clinical Psychology independently translated CASI in Urdu. Secondly, expert panel opinion was taken to select CASI's most suitable translated items. The expert panel was comprised of 4 bilingual postgraduates of Clinical Psychology. Suggestions and recommendations were taken. Thirdly, the Urdu translation of CASI was back- translated to English by three independent members. Two of the members were postgraduate students, and one was a teacher. The translated and original versions were compared in the committee approach by analyzing semantic equivalence. Lastly, Cognitive interviewing was carried out with a sample of 10 children. Some of the Urdu words were difficult to read and comprehend for children of 6 to 8 years of age during cognitive interviewing, for example, the word " احساسات". These terms and phrases were substituted with simpler words and English words were used along with the Urdu word. This decision was carried out by expert panel because English is the official language of Pakistan and it is used as a medium of instruction in school settings. A rich pool of English vocabulary has also been used in Urdu conversation in Pakistan which gives a plausible reason to use English words with Urdu words for comprehension (Appendix A: Urdu version CASI).

Phase 2: Reliability Estimate, and Factor Structure of CASI

Sample. Sample size was determined by using the criteria of MacCallum, Widaman, Zhnage, & Hong (MacCallum et al., 1999) which suggests 100 to 200 sample size for well determined factors (r =>.80) and high communalities (>.50), and 300 sample for small number of factors and few number of indicators. Based upon the existing literature about the factor structure of CASI, it was hypothesized that CASI has fewer number of factors, less communality and has not well determined factors, so a sample size of 658 was taken. Inclusion criteria was age range from 6 to 17 years; and school going. The sample was taken through convenient sampling from schools based in two different localities i.e. orphanage and community setting.

Data was collected from three major cities i.e. Islamabad, Rawalpindi, and Wah Cant Pakistan. Islamabad is the capital city of Pakistan while Rawalpindi is the fourth most populous city in the country (Pakistan Bureau of Statistics, 2017). The mean age of the sample was (*M*=13.24; *SD* =2.51, age range=6 to 17). Almost fifty percent participants were male, and fifty percent were female. Almost eighteen percent sample (*n*=116) was from three orphanage-based schools in Rawalpindi and Islamabad while eighty two percent participants (*n*=542) participants were from community-based government and private schools. The total sample was divided into two halves to conduct exploratory factor analysis (*n*=325; Mean age=15.02; *SD*=1.56; 41.5% boys, 58.5% girls) and confirmatory factor analysis (*n*=333, Mean age= 11.30, *SD*= 2.10, 59.5% boys and 39.3% girls). In order to analyze CASI as a screening measure for anxiety disorders some of participants' parents were requested to (*n*=180) fill SCARED parent-report version and some of the participants filled SCARED self-report version (*n*=87).

Procedure

Ethical approval for the study was taken from the Institute's ethics review committee. Written Informed consent from participants' parents in the community-based schools and from caretakers' in orphanage-based schools was taken. Assent was also taken from children for participation in the study. During school time, the class teacher randomly selected students to fill out the questionnaire. Scales were self-administered in a group setting during school timings.

Three research assistants were present to answer any queries by the participants. Instructions were read aloud to all participants. The questionnaires were also read aloud to children from 6 to 9 years of age. SCARED parent version was filled out by parents of children from community schools, while SCARED self-report was filled out by participants living in orphanages due to the unavailability of parents in orphanage.

Statistical Analyses

SPSS version 23 and AMOS version 24 was used for analyses. Data was cleaned by checking outliers, mean and missing values. Normality assumptions and internal consistency of scales and subscales were analyzed by calculating skewness, kurtosis, histogram, Kolmogorov Smirnov test and reliability analyses respectively. Exploratory factor analysis was performed for initial factor extraction using Principal Axis Factoring with Promax rotation. Confirmatory factor analysis was performed in AMOS to check the comparative goodness of fit of EFA derived factor structure model. Maximum likelihood estimation was used for CFA. Chi-square difference, RMSEA, SRMR, CFI, and AIC were used to check model's goodness of fit. ROC curve analysis was used to determine the sensitivity and specificity of CASI as a screening measure for anxiety disorders.

Results

Descriptive analysis indicates that overall CASI, SCARED parent-reported version, and self-reported version have adequate internal consistency. The value of skewness and kurtosis indicates normality of data distribution of all study variables within ±2 range (Table 1).

Table 1

Descriptives of Study Variables CASI, SCARED self- report and parent report (N = 658)

Scale					Range		Skew	Kurtosis
	k	*M*	*SD*	*α*	Actual	Potential		
CASI	15	25.26	5.80	.82	15-45	15-45	.33	-.27
Factor 1	6	9.99	2.81	.70	6-18	6-18	.45	-.43
Factor 2	5	8.51	2.36	.66	5-15	5-15	.32	-.54
Factor 3	4	5.80	1.99	.50	4-12	4-12	1.24	.92
SCARED-P	41	19.02	13.27	.92	0-71	0-82	1.23	2.09
SCARED-S	41	35.80	11.30	.83	5-74	0-82	-.03	.86

Note. *k* = number of items CASI = Childhood Anxiety Sensitivity Index, SCARED = Screen for Anxiety and Emotional Related Disorder; *S* = self-report; *P* = Parent report; *S.E* of skewness and kurtosis: CASI=0.96, 0.19; SCARED-*S* = .25, .51; SCARED-*P* =.18, .36.

EFA of CASI indicated a four factor model explaining 32.89% variance with eigenvalues of 4.63, 1.41, 1.33, and 1.20, respectively. Item no. 1, and 5 have lowest communality value indicating it as poor items. The fourth factor has just two items and the lowest internal consistency indicating it a poor factor (Table 2).

Table 2

Exploratory Factor Analysis of Urdu version CASI (N=325)

Item No.	Statements	Factor Loadings				
		1	2	3	4	H^2
6	It scares me when my heart beats fast	.66				.38
4	It scares me when I feel I am going to faint	.61				.28
9	When I notice that my heart is beating fast, I worry that there might be something wrong with me	.57				.39
10	It scares me when I have trouble getting my breath	.57				.41
8	It scares me when I feel like I am going to throw up	.48				.26
11	When my stomach hurts, I worry that there might be something wrong with me.	.38				.37
7	It embarrasses me when my stomach growls	.37	.71			.26
2	When I cannot keep my mind on my school work, I worry that I might be going crazy		.52			.42
12	It scares me when I cannot keep my mind on my school work		.47			.34
16	It scares me when I feel nervous		.27			.43
3	It scares me when I feel shaky		.27	.69		.30
14	Unusual feelings in my body scare me			.47		.30
13	Other kids can usually tell when I feel shaky			.36		.43
15	When I am afraid I worry that I might be crazy			.33		.42
1	I do not want other people to know when I feel afraid					.11
18	Funny feelings in my body scare me					.39
17	I do not like to let my feelings show				.55	.33
5	It is important for me to stay in control of my feelings				.31	.13
	No of items	7	5	4	2	
	Eigenvalues	4.63	1.41	1.33	1.20	
	Total variance explained	22.20	4.32	3.78	2.68	
	Internal Consistency	.73	.69	.57	.30	

CFA was carried out with four factor hierarchical model and it was improved based upon the model fit indices of Model Chi-square (χ^2), Root Mean Square Error of Approximation (RMSEA), comparative fit index (CFI), and standardized root mean square residual (SRMR) and factor loadings. Model fit of the initial EFA based four factor model was poor (χ^2 = 476.50, *df*= 130, RMSEA= .09, CFI= .62, SRMR= .21, AIC= 558.50), so item no.1 was removed because of low factor loading. After removing item 1 model fit was slightly improved (χ^2 = 216.14, *df*= 115, RMSEA= .09, CFI= .87, SRMR= .05, AIC= 292.14). Item no. 7 and 17 were removed in the second round due to low factor loading (<.30) to improve the model fit. The final model fit falls under the acceptable range and all items have acceptable factor loadings (χ^2 = 152.52, *df*= 87, χ^2/ *df*= 1.75 RMSEA= .05, CFI= .92, SRMR= .05, AIC= 218.52).

Table 3

Factor Loadings based on CFA of CASI (N=333).

Factor	Item no	λ
1	4	.44
1	6	.55
1	9	.58
1	8	.43
1	10	.42
1	11	.53
2	2	.41
2	3	.37
2	12	.41
2	14	.55
2	16	.50
3	5	.50
3	13	.37
3	15	.50
3	18	.55

ROC curve analysis indicated adequate sensitivity to assess anxiety disorders in children with a cut of score 20 against parent-reported anxiety and 23 against self-reported anxiety disorders. (Table 4).

Table 4

ROC Curve Analysis of CASI against SCARED-parent (N=180) and SCARED-self (N=87)

CASI Scores	Anxiety Disorders						
	AUC	*S.E*	*p*	95% *CI*	OCP	Sensitivity	Specificity
SCARED P	.70	.04	.000	.61-.80	20	.84	0.58
SCARED S	.83	.04	.000	.74-.93	23	.93	0.60

Note. AUC= area under the curve; CASI=Childhood anxiety sensitivity index; SCARED= Screen for children anxiety related emotional disorders; *P*=parent version; *S*=self-report; OCP= optimal cutoff point.

Discussion

The aim of the present study was to translate, adapt and analyze the psychometric properties of Urdu version of CASI for Pakistani children. A secondary aim was also to analyze CASI, a screening measure for anxiety disorders in children.

The results indicated that CASI Urdu version has good internal consistency (Table 1) for the overall scale (α =.82); acceptable for the subscales as well (α=.70, .66, .50). Previous studies of CASI structure also report similar alpha coefficient for three factors respectively. Third factor comprising of social concerns related 3 items usually had lower reliability estimates in the previous studies as well i.e. .48, 55 (Francis et al., 2019; Noël & Francis, 2011).

One possible reason could be lower no. of items and not clear enough to measure the social concerns related to anxiety sensitivity.

EFA results (Table 2) indicated a four-factor structure in which one of the factors consisted of seven items explaining 22.20% variance. Some items have low communality like item no. 7. The items in the first factor are mostly related to the physical body related concerns which might be interpreted as unsteadiness for example item no 6, 9, 10 and 11. These items are characterized in physical concerns factor in previous studies as well (Noël & Francis, 2011). Item no. 4 and 8 is usually characterized under unsteady concerns and fear of losing control but in the present research physical concerns and unsteady concerns made one factor.

Factor one has highest explained variance and this findings is consistent with previous study indicating that CASI items related to autonomic arousal are diagnostically superior to the full scale (Chorpita & Daleiden, 2000). Another EFA based study also indicated that nine items related to physical anxiety sensitivity has better model fit than two three or four factor model. The second factor comprised five items explaining 4.32% variance with acceptable communality values. The second factor was mainly related to mental concerns for example attention to work, nervousness, and feeling shaky. The third factor was made of four items explaining a 3.78% variance. Item no. 1 in the third factor has the lowest communality (.11). Factor four consisted of just two items about having emotional control explaining only 1.20% variance. Item five has the second lowest communality (.13). One reason could be the cultural aspect of not expressing one's feelings and maintaining group harmony in collectivist societies like Pakistan (Schreier et al., 2010). These items with the lowest commonalities were removed one by one in CFA to improve the model fit.

The results of CFA (Table 3) indicated that CASI has a hierarchical structure, comprised of three lower orders factors i.e. disease concern, unsteady concern, and mental illness concern measured by 15 items version of CASI. Previous studies on factor structure of CASI has also indicated better model fit with fewer items rather than eighteen items scale (Adornetto et al., 2008; Silverman, Wendy et al., 2003). Studies in United States also reported the best model for 13 items four factor structure (Feldner et al., 2008; Leen-Feldner et al., 2005). Items no. 1 and 17 that are removed in the present CASI factor structure are related to social concerns. Items no.17 was difficult to comprehend to children during cognitive interviewing as well which might be a reason of poor factor loading.

ROC Curve analysis (Table 4) suggested that CASI could be used as a screening measure for anxiety disorders. Previous studies also indicated that CASI can be used a screening tool for anxiety disorders (Francis et al., 2019; Manly, 2005; Paulus et al., 2018; Weems et al., 2010; Zvolensky et al., 2015, 2018).

CASI is a short and freely available scale which can be utilized effectively for screening purpose in clinical and community settings specifically in lower- and middle-income countries.

Recently research has been carried out on anxiety sensitivity as a trans-diagnostic factor that needs to be targeted for psychological disorders. A screening measure is necessary for the assessment and treatment (McHugh, 2019).

Limitations and Suggestions

The present research has some limitations, which must be kept in mind while interpreting the results. For example, the structured diagnostic interview is not used to determine the anxiety disorder for establishing anxiety disorder diagnosis which might undermine the absence/presence of anxiety disorder in participants. A broad age range was targeted in the present research which might impact the factor structure of CASI. Future research can incorporate multiple group analysis to analyze any difference of age and gender. Future research will also benefit from incorporating a mixed-method research design to study the construct of anxiety sensitivity and its phenomenology in Pakistani culture. The focus of the present research was to check if CASI can be used as a screening measure for anxiety disorders. Future studies can incorporate other important variables like depression, suicide, and other mood related disorders to analyze how anxiety sensitivity is related to these psychopathologies in Pakistani population.

Conclusion

Urdu CASI can be used to measure anxiety sensitivity in children in clinical setting and for future research purpose. CASI fifteen items scale has better reliability and can be used as a composite scale for screening anxiety disorders.

Declaration

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Conflict of interest. The authors are well informed and declared no competing interests.

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Availability of data and materials. The datasets used and/or analyzed during the current study are available from the corresponding authors on reasonable request.

Ethics approval and consent to participate. Formal permission was acquired from institutional Ethical Board to conduct research.

Competing interest. The author declares to have no competing interests.

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