

Adaptation of the Childhood Anxiety Sensitivity Index for Use in Turkey



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SUMMARY

Objective: Anxiety sensitivity (AS) is a measure of the level of fear of anxiety-related stimuli. The aim of this study was to investigate the validity and reliability of the Childhood Anxiety Sensitivity Index (CASI)-Turkish Version (TV).

Materials and Methods: The study group included 328 healthy individuals aged 8-15 years. All the participants were administered the Childhood Anxiety Sensitivity Index (CASI) and State-Trait Anxiety Inventory for Children (STAI-C).

Results: The CASI-TV total score was strongly correlated with both trait and state anxiety scores ($r = 0.42$ and $r = 0.32$, respectively). CASI-TV had high internal consistency (Cronbach's $\alpha = 0.74$) and good test-retest reliability ($r = 0.77$, $P < 0.001$). Exploratory factor analysis showed that CASI-TV is comprised of 6 lower-order factors; however, the CASI-TV was established as a 3-factor model, according to literature: physical, cognitive, and social.

Conclusion: The findings show that CASI-TV is valid and reliable for use in Turkey.

Keywords: Anxiety sensitivity, Childhood Anxiety Sensitivity Index, validity, reliability

INTRODUCTION

Anxiety sensitivity (AS) is a construct developed by Reiss and McNally (1985) that is a measure of the level of discomfort an individual experiences in response to anxiety-related stimuli and the degree to which the discomfort is experienced as physical, psychological, and social threats. Although AS is associated with anxiety, it is hypothesized to be indicative of a relatively stable dispositional variable distinguishable from anticipatory or trait anxiety, and is predictive of subsequent development of anxiety disorders (McNally 1996). Studies have also shown that AS is associated with a genetic baseline and with the autonomic nervous system (Schmidt and Zvolensky 2007; van Beek and Griez 2003; Stein et al. 1999).

AS has primarily been associated with a tendency for anxiety disorders, such as panic disorder and post-traumatic stress disorder. Additionally, recent studies have shown that AS can protect against or trigger some psychiatric disorders, including alcohol/substance addiction, depression, and conduct disorder (Bilgiç et al. 2013; Mantar 2011; Kılıç et al. 2008). The scale associated with AS that is most frequently studied and used in adults is the Anxiety Sensitivity Index (ASI) (Reiss et al. 1986). ASI includes items that measure sensations due to anxiety and the total score is calculated by summing the score for each item. The ASI Turkish Version was reported to be valid and reliable for use in Turkey (Ayvaşık 2000). Although ASI was initially conceptualized as a single-factor structure, research has provided evidence

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suggesting that ASI can be represented by a 3-factor structure that includes physical, cognitive, and social factors (Taylor et al. 2007). The Anxiety Sensitivity Index-3 (ASI-3) Turkish Version, based on a 3-subfactor structure, was reported to be valid and reliable for use in Turkey (Mantar et al. 2010).

The Childhood Anxiety Sensitivity Index (CASI) was developed by Silverman (1991) and includes 18 items for assessing the degree of fear of anxiety-related stimuli in children aged 6-17 years. The primary difference between child and adult versions of the scale is the simplicity of the items and the grading system used. Although it was originally considered to be a single factor construct, subsequently the existence of subscales derived from various subfactors has been proposed. Similar to the adult form, CASI consists of 3 factors (physical, cognitive, and social) and has been used in recent studies (Adronetto 2008; Silverman 2003). The present study aimed to adapt CASI for use in Turkey, and to determine its validity and reliability.

MATERIALS and METHODS

Scale Translation

Permission to adapt CASI for use in Turkey was provided by Silverman et al. CASI was translated into Turkish by 2 child/adolescent psychiatrists, and then was backtranslated into English by an adult psychiatrist; all were fluent in English. In order to evaluate the understandability of the translated scale CASI-Turkish Version [TV] was administered to 10 children that presented to Ankara University, School of Medicine, Department of Child and Adolescent Psychiatry. The items that were not clearly understood were reviewed and revised accordingly to develop the final form of the scale. Consequently, it was considered to have face validity.

Samples and Procedure

The study protocol was approved by the Governorship of Ankara and the Ankara University, School of Medicine Ethics Committee. To recruit participants we referenced lists from the Turkish State Institute of Statistics specifying the socioeconomic status of various regions of Ankara. From these data 3 schools were selected that represented 3 socioeconomic statuses. Students in grades 2, 4, 6, and 8 (approximately 100 students from each school) were incorporated into the study in order to balance the age groups. Classes were selected randomly. Self-report scales were administered during school hours and the process was monitored by teachers. Prior to administration, the study scales were briefly introduced to the students, and then they provided informed consent. After the completed scales were collected each school's administration selected 1 class to iterate the test, and 10 d later 20 students from each selected class were again administered the scales.

Data Collection Tools

Demographic Information Form

A specially prepared demographic data form was administered to collect data on student age, gender, socioeconomic status, and physical and psychiatric application information. The form also collected parental data, including age and level of educational. The collected data were also used to audit the factors that could affect the development of psychopathology in the students.

Childhood Anxiety Sensitivity Index (CASI)

CASI is an 18-item self-report scale that was developed by Silverman et al. (1991) via modification of the ASI that was developed by Reiss et al. (1986). CASI assesses emotions of children stimulated after internal or external stimulants, which can develop anxiety. Unlike the 4-point Likert-type adult form, CASI is a 3-point Likert-type scale, which increases comprehensibility. CASI items are scored as none (1), some (2), and a lot (3). This scale is easily understood by children as young as 7 years. CASI total score ranges from 18 to 54. The scale includes 3 domains: physical, non-physical, and mixed. Silverman et al. (1991) reported that CASI is valid and reliable. CASI-TV was used in the present study.

State and Trait Anxiety Inventory for Children (STAI-C)

STAI-C was developed by Spielberger (1976) and includes 2 subscales (state anxiety and trait anxiety), each consisting of 20 multiple-choice items. Items are scored as 0, 1, or 2, according to the severity of symptoms. State anxiety is anxiety experienced by an individual at a particular time and in a particular situation. State anxiety varies according to external factors. Trait anxiety, on the other hand, is the degree of anxiety an individual experiences in general. The Turkish version was reported to be valid and reliable for use in Turkey (Özusta 1995).

Statistical Analysis

The internal consistency and test-retest reliability of CASI-TV were examined. Cronbach's alpha analysis was used to determine the internal consistency of the scale, exploratory factor analysis was used to measure the scale's validity, and the scale's test-retest reliability was investigated using Pearson's correlation analysis. Confirmatory factor analysis was used to evaluate the factor structure and distribution. The t-test and ANOVA were used to assess the relationship between scale scores and demographic data. AMOS software was used for confirmatory factor analysis and all other data were analyzed using SPSS. The level of statistical significance was set at $P < 0.05$.

RESULTS

The study included 328 children aged 8-15 years (mean age: 10.7 ± 2.1 years). Among the children, 181 were female (mean age: 10.93 ± 2.1 years) and 147 were male (mean age: 10.48 ± 2.2 years). There wasn't a significant difference in age between the males and females ($t = -1.86$, $P = 0.06$). In terms of socioeconomic status, 127 children (38.7%) had a high, 92 children (28%) had a moderate, and 109 children (33%) had a low socioeconomic status.

Validity Assessments

1. Correlation with STAI-C, which is used to measure the severity of anxiety symptoms, was investigated to determine the validity of CASI-TV. Pearson's correlation analysis showed that CASI-TV scores were strongly correlated with both state anxiety and trait anxiety scores (Table 1).

Table 1. Correlation between CASI-TV and STAI-C scores.

		State Anxiety	Trait Anxiety
Anxiety	r	0.326*	0.421*
Sensitivity	P	<0.001	<0.001
	n	307	318

* $P < 0.001$

2. Structural validity is the degree to which a particular scale measures what it is designed to measure. The structural validity of CASI-TV was determined via exploratory factor analysis and confirmatory factor analysis. In order to test the sufficiency of the sample size the Kaiser-Meyer-Olkin (KMO) test was applied. The KMO value calculated for the entire study population was 0.78. The KMO value is considered to be perfect as it approaches 1.0. To determine the factor structure of CASI-TV principle component analysis was applied to the data, according to Kaiser normalization and varimax transformation. Common variance is the quantity of variance that a particular variable shares with other variables analyzed. The common variance of all CASI-TV items was >0.30 (Table 2). These findings indicate that CASI-TV has structural validity.

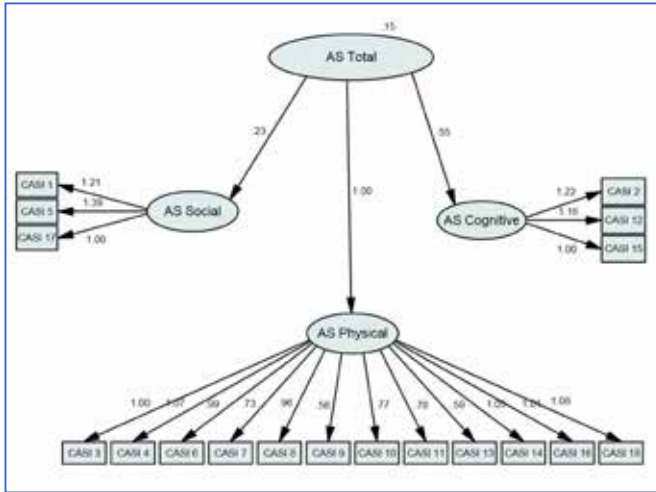
CASI-TV factors with an Eigen value >1 were considered to be significant. The aim of the rotation of variables is to obtain interpretable and significant factors. As such, varimax rotation results are presented in Table 2. Factor analysis showed that there were 6 factors with values ≥ 1 . As such, it can be seen in Table 2 that the scale has 6 subscales (Table 2). Confirmatory factor analysis was performed using structural equation modeling in conformity with the factor structure in the literature. All 3 models were statistically acceptable, and

Table 2. Factor distribution of CASI-TV.

	Physical 1	Physical 2	Physical 3	Physical 4	Cognitive	Social	Common Variance
4. It scares me when I feel like I am going to faint.	0.688	0.213	0.143	0.143	-0.079	-0.012	0.565
8. It scares me when I feel like I am going to throw up.	0.625	0.021	0.032	0.007	0.382	0.012	0.539
3. It scares me when I feel shaky.	0.482	0.036	0.457	0.049	0.208	-0.145	0.509
10. It scares me when I have trouble catching my breath.	0.455	0.318	-0.116	0.219	-0.020	0.146	0.391
18. Funny feelings in my body scare me.	0.079	0.778	0.146	-0.115	0.082	0.070	0.659
14. Unusual feelings in my body scare me.	0.244	0.612	-0.102	0.217	0.134	0.254	0.574
16. It scares me when I feel nervous.	0.171	0.553	0.180	0.282	0.131	-0.200	0.504
11. When my stomach hurts, I worry that I might be very sick.	0.016	0.441	0.285	-0.081	0.184	0.019	0.316
13. Other kids can tell when I feel shaky.	0.025	0.039	0.698	0.036	0.000	0.129	0.508
9. When I notice that my heart is beating fast, I worry that there might be something wrong with me.	-0.112	0.095	0.635	0.173	0.089	-0.059	0.467
6. It scares me when my heart beats fast.	0.329	0.220	0.590	-0.147	0.010	-0.037	0.527
7. It embarrasses me when my stomach growls.	0.216	0.105	0.143	0.715	0.072	0.075	0.600
2. When I cannot keep my mind on my schoolwork, I worry that I might be going crazy.	0.086	0.147	0.025	-0.105	0.704	0.073	0.542
12. It scares me when I can't keep my mind on my schoolwork.	0.006	0.142	0.056	0.272	0.663	-0.003	0.537
15. When I am afraid, I worry that I might be crazy.	0.187	0.155	0.287	-0.417	0.446	-0.075	0.521
5. It is important for me to stay in control of my feelings.	-0.007	0.201	-0.023	0.025	-0.075	0.775	0.648
17. I don't like to let my feelings show.	-0.026	-0.147	0.180	0.286	0.293	0.576	0.554
1. I don't want other people to know when I feel afraid.	0.475	0.000	-0.106	-0.273	-0.005	0.489	0.551

Table 3. Confirmatory factor analysis.

	χ^2	SD	χ^2/SD	P	RMSEA	CFI	GFI
Separate correlated model	238.041	133	1.790	<0.001	0.049	0.826	0.922
Single-factor model	262.239	135	1.943	<0.001	0.054	0.789	0.913
Higher order model	235.249	132	1.782	<0.001	0.049	0.829	0.922

Figure 1. High Order Model

AS: Anxiety Sensitivity
CASI: Childhood Anxiety Sensitivity Index

high order models exhibited statistically better conformity (Table 3 and Figure 1).

Reliability Analysis

1. The internal consistency of CASI-TV was assessed using Cronbach's alpha reliability analysis. The internal consistency coefficient was 0.74. The internal consistency coefficient of the social, cognitive, and physical subscales was 0.36, 0.43, and 0.73, respectively.
2. To determine the test-retest reliability of CASI-TV the scale was re-administered to 20 participants 10 d after the initial administration. The total score correlation coefficient between both administrations was $r = 0.77$ ($P < 0.001$).

Table 4. AS, according to gender and socioeconomic status.

	Gender	n	Mean $\pm$ SD	t test
Gender	Female	181	33.41 $\pm$ 6.16	$t = 2.85$ $P = 0.005$
	Male	144	31.51 $\pm$ 5.70	
	Status	N	Mean $\pm$ SD	ANOVA
Socioeconomic Status	Low	108	32.76 $\pm$ 6.33	$F = 0.189$ $P = 0.828$
	Medium	91	32.69 $\pm$ 6.20	
	High	126	32.31 $\pm$ 5.66	

CASI Scores According to the Demographic Data

The CASI-TV score was 32.56 ± 6.02 . ANOVA was used to determine if AS differed according to age, gender, or socioeconomic status. The findings of ANOVA and Tukey's post-hoc analysis showed that there wasn't a significant difference in CASI-TV total score according to age. The mean total CASI-TV score for the females was significantly higher than that for the males. In addition, CASI-TV total score did not differ significantly according to socioeconomic status (Table 4).

DISCUSSION

The present study investigated the validity and reliability of CASI-TV in a group of healthy volunteer children representative of the general population. The findings show that CASI-TV has acceptable psychometric characteristics. Such variables as gender, socioeconomic status, and age were considered during the recruitment phase, and possible confounding factors that could have affected the data concerning AS were excluded. Correlations between AS, and state and trait anxiety (which later was considered as a similar construct as AS) were examined to assess the validity of CASI-TV. The present study's findings show that the CASI-TV total score had the strongest correlation with the trait anxiety score, as expected. In addition, the state anxiety score was strongly correlated with the AS score (Table 1). Earlier studies reported that as the AS score increases the rate of anxiety also increases (Mantar et al. 2010), which is confirmed by the present findings.

A sufficient sample size is important for factor analysis, in terms of the reliability of the correlation. The Kaiser-Meyer-Olkin test for sufficiency of the sample size was used in the present study and the sample sufficiency criterion was 0.78, which is an excellent value; in addition, Bartlett's test results showed a significant difference ($P < 0.001$). Based on these findings, the present study's data sample was deemed appropriate for factor analysis.

Several studies have assessed CASI with 2, 3, or 4 factors. The most widely used form factor is the 3-factor model, which includes social, cognitive, and physical subfactors (Adronetto et al. 2008; Silverman et al. 2003). Principal component analysis and varimax rotation in the present study indicated

there were 6 factors with Eigen values >1.0. The literature shows that CASI has 3 subscales: physical, social, and cognitive. Two of the 6 factors noted in the present study fully conform to the cognitive and social factors mentioned in the literature. The items that constitute the physical subfactors in the literature were split into 4 subgroups in the present study. Similarly, Lambert et al. (2004) observed a 6-factor model based on exploratory factor analysis; however, the number of factors in the present study was reduced to comply with the literature, as it was thought to be beneficial to maintain the integrity of the Turkish version of the scale. Additionally, maintaining the 3-factor structure facilitates comparison with future studies in Turkey and in other countries. Confirmatory factor analysis was performed after CASI-TV was arranged according to a 3-factor structure, the results of which indicated a good fit ($\chi^2/SD < 2$, $P < 0.05$, $GFI > 0.90$, $CFI > 0.90$, $RMSA < 0.05$). All 3 models in the present study indicated a good fit, except for CFI. As such, because the CFI value was low, the present study's model compliance may be considered acceptable. An 18-item 3-factor model used in another study had a CFI value <0.9 (Adronetto 2008), which shows that all of the models are acceptable, but that 3 subfactors and a high order model is best (Figure 1). The cut-off point ranges from 0.30 to 0.32 for factor loads. In the present study all factor loads were above this range. These findings taken as a whole indicate that CASI-TV is valid for use in Turkey.

The internal consistency reliability coefficient was calculated to determine the internal consistency of CASI-TV. Cronbach's alpha coefficient was 0.87 in the validity and reliability study of the original CASI (English form), whereas in the present study Cronbach's alpha coefficient was 0.74, which is indicative of a high level of reliability. Furthermore, internal consistency reliability evaluations were also performed for the CASI-TV subfactors, and the Cronbach's alpha value was 0.36 for social symptoms, 0.43 for cognitive symptoms, and 0.73 for physical symptoms. These findings indicate that physical factors alone were quite reliable and that it is more convenient to use the other subfactors correlated or high order in a supplementary way. The higher internal consistency for the physical symptom scores observed in the present study might have been due to the fact that Turks are culturally more sensitive to physical symptoms.

The test-retest correlation, another reliability evaluation, was also determined for CASI-TV. AS has been reported to be a trait marker, or a personality feature, and test-retest correlation analysis is an important reliability measurement used to determine the scale's sensitivity. In the CASI validity and reliability study by Silverman et al. (1991) the test-retest reliability coefficient was 0.76, and in the present study this coefficient was 0.77 ($P < 0.001$), indicating sufficient test-retest reliability. When assessing CASI scores of healthy individuals

in other countries, the mean CASI score in healthy individuals was 31.3 and 33.71-32.73 in 2 studies conducted in the US (Lambert et al. 2004; Chorpita and Daleiden 2000), and a study conducted in Holland reported a mean score of 27.2 (Widenfelt et al. 2002). In the present study the mean CASI-TV score was 32.56, which is similar to previous reports.

Although in the present study the socioeconomic data was equilibrated, so as to be representative of the general Turkish population, data collection was performed in only 1 city, which is a limitation. Moreover, had the study employed a larger sample and separately evaluated both genders, children, and adolescents more detailed findings concerning the scale's factor structure might have been obtained. Despite these limitations, the present findings show that CASI-TV is a valid and reliable tool for evaluating AS in Turkish children and adolescents. We think that CASI-TV can be used to improve our understanding and treatment of anxiety disorders in Turkey, especially panic disorder, depression, and impulse control disorders. Furthermore, in a relatively short time period, one can decide the group to be given preventive treatment, especially for groups having post-traumatic stress disorder. Additionally, we think that more research on CASI-TV could further elucidate the concept of AS in Turkey.

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