



Research Article

Reliability and Validity of the Turkish Version of Children's Somatization Inventory

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SUMMARY

Purpose: The purpose of this study was to examine the psychometric properties of the Children's Somatization Inventory (CSI) in Turkish schoolchildren and adolescents.

Methods: The CSI was translated using translation and back-translation. The participants were 813 schoolchildren, adolescents and their parents ($n = 453$). Content and construct validity were assessed to test the validity of the CSI-24. Internal consistency reliability, interrater reliability (child-parent agreement) and test-retest reliability were assessed to test the reliability of the CSI-24.

Results: Psychometric analyses of the Turkish version of the CSI-24 indicate high reliability and good content and construct validity.

Conclusion: The Turkish version of the CSI-24 is a useful instrument for measuring self-reported somatic complaints in Turkish schoolchildren and adolescents between the ages of 9 and 15.

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Introduction

Somatic complaints are common in children and adolescents (Cederquist, 2006; Hjern, Alfvén, & Ostberg, 2008; Ostberg, Alfvén, & Hjern, 2006; Perquin et al., 2000; Roth-Isigkeit, Thyen, Raspe, Stoven, & Schmucker, 2004; Vila et al., 2009) and related to children's psychological functioning (Campo et al., 2004; Jellesma, Rieffe, Meerum-Terwogt, & Kneepkens, 2006; Karatas & Ozturk, 2011). According to the latest edition of the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition—text revision (DSM-IV—TR), in somatization, physical symptoms are regarded as an expression of psychological distress and psychosocial stress (American Psychological Association, 2000). Schoolchildren with somatic complaints have difficulty in maintaining relationships with their peers. These children often seem to have low self-esteem and over-dependence on their families (Gini, Carli, & Pozzoli, 2009) or they experience conflicts in the family, school problems and exhibit absenteeism (Campo & Gregory, 2001).

Epidemiological studies show that between 5–30% of 8–16-year-olds complain of weekly headaches, recurrent abdominal pain or musculoskeletal pain (Egger, Costello, Erkanli, & Angold, 1999). In a large number of cases, sometimes up to 90%, non

organic reason can provide an adequate explanation for the frequent and persistent occurrence of somatic symptoms (Compas & Harding-Thomsen, 1999; Roth-Isigkeit et al., 2004). Although there is a relatively high prevalence of somatic symptoms, the diagnosis of somatization disorder in children and adolescents is rare (Meesters, Muris, Ghys, Reumerman, & Rooijmans, 2003).

Students who make a habit of visiting the school nurses with recurrent and unexplained physical symptoms have common somatic complaints such as headache and stomachache (Campo & Gregory, 2001; Postilnik, Eisman, Price, & Fogel, 2006) which are associated with the psychosocial variables of anxiety and depression, childhood adversities, and school stress (Shannon, Bergren, & Mathews, 2010). This complex children's health issue needs to be addressed with effective and practical treatment approaches that encompass accurate identification, appropriate referral, screening for associated conditions, and individualized treatment plans (Shannon et al.). Thus, these complaints must be assessed with a measurement tool that can provide the means of making a distinction between students' somatic complaints and other real illnesses. School nurses need to examine the clinical presentation, associated variables, and the implications of the complaints of children who frequent school health offices with somatic symptoms (Shannon et al.). There is no Turkish version instrument to measure somatization in children. We therefore needed to adapt the Children's Somatization Inventory-24 (CSI-24) to Turkish language and test it for validity and reliability. The CSI, which was developed with 35 items by Walker, Garber, and Green (1991), was

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subsequently revised to 24 items by Walker et al. Cronbach's alpha for the CSI-24 was .87 (Walker, Beck, Garber, & Lambert, 2009). The CSI has been used in numerous studies of pediatric patients, children and adolescents in the Netherlands, Denmark, United States, Britain, Ukraine and other countries (Walker et al.). In this study, we wanted to examine the psychometric properties of the CSI-24 in Turkish schoolchildren and adolescents.

Methods

Participants

A total sample of 963 school children in two public primary schools and their parents were invited to participate in this study. These two schools were located in the urban area of Istanbul in Turkey. The schoolchildren were children and adolescents in grades 3 (age 9) through 8 (age 15). The reading level of the inventory was third grade level.

Data collection

Data was collected in spring 2011. The permission to approach parents and students was obtained from the schools and the local education authority. All students and parents received letters and information sheets inviting them to participate in the study, while also providing them the opportunity to opt out of the study. Oral consents from the participants were received. A pilot study was conducted to establish whether students could understand and respond appropriately to the questions and to test the logistics of administering the questionnaire.

On the day the questionnaires were administered, students were asked to complete the CSI-24 (Children's form) at school during regular classes, with a teacher and a research assistant present in order to ensure independent and confidential responding and to provide assistance when necessary. Parents received the CSI-24 (Family form) via their children, completed them at home, and returned the materials in a sealed envelope. The retest was performed approximately 2 weeks after the first data collection.

Measures

The CSI-24, Children's Form

The CSI was developed and revised by Walker et al. (1991, 2009). The CSI-24 includes items from the symptom criteria for somatization disorder as defined by the DSM-III-R, items from the Somatization factor of the Hopkins Symptom Checklist, and an additional symptom—constipation—that is common in functional gastrointestinal disorders (Walker et al.). CSI-24 contains 24 items that have to be rated on a 5-point scale; 0 = *not at all*, 1 = *a little*, 2 = *somewhat*, 3 = *a lot*, 4 = *a whole lot*. CSI-24 is a self-report questionnaire reflecting the extent to which the symptoms were experienced in the past 2 weeks. Total scores are calculated by adding the scores across all items, with higher scores indicating a higher intensity of somatic complaints. The total CSI-24 score can range from 0 to 96. In this study, the Turkish version of CSI-24 was used.

The CSI-24, Parent's Form

The parent version of CSI-24 was identical to the CSI-24 and used the same response format as the children's version, except that the questions were worded differently to accommodate the parents' observations of their children's somatic complaints during the past 2 weeks.

Translation procedures

Permission was obtained from Lynn S. Walker. The CSI-24 was translated using back-translation techniques. The CSI-24 was first translated from English to Turkish separately by three bilingual linguistic, medical and nursing professionals. Another expert and the researchers reviewed the Turkish translations together with the original English form for inconsistencies and meaning in context and culture. They suggested minor revisions in some areas. A Turkish version of CSI-24 was eventually created. Subsequently, it was translated back from Turkish to English by a bilingual language expert. The back-translated and original forms of CSI-24 were compared and found to be highly similar in meaning. In addition, the back-translated and Turkish version of CSI-24 were sent to Lynn S. Walker, who confirmed the sameness of meaning.

Content validity procedure

Content validity of CSI-24 was determined by measuring the relevance, clarity and comprehensiveness of CSI-24. The authors assessed content validity with the Lynn method (Lynn, 1986) at both the item and the instrument levels. A review of the Institute for Scientific Information Citation Index reveals 186 citations of the Lynn reference in the disciplines of nursing, medicine, sociology, psychology, pharmacology, physical therapy, occupational therapy, social work, and education (Schilling et al., 2007). Content validity of the tool was assessed by an expert panel of seven academicians (One professor in children's health nursing, two assistant professors in psychiatric nursing, three assistant professors and one lecturer in community health nursing). The experts were then asked to rate each item based on relevance (responses 1–4 with a score of 4 demonstrating *high relevance*), clarity (responses 1–4 with a score of 4 showing *high clarity*), and comprehensiveness (responses 1–4 with a score of 4 showing *high comprehensiveness*) on the 4-point scale.

Data analysis

Statistical analyses were carried out using SPSS version 17.0 for Windows (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to analyze the characteristics of the sample.

Content and construct validity internal consistency, interrater reliability (child parent agreement) and test-retest reliability (stability) of CSI-24 were assessed. Content validity was based on an experts' panel and assessed by using a content validity index. Construct validity of CSI-24 was assessed by using principal component factor analysis that was conducted using varimax rotation (exploratory factor analysis). The internal consistency of CSI-24 was assessed using Spearman's correlation (item-total correlation) and Cronbach's alpha. Interrater reliability (child parent agreement) and test-retest reliability (stability) were assessed using kappa agreement and Spearman's correlation. Significance was set at $p < .05$ and the confidence interval estimated to be at the 95% level.

Ethical considerations

The Ethical Committee of the Directorate of National Education, Istanbul, Turkey, approved all of the study procedures.

Results

Out of the total 936 children and their parents, 831 children and 475 parents (response rate for children and parents, 88.7%, 48.3% respectively) completed the CSI-24. A total of 105 children were absent on data collection day. Eighteen children and adolescents'

reports and 22 parents' reports were excluded because of missing items. Eventually, the study was completed with a total of 813 children and adolescents (50.8% girls, 49.2% boys) and 453 of their parents. Mean age of the children was 11.05 years ($SD = 1.53$, range: 9–15 years).

Validity

Content validity

Relevance at the item level had a mean result of 3.8 out of 4, and at the instrument level, a score of 95.5% was obtained. Clarity at the item level had a mean result of 3.8 out of 4, and at the instrument level, a score of 96.1% was obtained. Comprehensiveness at the item level had a mean result of 3.8 out of 4, and at the instrument level, a score of 96.1% was obtained. The overall content validity index (CVI) was 95.9% which signified that the CSI-24 has good content validity.

Factor structure

Construct validity was supported in the factor analysis. The Kaiser-Meyer-Olkin measure was .93 indicating sampling adequacy. Bartlett's test of sphericity was statistically significant ($p < .001$). Factor analysis of the scale was carried out using principal component analysis with varimax rotation and the acceptable level for scale items was set to be above .37 (Table 1). All items demonstrated moderate to strong loading.

Reliability

Internal consistency reliability

The CSI-24 (Children's Form) had a Cronbach's alpha of .91, indicating good internal consistency. Item total correlations varied from .39 (headache) to .62 (Pain-arms or legs; Table 1). Cronbach's alpha for the CSI-24 (Parent's Form) was .87, indicating good internal consistency. Item-total correlation was between .25 (Constipation) and .57 (Pain-arms or legs).

Table 1 Characteristics of Items in CSI-24

Item	M	SD	Item-total correlation	Factor load	Test-retest Kappa agreement ($n = 83$)
Headache	1.96	0.80	.40	.617	.80
Faintness or dizziness	1.44	0.76	.52	.642	.79
Pain—heart or chest	1.63	0.91	.56	.514	.78
Low energy or slowed down	1.79	1.00	.56	.574	.66
Pain—lower back	1.61	0.90	.53	.542	.77
Sore muscles	1.55	0.85	.57	.604	.81
Trouble getting breath	1.54	0.96	.57	.504	.70
Hot or cold spells	1.55	0.87	.58	.539	.68
Paralysis or muscle weakness	1.69	0.91	.57	.406	.67
Weakness	1.59	0.86	.56	.479	.61
Heavy feelings in arms or legs	1.67	0.96	.57	.575	.72
Nausea or upset stomach	1.66	0.91	.56	.495	.59
Constipation	1.28	0.66	.50	.747	.68
Loose bowel motility	1.35	0.70	.49	.758	.68
Pain—stomach	1.84	0.98	.60	.370	.70
Heart beating too fast	1.58	0.97	.52	.617	.64
Difficulty swallowing	1.40	0.82	.49	.533	.58
Losing voice	1.58	0.85	.53	.536	.68
Blurred vision	1.40	0.84	.48	.635	.74
Vomiting or throwing up	1.29	0.64	.51	.628	.57
Feeling bloated or gassy	1.35	0.76	.57	.658	.61
Food makes you sick	1.36	0.70	.56	.497	.65
Pain—knees, elbows or joints	1.74	10.00	.60	.739	.73
Pain—arms or legs	1.86	10.02	.63	.709	.73
Total	37.70	12.26	—	—	—

Interrater reliability (child-parent reports)

At the item level, the interrater agreement was poor between children ($n = 453$) and their parents ($n = 453$; weighted kappa between .17 and .34). Also at scale level, Spearman's correlations revealed moderate agreement with correlation value .50.

Test-retest reliability

In order to assess the scale's stability over time, test-retest reliability of the scale was carried out after 2 weeks. At the item level, the kappa agreement was good between the test and retest (weighted kappa between .55 and .78; Table 1). Also at the scale level, Spearman's correlations revealed good agreement with correlation value of .72. Test-retest reliability was adequate in this study.

Discussion

This study examined the psychometric properties of the CSI-24 in Turkish children and adolescents. The findings should be viewed in light of the limitations of the study. Firstly, the psychometric results can only be generalized to 9–15 year-olds in Turkey. Secondly, the parent response rate was low. Thirdly, children who had a physical problem were not excluded from this study. Whereas the fact that somatization by definition refers to complaints that “cannot be fully explained by any known general medical condition”. However we thought that number of children who have any physical problems were low. The process of cross-cultural adaptation tries to produce equivalency between source and target based on content (Beaton, Bombardier, Guillemin, & Ferraz, 2000). The first stage in cross-cultural adaptation of a scale is translation. In our study, we used forward and back translation. The back-translated and original forms of CSI-24 were compared and found to be highly similar in meaning. After the translation, we evaluated the validity and reliability of CSI-24.

Validity

Validity pertains to determining whether a measurement instrument is able to make an accurate measurement. A valid instrument is one that truly reflects the concept it is expected to measure. There are three major kinds of validity, varying according to the kind of information provided and the purpose of the investigator (i.e., content, criterion-related, and construct validity; Haber & Lobiondo-Wood, 2006). In our study, we used content and construct validity.

Content validity measures the comprehensiveness and representativeness of the content of a scale. Measuring and reporting content validity of an instrument are important. This type of validity is also useful in ensuring construct validity and giving readers and researchers more confidence about the instrument. Content validity is used to measure the variables of interest and is also known as relevance validity, representative validity, and logical or sampling validity. It can be used to measure the appropriate samplings of the content domain of items in a questionnaire (Yagmaie, 2003).

Lynn (1986) has proposed that a CVI of at least 83% is required for an acceptable level of content validity. In this study, the overall CVI was 95.9%, which signified that the CSI-24 has good content validity.

Construct validity is based on the extent to which a test measures a theoretical construct or trait (Haber & Lobiondo-Wood, 2006). Construct validity is particularly useful in measuring traits or feelings such as generosity, grief, or satisfaction. Wood and Ross-Kerr stated that “the theoretical base for the concept is tested by determining the extent to which the instrument actually measures that concept” (Wood & Ross-Kerr, 2006, pp. 195–221). In our study, the factor load was above the set point of .30 for all items and therefore we did not exclude any item from the original scale.

Reliability

The reliability of a research instrument is defined as the extent to which it yields the same results on repeated measures. Reliability then explores consistency, accuracy, precision, stability, equivalence, and homogeneity. A reliable measure produces the same results when the behavior is measured again with the same scale. Reliability signifies the proportion of accuracy to inaccuracy in measurement. The three main attributes of a reliable scale are stability (test-retest reliability), homogeneity (internal consistency reliability), and equivalence (interrater reliability). The stability of an instrument refers to the ability of an instrument to produce the same results with repeated testing. Its homogeneity refers to the fact that all the items in the tool measure the same concept or characteristic. An instrument exhibits equivalence if the tool yields the same results when equivalent or parallel instruments or procedures are used (Haber & Lobiondo-Wood, 2006). In our study, we used internal consistency reliability, interrater reliability (child-parent reports), and test-retest reliability to test the reliability of CSI-24.

Internal consistency reliability was found to be high; this was consistent with the original CSI-24 and previous studies (Litcher et al., 2001; Meesters et al., 2003; Vila et al., 2009; Walker et al., 2009). Item-total correlations of all items were above .25. We therefore did not exclude any item from the original CSI-24.

Interrater reliability (agreement between child and parent) was poor at the items level, moderate at the scale level. However, highly similar psychometric properties were obtained for the parent form.

Test-retest reliability was also acceptable for CSI-24. A special feature of being a reliable measurement tool is that consistent results are obtained with repeated measurements. Two test results are evaluated by correlation analysis and the closer the correlation coefficient is to 1, the better the time-invariance of the test (Erkus, 2003; Sencan, 2005). Correlation coefficients are usually interpreted as showing high correlation when above .80, a strong correlation at .60–.80, a moderate correlation at .40–.59, and a weak correlation at .20–.39 (Cam & Arabaci, 2010; Sencan).

Conclusion

Psychometric analyses of the Turkish version of the CSI-24 indicate high reliability and good content and construct validity. Based on these findings, we can say that the Turkish version of the CSI-24 is a useful instrument for measuring self-reported somatic complaints in Turkish schoolchildren and adolescents between the ages of 9–15 years. School nurses can use the CSI-24 for evaluating somatization in school children.

Conflict of interest

The authors declare no conflict of interest.

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