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The Psychometric Properties of the Turkish Version of the Stress Scale for Siblings of Childhood Cancer Patients

Bahar Aksoy¹ | Melike Demir Doğan² | Edanur Tar Bolacali³ | Tuğba İnci⁴

¹Kumluca Faculty of Health Sciences, Child Health and Disease Nursing Department, Akdeniz University, Antalya, Türkiye | ²Internal Medicine Nursing, Gumuşhane University Faculty of Health Sciences, Gumushane, Türkiye | ³Faculty of Health Sciences, Child Health and Disease Nursing Department, Kırşehir Ahi Evran University, Kırşehir, Türkiye | ⁴Karadeniz Technical University, Farabi Hospital, Pediatric Nurse, Trabzon, Türkiye

Correspondence: Edanur Tar Bolacali (edanurtar.1107@gmail.com)

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ABSTRACT

Aim: This study aimed to evaluate the psychometric characteristics of the Turkish version of the “Stress Scale for Siblings of Childhood Cancer Patients (SCCP)”.

Methods: This study was conducted with 273 siblings aged 11-16 of childhood cancer patients (SCCPs) who were treated in a hospital in the Black Sea Region of Türkiye between March 2022 and April 2024. Data were collected with “The Socio-demographic Information Form” and “SCCP”. The data were examined through descriptive statistics, as well as exploratory and confirmatory factor analyzes.

Results: The SCCP Turkish version is a valid and reliable scale consisting of 27 items and six sub-dimensions. The SCCP Turkish version explained 77.676% of the total variance. The SCCP Turkish version was found to be summable according to Tukey’s test of additivity ($p = 0.334$), and the test-retest reliability of the scale was $r = 0.864$ ($p < 0.05$).

Conclusion: This study indicate that the Turkish version of the SCCP is a valid and reliable instrument for evaluating stress levels in siblings aged 11 to 16.

Practice Implications: With SCCP, nurses can determine the stress levels of SCCPs and contribute to the planning of necessary interventions to cope with stress.

1 | Introduction

Approximately 400,000 children and adolescents worldwide are diagnosed with cancer each year, and while estimates of the specific number of cases are limited, the incidence of child and adolescent cancers is projected to increase over time [1, 2]. Cancer TODAY 2022 Türkiye report reported that 4793 children in the 0-19 age group had cancer and 28.3% of these children had Leukemia [3]. The majority of pediatric cancers can be effectively treated using generic medications,

along with various other treatment modalities such as surgery and radiotherapy [2]. Consequently, survival rates have shown significant improvement in recent years, with the current 5-year survival proportion reaching 83.9% [4].

The process of cancer treatment affects the child with cancer and family members psychologically, socially, etc [5–7]. In a study, siblings strive to support and care for their ill sibling, themselves and their parents. Although they mentally acknowledge that their parents are exerting considerable effort, they continue to face

significant emotional challenges associated with the circumstances [8]. In another study, it was reported that a child undergoing cancer treatment may show grief and anxiety due to the loss of his/her sibling's normal life and may experience the grief of becoming insignificant in the family [9]. Research involving siblings of children receiving active cancer treatment indicates that these siblings encounter stress and various forms of loss, including diminished parental presence and unmet emotional needs [5, 7, 10, 11]. Children with siblings diagnosed with cancer frequently encounter negative emotions including fear, helplessness, anxiety, guilt, and loneliness which are linked to both the cancer diagnosis and apprehensions about the future [5–7]. Additionally, it has been reported that siblings are at risk for negative psychological outcomes due to the cancer diagnosis and treatment of their brother or sister [5, 6, 12].

Numerous studies have reported that these siblings exhibit heightened emotional and behavioral issues, elevated levels of posttraumatic stress, decreased perceived well-being, and an increase in internalizing problems [5–7, 10, 11]. In the context of pediatric cancer experiences, research indicates that siblings endure considerable stress, which can lead to difficulties in adjustment, coping mechanisms, and social relationships [5, 6, 13–17]. Siblings of children diagnosed with cancer have reported experiencing increased negative emotions, decreased positive emotions, a lower quality of life, and moderate symptoms associated with cancer-related posttraumatic stress [12]. Some studies in the literature have suggested that there is no significant difference in stress levels between children who have siblings with cancer and those without [12, 15]. “Stress Scale for Siblings of Childhood Cancer Patients (SCCP)”, developed by Yu et al. (2021) [18], contributed to the literature by providing assessment of overall stress levels of siblings of pediatric cancer patients. The SCCP was the first scale designed to assess various aspects of stress experienced by siblings aged 11–16 of pediatric cancer patients (Yu et al., 2021) [18]. In Türkiye, no measurement tool has been found to evaluate the stress levels of siblings of pediatric cancer patients. Therefore, this research sought to assess the psychometric properties of the Turkish version of the “Stress Scale for Siblings of Childhood Cancer Patients (SCCP).”

2 | Research Questions

Is the Psychometric Properties of the Stress Scale for Siblings of Childhood Cancer Patients adapted to the Turkish population a valid measurement tool?

Is the Psychometric Properties of the Stress Scale for Siblings of Childhood Cancer Patients adapted to the Turkish population a reliable measurement tool?

3 | Methods

3.1 | Design

This study employed a methodological design to evaluate the stress levels experienced by siblings of childhood cancer patients (SCCPs). The “Consensus-based Standards for the selection of health

Measurement Instruments (COSMIN) and Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklists” were used [19, 20]. The stages of the research process were shown in Figure 1.

3.2 | Setting and Sample

This research was conducted with siblings of childhood cancer patients (SCCPs) who were treated in a hospital in the Black Sea Region of Türkiye between March 2022 and April 2024. The Pediatric Hematology Oncology Department of the university where the study was conducted was established in 2000. Around 1000 children with cancer have been followed up and treated since 2000. Pediatric patients with hematological problems are followed up and treated in the Pediatric Hematology-Oncology clinic, outpatient clinic service and Pediatric Bone Marrow Transplant Unit at this university.

The Pediatric Hematology-Oncology clinic has 18 beds and provides service with 90%–100% capacity occupancy. There is one two-bed room with a HEPA filter cabin in the Pediatric Hematology-Oncology clinic. Patients diagnosed with severe febrile neutropenia are followed up and treated in this room. Seven nurses and one nurse in charge work in the Pediatric Hematology-Oncology clinic. Pediatric assistants work in the clinic on a monthly rotation basis. There is also a children's playroom in the clinic.

The average daily patient count in the Pediatric Hematology-Oncology outpatient clinic is between 30 and 50. Patient follow-up and treatment are carried out separately in the hematology and oncology polyclinics. There is also a chemotherapy room with a capacity of six patients and an intervention room. In the polyclinic, two nurses perform chemotherapy, blood and blood product transfusion and other treatments of patients, and also take blood samples for examination from pediatric patients diagnosed with cancer. Chemotherapy, bone marrow aspiration and biopsy, intrathecal treatment, blood and blood product transfusion are performed in both the clinic and the polyclinic. In addition, peripheral smear and bone marrow smear evaluations are performed.

The study were included siblings of childhood cancer patients (a) were between the ages of 11–16, (b) agreed to participate in the study by themselves and their legal guardians, (c) only one sibling of a child with cancer, (d) were literate in Turkish, (e) were Turkish citizens. In the literature, stated that there should be 5–10 participants per item in the scale in calculating the sample size [21, 22]. According to this rule, in the conduct of the SCCP validity-reliability study consisting of 27 items, it was aimed to include at least 135 people in the research sample and the study was completed with 273 SCCPs.

3.3 | Data Collection Tools

The data collection tool consisting of two parts was used to collect the data in the study. The first part includes “The Sociodemographic Information Form” and the second part includes “Stress Scale for Siblings of Childhood Cancer Patients (SCCP)”.

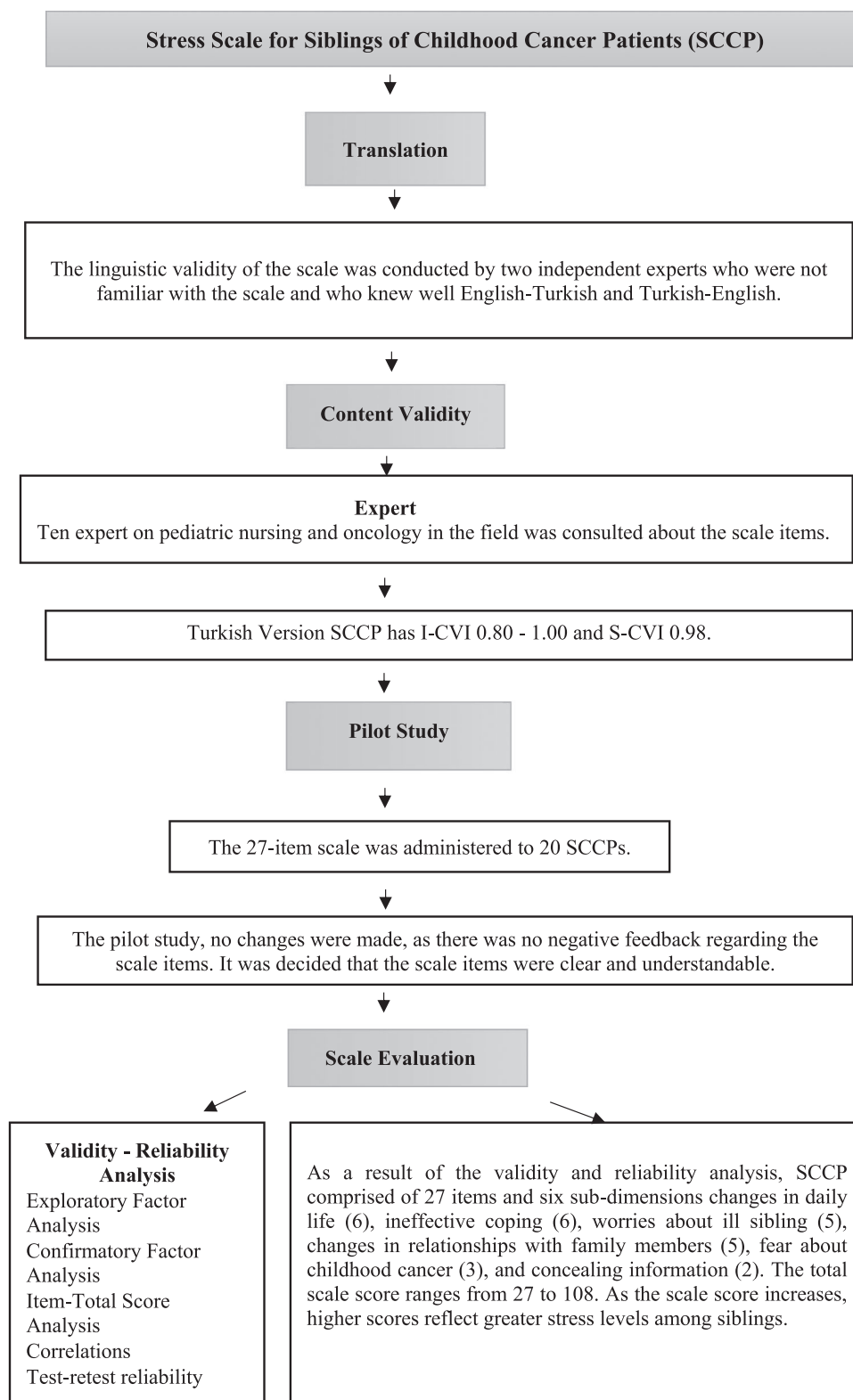


FIGURE 1 | Research Process.

3.3.1 | The Sociodemographic Information Form

The sociodemographic information form, developed by the researchers based on existing literature, included questions regarding the sociodemographic characteristics of the child with cancer, their siblings, and the family [5, 6, 10, 12]. This form consists of a total of 10 questions, 3 open-ended and 7

closed-ended questions. In this form includes questions, “age of sibling, number of siblings, age of childhood cancer patient” 3 open-ended and “siblings’ gender, maternal education level, paternal education level, perceived income status, birth order of a childhood cancer patient, gender of a childhood, cancer patient, and duration since diagnosis years” 7 closed-ended questions.

3.3.2 | Stress Scale for Siblings of Childhood Cancer Patients (SCCP)

The Stress Scale for Siblings of Childhood Cancer Patients (SCCP) was developed by Yu et al. (2021) [18] to measure the stress experienced by siblings of children diagnosed with cancer. The SCCP comprised of 27 items and six sub-dimensions changes in daily life (6), ineffective coping (6), worries about ill sibling (5), changes in relationships with family members (5), fear about childhood cancer (3), and concealing information (2). The scale was graded on a 4-point Likert scale “1 = Not at all, 2 = Somewhat untrue, 3 = Somewhat true, and 4 = Very true” because of an odd number could lead to skewed responses around the median. The total score of the scale ranges from 27 to 108 points, with a higher score indicating an increased level of stress [18]. The cronbach's alpha coefficients of SCCP is as follows: total ($\alpha = 0.91$), changes in daily life ($\alpha = 0.80$), ineffective coping ($\alpha = 0.82$), worries about ill sibling ($\alpha = 0.77$), changes in relationships with family members ($\alpha = 0.77$), fear about childhood cancer ($\alpha = 0.66$), and concealing information ($\alpha = 0.70$) [18]. In this study, Cronbach's alpha coefficient ranged from 0.87 to 0.95.

3.4 | Data Collection

Before the data collection process, the researchers informed the nurses working in the pediatric oncology clinic and outpatient clinic about the research, and SCCPs that met the inclusion criteria were identified. Telephone numbers of the families of the identified SCCPs were obtained from patient document files. First, legal guardians were informed about the study over the phone. The children (SCCPs) of participants who consented to take part in the study were informed about the research and subsequently interviewed to determine their willingness to participate. Considering that SCCPs were between the ages of 11–16, their participation was accompanied by their legal guardians. The data were collected through The Socio-demographic Information Form and SCCP from SCCPs between March 2022–April 2024 by online interview method. After obtaining consent from the parents, to increase the reliability of the data and reduce bias, children were allowed to answer the questions in the data collection form independently so that they were not be affected by the presence of their parents. To determine the test-retest reliability of a measurement instrument, retesting using the same instrument is required at least 2 weeks apart [22, 23]. The overtime stability of the scale was conducted with 30 SCCPs who completed the form after 4 weeks. Additionally, a pilot study was conducted with 20 SCCPs who were excluded from the study sample. After the pilot study, it was decided that the scale items were clear and understandable, as there was no negative feedback regarding the scale items. The interviews to complete the survey form took approximately 15–20 min.

3.5 | Experts' Opinions

Written permission was obtained from Yu et al. [18] who developed the SCCP for the Turkish adaptation and use of the

scale before starting the study. The linguistic validity of the scale was conducted by two independent experts who were not familiar with the scale and who knew well English-Turkish and Turkish-English. The items obtained by the double translation method were combined by the researchers and the measurement tool was finalized. The scale (27 items) translated into Turkish was evaluated by 10 experts in pediatric nursing and oncology using the Davis technique [21, 22]. To assess the cultural appropriateness and clarity of the scale items within the context of Turkish culture, the experts were asked to give the items a score between 1 and 4 “1 = Not at all appropriate, 4 = Completely appropriate”.

3.6 | Data Analysis

The data were analyzed with IBM SPSS 29.0, LISREL program, and AMOS 23.0 and p-value was considered significant at < 0.05 . The content validity of the scale was assessed using the Davis technique. The construct validity of the SCCP Turkish version was conducted with “Explanatory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA)”. Also, fit indices were used to evaluate the factor structure of the scale. The reliability phase of the scale was evaluated using Cronbach's alpha coefficient, McDonald omega values, item-total correlations, two-half analysis, Hotelling's T^2 , Tukey's test of additivity, and test-retest analyzes.

3.7 | Ethical Considerations

Permission was obtained from the scale aauthor Juyoun Yu via e-mail to make the Turkish version of SCCP. Before the study, ethical approval from a university (No. 2022/1 dated 23/02/2022) and institutional permission was obtained. Before data collection, siblings and their legal guardians who met the inclusion criteria were informed about the study at the oncology clinic or outpatient facility. Once the SCCPs and their guardians consented to participate in the study, they were provided with an informed consent form, and written consent was subsequently obtained.

4 | Results

The mean age was 8.15 ± 1.88 for the childhood cancer patient and 14.01 ± 1.66 for the siblings. Number of siblings had an average of 3.16 ± 0.89 . In this research, 58.6% of the siblings were girls, 45.8% of the mothers, and 42.9% of the fathers had completed high school education. 57.1% of the siblings perceive income is equal to expenditure. 52.7% of the childhood cancer patient of were girls, 48.4% middle child and 45.8% ill siblings were diagnosed with childhood cancer within the 1–2 years (Table 1).

4.1 | Validity

4.1.1 | Content Validity

The 27-item Turkish translated scale was evaluated by 10 child health and oncology nursing experts using the Davis technique, yielding an “I-CVI of 0.80–1.00 and an S-CVI of 0.98”.

TABLE 1 | Sociodemographic characteristics of siblings of childhood cancer patients ($n = 273$).

Variables		Frequency	Percentage
Age of sibling (Mean \pm SD)		14.01 \pm 1.66	
Number of siblings (Mean \pm SD)		3.16 \pm 0.89	
Age of childhood cancer patient (Mean \pm SD)		8.15 \pm 1.88	
Siblings gender	Girl	160	58.6
	Boy	113	41.4
Maternal education level	Primary school	35	12.8
	Secondary school	63	23.1
	High school	125	45.8
	Associate Degree + Bachelor's Degree	50	18.3
Paternal education level	Primary school	36	13.2
	Secondary school	42	15.4
	High school	117	42.9
	Associate Degree + Bachelor's Degree	78	28.7
Perceived income status	Income is less than expenditure	50	18.3
	Income is equal to expenditure	156	57.1
	Income is more than expenditure	67	24.6
Birth order of a childhood cancer patient	First	59	21.6
	Middle	132	48.4
	Third	65	23.8
	Last	17	6.2
Gender of a childhood cancer patient	Girl	144	52.7
	Boy	129	47.3
Duration since diagnosis (years)	< 1 yr	111	40.7
	1–2 yrs	125	45.8
	2–5 yrs	31	11.4
	> 5 yrs	6	2.1

4.1.2 | Construct Validity

During the adaptation of the SCCP for the Turkish sample, “Bartlett Sphericity test 6057.61 ($p < 0.001$) and the Kaiser-Meyer-Olkin (KMO) coefficient 0.808” were determined. These findings confirmed the appropriateness of the SCCP Turkish version data set for factor analysis. As a result of EFA, these six factors explain 77.676% of the variance in the Turkish version of 27-item SCCP structure as a whole. Total variance explained of subdimensions “changes in daily life, ineffective coping, worries about ill sibling, changes in family relationships, fear about childhood cancer, and concealing information” 25.057%, 18.476%, 13.930%, 8.377%, 6.660% and 5.176%, respectively (Table 2). Table 2 indicates that the factor loadings for all items in the Turkish version of the SCCP varied from 0.587 to 0.925.

The CFA conducted of the SCCP Turkish version yielded the following fit indices Chi-square (χ^2) = 728.44, degrees of freedom (df) = 305, $\chi^2/df = 2.386$, Root Mean Square Error of Approximation (RMSEA) = 0.07, Normed Fit Index (NFI) = 0.91, Standardized Root Mean Square Residual (sRMR) = 0.06, Comparative Fit Index

(CFI) = 0.95, Incremental Fit Index (IFI) = 0.95, Tucker-Lewis Index (TLI) = 0.90, Goodness of Fit (GFI) = 0.85, and Relative Fit Index (RFI) = 0.91 (Table 3). Additionally, the SCCP Turkish version the 27 items factor loadings were found to be between 0.53 and 0.98 and statistically significant ($p < 0.001$) (Figure 2).

4.2 | Reliability

The Cronbach's alpha coefficient and McDonald's omega values of the SCCP Turkish version and its six dimensions were above 0.87 (Table 4). These findings indicated that the SCCP Turkish version was highly reliable in terms of internal consistency. Additionally, SCCP Turkish version reliability assessment first and second half of Cronbach's alpha coefficient, Guttman split-half coefficient, Spearman-Brown coefficient and correlation of between the two halves coefficient were determined ($0.70 \leq \alpha \leq 0.90$) and there was a good and significant relationship between the two halves. The significance value obtained from Tukey's test of additivity ($p = 0.334$) indicated that the scale was appropriate for obtaining a total score by

TABLE 2 | Exploratory factor analysis: Factor loadings of SCCP items ($n = 273$).

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Item 13	0.857					
Item 18	0.863					
Item 21	0.905					
Item 24	0.903					
Item 25	0.912					
Item 26	0.908					
Item 8		0.817				
Item 9		0.587				
Item 10		0.813				
Item 12		0.866				
Item 15		0.792				
Item 16		0.652				
Item 2			0.793			
Item 11			0.884			
Item 19			0.868			
Item 20			0.839			
Item 27			0.844			
Item 1				0.794		
Item 3				0.876		
Item 5				0.881		
Item 6				0.843		
Item 22				0.819		
Item 4					0.828	
Item 7					0.922	
Item 14					0.877	
Item 17						0.918
Item 23						0.925
Eigenvalues	6.765	4.989	3.761	2.262	1.798	1.397
Explained variance (%)	25.057	18.476	13.930	8.377	6.660	5.176
KMO coefficient				0.808		
Barlett test				6057.61 ($p < 0.001$)		

TABLE 3 | Goodness of fit indices.

Models/Data-model fit indices	χ^2	df	χ^2/df	RMSEA	NFI	sRMR	CFI	IFI	TLI	GFI	RFI
Six-factor model	728.44	305	2.386	0.07	0.91	0.06	0.95	0.95	0.90	0.85	0.91

Abbreviations: CFI, Comparative Fit Index; df, Degrees of Freedom; IFI, Incremental Fit Index; Index Normed Fit Index; Trucker-Lewis Index; NFI, Normed Fit Index; RFI, Relative Fit Index; RMSEA, Root Mean Standard Error Approximation; SRMR, Standardized Root Mean Square Residual; TLI (NNFI), GFI, Goodness of Fit; X2, Chi-square.

summing the relevant items, confirming their additive properties. For the SCCP Turkish version, Hotelling's T^2 value was 169.384 ($p < 0.001$), and item-total score correlations between 0.697 and 0.914 (Table 5). Test-retest reliability analysis showed a stable structure over time ($r = 0.864$; $p < 0.05$).

4.3 | Scoring of the Sccp Turkish Version

The SCCP employs a 4-point Likert-type scale without reverse items, with scores ranging from 27 to 108; higher scores reflect greater stress levels among siblings.

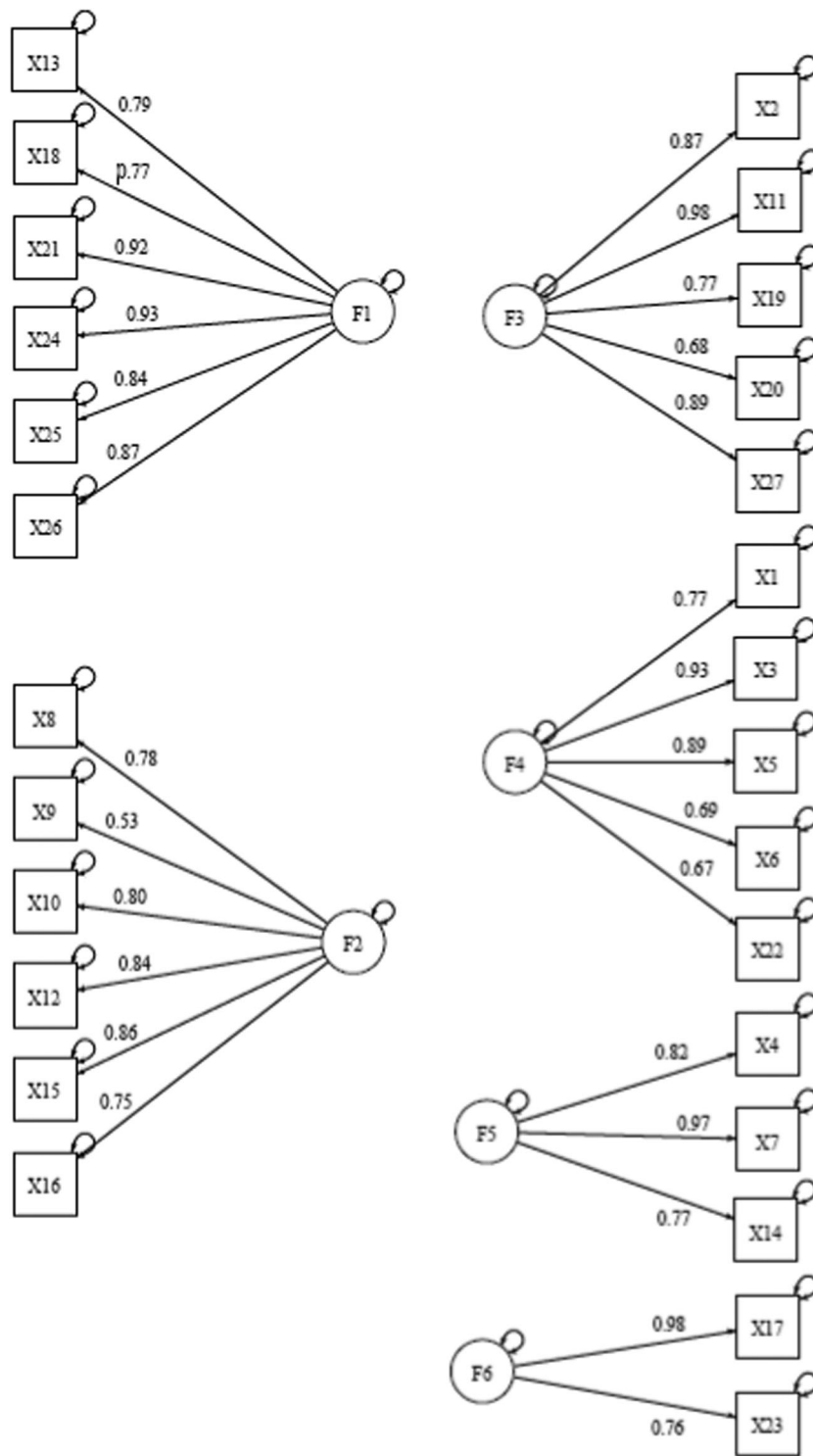


FIGURE 2 | Confirmatory factor analysis of the SCCP Turkish version.

5 | Discussion

The relationship between siblings starts in childhood, continues throughout life and is a very important factor in the healthy development of children [10, 24]. The inclusion of a chronic illness child in the family poses a risk for children's adjustment to the ill sibling, psychological health, well-being, emotional and behavioral reactions, and the relationship between siblings. One of the chronic illness seen in children is childhood cancer diseases [5-7]. Childhood cancers not only affect the affected

child, but also their siblings. Several studies have shown that healthy siblings of childhood cancer patients have psychological problems such as decreased school success, weight loss, anorexia, social isolation, longing, fear, anxiety, helplessness and stress [6, 7, 24, 25].

Therefore, it is crucial to measure the stress of SCCPs is of great importance. The SCCP is the first scale designed to assess various aspects of stress experienced by SCCPs. The SCCP demonstrates appropriateness, validity and reliability in

TABLE 4 | Results of the reliability analyzes of the scale ($n = 273$).

	Cronbach's α	McDonald Omega ω	First half of Cronbach's α	Second half of Cronbach's α	Spearman--Brown	Guttman split half	Correlation between two halves
Scale Total	0.870	0.875	0.847	0.851	0.785	0.781	0.714
Factor 1	0.951	0.948					
Factor 2	0.886	0.891					
Factor 3	0.932	0.925					
Factor 4	0.908	0.907					
Factor 5	0.878	0.887					
Factor 6	0.899	0.898					

Abbreviation: SD, standard deviation.

assessing the stress experienced by SCCPs in the Turkish population. The SCCP was considered an appropriate, valid, and reliable tool for assesses stress experienced by 11-16 year siblings of childhood cancer patients in the Turkish population. This study examined the Turkish psychometric properties of the "Stress Scale for Siblings of Childhood Cancer Patients."

The content validity assessment of the SCCP Turkish version, performed using the Davis technique [22], resulted in I-CVI and S-CVI values between 0.80 and 1.0 from evaluations by 10 experts, indicating adequate content validity, consistent with the original research by Yu et al. (2021) [18], which reported an S-CVI of 0.90 [18, 21].

The suitability of the sample size for factor analysis of the SCCP Turkish version, as well as the relationships between scale items, was assessed using "the Bartlett Sphericity test and KMO coefficient", with Yu et al. (2021) [18] reporting a KMO coefficient of 0.819 and a Bartlett Sphericity test $\chi^2 = 2068.961$ ($p < 0.001$), indicating that the sample size was excellent according to KMO values of the SCCP Turkish version 0.80-0.89 and a significant Bartlett Sphericity test ($p < 0.05$) [26, 27].

In this study, EFA results revealed that items in the SCCP Turkish version aligned with those in the original scale, comprising six sub-dimensions. These dimensions accounted for 77.676% of the total variance. Yu et al. (2021) [18] reported that the 27-item SCCP explained 61.2% of the variance across six sub-dimensions. For multidimensional scales, it is recommended that total variance should fall between 40% and 60%, with higher variance ratios indicating a stronger factor structure of the instrument [28, 29]. Both the original study by Yu et al. (2021) [18] (0.399-0.827) and the SCCP Turkish version (0.587-0.925) factor loadings above 0.30. This suggests that the scale retains its original structural integrity and demonstrates a strong factor structure [29, 30]. Consequently, in this study findings indicate strong and robust construct validity for the Turkish SCCP version.

In this study, the six-factor structure of the 27-item SCCP Turkish version was validated through CFA. In this study, fit indices revealed that the six-factor structure had a strong model fit within the Turkish population (Table 3) [31, 32]. Yu et al. (2021) [18] did not provide CFA results for SCCP in their study; therefore, no evaluation could be made. In this study, internal consistency was assessed using both Cronbach's alpha coefficient and McDonald's omega [31, 33, 34]. Yu et al. (2021) [18] reported that the Cronbach's alpha values for the total scale and its sub-dimensions ranged from 0.70 to 0.91. For the Turkish version of the SCCP, the total and sub-dimensions demonstrated Cronbach's alpha coefficients of 0.87 to 0.95 and McDonald's omega values of 0.87 to 0.94. Additionally, "first and second half Cronbach's alpha coefficient, Guttman split-half coefficient, Spearman-Brown coefficient and correlation coefficient between the two halves" were above 0.70. The findings of this study suggest that a Cronbach's alpha nearing 1 and a McDonald's Omega coefficient of at least 0.70 indicate high reliability, whereas a split-half reliability analysis yielding a coefficient of at least 0.70 reflects an acceptable level of reliability.

In the Turkish version of the SCCP, the item-total score correlation coefficients across the factors were positive, ranging

TABLE 5 | Correlations.

Factor	Items	Mean \pm SD	Item total score correlation (r)* (n = 273)	Corrected Item Total Score correlation (r)* (n = 273)	Test-Retest correlation of items (r)* (n = 30)
Factor 1: Changes in daily life	Item 13	2.95 \pm 0.68	0.811	0.811	0.738
	Item 18	3.00 \pm 0.70	0.818	0.818	0.747
	Item 21	3.04 \pm 0.64	0.868	0.868	0.762
	Item 24	3.08 \pm 0.69	0.861	0.861	0.780
	Item 25	3.11 \pm 0.66	0.864	0.864	0.719
	Item 26	3.15 \pm 0.65	0.866	0.866	0.862
Factor 2: Ineffective coping	Item 8	3.08 \pm 0.67	0.718	0.718	0.748
	Item 9	3.06 \pm 0.76	0.697	0.697	0.910
	Item 10	3.03 \pm 0.61	0.765	0.765	0.927
	Item 12	3.01 \pm 0.73	0.806	0.806	0.796
	Item 15	3.07 \pm 0.71	0.794	0.794	0.742
	Item 16	3.09 \pm 0.77	0.699	0.699	0.758
Factor 3: Worries about ill sibling	Item 2	3.11 \pm 0.70	0.814	0.814	0.894
	Item 11	3.16 \pm 0.68	0.914	0.914	0.972
	Item 19	3.22 \pm 0.75	0.830	0.830	0.885
	Item 20	3.17 \pm 0.75	0.739	0.739	0.893
Factor 4: Changes in family relationships	Item 27	3.10 \pm 0.69	0.808	0.808	0.835
	Item 1	2.94 \pm 0.68	0.698	0.698	0.857
	Item 3	3.06 \pm 0.73	0.802	0.802	0.794
	Item 5	3.10 \pm 0.75	0.817	0.817	0.884
	Item 6	3.13 \pm 0.74	0.761	0.761	0.945
Factor 5: Fear about childhood cancer	Item 22	3.21 \pm 0.68	0.759	0.759	0.715
	Item 4	3.28 \pm 0.68	0.755	0.755	0.754
	Item 7	3.19 \pm 0.69	0.875	0.875	0.839
Factor 6: Concealing information	Item 14	3.13 \pm 0.67	0.722	0.722	0.752
	Item 17	2.92 \pm 0.78	0.768	0.768	0.776
	Item 23	3.09 \pm 0.70	0.767	0.767	0.765

Abbreviation: SD, standard deviation.

* $p < 0.001$.

from 0.697 to 0.914. These values, all exceeding 0.30, indicate high internal consistency and reliability [22, 23]. However, the original research did not report the item-total score correlation coefficients for the SCCP, precluding direct comparison [18]. The test-retest reliability analysis indicated that the Turkish version of the SCCP demonstrates a stable structure over time ($r = 0.864$; $p < 0.05$), reflecting its temporal stability. Yu et al. (2021) [18] stated in their study that the SCCP had test-retest reliability ($r = 0.597$). These findings indicate that both the original and adapted versions of the scale exhibited sufficient psychometric properties and reliability [22, 23, 32].

6 | Strengths and Limitations

This study has several strengths and limitations. The strength of this study was the adherence to the COSMIN guidelines in the reliability and validity testing of the SCCP. The use of communication

and information technologies in the data collection process was another strength. However, the fact that the study was single-centered and could not be generalizable to all SCCPs was one of the limitations of the study. The other limitation is that the study was conducted with siblings of children with different diagnoses, duration of diagnosis and oncologic problems. The stress states of children vary at different times “diagnosed, remission, relapse and honeymoon period”. Therefore, in further studies, it is recommended to use the SCCP with at different times and different age groups to determine the stress levels of children's siblings.

7 | Implications for Practice

Having a sibling with childhood cancer negatively affects the psychological health of healthy siblings. Siblings of children diagnosed with cancer often face numerous challenges, including anxiety, depression, posttraumatic stress symptoms, aggression,

introversion, guilt, anger, decreased quality of life and academic performance, peer relationship issues, adjustment and behavioral disorders, low self-esteem, social isolation, fear, and stress [5, 6, 10, 11]. In this process, pediatric nurses should empower and support both the ill child and his/her siblings by adopting a child and family-centered approach. The SCCP instrument provides valuable insights for pediatric nurses concerning SCCPs' "changes in daily life, ineffective coping, worries about ill sibling, changes in relationships with family members, fear about childhood cancer, concealing information". To reduce the stress of siblings whose stress levels were determined using SCCP; nurses should ensure that the child can cope with stress by using a calm and reassuring approach [16, 17]. In addition, pediatric nurses should provide counseling services on finding support groups, virtual communities contribute to the network of social support where siblings can freely express their feelings and thoughts [16, 17, 35]. Further research is necessary to enhance understanding of how nurses can effectively improve stress management and coping strategies for SCCPs.

8 | Conclusion

The Stress Scale for Siblings of Childhood Cancer Patients (SCCP) is a valid and reliable tool for evaluating the stress experienced by 11-16 year SCCPs. The utilization of this scale promises valuable insights into the evaluation of situations caused by SCCPs, changes in daily life, ineffective coping, worries about ill sibling, changes in relationships with family members, fear about childhood cancer, and concealing information. In Turkish society, SCCP has shown its reliability regarding assessing the overall stress levels of SCCPs. Conducting studies to determine the overall stress levels of SCCPs can offer support to siblings experiencing stress.

Author Contributions

Conception and design: Bahar Aksoy, Melike Demir Doğan, Edanur Tar Bolacali, Tuğba İnci. Data collection: Bahar Aksoy, Edanur Tar Bolacali, Tuğba İnci. Analysis and interpretation: Bahar Aksoy. Writing the manuscript: Bahar Aksoy, Edanur Tar Bolacali. Critical revision of the manuscript: Bahar Aksoy, Melike Demir Doğan, Edanur Tar Bolacali, Tuğba İnci. All authors approved the final version for submission.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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