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The Development and Psychometric Evaluation of the Adolescent and Parent Form of Sleep Assessment Scale for Children with Cancer

Kanserli Çocuklar için Uyku Değerlendirme Ölçeği Adölesan ve Ebeveyn Formunun Geliştirilmesi ve Psikometrik Değerlendirmesi

Ayşe Arıcıoğlu Sülün[1], Murat Bektaş[2]

[1]Siirt University Faculty of Health Sciences, Department of Midwifery, Siirt, Turkey

[2]Dokuz Eylül University Faculty of Nursing, Department of Pediatric Nursing, İzmir, Turkey

ABSTRACT

Objectives: The study aimed to develop and evaluate the reliability and validity of the adolescent and parent forms of the Sleep Assessment Scale for Children with Cancer.

Materials and Methods: One hundred forty-seven adolescents and their parents who were receiving care at two children's hospitals' oncology-hematology clinics made up the study's sample. With the aid of 16 professionals with expertise in child oncology and hematology, the scale's content validity was assessed. Number/percentage, t-test, correlation analysis, Cronbach's reliability coefficient, and factor analysis techniques were applied to analyze data.

Results: The Cronbach's alpha coefficient for the adolescent form of the sleep assessment scale for children with cancer is α 0.87 for the Adolescent Form and 0.86 for the parent form. According to the confirmatory factor analysis, the compliance indices were calculated as root mean squared error of approximation (RMSEA)=0.04, comparative fit index (CFI)=0.097, non-normed fit index (NNFI)=0.96, and NFI=0.89 for the adolescent form and as RMSEA=0.06, CFI=0.95, NNFI=0.94, and NFI=0.87 for the parent form.

Conclusion: The scale is a valid and reliable assessment tool for Turkish culture, according to all the statistical procedures used in the validity and reliability stages of the study.

Keywords: Adolescent, cancer, sleep, validity, reliability

ÖZ

Amaç: Bu çalışmanın amacı; kanserli çocuklar için uyku değerlendirme ölçeği adölesan ve ebeveyn formunun geliştirilmesi, geçerlilik ve güvenirliğinin değerlendirilmesidir.

Gereç ve Yöntem: Bu çalışmanın örneklemini 12-18 yaş arası iki hastanenin Onkoloji Kliniğinde yatmakta olan ve polikliniğe başvuru yapmış olan 147 ergen ve ebeveyni oluşturmaktadır. Ölçeğin kapsam geçerliliği, çocuk onkoloji ve hematoloji alanlarından 16 uzmanın görüşüne başvurularak değerlendirilmiştir. Verilerin analizinde sayı/ yüzde, t-testi, korelasyon analizi, Cronbach α güvenirlik katsayısı ve faktör analizi yöntemleri kullanılmıştır.

Bulgular: Doğrulayıcı faktör analizi sonucunda ergen formunda uyum indeksleri, root mean squared error of approximation (RMSEA)=0,04, comparative fit index (CFI)=0,97, non-normed fit index (NNFI)=0,96 ve NFI=0,89 ve Ebeveyn Formunda ise RMSEA=0,06, CFI=0,95, NNFI=0,94 ve NFI=0,87 olarak bulunmuştur. Cronbach α güvenirlik katsayısı ergen formu için 0,87, ebeveyn formu için ise 0,86 olarak bulunmuştur.

Sonuç: Yapılan analizler ve değerlendirmeler sonucu kanserli çocuklar için uyku değerlendirme ölçeği ergen ve ebeveyn formunun, geçerlik ve güvenirliği yüksek bulunmuştur. Bu sonuçlar geliştirilen ölçeğin Türkiye'de yapılacak araştırmalar için geçerli ve güvenilir bir ölçüm aracıdır.

Anahtar Kelimeler: Ergen, kanser, uyku, geçerlik, güvenirlik

Address for Correspondence/Yazışma Adresi: Ayşe Arıcıoğlu Sülün, Siirt University Faculty of Health Sciences, Department of Midwifery, Siirt, Turkey

Phone: +90 544 645 84 02 **E-mail:** aysearici09@gmail.com **ORCID:** orcid.org/0000-0002-4084-5273

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Introduction

Each year there are more than 200,000 new cases of childhood cancer.[1,2] According to the statistical data on tumors published, the incidence rate of cancer in Turkish children between the ages of 10-14 is 22.80 per million and 7.35 per million in children between the ages of 15-19 years.[2] Although the cancer rate has increased, with the treatment methods that have been developed in the field of pediatric oncology, survival rates for these children now exceed 80.0%.[3,4] However, low quality of life, psychological, physical and emotional problems can be seen in adolescents who continue to live.[1,5,6] One of the factors that negatively affects the quality of life of children with cancer is sleep problems. Especially, poor sleep and reduction in the quality of sleep is an important factor because it can increase the incidence of depressed mood, anxiety, stress, and depression syndromes among those adolescents.[3,7,8]

Sleep is one of the most common problems associated with cancer. Approximately 30.0-50.0% of children diagnosed with cancer experience sleep disorders.[7,9] Sleep problems may persist in adolescents after cancer treatment.[9] Sleep disorders may begin in diagnosed children as they are admitted to the clinic.[7,10,11] Factors such as being in a foreign environment, disruption to sleep routines, and being away from their own rooms and beds can have a negative effect on the sleep process and its quality.[9,11,12] In addition to these causes, the diagnosis of cancer in adolescents can cause sleep disorders by itself. Sleep disorders are very common in adolescents diagnosed with brain tumors.[12-15] Furthermore, the side effects of chemotherapy and radiotherapy, the long-term treatments required at inopportune times , and all the symptoms experienced by the child including pain, can negatively affect the sleep process and its quality.[6,8,16-18]

The most common sleep disorders in children with cancer are daytime sleepiness due to insufficient sleep during the night, insomnia, difficulty falling asleep, excessive sleep, parasomnia, hypoxia, and cardiac rhythm disorders.[9,10] These sleep disorders negatively affect both the treatment compliance and healing process.[7,9]

The quality and quantity of sleep needs to be improved to facilitate treatment compliance and enhance the children's quality of life. However, there are few studies in the literature that examine the scales used to gauge sleep issues and their prevalence in children with cancer.[14] In Turkey, only a small number of studies have been conducted on sleep disorders.[19] It can be seen that most of the measurement tools used in these studies are not specific tools for diagnosing the sleep problems experienced by children with cancer.[20]

To determine sleep problems and to take initiatives to eradicate these problems, valid and reliable tools are needed.[21] These tools also should be suitable for the specific culture. The Pittsburgh and Epworth scales have been used to diagnose sleep problems in children with cancer in Turkey. However, these scales are not tools specifically aimed at determining the sleep problems in those populations.

Therefore, there is a need for a valid and reliable tool for identifying the sleep problems and sleep quality of children diagnosed with cancer.[19] The aim of this study is to develop, validate, and assess the reliability of the adolescent and parent form of the sleep assessment scale for children with cancer.

Materials and Methods

To design a sleep and sleep quality evaluation in cancer scale for kids with cancer and to evaluate its psychometric features, a cross-sectional, methodological, descriptive, and correlational study was done. Figure 1 provides an overview of the study's methodologies.

Sample

The sample of the research was calculated using the "5's, 10's and 100's rule" as 100 adolescents. The research data were collected between September 2016 and November 2017. The study included adolescents who have been diagnosed with cancer for at least one month between the ages of 12 and 18 and parents who are primarily responsible for them. One hundred forty-seven adolescents and parents participated in the study.

Data Collection Tools

Adolescent and Parent Information Form: This form consisted of 10 questions on socio-demographic characteristics of adolescents, diagnosis, disease stage, received treatments, diagnosis time, duration of treatment, and age and gender of the parents.

Sleep Assessment Scale for Children with Cancer (SASCC) - Adolescent Form: A literature review was carried out for the determination of sleep disorders and the factors affecting sleep in childhood cancers. In reviewing the literature, general information about sleep, general scale on sleep and a child-specific scale were found. Because of the literature review, the subscales of general sleep problems, falling asleep and sleep disruption, physical environment, and nausea-vomiting were created on the premise that these determine all aspects of the sleep process and quality of sleep.[9,17,22-26] The draft scale was refined with the help of professional judgment.

SASCC - Parent Form: This form was created in parallel with the adolescent form because of the literature review.[9,17,22-26]

Visual Sleep Scale: This scale is a measurement tool that visually evaluates the sleep process and quality. Scale items are marked from "1" to "10", with higher scale scores indicating the better sleep process and quality.

A literature review was performed for the determination of sleep disorders and factors affecting sleep in childhood cancers. In reviewing the literature, a general scale about sleep and a child-specific scale were found. Because of the literature review, the subscales of general sleep problems, falling asleep and sleep disruption, physical environment, and nausea-vomiting were created on the premise that these determine all aspects of the sleep process and quality.[9,23,26] The draft scale consisted of 51 items, 31 for general sleep problems, 2 for nausea-vomiting, 10 for falling asleep and sleep disruption, and 8 for physical environment.

Expert Opinions

To test the face validity of the scale, experts specialized in sleep quality and the quality of life in children with cancer were selected. Of the 16 experts chosen, who having research related to sleep, 13 were from the Pediatric Nursing Department, one from the Pediatric Hematology Department, one from the Oncology Nursing Department and one from the Public Health Nursing Department.

The experts rated each item from 1-4 (1= needs a lot of change, 2= needs a little change, 3= appropriate, and 4= very appropriate). Because of the evaluation and analysis made according to the recommendations of the experts, the number of items were reduced from 51 to 38, with questions 7, 11, 16, 20, 21, 22, 26, 28, 34, 37, 38, and 42 being removed. The final version of the scale was then presented again to the same experts.

Pilot Application

The pilot application of the scale was carried out with 30 adolescents and parents. No items were removed from the scale because the groups could easily understand the questions and answer all of them accordingly. The data obtained from the pilot groups were not included in the study, and no scale was re-applied to these groups. The 38-item scale applied to the adolescents and parents was organized as a 4-point Likert type scales (1= always, 2= frequently, 3= occasionally, 4= never).

Compliance with Ethical Standards

Before carrying out the study, ethical approval, dated 28.07.2016 with protocol no. 2830-GOA and decision no. 2016/ 21-04, was obtained from the Non-Interventional Clinical Research Ethics Committee of Dokuz Eylül University. Permission to conduct the study was granted by the Chief Physicians of Universities Hospitals. Before the research, children and their parents were informed about the study.

After obtaining the verbal consent of the children and the written and verbal consent of the parents are included.

Statistical Analysis

Descriptive statistics were performed using percentages and means. The internal consistency of the scale and its subscales was assessed using Cronbach's alpha (α) coefficient for the reliability analysis and item-total score analysis. Validity was assessed using the content validity index (CVI), exploratory factor analysis (EFA), and confirmatory factor analysis (CFA). The database was split in half, and analyses using EFA and CFA were run on the first and second halves, respectively. The threshold for statistical significance was set at 0.05 (two-tailed).

Results

Among the adolescents in the study group, 57.8% were male, the mean age was 14.2±1.9 years, 36.7% had leukemia, 21.8% had lymphoma, 19.7% had tumors in their central nervous system, and 21.8% had other solid tumors. Regarding the treatments of the adolescents, 82.3% received chemotherapy, 0.7% radiotherapy, 4.1% underwent surgical treatment, 3.4% received bone marrow transplantation, 7.4% received drug treatment, and 2.1% received no treatment. Among the parents, 81.0% were mothers, 13.6% were fathers, 0.7% were grandmothers and 4.8% were other relations, such as sisters and aunts. Regarding the parents' education levels, 32.7% were primary school graduates, 21.1% completed up to middle school, 21.1% completed up to high school, and 12.9% had bachelor's degrees.

Validity Analysis Results

The evaluation of the opinions of experts was done using the CVI. The scale-based CVI was 0.99, whereas the item-based CVI ranged from 0.99 to 1.00. Table 1 displays the findings of the SASCC's EFA of the adolescent and parent forms. Because of the first factor analysis, 10 items with a factor load below 0.40 were excluded from the adolescent and parent scales and the analyzes were made on 28 items.

In the EFA of the adolescent form of the SASCC, the Kaiser-Meyer-Olkin coefficient (KMO) was found to be 0.80, while the Bartlett test result was x^2=1022.117, p<0.001. Results from the analysis further showed that the scale items had a 4-factor structure with an eigenvalue above 1.00 and explained 52.0% of the total variance, 17.8% of the total variance in the general sleep problems subscale, 11.9% of the total variance in the nausea-vomiting subscale, 11.2% of the total variance in the falling asleep and sleep disruption subscale and 11.1% of the total variance in the physical environment subscale in Table 1.

The KMO was determined to be 0.80 in the EFA of the parent form of the SASCC, while the Bartlett test result was x^2=992.72, p<0.001. Based on these findings, it was found that the SASCC parent form, which consists of 28 items, contained four subscales that accounted for 53.2% of the total variance: the general sleep problems subscale, which accounted for 15.9% of the total variance; the nausea-vomiting subscale, which accounted for 14. 7% of the total variance; the falling asleep and sleep disruption subscale, which accounted for 13.3% of the total variance; and the physical environment subscale, which accounted for 10.2 percent.

Results of CFA adolescent and parent forms of the SASCC are shown in Figure 2 and 3. From the results of the first CFA, it was determined that the t values were significant, and that items 4, 5, 12, 22, and 19, should be removed from the scale. Thus, the SASCC originally consisted of 20 items. At the end of the study, SASCC adolescent and parent form is included in Appendix 1.

According to the CFA, the compliance indices were calculated as root mean squared error of approximation (RMSEA)=0.04, comparative fit index (CFI)=0.97, non-normed fit index (NNFI)=0.96, and NFI=0.89 for the adolescent form and as RMSEA=0.06, CFI=0.95, NNFI=0.94, and NFI=0.87 for the parent form.

The response bias of the scale was evaluated with Hotelling's T^2, with the results showing that Hotelling's T^2=2655.637 (p=0.000), indicating that there was no response bias on the scale.

Reliability Coefficients of the SASCC

The means, standard deviations, and Cronbach's α reliability coefficients of the total scale and subscales are given in Table 2. The reliability coefficient of the adolescent form of the is α=0.87, while the reliability coefficient of the general sleep disorders, nausea-vomiting, falling asleep and sleep disruption, and physical environment subscales are α=0.83, α=0.89, α=0.70 and α=0.70, and parent form of the SASCC, α=0.86, α=0.79, α=0.76, α=0.74, α=0.70 respectively (p<0.001, Table 2).

Item-subscales Total Score Analysis of the Adolescent and Parent SASCC

It was determined that the correlation coefficients were between 0.73 and 0.58 for the general sleep problems subscale, between 0.94-0.95 for the nausea-vomiting subscale, between 0.31-1.00 for the failing asleep and sleep disruption subscale, and between 0.13-1.00 for the physical environment subscale. All these were statistically significant (p<0.001, Table 3).

In examining, as part of the reliability analysis (n=147), the item-total score correlations of the 28-item parent form of the sleep assessment scale for children with cancer, which was created in parallel with the adolescent form of the sleep assessment scale for children with cancer, it was found that the correlation coefficients of the scale items with the scale total scores varied between 0.31 and 0.66 (p<0.001, Table 3).

The item-subscale correlations of the parent form of the SASCC the general sleep problems subscale correlation coefficients were between 0.45-0.61 for the general sleep problems subscale,

Table 1. Explanatory factor analysis results for the adolescent and parent form of the sleep assessment scale for children with cancer (n=147)

Item number	Factors	Factor loads of adolescent form	Explained variances of adolescent form	Factor loads of parent form	Explained variances of parent form
Item 10	Factor 1	0.52	17.81	0.50	15.41
Item 11		0.44		0.44	
Item 12		0.58		0.58	
Item 13		0.46		0.46	
Item 17		0.64		0.64	
Item 18		0.67		0.67	
Item 19		0.64		0.64	
Item 20		0.66		0.64	
Item 14	Factor 2	0.79	11.89	0.80	14.67
Item 15		0.79		0.82	
Item 1	Factor 3	0.66	11.16	0.70	13.27
Item 2		0.71		0.72	
Item 3		0.57		0.60	
Item 16		0.51		0.52	
Item 4	Factor 4	0.52	11.12	0.50	10.16
Item 5		0.36		0.36	
Item 6		0.69		0.70	
Item 7		0.64		0.62	
Item 8		0.43		0.43	
Item 9		0.57		0.57	
Total explained variances			51.99	53.22	53.22

Table 2. Cronbach's alpha coefficients of the adolescent and parent form (n=147)

Scale and subscales	Adolescent form		Parent form	
	Mean ± SD	Cronbach's alpha coefficient	Mean ± SD	Cronbach's alpha coefficient
Total scale	45.06±11.65	0.87	49.47±11.35	0.86
General sleep problems sub-scale	14.10±3.98	0.83	14.10±3.98	0.79
Nausea-vomiting sub-scale	10.16±3.76	0.89	10.16±3.76	0.76
Falling asleep and sleep disruption sub-scale	9.18±2.99	0.70	9.18±2.99	0.74
Physical environment sub-scale	4.88±1.97	0.70	4.88±1.97	0.70

SD: Standard deviation

Table 3. Item-subscale total score correlations of the adolescent and parent forms of the sleep assessment scale for children with cancer (n=147)

Item number	Items	Scale subscale	Item-subscale the total score correlation of adolescent form (n=147)		Item-subscale the total score correlation of parent form (n=147)	
			r	p	r	p
Item 10	It bothers me that I can't sleep in the position I want to	General sleep problems	0.61	0.000	0.63	0.000
Item 11	It makes I uncomfortable to stay stil for long periods		0.58	0.000	0.58	0.000
Item 12	My treatment affects my sleep		0.72	0.000	0.52	0.000
Item 13	My treatment prevents me from falling asleep		0.65	0.000	0.49	0.000
Item 17	I want to sleep during the day		0.66	0.000	0.49	0.000
Item 18	I am angry during the day because I don't sleep well at night		0.73	0.000	0.38	0.000
Item 19	I don't want to do anything during the day because I don't sleep well at night		0.72	0.000	0.45	0.000
Item 20	I lose my appetite because I don't sleep well		0.72	0.000	0.66	0.000
Item 14	I don't get enough sleep because of my nausea	Nausea-vomiting	0.95	0.000	0.44	0.000
Item 15	I don't get enough sleep because I must vomit		0.94	0.000	0.51	0.000
Item 1	I can't sleep at night because of the noises	Falling asleep and sleep disruption	0.30	0.000	0.58	0.000
Item 2	The lights disrupt my sleep		0.34	0.000	0.56	0.000
Item 3	The frequent entries into the room bother me		0.31	0.000	0.54	0.000
Item 16	I wake up tired in the morning		1.00	0.000	0.48	0.000
Item 4	I cannot sleep in the hospital.	Physical environment	0.31	0.000	0.50	0.000
Item 5	The temperature of the room affects my sleep		0.31	0.000	0.57	0.000
Item 6	The smells in the room prevent me from sleeping		0.13	0.000	0.31	0.000
Item 7	The bed is uncomfortable		1.00	0.000	0.59	0.000
Item 8	The crowdedness of the room affects my sleep		0.30	0.000	0.60	0.000
Item 9	The frequent entries into the room bother me		0.30	0.000	0.56	0.000

between 0.40-0.65 for the nausea-vomiting subscale, between 0.50-0.60 for the falling asleep and sleep disruption subscale, and between 0.50-0.60 for the physical environment subscale ($p<0.001$, Table 3).

Discussion

In this study, the expert opinions received for the adolescent and parent form were found above 0.80 for both the item and the whole scale. In the literature the compliance obtained between experts is above 0.80 which is suggested as a proof that the scale can adequately measure the desired area.[27-29] The compliance obtained between the opinions of the experts in this study showed that it is a sufficient scale to define the problems related to sleep in adolescents with cancer.[30]

After the expert opinion, explanatory factor analysis was performed to determine whether the scale is one-dimensional or multi-dimensional. KMO and Bartlett tests have shown that both adolescent and parent databases are suitable for factor analysis.[31,32] Once the databases are determined to be suitable for EFA, item-total score correlation analysis and EFA were performed and because of the analyzes, 18 items with item total score correlation below 0.30 and factor load below 0.40 were removed from both adolescent and parent form and then the factor analysis was performed with 20 items. It is desired that the total variance explained in the newly developed scales in the literature is over 50.0% and factor loads to be at least 0.40.[33] As a result of the EFA in this study, it was determined that the remaining 20 items in adolescent and parent forms explained more than 50.0% of the total variance and factor loads were above 0.40. As a result of EFA, it was determined that both adolescent and parent forms consist of four subscales. Because of the analyses, it was determined that SASCC has a high level of construct validity in detecting the problems of cancer-related adolescents about sleep. When the literature is examined, it's seen that there are no special scales evaluating the sleep problems of children with cancer, and their sleep problems are mostly evaluated with general scales.[34-42] These scales are inadequate most of the time to detect sleep problems of children with cancer. This newly developed scale has been developed

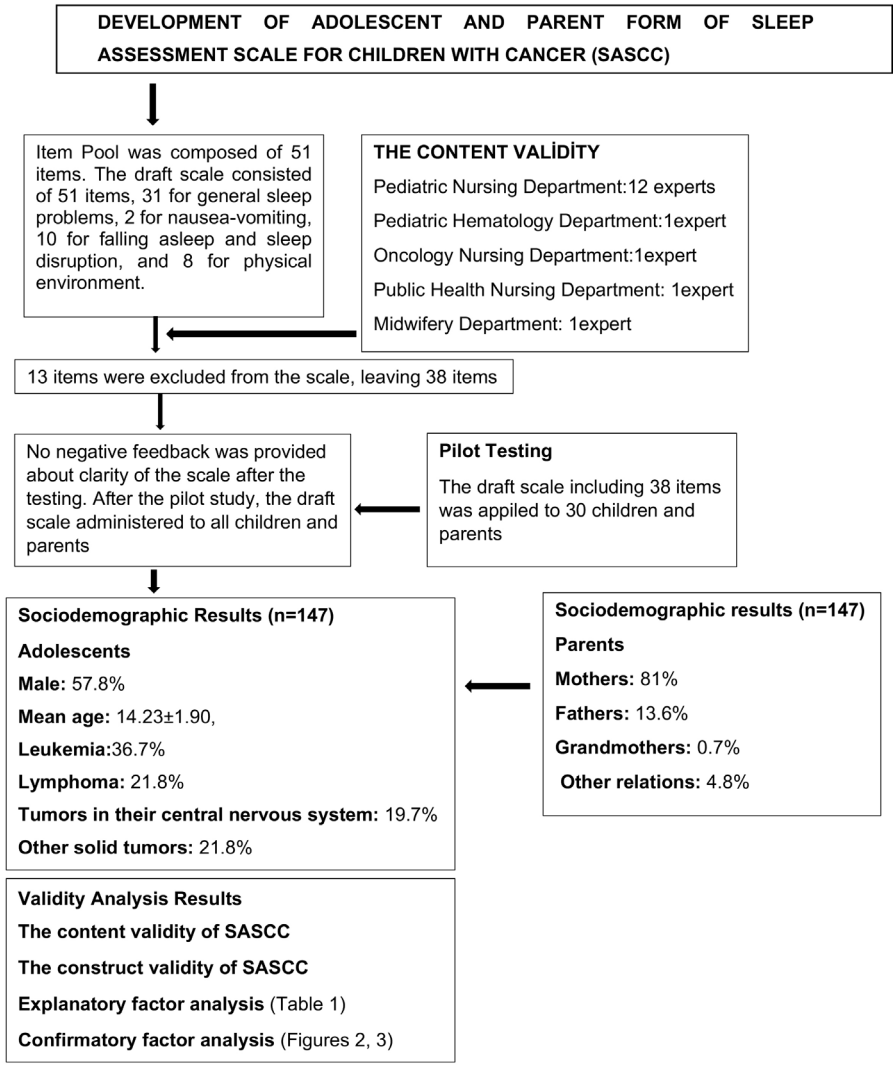

Figure 1. Summary of the method of study

both in children with cancer and has addressed situations such as nausea and vomiting specific to those children and evaluated by the parent as a parallel form. Therefore, it will provide more objective detection of sleep problems in children with cancer. In addition, it is seen that the newly developed scale has a similar or better construct validity than other scales related to sleep problems in the literature. With these aspects, the newly developed scale will perform much better than other scales in the literature in detecting the sleep problems of children with cancer.[34-42]

In the literature, scale and sub-dimension matching determined with EFA is requested to prove with CFA. In CFA, especially factor loads are desired to be greater than 0.40. RMSEA, which is one of the main fit indices, desired to be less than 0.08 and other fit indices to be greater than 0.90.[43] Because of the performed CFA, it was determined that all the factor loads for adolescent and parent forms are greater than 0.40, the RMSEA is less than 0.80 and other fit indices are greater than 0.90 (Figures 2, 3). These values showed that the items with four sub-dimensions determined by EFA are sufficient to detect sleep problems of cancerous children, related to sleep problems, and their scale and sub-dimensions can accurately detect the sleep problems of adolescents with cancer.[43] When the scales in the literature are examined, it is seen that CFA is performed in a very little part of them. It is seen that CFA results in this scale are similar or higher than other scale results.[34-42] These results show that SASCC has a construct validity as much as or higher than other scales in the literature in detecting sleep problems of cancerous adolescents.[34-42]

In this study, it was determined that both adolescent and parent form's Cronbach alpha coefficients were above 0.70.[44,45] The fact that the alpha coefficient of Cronbach is above 0.70 indicates that its items on the scale are compatible with each other, are highly reliable and measure the desired feature. In this study, the Cronbach alpha coefficients calculated for both the whole scales and sub-dimensions provided the criteria specified in the literature and the scales had high level of reliability.[45,46]

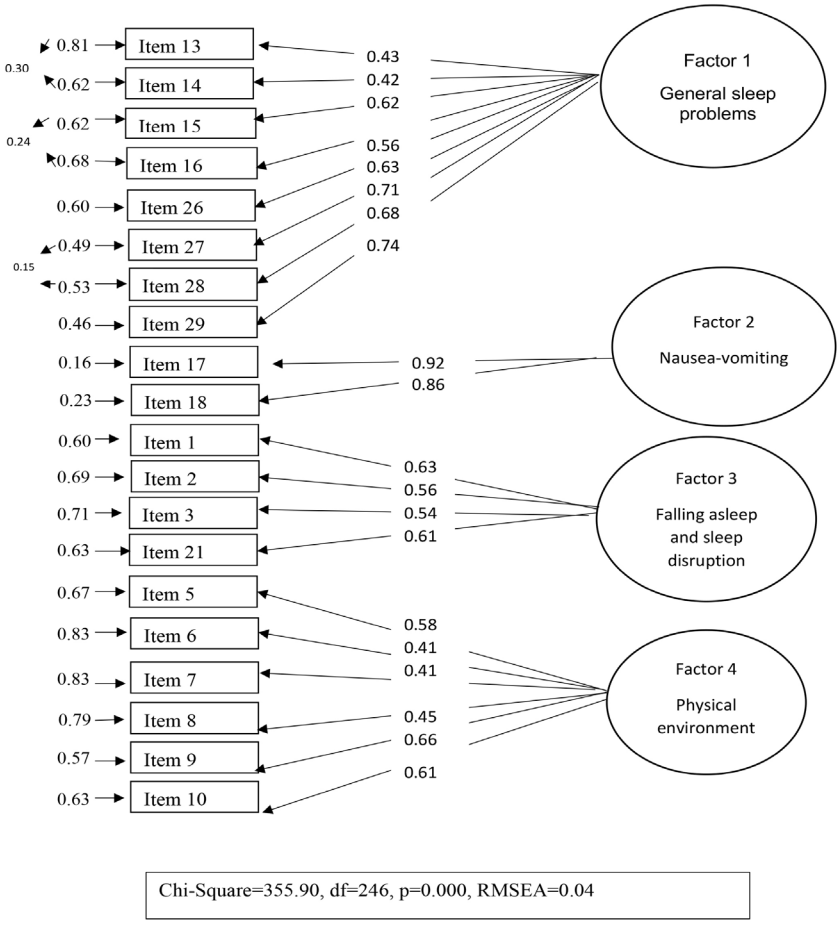

Figure 2. Confirmatory factor analysis for the adolescant form of the SASCC

SASCC: Sleep assessment scale for children with cancer, RMSEA: Root mean squared error of approximation

This result has shown that the items in the scale were related to the sleep of both adolescents and cancerous adolescents. In addition, when the general sleep scales used in adolescents in the literature are examined, it is seen that the reliability of the scales developed in this study is similar or better than the scales in the literature.[34-42] These results prove that the newly developed adolescent and parental scales are reliable measurement tools for assessing sleep problems of children with cancer.

In this study, it was determined that item-total and item-sub-dimension total score correlations for both adolescent and parent forms are greater than 0.30.[47] The fact that each item of the scale is highly linked to the total score in the literature indicates that the item has a high level of relationship with the measured conceptual structure and that the item can measure the targeted behavior effectively and adequately. This value is expected to be greater than 0.30 on newly developed scales. In this study, both adolescent and parent form item-total score and item-sub-dimension total score correlation coefficients are above 0.30 (Tables 2, 3). This result is that the items in the adolescent and parent form are highly related to sleep and sufficient to identify sleep related problems; it also showed that it can measure these problems correctly. It is thought that the item-total score correlations obtained in this study are at the same level or higher than the general sleep scales in the item-total score correlation analysis in the literature, and the scales in this study may yield more reliable results than the scales in the literature in determining the sleep problems of children with cancer.[34-42]

Study Limitations

There are several limitations of this study. The first is that the random sampling method was used in the study, and this can affect the generalizable of the results of the study. The second limitation is that the scales were developed only to diagnose the sleep problems of adolescents aged 12-18 years.

Conclusion

The validity and reliability should be done in also this age groups for use in children of other age groups to detect sleep problems.

Acknowledgement

This article was created from the master's thesis titled "Development of the Sleep Assessment scale for children with cancer: adolescent and parent form" completed by the first author.

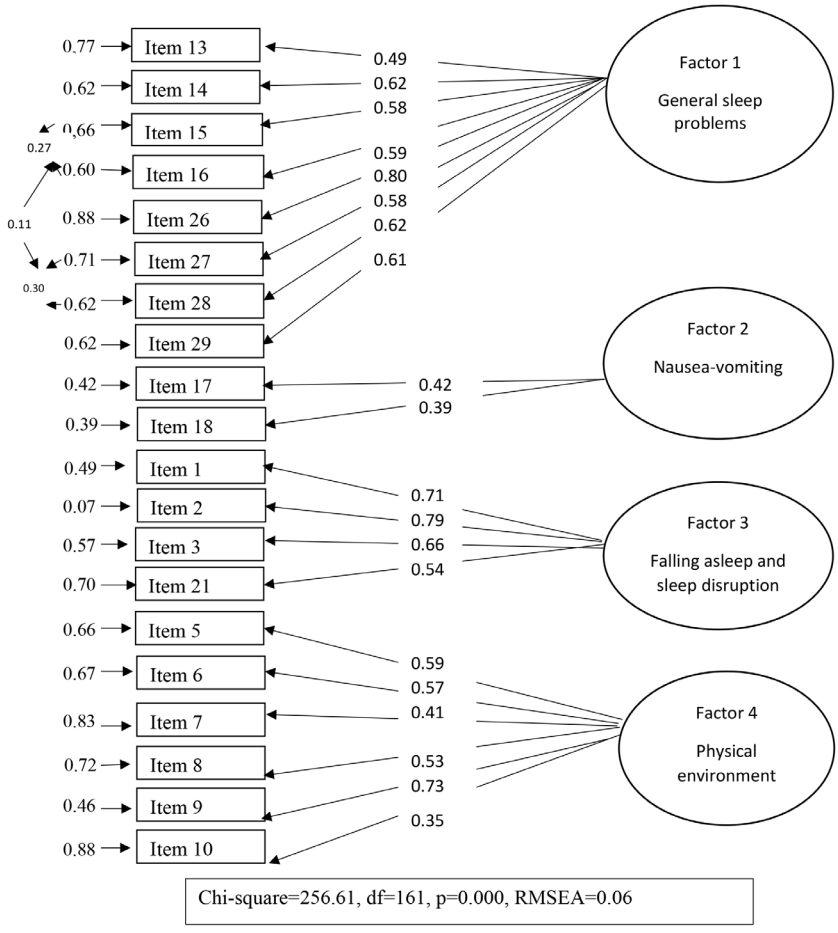

Figure 3. Confirmatory factor analysis for the parent form of the SASCC

SASCC: Sleep assessment scale for children with cancer, RMSEA: Root mean squared error of approximation

Ethics

Ethics Committee Approval: Before carrying out the study, ethical approval, dated 28.07.2016 with protocol no. 2830-GOA and decision no. 2016/21-04, was obtained from the Non-Interventional Clinical Research Ethics Committee of Dokuz Eylül University.

Informed Consent: After obtaining the verbal consent of the children and the written and verbal consent of the parents are included.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: A.A.S., M.B., Design: A.A.S., M.B., Data Collection or Processing: A.A.S., Analysis or Interpretation: A.A.S., M.B., Literature Search: A.A.S., M.B., Writing: A.A.S., M.B.

Conflict of Interest: No conflict of interest was declared by the authors.

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Appendix-1. Final version of the adolescent form of the sleep rating scale for children with cancer (20 items)					
Items		**Never (1)**	**Rarely (2)**	**Sometimes (3)**	**Always (4)**
1.	I can't sleep at night because of the noises				
2.	The lights disrupt my sleep				
3.	The frequent entries into the room bother me				
4.	I cannot sleep in the hospital				
5.	The temperature of the room affects my sleep				
6.	The smells in the room prevent me from sleeping				
7.	The bed is uncomfortable				
8.	The crowdedness of the room affects my sleep				
9.	The frequent entries into the room bother me				
10.	It bothers me that I can't sleep in the position I want to				
11.	It makes I uncomfortable to stay still for long periods				
12.	My treatment affects my sleep				
13.	My treatment prevents me from falling asleep				
14.	I don't get enough sleep because of my nausea				
15.	I don't get enough sleep because I must vomit				
16.	I wake up tired in the morning				
17.	I want to sleep during the day				
18.	I am angry during the day because I don't sleep well at night				
19.	I don't want to do anything during the day because I don't sleep well at night				
20.	I lose my appetite because I don't sleep well				

The final version of the parent form of the sleep rating scale for children with cancer (20 Items)					
Items		**Never (1)**	**Rarely (2)**	**Sometimes (3)**	**Always (4)**
My child;					
1.	Can't sleep at night because of the noises				
2.	The lights are interrupting my child's sleep				
3.	Your roommate can't sleep because of snoring/crying				
4.	She/he can't sleep in the hospital				
5.	If the room is hot/cold, my child affect your sleep				
6.	The smells in the room make my child sleep blocking				
7.	The bed bothers my child				
8.	The crowded room makes you sleepy affecting				
9.	The frequent entries into the room bother my child				
10.	Inability to sleep in desired position it bothers my child				
11.	Being sedentary for long periods of time feels uncomfortable				
12.	His/her treatment is affecting my child's sleep				
13.	His/her treatment prevents him/her from falling asleep				
14.	He/she can't get enough sleep because of his nausea				
15.	He/she is not getting enough sleep due to vomiting				
16.	He/she wakes up tired in the morning				
17.	He/she wants to sleep during the day				
18.	He/she gets irritable during the day because he/she doesn't sleep well				
19.	He/she doesn't want to anything during the day because he can't sleep well				
20.	Since he/she does not well sleep, his/her desire to eat decreases				