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Research Article

Validity and Reliability of Sun Protection Behavior Scale among Turkish Adolescent Population

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SUMMARY

Purpose: The aim of this research was to adapt the Sun Protection Behavior Scale (SPBS) to Turkish and to perform validity and reliability analyses.
Methods: The scale was administered to a total of 900 adolescents, the retest to 91 adolescents. The construct validity of the scale was evaluated using exploratory (EFA) and confirmatory factor analysis (CFA). The EFA and CFA were applied to sample groups of 449 and 451 people, respectively.
Results: The Cronbach alpha coefficients for the Turkish form of the SPBS ($\alpha = .74$) and its sunscreen ($\alpha = .88$) and hat use ($\alpha = .70$) subscales were found to be $\geq$.70 while the sun avoidance subscale was calculated to be .67. The item-total score correlation between the scale and its subscales was $\geq$.26 and the test-retest correlations were found to be $\geq$.51. The CFA results verified the 8-item, 3-factor Turkish version of the SPBS. The confirmatory factor loadings for the scale were .45–.80 for sun avoidance, .72–.93 for sunscreen use, and .66–.83 for hat use. In particular, SPBS and sunscreen use ($p < .001$) exhibited significantly high mean scores among girls and economically better backgrounds ($p = .007$, $p < .001$, respectively). In addition, SPBS ($p = .004$) and hat use ($p < .001$) revealed that the mean scores were significantly high in younger adolescents.
Conclusions: The SPBS was found to be valid and reliable and its psychometric characteristics acceptable. The scale can be used to measure the behavior of Turkish adolescent populations with respect to sun protection.

Introduction

The incidence of skin cancers has steadily increased over the past 50 years in predominately fair-skinned populations. This increase is reported to have leveled off recently in several northern and western European countries, Australia, New Zealand and in North America [1].

While the rate of standardized melanoma relative to age in Turkey in 2004 was 1.5 in 100,000 in men and 1.2 in women, in 2009 these rates rose to 2.1 in men and to 1.6 in women. The rate of nonmelanoma skin cancers, meanwhile, was 20.8 in and 14.5 in women per each 100,000 of the population in 2004, but rising to 24.0 in men and 15.8 in women in 2009. As can be seen from this data, there has been a striking rise of both melanoma and non-melanoma skin cancer cases in Turkey [2].

The popularity of getting a tan, particularly the wide interest in this trend among young girls aged 14–16 years, the psychological motivation to look beautiful, the belief that a tan is a sign of health, as well as the increase in vacation and leisure-time activities have all resulted in an increased impact of ultraviolet rays on human health [3]. Parallel to these changing trends in the population, skin cancer risks associated with unprotected exposure to long-term, intermittent or intense sunrays and a history of sunburn in childhood have increased [4].

The Turkish population is constantly subjected to a high level of ambient ultraviolet radiation throughout the year. Ultraviolet index values in central Turkey, in the region of the country's capital Ankara, are 8–10 in the summer months, 4–6 in the spring. In the period of April–September, values rise above 4, which is considered to be a baseline for sun protection [5].

In one review, sun protection educational programs are recommended in adolescence because of their benefits in terms of

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skin cancer protection and their effectiveness in establishing sun protection behavior changes in adolescents [6]. Another review has emphasized the importance of the key role nurses may play in health maintenance and improvement programs that help protect the community from skin cancers [7]. Because of their position as a major professional group in health services, nurses are advised to play an active role in schools in skin cancer prevention programs [8].

Determining the nature of the sun protection behavior of individuals, particularly of children and adolescents, may form the basis of planning interventional studies and health improvement programs [9,10]. Sun protection was measured using the 9-item Sun Protection Behavior Scale (SPBS), which evaluates how individuals protect themselves from the sun [11-13]. The SPBS included questions assessing the frequency of sun protective behaviors (e.g., frequency of wearing hats, using sunscreens, time spent in the shade), such that higher scores reflected greater frequency of sun protective behaviors. Each item was a self-report of behavior on a 5-point Likert scale of frequency (*never*, *rarely*, *sometimes*, *often*, and *always*), "when in the sun for more than about 15 minutes". The SPBS included components of sun avoidance, sunscreen use, and hat use, and has been shown to be reliable and valid [14], as well as sensitive to intervention effects in adolescents and adults [11,13].

In Turkey, 30.0% of the population is made up of children aged 0–17 [15]. Some descriptive and cross-sectional studies conducted in Turkey have revealed that the knowledge, attitudes and behaviors of individuals, especially of children, regarding sun protection are insufficient and reportedly, the methods of protecting children from the sun are inadequate [16,17].

In a study conducted in Turkey, researchers found that the sun protection behavior scores of elementary school children were low and that the method used the most was staying in the shade in the peak sunlight hours and wearing light-colored clothes [17].

Although there have been many studies on skin cancer in Turkey, it is worthy of note to acknowledge that no common data collection form that measures sun protection behavior among elementary school children has been used and that researchers have used different questionnaires that they have themselves devised. The differences in data collection therefore have made it difficult to reach a common conclusion [18]. It was for this reason that the need arose to create a Turkish version adaptable to the Turkish adolescent population, of the SPBS that is being used in many interventional studies in the American population [11,13].

The main purpose of this study was to make a cultural adaptation and perform psychometric analyses of the SPBS. In this context, the aims of the study can be summarized as the following: (1) translating the SPBS from English to Turkish; (2) assessing the instrument's item-total correlations, internal and test-retest reliability; (3) replicating the factor construct for the instrument; (4) reporting the prevalence of sun protection behavior for Turkish adolescents.

Methods

Study design

This study was a methodological study to evaluate reliability and the factor construct of the SPBS.

Setting and sample

The study was conducted in Sakarya Province, located on the coast of the Black Sea in the Marmara Region of Turkey. The climate is oceanic due to its close proximity to the Black Sea. The research was carried out using the random cluster sampling method. In this context, sixth to eighth grade students from 32 public elementary schools in the region comprised one cluster, and sixth to eighth grade students from 8 private elementary schools made up the other cluster in the study. A school was chosen randomly from each cluster. Ultimately, the study sample comprised 1060 students, 640 from the public school and 420 from the private elementary school. The students were all in the sixth to eighth grades and between the ages of 12–15 years. Consent forms were sent out via the children to parents, together with an introductory letter explaining the purpose of the study. The parents then filled out the forms at home and returned the materials. The 900 parents were thus contacted and the consent of all was received before the start of the study. The final study sample was made up of 574 students from the public school and 326 students from the private school. Two weeks after the implementation of the research questionnaires, a posttest was administered to two random classes from each school. In the posttest, the aim was to use parametric measurement methods in hypothesis testing without interfering with school activities. Therefore, it was established that 90 students that made up 10.0% of the sample were sufficient for the study. At this stage, the posttest was administered to 58 public school and 33 private school students. A power analysis was carried out for the study (80.0% power and a level of significance of 0.05). We found that 429 participants would be adequate for this study.

Ethical consideration

The authors of the original instrument contacted Jay E. Maddock for permission to use the instrument. Permission to conduct the research in the schools was also obtained from the school administrations and the local education authority. Institutional review board approval was obtained prior to the study (2013-5).

Instrument: SPBS

The information sheet that was used in the research contained descriptive information about age, economic status and skin type of the students. The other data collection instrument that was used in the study was the SPBS.

The SPBS is a 9-item Likert type of scale developed to measure how often individuals engaged in sun protection behaviors [14]. The SPBS examines how often the individual engages in sun protection behavior at times when exposure to the sun is more than 15 minutes, such that 1 represented *never*, 2 represented *rarely*, 3 represented *sometimes*, 4 represented *usually*, and 5 represented *always*. The higher scores in the scale and in each item indicate better sun protection behavior. The scale has three subscales, including regular sun avoidance, sunscreen use and hat use. The minimum score on the SPBS was 9; the maximum score was 45. The minimum score for sun avoidance was 4; the maximum 20. The lowest mean score for sunscreen use was 3; the highest was 15. The lowest mean score for hat use was 2; the highest was 10. The SPBS was applied to an adolescent population by Maddock et al [14] and the 3-factor construct made up of the subscales of sun avoidance, sunscreen use and hat use was validated [14,19]. SPBS was used in a beach community where only two of the subscales (sunscreen use, $\alpha = .86$ and sun avoidance $\alpha = .82$ reliable) were found to be reliable [12]. A 7-item SPBS with two subscales was used with adolescents; Cronbach α ($\alpha = .78$) and test-retest reliability ($r = .70$) were found to be good [20].

Translation and content validity

The SPBS Instrument adaptation into the Turkish language was performed in a series of five steps [21]. Step 1 entailed the translation of the original instrument into Turkish by two translators, fluent in both languages, one of them a health professional and the other a professional translator. Step 2 entailed the correction of inconsistencies between the translations of the translators. Step 3 entailed the translation of the Turkish version back into the original language by two translators, one of them a health professional and the other a professional translator. Step 4 comprised the review of the translation of the instruments from the original language into Turkish and the back-translation of the Turkish into English by three experts, who gave the instruments its final form. In Step 5, the instruments were given a pilot test run with 20 participants whose characteristics were similar to those of the study group. After the pilot test, parts of the instrument that had not been fully understood or had been misunderstood were reworded in line with the recommendations of the experts. The Turkish and the English form of the instruments were sent out to an expert panel that consisted of 10 university faculty members including a psychologist, a pediatrician, public health physicians and public health nurses with similar backgrounds to those of the translators. The experts were asked to evaluate the items in the instruments on the basis of the content validity index (CVI), on a scale of 1–4 such that 1 meant *unsatisfactory*, and 4 meant *very satisfactory*. For the content to be 80.0% satisfactory in terms of validity, the experts had to give each item of the instrument a 3 or 4-point score [22]. In terms of scope validity, Kendall's W analysis was used to determine whether there were differences between the expert opinions. Finally, the cultural equivalence of the Turkish instrument was tested among 60 Turkish primary school students in the province of Sakarya.

Data collection

Data were collected in the students' classes during the hours advised by the school administration. The scale took approximately 20 minutes to complete. Two weeks after the application, it was administered to 10.0% (91 individuals) of the sample as a retest. The SPBS was administered to the adolescents in the spring of 2013.

Data analysis

Cronbach α coefficients, item-total correlations and test-retest correlations of the SPBS Turkish version were examined in the reliability analysis. Values ≥ .70 for the Cronbach α coefficient, > 0.20 for the item-total correlations and > .40 for the test-retest application correlations for 2 weeks were determined to be acceptable levels for the instruments and its subscales [23,24].

To test the construct validity of the SPBS, a data set of 900 persons was randomly divided into two groups using SPSS version 18 (IBM SPSS Statistics, Chicago, IL, USA), where n_1 was 449 and n_2 was 451. Exploratory factor analysis was used in the first sample and confirmatory factor analysis in the second.

In the first group ($n_1 = 449$), exploratory factor analysis was performed to explore structural relations in Turkish culture. At this point, as a factor extraction method, when the correlations between the factors and maximum likelihood were less than 0.30, varimax rotation was employed; the direct oblimin axis rotation method was applied when the correlations were larger than 0.30. In determining the number of factors, parallel analysis and scree plot were used. The factor constructs in the exploratory factor analysis as well as the factor constructs in the theoretical model were analyzed and evaluated.

The constructs emerging from the confirmatory factor analysis were examined using structural equation modeling in the second group ($n_2 = 451$) and cross-validation was performed. To avoid bias, all of the structures emerging from the exploratory factor analysis were reviewed and the structure and model offering the best goodness of fit (GFI) was determined [25]. Various GFI indices were used in the evaluation of the alternative models in the structural equation modeling [26,27]. The root mean square error of approximation (RMSEA) values of <0.05 are considered a good fit, values between 0.05 and 0.08 an adequate fit, values between 0.08 and 0.10 are regarded as a mediocre fit, whereas values > 0.10 are not acceptable [26]. Although there is general agreement that the value of RMSEA for a good model should be less than 0.05, Hu and Bentler [27] suggested an RMSEA of less than 0.06 as a cutoff criterion. The χ^2 value is the traditional measure for evaluating overall model fit; it assesses the magnitude of discrepancy between the sample and the fitted covariances matrices [27]. The GFI index used in the present study accepts > 0.90 as a good fit and > 0.95 as an exact fit [28]. The comparative fit index (CFI) accepts > 0.90 as an acceptable fit and > 0.95 as a good fit [27]. On the adjusted GFI (AGFI), values > 0.80 on the AGFI are asserted to be acceptable [28]. After the best-fitting model was identified, ordinal coefficients and α were calculated for all retained subscales. The scale and its subscales were examined as to the mean scores of variables such as age, gender, economic status and skin type, using the analysis of variance at a significance level of < 0.05 and the Tukey's honest significance difference post hoc test.

Results

The mean age of the students participating in the research was 13.06 ± 0.85 years; 43.9% were girls, 56.1% were boys. Of the students, 65.2% reported that their family's economic situation was good; 27.3% indicated that they had sensitive skin while 48.4% said their skin was normal and 24.3% reported having dark skin (see Table 1).

The Turkish SPBS was created with the completion of the content validity and cultural adaptation steps: (1) examination of the original English, Turkish, and back-translation of the SPBS by an expert panel; (2) pretesting of the Turkish translation on a monolingual target language sample. During cultural adaptation, the expression “mid-day hours” was defined as “between the hours of 10 AM to 4 PM” in the SPBS Item 3 and Item 4. No items or words were found to be incomprehensible during the cultural adaptation.

Table 1 *Descriptive and Personal Information of Students.*

Variables	Categories	*n* (%)
Grade	6	295 (32.8)
	7	325 (36.1)
	8	280 (31.1)
Age (yr)	12	273 (30.3)
	13	324 (36.0)
	14–15	303 (33.7)
Gender	Girls	395 (43.9)
	Boys	505 (56.1)
Economic status	Low to medium	202 (22.4)
	Good	587 (65.2)
	Extremly good	111 (12.4)
Skin colour	Light	348 (38.6)
	Brown-wheat	398 (44.2)
	Dark	154 (17.2)
Skin type	Sensitive	245 (27.3)
	Moderate	436 (48.4)
	Dark	219 (24.3)
Total		900 (100.00)

Table 2 *Descriptive Statistics of Revised 8-item Turkish Version of SPBS in First Sample ($n_1 = 449$).*

Items	Mean ± SD	One factor	Three factor		
How often did you		F1	F1	F2	F3
2. Stay in the shade?	3.63 ± 0.91	0.23		0.45	
3. Avoid the sun during the mid-day hours?	2.87 ± 1.14	0.52		0.85	
4. Limit your exposure to the sun during the mid-day hours?	2.95 ± 1.14	0.51		0.79	
5. Use a sunscreen?	3.18 ± 1.38	0.77	0.84		
6. Use a sunscreen with an SPF of 15 or more on your face?	2.72 ± 1.52	0.81	0.92		
7. Use a sunscreen with an SPF of 15 or more on all your sun exposed areas?	2.77 ± 1.46	0.80	0.92		
8. Wear a hat.	3.06 ± 1.14	0.41			0.88
9. Wear a hat with a wide brim.	2.35 ± 1.24	0.43			0.86
Eigenvalue		2.83	2.83	1.76	1.17
Total		2.83	5.76		
Percentage		35.40	35.40	21.98	14.59
Total		35.40	71.97		
Kaiser-Meyer-Olkin		0.68	0.68		
Cronbach α		.73	.89	.59	.76
Item-total correlations		.18–.58	.70–.83	.26–.57	.61–.61

Note. F1 = Factor 1; F2 = Factor 2; F3 = Factor 3; SPBS = sun protection behavior scale; SPF = sun protection factor.

Kendall's W analysis results showed that there were no significant differences between the opinions of the experts as related to the SPBS (W = .17, p = .867).

After the language and content analysis was completed, item analysis was performed for the scale. The scale's item-total correlations and the Cronbach α values were calculated for the entire sample. The first item ("Wear a shirt"), which had an item-total correlation value of below .20, was removed from the 9-item scale that emerged as a result of the analysis. The item-total correlations and the Cronbach α values were then recalculated after the first item was removed. The analysis performed showed that the item-total correlation values of the scale were higher than 0.20. After this stage, an analysis for construct validity was performed on the 8-item Turkish version of the scale.

Construct validity

To determine whether the 8-item 3-factor theoretical model of the SPBS was valid or not, the Turkish version was examined using exploratory factor analysis for the first sample (n_1 = 449). At the end of the analysis, the scree test was not readily interpretable. Parallel analysis revealed a 3-factor construct (Table 2). Accordingly, the three dimensions on the revised 8-item scale were examined with exploratory factor analysis (Table 2). At the end of the analysis, the Kaiser-Meyer-Olkin coefficient showing sampling adequacy in factor analysis of the correlation between data was at an average level of .68. The result of the Barlett test was found to be 1,328.8 with $p < .001$ (total explained variance = 0.72). The Cronbach α coefficients obtained from the 8-item three-dimensional factor analysis were calculated as .59 for sun avoidance (Item 2, Item 3 and Item 4), .89 for sunscreen use (Item 5, Item 6 and Item 7) and .76 for hat use (Item 8 and Item 9). As can be understood from the Cronbach α coefficients, the reliability coefficient in the first dimension was at an unacceptable level (Table 2). It was not possible to interpret findings that have been calculated to have reliability coefficients at unacceptable levels (< .60) (Table 2). For this reason, in the next stage of the analysis, a confirmatory factor analysis was performed on the second sampling (n_2 = 451).

The results of the confirmatory factor analysis showed that the one-factor model did not fit well (GFI .80, AGFI .64, CFI .68, χ^2/df 20.83 and RMSEA .210). The general goodness of fit coefficients of the revised 3-factor model were noticeably high (GFI .98, AGFI .96 and CFI .98, χ^2/df 2.08 and RMSEA .049). Also, the correlation coefficients among the factors were in the range of 0.17–0.37 (Figure 1). The correlations between the data obtained from the SPBS form can be explained with the revised 3-factor model. There was no correlation found between the error variance of the items in the scale. The confirmatory factor loads of the sun avoidance subscale showed a variance ≥ 0.45–0.80, those of the sunscreen use

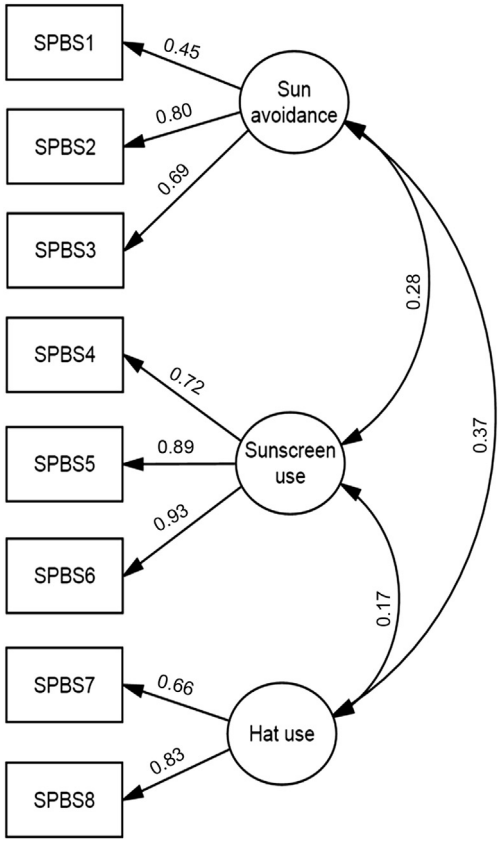

Figure 1. Revised 8 items three-factor structure of the Turkish version Sun Protection Behavior Scale with standardized parameter estimates.
Note. SPBS = sun protection behavior scale.

Table 3 *Psychometric Properties of Revised 8-item Turkish Version of SPBS in Second Sample ($n_2 = 451$).*

Instruments	Items	$M \pm SD$	Item-total correlation[a]	Test-retest r[a]	Cronbach α
Sun avoidance	1. Stay in the shade?	3.64 ± 0.94	.37	.51	.67
	2. Avoid the sun during the mid-day hours?	2.87 ± 1.14	.59		
	3. Limit your exposure to the sun during the mid-dayhours?	2.98 ± 1.13	.52		
Sunscreen use	4. Use a sunscreen?	3.22 ± 1.41	.68	.73	.88
	5. Use a sunscreen with an SPF of 15 or more on your face?	2.81 ± 1.58	.81		
	6. Use a sunscreen with an SPF of 15 or more on all your sun exposed areas?	2.82 ± 1.49	.83		
Hat use	7. Wear a hat.	3.10 ± 1.11	.54	.61	.70
	8. Wear a hat with a wide brim.	2.41 ± 1.24	.54		
Overall SPBS	8 items	23.84 ± 6.07	.26–.62	.73	.74

Note. SPBS = sun protection behavior scale.
[a] All correlations significant ($p < .01$).

Table 4 *Comparison of SPBS and Subscales for Gender, Years, Economic Level and Skin Type ($N = 900$).*

Variables	Scale	Groups	n	$M \pm SD$	F[a]	p
Gender	Overall SPBS	Girls	395	24.79 ± 6.06	32.91	<.001
		Boys	505	22.52 ± 5.72		
	Sun avoidance	Girls	395	9.63 ± 2.56	3.87	.049
		Boys	505	9.31 ± 2.33		
	Sunscreen use	Girls	395	9.64 ± 3.89	46.17	<.001
		Boys	505	7.88 ± 3.82		
	Hat use	Girls	395	5.51 ± 2.13	1.64	.200
		Boys	505	5.32 ± 2.10		
Ages	Overall SPBS	12	273	24.08 ± 6.18	5.55	.004
		13	324	23.90 ± 5.90		
		14–15	303	22.60 ± 5.76		
	Sun avoidance	12	273	9.55 ± 2.45	1.29	.275
		13	324	9.54 ± 2.40		
		14–15	303	9.27 ± 2.47		
	Sunscreen use	12	273	8.70 ± 4.02	1.14	.320
		13	324	8.86 ± 3.89		
		14–15	303	8.39 ± 3.93		
	Hat use	12	273	5.83 ± 2.17	13.68	<.001
		13	324	5.49 ± 2.05		
		14–15	303	4.93 ± 2.04		
Economic level	Overall SPBS	Medium to low	202	22.37 ± 5.89	4.96	.007
		Good	587	23.89 ± 5.80		
		Very good	111	23.63 ± 6.62		
	Sun avoidance	Medium to low	202	9.24 ± 2.43	2.45	.087
		Good	587	9.58 ± 2.38		
		Very good	111	9.14 ± 2.74		
	Sunscreen use	Medium to low	202	7.73 ± 4.06	7.94	<.001
		Good	587	8.84 ± 3.86		
		Very good	111	9.34 ± 3.91		
	Hat use	Medium to low	202	5.38 ± 2.15	1.09	.334
		Good	587	5.46 ± 2.07		
		Very good	111	5.14 ± 2.26		
Skin type	Overall SPBS	Sensivity	245	23.73 ± 6.03	2.28	.102
		Moderate	436	23.10 ± 5.88		
		Dark	219	24.10 ± 6.06		
	Sun avoidance	Sensivity	245	9.63 ± 2.46	0.89	.409
		Moderate	436	9.38 ± 2.42		
		Dark	219	9.39 ± 2.46		
	Sunscreen use	Sensivity	245	8.69 ± 4.13	2.11	.121
		Moderate	436	8.42 ± 3.84		
		Dark	219	9.09 ± 3.90		
	Hat use	Sensivity	245	5.41 ± 2.29	1.74	.176
		Moderate	436	5.29 ± 2.02		
		Dark	219	5.62 ± 2.09		

Note. SPBS = sun protection behavior scale.
[a] F measured by analysis of variance, $p < .05$.

subscale, a variance ≥ 0.72–0.93, and the factor loads of the hat use subscale, ≥ 0.66–0.83. The results of the confirmatory factor analysis of the revised 8 items in the SPBS are shown in Figure 1. The Cronbach α coefficients were recalculated in the second sampling ($n_2 = 451$). The Cronbach α coefficients revealed values of .67 for sun avoidance (Item 2, Item 3 and Item 4), .88 for sunscreen use (Item 5, Item 6 and Item 7), and .70 for hat use (Item 8 and Item 9).

Reliability

We found that Cronbach α was .74 and that item-total correlations were ≥ .26–.62 for the whole of the revised 8-item SPBS in the 451-person sample (Table 3). The item-total correlations for the instrument's subscales of sun avoidance, sunscreen use and hat use were .37–.59, .68–.83, .54, respectively in the 451-person sample (Table 3). The Cronbach α values for the instrument's subscales of sun avoidance, sunscreen use and hat use were .67, .88 and .70, respectively in the 451-person sample (Table 3). The Pearson correlation coefficients representing the correlation between the test and retest of the scale and its subscales of sun avoidance, sunscreen use and hat use were .51, .73, and 0.61, respectively in the 91-person sample; this was statistically significant ($p < .001$). The mean scores, standard deviations, Cronbach α values, item-total correlations and test-retest correlations for a 451-person sample are given in Table 3.

Prevalence of sun protection behaviors among Turkish adolescents

The SPBS ($F = 32.91$, $p < .001$), the sun avoidance ($F = 3.87$, $p = .049$) and the sunscreen use ($t = 46.17$, $p < .001$) subscale mean values were higher and more significant in girls compared to boys (Table 4). In the SPBS ($F = 5.55$, $p = .004$) and its hat use subscale ($F = 13.68$, $p < .001$), the mean scores of the younger students were significantly higher than those of the older ones (Table 4). In the advanced analysis, the SPBS ($p = .008$) and the hat use subscale ($p < .001$) showed that the scores of the 12-year-olds were significantly higher than those of the 14–15-year-olds and the scores of the 13-year-olds were also significantly higher than those of the 14–15-year-olds (respectively, $p = .017$, $p < .001$). The SPBS ($F = 4.96$ and $p = .007$) and the sunscreen use subscale ($F = 7.94$ and $p < .001$) revealed that the mean scores of students from economically better backgrounds were significantly higher than the mean scores of students from middle and lower income groups (Table 4). In the advanced analysis, we found that the scores of students from the higher income bracket had significantly higher scores on the SPBS than students in the middle and lower income groups ($p < .001$); in the sunscreen use subscale, the group that was

in the higher income bracket also had higher scores than the middle ($p < .001$) and lower ($p < .001$) income groups. This was a statistically significant finding. In the comparisons made of the SPBS and its sun avoidance, sunscreen use and hat use subscales, no statistically significant difference was found in terms of skin type (respectively, $p = .102$, $p = .409$, $p = .121$, $p = .176$) (Table 4).

Discussion

This study found the 8-item, 3-factor revised version of the SPBS, from which the item "Wear a shirt" had been removed, to be valid and reliable for use in Turkish adolescent populations. In addition, the present study describes sun protection behaviors among adolescent students aged 12–15 years in Turkey. According to the results of the sun protection behaviors analysis using variables such as gender, age, family economic status and skin type, the SPBS was found to be sensitive to the Turkish adolescent population.

Construct validity

It has been set forth that there might be differences in the adaptation of scales to different cultures and that different constructs may emerge in different societies. In addition, before the items with low reliability coefficients are removed from the scale, it is recommended that the change in the α coefficient and mean scores are examined; if the α coefficient is higher when the item is removed, we must understand and note that there is an issue present that reduces item reliability and therefore the item must be removed [23,29,30]. At the end of the reliability analysis of the scale in this study, the Cronbach α coefficient and item-total correlation of the first item "Wear a shirt" was found to be low and therefore unacceptable. The Cronbach α coefficients of the other items were at an acceptable level, however. When the first item on the SPBS was removed, and the Cronbach α was measured, we found that the values of the 8-item revised form of the scale were higher than its 9-item structure.

One of the basic purposes of factor analysis in evaluating scale constructs is to create new constructs based on the correlations between variables. In confirmatory factor analysis, each item comprising the factors is evaluated to see whether its correlation with the factor is adequate or not. Confirmatory factor analysis is at the same time a method of finding a proof of validity that can be used specifically in adapting a scale developed in one culture to another [31].

The SPBS was developed for American adolescents by Maddock et al [14]. In the development of the scale, the sample was randomly divided into two using the split half technique, applying exploratory factor analysis to the first sample and confirmatory factor analysis to the second sample. The exploratory factor analysis using the minimum average partial method revealed a 2-factor structure while the parallel analysis revealed a 3-factor construct. Later in the exploratory factor analysis of the second sample, the 2-factor and 3-factor constructs were compared using confirmatory factor analysis. The results of the confirmatory factor analysis verified the 9-item, 3-factor construct of the scale.

This study evaluated a revised 8-item, and 1-factor and 3-factor constructs of the SPBS. The results of the analysis confirmed the validity of the revised 3-factor model (Figure 1). The GFI coefficients obtained from the analysis indicated a good fit (GFI = 0.975, AGFI = 0.955 and CFI = 0.979, $\chi^2/df = 2.08$ and RMSEA = 0.049) [26,27]. These results confirmed the theoretical 3-factor model in an adolescent population [14,19]. In the light of this data, we assert that the 3-factor construct of the revised 8-item SPBS comprising the subscales of sun avoidance, sunscreen use and hat use, are parallel to that of studies in the literature [14,19].

Reliability

Coefficient α was determined for each scale to provide information on reliability: $\alpha > .60$ reflects modest reliability and $\alpha > .70$ generally reflects good reliability for research purposes [32]. Cronbach α values for the overall SPBS, the sun avoidance, sunscreen use and hat use subscales were .74, .67, 0.88, and .70, respectively, and the item-total correlations were $\geq .26$. The test-retest correlation coefficients were $\geq .51$.

Cronbach α values for the SPBS instrument in previous studies were reported as .78 for the sun avoidance subscale, .92 for the sunscreen use subscale, and .59 for the hat use subscale [14,19]. A 7-item overall SPBS was used with adolescents; internal consistency ($\alpha = .78$) and test-retest reliability ($r = .70$) were found to be good [20]. The nine-item scale was used in a beach community but only two of the subscales (sunscreen use $\alpha = .86$ and sun avoidance $\alpha = .82$) were found to be reliable [12]. Similarly, in the present study, the internal consistency of the overall SPBS ($\alpha = .74$) and the sunscreen use subscale were good ($\alpha = .88$), but the Cronbach α of the sun avoidance subscale ($\alpha = .67$) was found to have slightly lower values than that in previous studies. On the other hand, the Cronbach α of the hat use subscale was good ($\alpha = .70$) in our study. The item-total correlations and test-retest correlations were of acceptable levels [23,24].

To conclude, the best GFI that the SPBS exhibited in this study showed similarity to the findings of Maddock et al [14]. This GFI was achieved by removing an item from the scale, however. The Cronbach α values, item-total correlations, test-retest correlations of the scale and its subscales, as well as the confirmatory factor loadings of the subscales are at an acceptable level and parallel to previous studies [14,19]. In the light of these findings, it can be said that the 8-item, 3-factor structure of the SPBS is a valid and reliable instrument for use in Turkish adolescent populations.

Prevalence of sun protection behaviors among Turkish adolescents

This study found that in the SPBS, girls, younger students, and those at a higher economic status exhibited higher scores than their counterparts; these differences are statistically significant.

The literature reveals studies with adolescents that have shown that ratios of spending more time outdoors and using a hat are higher in boys, but that using sunscreen and exhibiting sun avoidance behavior is at a higher level in girls [16,17,33,34]. Another study on adolescent sun protection behavior reports that girls are more likely to use sunscreen compared to boys and that they have more of a desire to be tanned, while boys display greater percentages of using hats and protective clothing compared to girls [35].

Some studies carried out with adolescents 11–19 years old on their knowledge, attitudes and behavior regarding sun protection showed that the fair-skinned and the older girls in this age group in particular showed higher percentages in the use of solariums and sun protection [16,17,34]. In the present study, results pointed to the fact that female students were more likely to better protect themselves from the sun compared to boys were, and that girls showed sun protection behavior. This result paralleled other studies in the literature [16,17,33,34]. This study found that the younger students exhibited a higher level of sun protection behavior. This result is also parallel to findings in the literature [16,17,33,34,36].

Of the types of sun protection behavior, we found that only using sunscreen had an association with economic status. The literature, however, reports in some studies that there is no association between sun protection behavior and economic status [12]. On the other hand, a study conducted in Turkey with pupils in grades six to eight, particularly in girls, seventh grade students and students from higher income brackets, displayed higher frequencies of taking protective measures and using sunscreen [37]. The present study reveals a positive correlation between using sunscreen and economic status.

Strengths and limitations

The World Health Organization has defined sun protection behaviors as sun avoidance in the middle of the day, staying in the shade in that period, using a minimum 15-factor sunscreen, wearing a hat to protect the head from the sun, walking around dressed and tanning rather than burning. Practicing these types of behavior is of the greatest importance for people at every age in terms of curbing the increase of skin cancers. The importance of the key role nurses may play in health maintenance and improvement programs that help to protect the community from skin cancers has been emphasized [7]. School nurses must take responsibility for protecting children from excessive amounts of ultraviolet radiation at school [38]. School nurses, in particular, are in a prime setting for educating the greatest number of children about sun safety [39].

Although there are many studies on skin cancer and sun protection in the Turkish population, we found that no standard data collection questionnaire has been used, especially to measure the behavior of primary school children. We observed that researchers have devised and used different forms [16,17,37], which make it difficult to compare results from different studies. The greatest strength of this study is that it sets forth the reality that there is in fact an instrument of measurement that has been tested in different populations (14,19) and proved to be a valid and reliable tool for use in the Turkish culture as well.

The second important strength of the study is the size of the sample and the fact that it was brought together using the random cluster sampling method. At the same time, this study is the first to examine the validity of a school-based scale on sun protection behavior in Turkey.

Lastly, the Turkish version of the SPBS will allow nurses to quickly identify adolescent sun protection behavior as the summer season approaches since summer is the time when the rays of the sun are more damaging, and adolescents spend more time outside. Additionally, the health education that nurses provide on the matter of sun protection will enable them make an evaluation of their efforts and assess other sun protection programs.

Although the Turkish version of the SPBS was found to be valid and reliable, this study has certain limitations. Firstly, the psychometric results can only be generalized to 12-15 year-olds in Turkey. Secondly, we used self-reported sun protection data, which may reflect a recall bias or a social desirability bias on the part of the participants.

Conclusions

The Turkish version of the SPBS in its 8-item form with three subscales has been shown to be valid and reliable in adolescent populations. In addition, the scale has been shown to be sensitive to Turkish adolescents. It may be used in interventional studies and as an evaluation tool in sun protection programs.

Conflicts of interest

The authors declare no conflict of interest.

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References

1. Erdmann F, Lortet-Tieulent J, Schüz J, Zeeb H, Greinert R, Breitbart EW, et al. International trends in the incidence of malignant melanoma 1953–2008—Are recent generations at higher or lower risk? Int J Cancer. 2013;132(2):385–400. http://dx.doi.org/10.1002/ijc.27616
2. Gültekin M, Boztaş G. Türkiye Kanser İstatistikleri [Internet]. Cancer statistics in Turkey. Ankara (Turkey): T. C. Sağlık Bakanlığı, Türkiye Halk Sağlığı Kurumu, Kanser Daire Başkanlığı; 2014 [cited 2014 Jan 18]. Available from: http://kanser.gov.tr/Dosya/ca_istatistik/2009kanseraporu.pdf
3. Lazovich DA, Vogel RI, Berwick M, Weinstock MA, Anderson KE, Warshaw EM. Indoor tanning and risk of melanoma: a case-control study in a highly exposed population. Cancer Epidemiol Biomarkers Prev. 2010;19(6):1557–68. http://dx.doi.org/10.1158/1055-9965.EPI-09-1249
4. Veierød MB, Adami HO, Lund E, Armstrong BK, Weiderpass E. Sun and solarium exposure and melanoma risk: effects of age, pigmentary characteristics, and nevi. Cancer Epidemiol Biomarkers Prev. 2010;19(1):111–20. http://dx.doi.org/10.1158/1055-9965.EPI-09-0567
5. Acar Y, Ekici M, Yagan S. Ozon ve ultraviyole radyasyon veri analizi [Internet]. Ozone and ultraviolet radiation data analysis. Ankara (Turkey): T. C. Orman ve Su İşleri Bakanlığı, Meteoroloji Genel Müdürlüğü, Araştırma Dairesi Başkanlığı; 2012 [cited 2014 Jan 1]. Available from: http://www.mgm.gov.tr/FILES/arastirma/ozonuv/OveUveri-analizi.pdf
6. Buller DB, Borland R. Skin cancer prevention for children: a critical review. Health Educ Behav. 1999;26(3):317–43. http://dx.doi.org/10.1177/109019819902600304
7. Saraiya M, Glanz K, Briss PA, Nichols P, White C, Das D, et al. Interventions to prevent skin cancer by reducing exposure to ultraviolet radiation. Am J Prev Med. 2004;27(5):422–66. http://dx.doi.org/10.1016/j.amepre.2004.08.009
8. Hatmaker G. Development of a skin cancer prevention program. J Sch Nurs. 2003;19(2):89–92. http://dx.doi.org/10.1177/10598405030190020501
9. Redding CA, Prochaska JO, Pallonen UE, Rossi JS, Velicer WF, Rossi SR, et al. Transtheoretical individualized multimedia expert systems targeting adolescents' health behaviors. Cogn Behav Pract. 1999;6(2):144–53. http://dx.doi.org/10.1016/S1077-7229(99)80025X
10. Rossi JS, Blais LM, Redding CA, Weinstock MA. Preventing skin cancer through behavior change: implications for interventions. Dermatol Clin. 1995;13(3):613–22.
11. Norman GJ, Adams MA, Calfas KJ, Covin J, Sallis JF, Rossi JS, et al. A randomized trial of a multicomponent intervention for adolescent sun protection behaviors. Arch Pediatr Adolesc Med. 2007;161(2):146–52. http://dx.doi.org/10.1001/archpedi.161.2.146
12. Weinstock MA, Rossi JS, Redding JA, Maddock JE, Cottrill SD. Sun protection behaviors and stages of change for the primary prevention of skin cancers among beachgoers in Southeastern New England. Ann Behav Med. 2000;22(4):286–93. http://dx.doi.org/10.1007/BF02895664
13. Weinstock MA, Rossi JS, Redding CA, Maddock JE. Randomized controlled community trial of the efficacy of a multicomponent stage-matched intervention to increase sun protection among beachgoers. Prev Med. 2002;35(6):584–92. http://dx.doi.org/10.1006/pmed.2002.1114
14. Maddock JE, Rossi JS, Redding CA, Meier KS, Velicer WF, Prochaska JO. Development of transtheoretical model constructs for sun protection behaviors among adolescents. Ann Behav Med. 1998;20(Poster):S208.
15. Türkiye İstatistik Kurumu Haber Bülteni. İstatistiklerle Çocuk, 2013 [Internet]. [The child in statistics, 2013]. Ankara (Turkey): Türkiye İstatistik Kurumu; 2014 [cited 2014 Jan 1]. Issue no.: 16054. Available from: http://www.tuik.gov.tr/PreHaberBultenleri.do?id=16054
16. Dalli D, Ogce F, Okcin FA. Knowledge of the effects of sun exposure of Turkish high school students and their sun bathing habits. Asian Pac J Cancer Prev. 2004;5(4):366–9.
17. Ergul S, Ozeren E. Sun protection behavior and individual risk factors of Turkish primary school students associated with skin cancer: a questionnaire-based study. Asian Pac J Cancer Prev. 2011;12(3):765–70.

18. Sümen A, Öncel S. Deri Kanseri ve Güneşten Korunmaya Yönelik Öğrencilerle İlgili Yapılan Çalışmalar: Literatür İncelemesi [Studies conducted with students about skin cancer and sun protection: a literature review]. Dokuz Eylül Üniversitesi Hemşirelik Yüksekokulu E Dergisi. 2014;7(2):78–91. Turkish.
19. Maddock JE, Redding CA, Rossi JS, Weinstock MA. Development and validation of an appearance motivation attitudes scale for sun protection. Psychol Health. 2005;20(6):775–88. http://dx.doi.org/10.1080/14768320500165944
20. Adams MA, Norman GJ, Hovell MF, Sallis JF, Patrick K. Re-conceptualizing decisional balance in an adolescent sun protection intervention: mediating effects and theoretical interpretations. Health Psychol. 2009;28(2):217. http://dx.doi.org/10.1037/a0012989
21. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. J Clin Epidemiol. 1993;46(12):1417–32.
22. Polit DF, Beck CT. Nursing research: principles and methods. 7th edition. Philadelphia (PA): Lippincott, Williams & Wilkins; 2004.
23. Kline P. A handbook of test construction: introduction to psychometric design. Methuen (MA): Routledge; 1986.
24. Streiner DL, Norman GR. Health measurement scales: a practical guide to their development and use. Oxford (England): Oxford Scholarship Online; 2009. Available from: http://dx.doi.org/10.1093/acprof:oso/9780199231881.001.0001
25. Joreskog KG. Testing structural equation models. In: Bollen JA, Long JS, editors. Testing structural equation models. Newbury Park (CA): Sage; 1993. p. 294–316.
26. Browne MW, Cudeck R. Alternative ways of assessing model fit. In: Bollen KA, Long JS, editors. Testing structural equation models. Newbury Park (CA): Sage; 1993. p. 136–62.
27. Hu LT, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct Equation Modeling Multidisciplinary J. 1999;6(1):1–55. http://dx.doi.org/10.1080/10705519909540118
28. Hooper D, Coughlan J, Mullen M. Structural equation modeling: guidelines for determining model fit. Electron J Business Res Methods. 2008;6(2008):53–60. Available from: www.ejbrm.com
29. Redding CA, Maddock JE, Rossi JS. The sequential approach to measurement of health behavior constructs: issues in selecting and developing measures. Calif J Health Promot. 2006;4(1):83–101.
30. Gözüm S, Aksayan S. A guide for transcultural adaptation of the scale II: psychometric characteristics and cross-cultural comparison. J Res Dev Nurs. 2002;4(2):9–20.
31. Tomarken AJ, Waller NG. Structural equation modeling: strengths, limitations, and misconceptions. Ann Rev Clin Psychol. 2005;1:31–65. http://dx.doi.org/10.1146/annurev.clinpsy.1.102803.144239
32. Nunnally JC. Psychometric theory. New York: McGraw-Hill; 1978.
33. Dusza SW, Halpern AC, Satagopan JM, Oliveria SA, Weinstock MA, Scope A, et al. Prospective study of sunburn and sun behavior patterns during adolescence. Pediatrics. 2012;129(2):309–18. http://dx.doi.org/10.1542/peds.2011-0104
34. Falk M, Anderson CD. Influence of age, gender, educational level and self-estimation of skin type on sun exposure habits and readiness to increase sun protection. Cancer Epidemiol. 2013;37(2):127–32. http://dx.doi.org/10.1016/j.canep.2012.12.006
35. Bränström R, Brandberg Y, Holm L, Sjöberg L, Ullén H. Beliefs, knowledge and attitudes as predictors of sunbathing habits and use of sun protection among Swedish adolescents. Eur J Cancer Prev. 2001;10(4):337–45. http://dx.doi.org/10.1097/00008469-200108000-00007
36. Livingston PM, White VM, Hayman J, Dobbinson S. Sun exposure and sun protection behaviors among Australian adolescents: trends over time. Prev Med. 2003;37(6):577–84. http://dx.doi.org/10.1016/j.ypmed.2003.09.004
37. Uysal A, Özsoy AS, Ergül Ş. Öğrencilerin cilt kanseri risklerinin ve güneş ışınlarından korunmaya yönelik uygulamaların değerlendirilmesi [Evaluating the skin cancer risks and sun-protection practices of students]. Ege Tıp Dergisi. 2004;43(2):95–9. Turkish.
38. Maguire-Eisen M, Rothman K, Demierre MF. The ABCs of sun protection for children. Dermatol Nurs. 2005;17(6):419.
39. Laughlin-Richard N. Sun exposure and skin cancer prevention in children and adolescents. J Sch Nurs. 2000;16(2):20–6.