Decisional Balance and Self-Efficacy for Sun Protection

Measurement Among Turkish Adolescents

Ozcan Aygun ▼ Ayse Ergun

Background: Sun protection is important for skin cancer prevention, but many adolescents do not protect themselves from the sun. Instrumentation derived from the transtheoretical model (TTM) can be used to study the process of change in health behaviors like sun protection.

Objective: The purpose of this study was to translate and adapt TTM-based decisional balance and self-efficacy for sun protection scales from English to Turkish and assess psychometric properties of scores when the scales are used among Turkish adolescents.

Methods: The Decisional Balance Scale (DBS) and the Self-Efficacy Scale (SES) for sun protection were adapted to Turkish culture using translation and back-translation. The scales were administered to a total of 900 adolescents in two Turkish schools. Confirmatory factor analysis was used to assess dimensionality. External validity was evaluated by comparing subscale scores across reported stages of change for sun protection.

Results: Reliability estimates for scores on the DBS Pros and DBS Cons and the SES Sunscreen Use scales were high and SES Hat Use and Sun Avoidance were moderate. The two-factor correlated model for the DBS and the three-factor correlated model for the SES reported in other studies were confirmed. Means increased across the stages of change for sun protection and sunscreen use for the DBS Pros and the SES subscales as predicted by the TTM, but the pattern of DBS Cons means did not.

Discussion: Scores from the Turkish version of the DBS and SES for sun protection were valid, reliable, and appropriate for Turkish culture. The pattern of means for the SES and DBS Pros across the stages of change supported propositions of the TTM. Theoretical inconsistencies in the pattern of DBS Cons scores across the stages of change suggest that greater attention to conceptualization and measurement of the DBS Cons for sun protection and sunscreen use is needed.

Key Words: adolescents • decisional balance • health behavior • self-efficacy • sun protection • Turkey

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In predominately fair-skinned populations, the incidence of skin cancer has steadily increased over the past 50 years. This increase is reported to have leveled off recently in several Northern and Western European countries, Australia, New Zealand, and North America (Erdmann et al., 2013). In Turkey, the estimated incidence rate of skin melanoma for 2004–2006 was 1.5 per million, whereas the rate of other skin cancer types was 23.2 per million. In 2002–2006, nonmelanoma skin cancers were ranked the third most common cancer type. These cancer types were ranked third in men and second in women (The Ministry of Health of Turkey, Department of Cancer Control, 2010).

Approximately 90% of nonmelanoma skin cancers and 65% of melanomas are caused by exposure to ultraviolet (UV) rays (Armstrong & Kricker, 1993). The popularity of getting a tan, particularly the wide interest in this trend among young girls of ages 14–16, 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 UV rays on human health (Lazovich et al., 2010). Parallel to these changing trends in the population, skin cancer risks associated with unprotected exposure to long-term or intermittent or intense sunrays and a history of sunburn in childhood have increased (Veierød, Adami, Lund, Armstrong, & Weiderpass, 2010).

Turkey is in a midlatitude climate zone and therefore exhibits moderate climatic conditions. It is, however, also under the influence of the Mediterranean macroclimate (Gozenc, 1998). Turkey's population is constantly subjected to a high

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level of ambient UV radiation (UVR) throughout the year. In the region of the country's capital Ankara in central Turkey, UV index values range from 8 to 10 in the summer months and from 4 to 6 in the spring; in the period April to September, UV index rises above 4, which is considered to be a baseline for use of sun protection (Acar, Ekici, & Yagan, 2012).

In Turkey, 30% of the population is made up of children aged 0–17 (Turkish Statistical Institute, 2014). Descriptive and cross-sectional studies have revealed that the knowledge, attitudes, and behavior of Turkish individuals, especially children, regarding sun protection are insufficient, and methods of protecting children from the sun are inadequate (Baz et al., 2003; Dalli, Ogce, & Okcin, 2004; Ergul & Özeren, 2011).

Skin cancer prevention programs for adolescents have had successful outcomes in Sweden (Kristjánsson, Helgason, Månson-Brahme, Widlund-Ivarson, & Ullén, 2003) and the United States (Norman et al., 2007). In a review, sun protection educational programs were recommended in adolescence because of benefits in skin cancer protection and their effectiveness in establishing sun protection behavioral changes in adolescents (Buller & Borland, 1999). Another review emphasized the importance of the key role nurses may play in health maintenance and improvement programs that help to protect the community from skin cancers (Saraiya et al., 2004). Because of the position of nurses as a major professional group in health services, nurses are advised to play an active role in school-based skin cancer prevention programs (Hatmaker, 2003). Theory-based models of behavioral change, such as the transtheoretical model (TTM; Prochaska & Velicer, 1997), support design and analysis of programs for health improvement and disease prevention.

The TTM encompasses concepts and sensitive instruments that measure an individual's cognitive and behavioral processes, self-confidence with respect to making a change, perception of the decision to change, and factors that make change difficult. TTM-based instrumentation includes the important temporal dimension, which posits five stages of change. The stages of change reflect an individual's motivation and interest in changing behavior. In the first stage, *precontemplation*, the individual does not regard his or her behavior as a problem and is not planning a change in behavior anytime soon. In the *contemplation* stage, any risky behavior is in fact seen as a problem and the benefits of change are recognized. Even though the individual may not be ready for change as yet, change may be planned for the long term. In the *preparation* stage, the individual is ready for change and usually makes a plan to change within the next month. The action stage refers to the period in which individuals have successfully changed their problem behavior over a period of 6 months. In the *maintenance* stage, individuals have attained a change in their problem behavior in the first 6 months since the change started and are able to maintain that change in behavior indefinitely (Prochaska & Velicer, 1997; Rossi, Blais, Redding, & Weinstock, 1995). In the TTM, the construct of self-efficacy reflects the self-confidence an individual feels in being able to cope with difficult situations without relapsing into former risk-taking habits. High scores on the Self-Efficacy Scale (SES) indicate the degree to which an individual is able to avoid a relapse into old behavior, despite the intense pressure of encouraging circumstances (Velicer, Di Clemente, Rossi, & Prochaska, 1990). Decisional balance reveals how an individual weighs the pros and cons of behavioral change. Pros reflect the positive sides to behavioral change, while cons reflect the obstacles standing in the way of change (Velicer, DiClemente, Prochaska, & Brandenberg, 1985).

The TTM can be used as a framework to identify individuals in the process of behavioral change, plan special interventions for the individual, assess the impact of applied interventions, and plan new interventions (Redding et al., 1999). There is a need in Turkey for valid and reliable instruments that evaluate adolescent behaviors and intentions regarding sun protection. Such tools can be used in planning, setting up, and evaluating sun protection programs.

The purpose of this study was to create and evaluate a cultural adaptation and perform psychometric analyses of the TTM SES and DBS for sun protection. The aims were to (a) translate the TTM decisional balance and self-efficacy for sun protection scales from English to Turkish, (b) assess reliability of scores obtained using the instruments, (c) replicate the factor structures for self-efficacy and decisional balance, (d) report the prevalence of stages of change for sun protection and sunscreen use, and (e) use the stages of change for concurrent validation of decisional balance and self-efficacy subscale scores.

METHODS

Participants, Design, and Procedure

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 because of its proximity to the Black Sea. The study sample comprised students enrolled in a private school (n = 420) and a public school (n = 640)—a total of 1,060 elementary school sixth to eighth grade students. The TTM instruments were administered to a total of 900 adolescents in the spring of 2010, and the participation rate of the sample was 85%. Two weeks after the application, they were administered to 10% (91 individuals) of the sample as a retest.

The authors of the original instruments were contacted for permission to use the instruments. 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.

Variables and Measurement

Stages of Change To identify stages of change with respect to sun protection and sunscreen use, respondents answered four questions about each behavior that were scored using an algorithm proposed by Rossi et al. (1995). (For English and Turkish versions of the questions, see Table, Supplemental Digital Content 1, http://links.lww.com/NRES/A120. The algorithm for scoring item responses is shown in a Table, Supplemental Digital Content 2, http://links.lww.com/NRES/A121.) The sun protection stages were measured by four questions designed to assess the sustainability of the basic behavior patterns of (a) consistently avoiding sun exposure, (b) using a sunscreen with a sun protection factor (SPF) of at least 15, and (c) wearing protective clothing and a hat. These questions were as follows:

1. Do you protect yourself from exposure to the sun consistently, that is, whenever you know you will be out in the sun for more than about 15 minutes?
2. Have you consistently protected yourself from exposure to the sun for the past 12 months?
3. Do you intend to consistently protect yourself from exposure to the sun in the next 12 months?
4. Do you intend to consistently protect yourself from exposure to the sun in the next 30 days?

The sunscreen use stages were measured by four questions designed to assess the sustainability of the intention and behavior of using a sunscreen with an SPF of at least 15. These questions were as follows:

1. Do you use a sunscreen with an SPF of at least 15 consistently, that is, whenever you know you will be out in the sun for more than about 15 minutes?
2. Have you been using sunscreens with an SPF of at least 15 consistently for the past 12 months?
3. Do you intend to use sunscreens with an SPF of at least 15 consistently in the next 12 months?
4. Do you intend to use sunscreens with an SPF of at least 15 consistently in the next 30 days?

The stages of change that determine the level of sun protection behavior and sunscreen use comprise the five stages of precontemplation, contemplation, preparation, action, and maintenance. Both sets of stages of change have been explored in many previous studies and proved valid in terms of the constructs of the TTM, which include sun protection decisional balance and self-efficacy (Hoeppner et al., 2005, 2006; Prochaska et al., 1994).

Decisional Balance The Decisional Balance Scale (DBS) was adapted from the decisional model to the TTM (Velicer et al., 1985), and its eight-item construct has been used in various studies on the perception of pros and cons of sun protection (Prochaska et al., 1994). The DBS is composed of two subscales (pros and cons of sun protection), each measured by four items; each scale is scored separately. The scales use 5-point Likert-type response options (1 = *not important*, 2 = *slightly important*, 3 = *moderately important*, 4 = *very important*, 5 = extremely important) to determine the degree to which respondents are decided about the importance of protecting themselves from the sun. Scores for each subscale can range from 4 to 20. Reliabilities of scale scores using Cronbach's alpha reported in other studies have been good (Pros $\alpha = .78$ and Cons $\alpha = .74–.85$; Maddock et al., 1998; Prochaska et al., 1994). The DBS items are listed in English and Turkish (see Table, Supplemental Digital Content 1, http://links.lww.com/NRES/A120).

Self-Efficacy The SES was adapted to the TTM from the original SES (Velicer et al., 1990) and developed to be used in sun protection (Maddock et al., 1998). The SES is composed of nine questions about reducing sun exposure, using sunscreen, and wearing hats that determine the degree to which respondents are self-confident about sun protection; the Likert-type response options are 1 = *not at all confident*, 2 = *not very confident*, 3 = *moderately confident*, 4 = *very confident*, 5 = *extremely confident*. SES scores can range from 9 to 45. In an adolescent population, the three-factor construct made up of the subscales of sun avoidance, sunscreen use, and hat use was validated (Maddock et al., 1998). Reliabilities for the subscale scores estimated using Cronbach's alpha were at moderate and high levels (sun avoidance $\alpha = .73$, sunscreen use $\alpha = .88$, and hat use $\alpha = .57$; Maddock et al., 1998). The SES items are available in English and Turkish (see Table, Supplemental Digital Content 1,http://links.lww.com/NRES/A120).

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Instrument Adaptation: Turkish Language

Adaptation of the TTM-based instrumentation for sun protection into the Turkish language was performed in a series of steps (Guillemin, Bombardier, & Beaton, 1993; Jones, Mallinson, Phillips, & Kang, 2006). Step 1 entailed translation of the original into Turkish by a health professional and a professional translator who were fluent in both languages. Step 2 entailed reconciliation of inconsistencies between the translations of the translators. Step 3 entailed translation of the Turkish version back into the original language by a health professional and 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, done by three experts who gave the instruments its final form. In Step 5, the instruments were given a pilot test run with 20 subjects whose characteristics were similar to those of the study group. After the pilot test, parts of the instruments 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 forms 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 on a scale of 1–4, such that 1 = *unsatisfactory*, 4 = very satisfactory. For the content to be 80% satisfactory in terms of validity (Lynn, 1986; Polit & Beck, 2004), the experts had the cultural equivalence of the English and Turkish instruments tested among 60 Turkish primary school students in the province of Sakarya/Turkey.

Data Analysis Plan

Reliability Cronbach's alpha coefficients, item–total correlations, and test–retest correlations of scores on the TTM instruments (Turkish versions) were examined in the reliability analysis. Values of ≥.70 for the Cronbach's alpha coefficient, >.25 for the corrected item–total correlations, and >.40 for the test–retest correlations for 2 weeks were used to indicate acceptable levels for the scores (Streiner & Norman, 2008).

Confirmatory Factor Analysis Measurement models were estimated using confirmatory factor analysis in a model selection framework (Jöreskog, 1993). The maximum likelihood estimator implemented in the AMOS v. 18.0 for Windows program was used. Various indices were used in the evaluation of the alternative models (Bentler, 1990; Browne & Cudeck, 1993; Hu & Bentler, 1999), including root mean square error of approximation with values of <.05 considered as good fit, between .05 and .08 as adequate fit, from .08 to .10 as a mediocre fit, and > .10 as not acceptable; the chi-square test statistic; absolute fit indexed by the standardized root mean square residual, where values up to .05 or .08 are deemed acceptable; and the comparative fit index with values of >.90 or .95 regarded as acceptable or good, respectively.

External Validity Differences in DBS and SES subscale scores across stages of change were evaluated using multivariate analysis of variance (MANOVA). Post hoc follow-up tests included analyses of variance (ANOVA) and Tukey's tests. Item values on the scales were first aggregated via unit weighting and converted to t scores (M = 50, SD = 10). In addition, the standardized t-score values of the scales in the stages of change were examined.

RESULTS

A total of 900 students took part in the study. Characteristics of participants are listed in Table 1. The mean age of the students participating in the research was 13.06 (SD = 0.85) and 43.9% were girls. Of the students, 65.2% reported that their family's economic situation was good. Self-reports of skin characteristics were variable; 27.3% indicated that they had sensitive skin, whereas 48.4% said their skin was normal and 24.3% reported having dark skin.

TABLE 1. Sample Description

Characteristic	*n*	%
Grade		
6	295	32.8
7	325	36.1
8	280	31.1
Age (years)		
12	273	30.3
13	324	36.0
14–15	303	33.7
Gender (female)	395	43.9
Economic status		
Low–medium	202	22.4
Good	587	65.2
Extremly good	111	12.4
Hair color		
Red-yellow	110	12.2
Light brown	207	23.0
Brown-balck	583	64.8
Eye color		
Blue-green	145	16.1
Light brown	136	15.1
Brown-black	619	68.8
Skin color		
Light	348	38.6
Brown-wheat	398	44.2
Dark	154	17.1
Skin type		
Sensitive	245	27.3
Moderate	436	48.4
Dark	219	24.3

Note. N = 900.

Translation

The Turkish DBS and SES were created with the completion of the content validity and cultural adaptation steps: (a) examination of the original English, Turkish, and back-translation of the DBS and SES by an expert panel; (b) pretesting of the Turkish translation on a monolingual target language sample; and (c) testing the original English and the Turkish DBS and SES on a bilingual sample. During cultural adaptation, expression "midday hours" was defined as "between 10 and 16 hours" in the SES Item 5. No items or words were found to be incomprehensible during the cultural adaptation. The Kendal's W analysis results showed that there were no significant differences between the opinions of the experts as related to the DBS (Kendall's W = .064, p = .72) or the SES (Kendall's W = .050, p = .85).

Reliability

Cronbach's alpha coefficients for the DBS Pros and Cons subscales in the 900-person sample were $\alpha > .70$, corrected item–total score correlations were ≥.26, and the test–retest

TABLE 2. Alternate Measurement Models: Decisional Balance Scale for Sun Protection

Model	χ^2	*df*	*p*	χ^2/df	AIC	CFI	SRMR	RMSEA [95% CI]
Null	2,094.68	28	<.001	74.81	2,094.67			
One factor	615.93	20	<.001	30.79	647.93	.712	.10	.182 [.17, .20]
Two factors, uncorrelated	242.52	20	<.001	12.12	242.14	.892	.16	.111 [.10, .12]
Two factors, correlated	106.88	19	<.001	5.62	140.88	.957	.05	.072 [.06, .09]

Note. AIC = Akaike information criterion; CFI = comparative fit index; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation.

correlation coefficients were ≥.50. The SES Sun Avoidance, Sunscreen Use, and Hat Use subscale reliabilities were α = .65, α = .84, and α = .69, respectively, and corrected item–total correlations were ≥.43. The test–retest correlation coefficients were ≥.48. The unadjusted means and standard deviations, the Cronbach's alpha coefficients, the item–total score correlations, and the test–retest analyses are given in the Table in Supplemental Digital Content 3, http://links.lww.com/NRES/A122.

Confirmatory Factor Analysis

Correlations Correlation matrices for the decisional balance and self-efficacy items were analyzed separately. Correlations, means, and standard deviations are shown in Table, Supplemental Digital Content 4, http://links.lww.com/NRES/A123.

Decisional Balance Measurement Model Confirmatory factor analysis was used to determine whether the two-factor theoretical model of the DBS (Pros and Cons) was valid in the Turkish version. Four competing measurement models were compared for the eight-item decisional balance measures: null model, one-factor model, two-factor uncorrelated model, and two-factor correlated model. Results are summarized in Table 2. Fit of the the one-factor model and two-factor uncorrelated model was not acceptable. The two-factor correlated model was best-fitting and performed best in model comparison. The chi-square

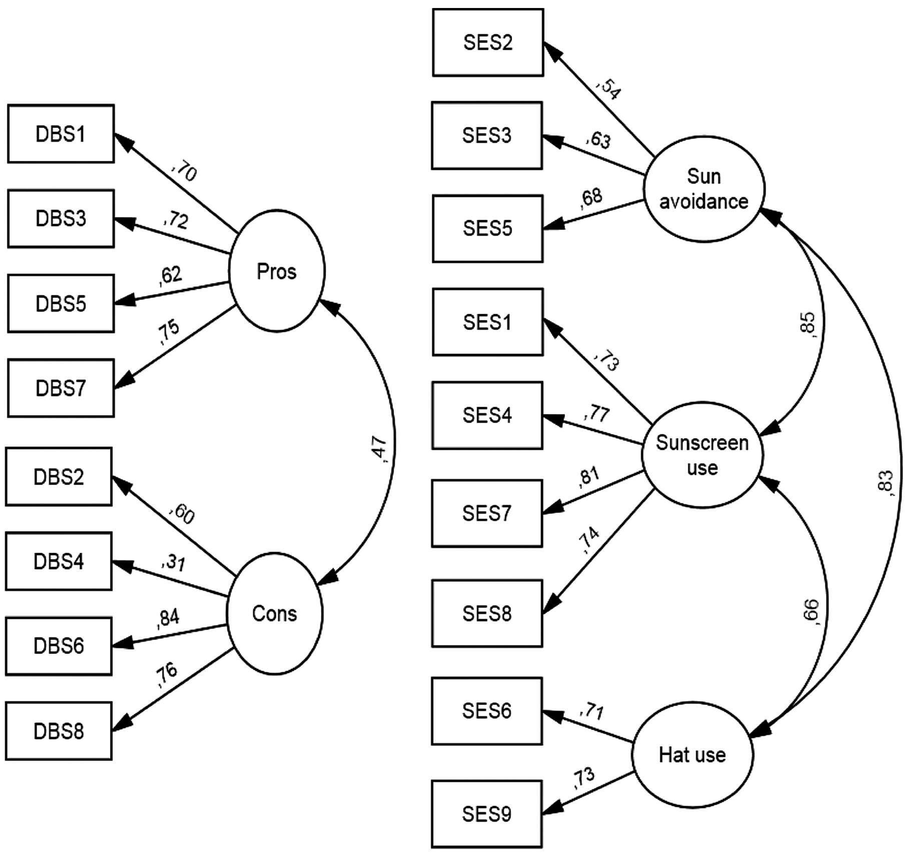

FIGURE 1. Measurement models for items from the Decisional Balance Scale (left) and Self-Efficacy Scale (right) for sun protection (Turkish version). (Item content is listed in Table, Supplemental Digital Content 1, http://links.lww.com/NRES/A120).

TABLE 3. Alternative Measurement Models: Self-Efficacy for Sun Protection

Model	χ^2	*df*	*p*	χ^2/*df*	AIC	CFI	SRMR	RMSEA [95% CI]
Null	3,043.10	36	<.001	84.53	3,043.10			
One factor	287.10	27	<.001	10.63	323.10	.914	.05	.104 [.09, .12]
Three factors, uncorrelated	138.73	27	<.001	5.13	174.07	.963	.03	.068 [.06, .08]
Three factors, correlated	91.88	24	<.001	3.82	133.88	.979	.02	.056 [.04, .07]

Note. AIC = Akaike information criterion; CFI = comparative fit index; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation.

difference test (two-factor uncorrelated to two-factor correlated models) was significant, indicating that the two-factor correlated model was a better representation of the data. The measurement model for responses to the eight decisional balance items is pictured in Figure 1. Standardized regression weights of factors on items (factor loadings) were high (≥.50) except for Item 4 (*Getting a tan makes me feel good*), which was .31. The correlation between the pros and cons factors was .47. Cronbach's alpha coefficients were .78 for the pros scale and .71 for the cons scale. These are reasonable given that there were only four items per scale. The unadjusted means and standard deviations are presented in the Table in Supplemental Digital Content 3, http://links.lww.com/NRES/A122.

Self-Efficacy Measurement Model To determine whether the three-factor theoretical model of the SES was valid in the Turkish version, correlations among item responses were modeled using confirmatory factor analysis for the sample ($n = 900$). Four competing measurement models were compared for the nine-item self-efficacy measures, as presented in Table 3.

The one-factor model did not fit well. Both the three-factor uncorrelated model and the three-factor correlated model had good fit, but the chi-square difference test was significant (χ^2 = 46.18, $df = 1$, $p < .001$), indicating that the three-factor correlated model was a better representation of the data. The SES items have high standardized regression loadings within their respective factors (≥.50). Correlations among the factors were in the range of .66–.85. This model is presented in Figure 1. The Cronbach's alpha coefficients were good: overall self-efficacy (α = 86) and sunscreen use (α = 84). However, Cronbach's alpha coeffiecients were moderate: sun avoidance (α = .65) and hat

TABLE 4. Decisional Balance and Self-Efficacy by Sun Protection Stages of Change

			Stages of change						Approximate *F* test			
Behavior	**Scale**	**Statistic**	**PC**	**C**	**P**	**A**	**M**	**Wilks' λ**	***F***	***df***	***p***	η^2
Sun protection		*n*	459	45	125	186	85					
	SES sun avoidance	*M*	7.20	8.91	8.62	9.15	10.48	.843	13.0	(12, 2362)	<.001	.055
		SD	3.02	2.85	2.69	3.07	2.78					
	SES sunscreen use	*M*	9.89	11.28	12.27	12.65	14.51					
		SD	4.43	4.06	4.13	4.32	4.18					
	SES hat use	*M*	5.12	6.57	5.85	6.12	6.70					
		SD	2.50	2.21	2.24	2.27	2.33					
	DBS Pros	*M*	11.93	13.57	14.61	13.77	15.88	.889	13.6	(8, 1788)	<.001	.057
		SD	4.29	3.69	3.49	4.25	3.18					
	DBS Cons	*M*	10.56	10.82	10.85	11.02	11.04					
		SD	4.33	3.88	3.97	4.24	4.00					
Sunscreen use		*n*	529	60	105	111	95					
	SES sun avoidance	*M*	7.51	8.56	9.36	8.89	9.68	.784	18.9	(12, 2362)	<.001	.078
		SD	3.12	2.88	2.82	2.83	3.17					
	SES sunscreen use	*M*	9.73	11.20	13.26	13.60	15.22					
		SD	4.24	3.15	3.97	4.19	4.06					
	SES hat use	*M*	5.31	5.56	6.59	5.57	6.63					
		SD	2.48	2.36	2.37	2.32	2.18					
	DBS Pros	*M*	11.93	13.95	15.47	14.72	14.92	.871	15.9	(8, 1788)	<.001	.067
		SD	4.29	3.60	3.45	3.74	3.55					
	DBS Cons	*M*	10.35	11.50	10.65	11.54	11.73					
		SD	4.23	3.87	4.07	4.26	4.12					

Note. *N* = 900. PC = precontemplation; C = contemplation; P = preparation; A = action; M = maintenance; SES = Self-Efficacy Scale; DBS = Decisional Balance Scale.

use (α = .69). The unadjusted means and standard deviations are presented in Table, Supplemental Digital Content 3, http://links.lww.com/NRES/A122.

Stages of Change

The students in the research were found to be in the following stages of change in terms of sun protection behavior: 51% (n = 459) were in the precontemplation stage, 5% (n = 45) in the contemplation stage, 13.9% (n = 125) in the preparation stage, 20.7% (n = 186) in the action stage, and 9.4% (n = 85) in the maintenance change. In terms of the sunscreen use stages of change, the percentages were 58.8% (n = 529) in the precontemplation stage, 6.6% (n = 60) in the contemplation stage, 11.7% (n = 105) in the preparation stage, 12.3% (n = 111) in the action stage, and 10.6% (n = 95) in the maintenance stage.

External Validity

Mean scores for the two DBS and three SES scales are presented in Table 4 by stages of change for sun protection behavior and sunscreen use. Descriptively, mean scores for the perception of DBS Pros, SES total, and its sun avoidance, sunscreen use, and hat use subscales were the lowest in the precontemplation stage and the highest in the maintenance stage. Scores for the DBS Cons were higher in the maintenance stage than in the precontemplation stage for sunscreen use.

MANOVA was performed to determine if the DBS Pros and DBS Cons and the three SES subscales of sun avoidance, sunscreen use, and hat use were different across stages of change for sun protection and sunscreen as predicted by the TTM. No violations of the assumptions for MANOVA were detected. Stages of change served as the independent variables, whereas the DBS Pros, the DBS Cons, and the three subscales of SES were dependent measures. Statistical results are shown in Table 4. The four MANOVAs resulted in significant main effects for both the sun protection and the sunscreen stages of change for both the DBS scales and the SES scales. Follow-up ANOVAs were performed on each of the dependent variables, after which Tukey's tests were used as a follow-up test for significant results (Table 5). Average DBS Cons scores were constant across sun protection stages of change; the SES subscale scores and DBS Pros scores varied across sun protection stages of change as predicted by the TTM, but significant increases occurred at different stages of change. Average DBS Pros and all three SES scores varied across sunscreen use changes as predicted by the TTM, but significant increases again occurred at different stages of change. The trend in average DBS Cons scores was also significant, but contrary to the pattern predicted by the TTM (i.e., average scores increased over the stages of change). To more clearly determine the correlation between the stages of change and the scales, the t-score values (M = 50, SD = 10) for the scales and their subscales in the sun protection stages of change were examined; these are presented in Figure 2.

DISCUSSION

The present study evaluated Turkish translations of the DBS Pros and Cons subscales and SES Sun Avoidance, Sunscreen Use, and Hat Use subscales and their associations with the TTM stages of change for sun protection and sunscreen use. The eight-item, two-factor form of the DBS and the nine-item, three-factor form of the SES and its subscales displayed acceptable reliabilities using Cronbach's alpha, corrected item–total correlations, and consistency over retesting at 2 weeks. Moreover, it was found that over the self-reported stages of change, the DBS Pros subscale and the SES subscales did not contradict predictions of the TTM but followed them only somewhat because means did not increase at every stage. However, the DBS Cons subscale did not follow the predicted pattern across the stages of change for sun protection. These results indicate that the sun protection and sunscreen stages of change are interpretable based on the TTM. The DBS and

TABLE 5. Effect Sizes: Stages of Change and Decisional Balance and Self-Efficacy of Sun Protection

Behavior	Scale	F	df	p	η^2	Tukey's pattern[a]
Sun protection	SES sun avoidance	31.67	12, 2362	<.001	.124	PC<C=P=A=M
	SES sunscreen use	29.87	12, 2362	<.001	.118	PC=C=P=A<M
	SES hat use	13.42	12, 2362	<.001	.057	PC<C=P=A=M
	DBS Pros	25.16	8, 1788	<.001	.101	PC=C=P=A<M
	DBS Cons	0.53	8, 1788	.71	.002	
Sunscreen use	SES sun avoidance	17.82	12, 2362	<.005	.074	PC=C=P=A<M
	SES sunscreen use	54.89	12. 2362	<.005	.197	PC=C<P=A<M
	SES hat use	10.47	12, 2362	<.005	.045	PC=C=P<A<M
	DBS Pros	30.33	8, 1788	<.005	.119	PC<C=P=A=M
	DBS Cons	3.95	8, 1788	<.005	.017	PC=C=P=A<M[b]

Note. N = 900. DBS = Decisional Balance Scale; SES = Self-Efficacy Scale; PC = precontemplation; C = contemplation; P = preparation; A = action; M = maintenance. [a]Significance was determined using nominal values of $p < .05$. [b]Pattern is contrary to the prediction of the TTM.

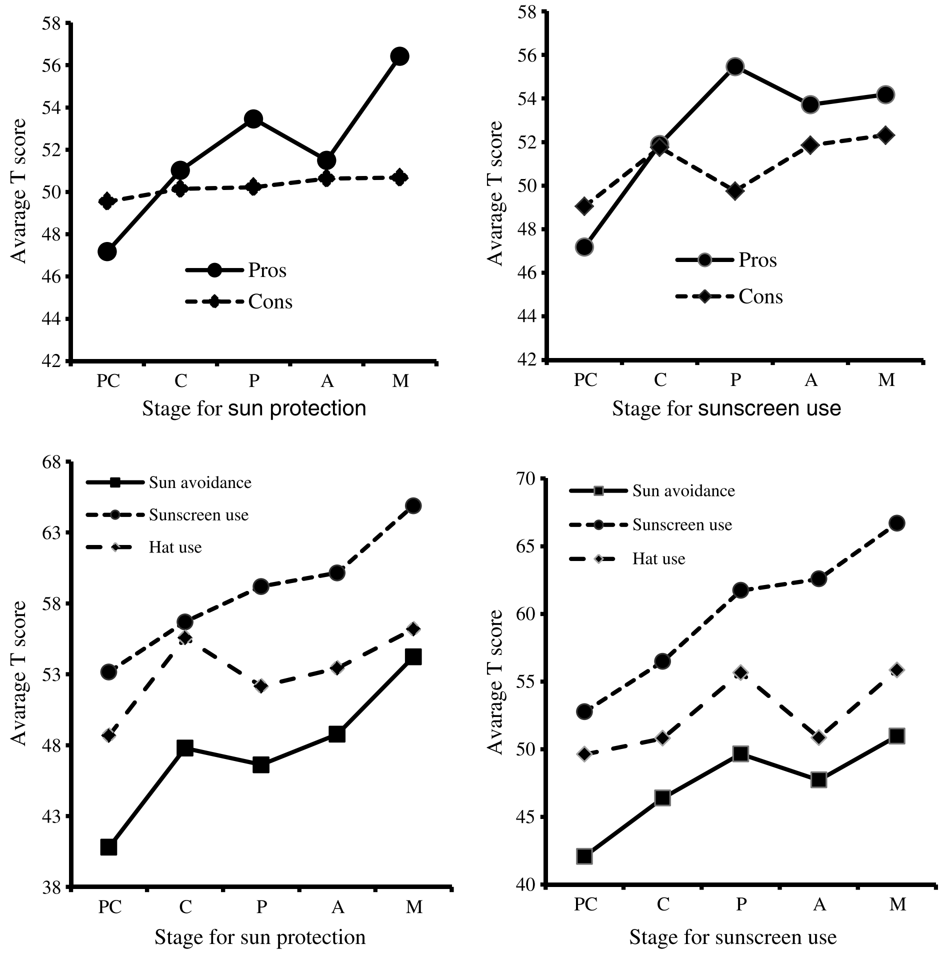

FIGURE 2. Pros, cons, and self-efficacy subscales *t*-score values for sun protection and sunscreen use stages of change. PC = precontemplation; C = contemplation; P = preparation; A = action; M = maintenance.

SES are valid and reliable tools that can be employed in the Turkish adolescent population to study sun protection and sunscreen use.

Reliability

Coefficient alpha was determined for scores on each subscale to provide information on reliability: $\alpha > .60$ reflects modest reliability and $\alpha > .70$ is generally considered to reflect good reliability for research purposes (Nunnally, 1978). In this study, Cronbach's alpha coefficient for the DBS Pros and DBS Cons was calculated to be $\alpha > .70$, corrected item–total score correlations were ≥.26, and the test–retest correlation coefficients were ≥.50. In previous studies, Cronbach's alpha coefficients for DBS Pros were found to be .78 and .81; for DBS Cons, scores were found to be respectively .74 and .85 (Maddock et al., 1998; Maddock, Redding, Rossi, & Weinstock, 2005). The Cronbach's alpha coefficients for DBS scores can be defined as good for the DBS Pros and Cons scores in the present study. The result is similar to what was found in previous studies (Hoeppner et al., 2006; Prochaska et al., 1994).

Cronbach's alpha values for the SES Sun Avoidance, Sunscreen Use, and Hat Use scores were $\alpha = .65$, $\alpha = .84$, $\alpha = .69$, respectively, and the corrected item–total correlations were ≥.43. The test–retest correlation coefficients were ≥.48. Cronbach's alpha values for scores on the self-efficacy subscales in previous studies were reported as .79 for sun avoidance, .88 for sunscreen use, and .57 for hat use (Maddock et al., 1998). Similarly in the present study, the Cronbach's alpha for sunscreen use scores was good, but Cronbach's alpha for hat use scores was at a moderate level. Cronbach's alpha for sun avoidance scores was found to have slightly lower values than in previous studies but was still moderate. The corrected item–total coefficients and test–retest correlations were of acceptable levels (Streiner & Norman, 2008).

Confirmatory Factor Analysis

One of the basic purposes of factor analysis in evaluating scale constructs is to create new constructs based on the correlations between variables. In the confirmatory factor analysis, each item composing a factor is evaluated to understand whether the correlation with the factor is adequate. 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 (Byrne, 2001; Tomarken & Waller, 2005).

In this study, the results of the confirmatory factor analysis performed on responses to the DBS items established that the goodness-of-fit coefficients for the two-factor correlated model were adequate. This result confirmed the theoretical two-factor correlated decisional balance model defined as pros and cons in many TTM studies in adult populations (e. g., Hoeppner et al., 2005; Prochaska et al., 1994). Hoeppner et al. (2006) and Maddock et al. (1998) implemented the DBS in an adolescent population. In these studies, the two-factor construct of the pros and cons of sun protection were validated. Adams, Norman, Hovell, Sallis, and Patrick (2009) conducted a confirmatory factor analysis that was specified for the two-factor measurement structure of decisional balance varied for adolescents.

In the SES, the single and three-dimensional constructs (sun avoidance, sunscreen use, hat use) emerging from the confirmatory factor analysis were tested. While the goodness-of-fit coefficients of the single-dimensional construct of the scale remained below the borders of acceptable levels, three-factor uncorrelated and three-factor correlated models were an adequate fit. The general goodness-of-fit coefficients of the theoretically recommended three-factor correlated model expressed a good fit better than the three-factor uncorrelated model. These results confirmed the theoretical three-factor model in an adolescent population (Maddock et al., 1998). In addition, Hoeppner et al. (2006) confirmed the two-factor structure of SES and found the values .78 and .90 for the Cronbach's alphas of the subscales sun avoidance and sunscreen use, respectively, in an adolescent population.

In the light of these data, it can be said that the two-factor construct of the eight-item DBS comprising perceptions of pros and cons and the three-factor construct of the nine-item SES comprising the subscales of sun avoidance, sunscreen use, and hat use are parallel to studies in the literature (Hoeppner et al., 2005, 2006; Maddock et al., 1998; Prochaska et al., 1994).

External Validity

The percentages of students in the study who were in the stages of change are similar to those in studies conducted with Swedish adolescents in a beach community (Kristjánsson, Bränström, Ullén, & Helgason, 2003; Weinstock, Rossi, Redding, Maddock, & Cottrill, 2000).

The interpretation of the effect size of the scales in the stages of change is based on the descriptive eta-square suggested by Cohen's (1988). Accordingly, about 1% of the variance was interpreted as representing a slight effect, 6% a medium effect, and 14% or more a large effect (Cohen, 1988). As sun protection and sunscreen use progress through the stages of change in the TTM, mean scores on the SES and DBS Pros increase (although not at every stage). In the stages of change of sun protection, the SES Sun Avoidance, Sunscreen Use, and Hat Use subscales and DBS Pros exhibited a moderate effect. In the stages of change of the sunscreen use, the SES sunscreen use subscale showed a large effect. In the SES subscales of sun avoidance and hat use and in the DBS Pros, the effect was moderate.

Plummer et al. (2001) conducted a study with college students on smoking, and Rossi et al. (2001) conducted a study with college students trying to reduce their dietary fat intake; both found that the mean scores on the SES and DBS Pros indicated the lowest scores in the precontemplation stage of the stages of change and the highest scores in the action and maintenance stages. The DBS for smoking prevention was successfully developed for a Bulgarian sample, where the relationship of the DBS with the stages of change was examined. Consistent with theoretical predictions, the DBS Pros of staying smoke free increased and the DBS Cons decreased from precontemplation to action/maintenance (Anatchkova, Redding, & Rossi, 2006). Furthermore, the results of a study that probed the associations between the scales and the stages of change regarding sunscreen use were similar to those in the studies on diet and smoking (Rapley & Coulson, 2005).

The sun protection SES's indicating low scores in the precontemplation stage of the Pros, high scores in the maintenance stage, and the Cons showing high scores in the precontemplation stage, while indicating low scores in the maintenance stage, are all consistent with the TTM (Prochaska & Velicer, 1997; Velicer et al., 1985). Hoeppner et al. (2006) implemented the DBS in an adolescent population. In this study, although the pros of sun protection showed an increase over the stages of change, it was not seen significant that the perception of cons decreased. In addition, the scores of the SES subscales increased throughout the stages of change. In the present study, the pros and the SES subscale scores increased with the progress of the stages as expected, but the cons, although expected to decrease, did not change and even increased. It can be said, based on these data, that the DBS Pros and the SES subscales fit the TTM but the DBS Cons do not fit the TTM.

Conclusions

TTM-based instrumentation for measuring decisional balance, self-efficacy for change, and stages of change for sun protection and sunscreen use were successfully translated into Turkish, and responses showed dimensional structures similar to those reported in other studies. DBS Pros and the SES subscales were associated with stages of change consistent with predictions of the TTM and have promise for use in interventional studies and for comparison of findings based on other languages. Theoretical inconsistencies in the pattern of DBS Cons scores across the stages of change suggest that greater attention to conceptualization and measurement of the DBS Cons for sun protection and sunscreen use is needed.

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