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The Impact of Sun Protection Program on the Sun Protection Behavior of Adolescents

Güneşten Korunma Programının Adölesanların Güneşten Korunma Davranışlarına Etkisi

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ABSTRACT

Background: The incidence of skin cancers is steadily increasing. In particular, because children and adolescents tend to be outdoors during the hours of most intensive sunlight, schools play an important role in establishing sun protection behavior among students.

Purpose: The aim of this research was to investigate the effect of a Sun Protection Program (SPP) on the sun protection behavior of Turkish adolescents.

Methods: This study was designed as pre-/posttest control group semi-experimental research. The research was carried out with 147 adolescents from years 12-15 in two schools. One of the schools was randomly designated as the intervention group of students and the other represented the control group. The study samples included 76 students in the intervention group and 71 students in the control group. Covariants were calculated in the pre-test scores and covariance analysis performed to evaluate the impact of the intervention on both groups. The SPP formed the basis for the program and consisted of 6 posters, a 12-page student handbook, 4 puzzles, educational videos, and a UV-sensitive Frisbee game.

Results: The intervention group's sunscreen use and sun avoidance stages, and self-efficacy mean scores was significantly higher than those of the control group after the implementation of the SPP ($p<.001$). In addition, the increase in the scores on the posttest as compared to the baseline in the sunscreen stage as well as in the pros scores was found to be significant in the intervention group but not in the control group ($p<.05$).

Conclusion: The study showed that a school-based SPP was effective in the short term in achieving progress in the Transtheoretical Model (TTM) sunscreen use stages, perceiving pros and in sun avoidance, sunscreen and hat use self-efficacy, meaning that the program may be used in schools to increase sun protection behavior. School-based, nurse-led, short-term studies encompassing group interventions are successful in developing sun protection attitudes and will be useful in the future in the context of school nursing activities.

Keywords: Adolescent, Skin cancer prevention, Sun exposure, Sun protection, Transtheoretical model

ÖZ

Amaç: Bu araştırmanın amacı, Güneş Koruma Programı'nın (GKP) Türk ergenlerin güneşten koruma davranışlarına etkisini araştırmaktır.

Yöntemler: Bu çalışma, ön-test / son test kontrol gruplu yarı-deneysel araştırma olarak tasarlanmıştır. Araştırma, iki okulda 12-15 yaş arası 147 adölesan ile yürütülmüştür. Okullardan biri rastgele yöntemle girişim grubu, diğeri ise kontrol grubu olarak belirlenmiştir. GKP 6 adet poster, 12 sayfalık bir öğrenci el kitabı, 4 adet bulmaca, eğitim videosu ve UV'ye duyarlı Frizbi gibi girişim materyallerinden oluşmaktadır. Çalışmada girişimin etkisini ölçmek için ön test puanları kovaryet olarak alınarak ve kovaryans analizi yapılmıştır.

Bulgular: GKP uygulandıktan sonra girişim grubunun güneş koruyucu kullanma ve güneşten kaçınma aşamaları ile öz-yeterlik puan ortalamaları kontrol grubununkinden anlamlı derecede yüksekti ($p <.001$). Ek olarak, girişim grubunun ön test puanlarına göre son testte güneş kremi kullanma değişim aşamaları ve yarar algısında anlamlı artış saptanırken ($p<.05$), kontrol grubundaki puan değişimlerinde anlamlı farklılık saptanmadı ($p>.05$).

Sonuç: Çalışma, okul temelli GKP'nin, Transteoretik model güneş kremi kullanma değişim aşamalarının ilerlemesinde, güneşten korunma yarar algısı, güneşten kaçınma, güneş kremi ve şapka kullanma öz yeterliliklerinin artışında kısa vadede etkili ve öğrencilerin güneşten koruma davranışını artırmak için okullarda kullanılabilir olduğunu ortaya koymaktadır. Okul temelli girişimleri içeren, hemşire liderli, kısa vadeli olan bu çalışma, öğrencilerin güneşten koruma davranışlarının geliştirilmesinde başarılıdır ve gelecekte okul hemşireliği faaliyetlerinde kullanılabilir.

Anahtar Kelimeler: Adölesan, deri kanserinden korunma, güneşe maruziyet, güneş koruma, transteoretik model

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INTRODUCTION

The incidence of skin cancers has been constantly increasing over the past decades (1). Studies have reported that sun avoidance and using sunscreen behaviors are effective for skin cancer protection (2, 3). Especially as a result of the thinning of the ozone layer, higher quantities of ultraviolet radiation are reaching the earth, leading to an increase in skin cancers throughout the world. Every year around the world, 2-3 million non-melanomas and 132,000 melanomas are reported and approximately 80.000 related deaths occur (1).

In Turkey in 2012, cancer rates, standardized according to age, were 277.7 per 100.000 in men and 188.2 per 100.000 in women. Among the 10 most common types of cancer, skin cancers occupy third place with an incidence of 29.2 per 100.000 in men, and also third place with an incidence of 19.1 per 100.000 in women (4).

Although everyone carries a risk of skin cancer, the condition is more of a risk for light-skinned, red-haired individuals with large moles and splotches who have been overly exposed to sun and who have experienced sunburn in childhood (5). Since children and adolescents tend to be outdoors during the hours of most intensive sunlight, schools play an important role in establishing sun protection behavior among students (6, 7).

In many epidemiological studies, sun education programs are proposed for children because of their gains in terms of skin cancer protection and their effectiveness in establishing sun protection behavior changes in children (8-10).

The World Health Organization stresses the importance of adopting nursing practices that contribute to the protection and improvement of public health. In addition, several studies in the literature report that nurses, a major professional group providing health care services, take active roles in skin cancer prevention programs at the schools. Nurses can take on the roles of case finder, advocate and educator in the prevention of extreme exposure to ultraviolet radiation. Nurses can determine the genetic risk factors involved in skin cancer as well as follow up on cases of primary skin cancer (11-13). In doing this, nurses have the capability of benefiting from certain models of behavior change in programs for health promotion and early disease-protection.

One of these models, the transtheoretical model (TTM), asserts that effecting a change in behavior is a process rather than a result and that facilitating change requires an individual to undertake initiatives that are appropriate to the particular stage change. TTM's stages of change is made up of five stages that reflect motivation and interest in changing that individual's behavior (14-16). In the *Precontemplation* (Not ready) stage, the individual is not actually thinking of changing in the next six months and is very little or not at all aware of the existence of any problems. The individual's family and friends, however, are aware of the problems and this exerts pressure on the individual and the change is perceived as a threat. At this stage, individuals may have tried to change many times in the past but have met with failure. They are therefore resistant to change, are not easily motivated or not ready for any program of health improvement. Health improvement programs that are widely popular cannot meet the needs of an individual at this stage (14-16). At the *Contemplation (Getting ready)* stage, people begin to think of changing their behavior in the next six months. They have become aware of a problem and think about solving it and contemplate methods of doing this. They cannot act upon this thought however. Because of the indecision and conflicting thoughts about the pros and cons of the change, this is a stage where individuals may linger for some time. This stage is described as a time of chronic contemplation, delaying action, or procrastination (14-16). The *Preparation (Ready)* stage is the period in which the individual intends to act upon the thought in the next month and is aware of having gone through some unsuccessful trials. The individual consequently makes plans to attend courses, seek counseling, talk to healthcare professionals, research the problem and try to change. Related actions, however, are irregular and ineffective (14-16). In the *Action* stage, individuals have successfully affected change in their problematic behavior in the last 1-6 months. In this stage, individuals try to cope with their problems by changing their behavior, experiences or surroundings (14-16). The last stage, *Maintenance,* starts from the first six months after the change and continues indefinitely. This stage is a period in which individuals try to prevent falling back into their risky behavior and to reinforce the achievements they gained during their time of action. They are less affected by stimuli that encourage their previous problematic behavior and proceed with self-confidence to continue maintaining the change (14-16). The *Self-Efficacy Scale* reflects the self-confidence an individual has about not falling back into risky behavior when faced with having to cope with a challenging situation. The higher scores on the self-efficacy scale indicate an individual's self-confidence and power to resist despite intense incentives to resort to previous behavior. It would be expected that self-efficacy scores are the highest in the maintenance stage (14-16). The *Decision-Balance Scale* sets forth the pros and cons of changing a behavior. Pros refer to the positive aspects of changing a behavior; cons refer to the barriers to change. An increase in pro perception supports change whereas a rise in a con perception results in the individual's becoming stuck in the contemplation and preparation stages for a long time (14-16).

With these characteristics, the TTM can be used as a framework to identify individuals in the process of behavioral change, to plan special nursing interventions for the individual, to assess the impact of applied interventions, and to plan new interventions (17, 18). The model has been used and found to be effective in promoting sun protection behavior (19-23).

In the majority of studies in the literature on sun protection, study subjects have been elementary and middle school pupils, and research has looked into students' knowledge, attitudes and behavior with respect to skin cancer, the damage inflicted by the rays of the sun and sun protection practices, and it has examined their habits regarding use of the solarium (24-28). It can be seen that these experimental studies have included interventions in which various educational programs are offered to encourage the habit-forming behavior of wearing a hat, using a sunscreen and standing in the shade at school, and curriculums have been enriched with topics related to sun protection and skin cancer prevention. It has been found in studies that sun protection practices and activities taught especially in the primary schools contribute positively to students' adoption of sun protection behaviors (24, 25, 28).

The main objective of the present study was to determine the impact of a Sun Protection Program (SPP) on the sun protection behavior of adolescents. Toward this end, the specific targets of the research

were to determine whether: (1) the intervention group reached the stages of sun protection and sunscreen use earlier than the control group; (2) the *pro* scores of the intervention group were higher than those of the control group, the *con* scores of the intervention group were lower than those of the control group; (3) the sun avoidance, sunscreen and hat use mean scores on the *self-efficacy* scale of the intervention group were higher than those of the control group.

Methods

Design, sample and procedure

The study was carried out with 147 12-15 years-old adolescents in two private schools in Sakarya during the year 2012. The schools were in the same district and the socioeconomic demographics of the students were similar. That the students of the intervention and control groups were in different schools was one of the important criteria of the study. The schools were designated randomly as one representing the intervention with the other representing the control group.

Before the start of the study, permission was obtained from the school administrations and from the regional education authorities; the approval of the Ethics Committee of Marmara University was also secured (27.07.2010-9/27). Following these formalities, a meeting was organized with the families of the adolescents and the school administrators. They were given information about the process of the study and the benefits that were expected, after which their permission was requested for the students' participation. One hundred and sixty parents attended this meeting and 124 approved their child's participation in the research. Later, the consent forms were given to the children to take to their parents and the invitation to join the study was repeated. Following this procedure, 44 more students who had brought in consent slips from their parents were recruited into the study. Thus, the number of students participating in the study was 168. A total of 12 students did not wish to participate. Ultimately, the study was initiated with 86 students from the intervention and 82 from the control group. In the final test of the study, the intervention group comprised 76, the control group 71, a total of 147 participants. The data collected from the students taking part in both tests were analyzed.

The SPP was offered to the children in the intervention group after a pre-assessment. The adolescents in the SPP intervention group were provided the education for a period of 6 weeks over March-May 2012. An intervention with the SPP with the control group, however, was carried out over the period September-November 2012.

Intervention

The Environmental Protection Agency SunWise School and the Centers for Disease Control and Prevention's sun protection programs were accepted as a basis for the program and 6 posters, a 12-page student handbook, 4 puzzles, educational videos and a UV-sensitive Frisbee game were among the tools prepared and used in the education.

In the first week of the program, 6 different posters containing messages on sun protection were hung up in the classrooms, school corridors, library and cafeteria. *In the second week,* a 15-minute meeting was held with the students that would be participating in the program. In addition, a 12-page student handbook that had been prepared to reinforce students' positive knowledge, attitudes and behavior about protecting themselves from the sun was distributed. *In the third week,* the students were shown an hour-long Power Point presentation. The presentation contained information about the effect of the sun on health, the skin problems that are related to sun exposure, and how to practice sun protection. *In the fourth week,* the researchers gave the students a game book that they had prepared that contained two crossword puzzles and two word games on the themes of the effects of the sun, sunburn, the ozone layer, UV radiation, tanning, sun protection and using sunscreen. *In the fifth week,* U.S. Environmental Protection Agency SunWise School videos supporting the targets of the program were shown in two separate sessions. The educational videos explained the ozone layer and its function, the effects of UV radiation on health, the steps needed to protect oneself from the sun, and the importance of sun protection for children. *In the last week's intervention,* the school organized a picnic and during the event, the first author presented a demonstration using an ultraviolet-ray-sensitive Frisbee. The UV Frisbee is white and when exposed to sunlight (even though the air is cloudy), the device turns color, first becoming pinkish, then taking on a purple color when exposed to the sun for a longer duration. The part of the Frisbee on which 15 – or 30-factor sunscreen has been spread stays white while the part on which 6-factor sunscreen has been spread takes on a pink color. Moreover, when left in the shade, or covered up with a dress or sunglasses, the covered parts are light in color while the sections left in the sun take on a dark tone. Five minutes after exposure, the Frisbee turns pink and then back to white. Intervention package was sent to expert panel. Then educational package was corrected in line with expert opinions.

Measurements

Inquiries were made about descriptive and personal information on the school, age, gender, economic status, hair-eyes-skin color, skin type of the students.

Instruments

The TTM stages of change in sun protection and using protective gear against the sun were developed by Rossi, Blais, Redding and Weinstock (16, 29) and used in many studies (19-23). The stages of change in the context of sun protection comprise four items that are used to measure the intent to protect oneself and to maintain basic behavior patterns such as consistently avoiding exposure to the sun, using at least a 15-factor sunscreen, and wearing appropriate clothes and a hat for sun protection (16, 29). The stages of change for using sunscreen comprise four items that are used to measure the intent to protect oneself and to maintain the behavior of consistently using at least a 15-factor sunscreen (16, 29).

The sun protection and using sunscreen stages of change comprise the basic structure of the transtheoretical model. The pretest in this study was employed to measure the students' intention to change and the posttest to measure the degree of change in their intentions. Examining the students' continuous sun avoidance, use of at least a 15-factor sunscreen and their wearing clothes that would protect the head, body, arms and legs were used to evaluate the degree to which the students fulfilled their intentions in the stages of change. In the stages of change regarding the use of at least a 15-factor sunscreen, 4 questions were asked to determine the students' intention to use sunscreen (16, 29).

Decisional balance scale (DBS): This is an 8-item 5-point (ranging between 1=not important, 5=very important) Likert-type scale developed by Maddock et al. (30) for adolescents that was used to determine how important the adolescents perceived their decision to protect themselves from the sun to be. The scale comprises two subscales of "pros" and "cons." Every subscale consists of 4 items. A total score is not computed for the scale, but the pros and cons are each scored separately. The lowest mean score of pros perceptions was 4, and the highest mean score was 20. The lowest mean score of cons perceptions was 4, and the highest mean score was 20 (32). The scale's internal consistency coefficient was measured in various studies (pro α=.78; 85 and con α =.74; 78) and it was shown to have strong internal consistency (30, 31). The Turkish version of the scale was tested for validity and reliability (Pros α=.76, Cons α=.71) and found to be valid and reliable (32).

Self-efficacy scale (SES): Developed by Maddock et al. (30) for adolescents, this is a 9-item 5-point (ranging between 1=I having no self-confidence to 5=I having a lot of self-confidence) Likert-type scale on sun protection, using sunscreen and the use of a hat, in which participants assess how much they are confident of themselves in pertinent situations. The scale's 9-item structure was measured to determine its internal consistency coefficient and it was found to have strong internal consistency (α=.84). The internal consistency coefficients of the subscales (sun avoidance α= .73, sunscreen use α= .88, and hat use α= .57) were at moderate and high levels (30, 31). The Turkish versions of the subscale scale were tested for validity and reliability (Self-efficacy α=.86; sun avoidance α=.65, sunscreen use α=.84 and hat use α=.69) and found to be valid and reliable (32). The scale's three subscales are sun avoidance, using sunscreen and wearing a hat. In terms of sun avoidance, the lowest mean score was 3, the highest 15. In the subsecale of using sunscreen, the lowest mean score was 4, the highest 20. In the subscale of wearing a hat, the lowest mean score was 2 while the highest was 10 (32).

Analytic Strategy

The pretesting for the research took place in March 2012, the posttest, 3 months after the pretest, in June 2012. Data were collected in the students' classes during the hours advised by the school administration. The scales took approximately 20 minutes to complete.

The chi-square test was used in the intervention and control groups to compare nominal variables such as identifying features and personal characteristics. Covariants were calculated in the pre-test scores and covariance analysis performed to measure the effect of the SPP on the intervention and control groups. Covariants were calculated in the pre-test scores and covariance analysis performed to measure the effect of the SPP on the intervention and control groups in Table 2. The Wilcoxon signed rank test was used in the stage progression of the groups in Table 3.

A comparison of the identifying characteristics of the students in the intervention and control groups is presented in Table 1. No significant difference was found in the study between students in the intervention and control groups in terms of gender, family economic status, hair color, eye color, skin color or skin type (p>0.05).

Table 1. Demographic profile of the sample and comparisons between intervention and control groups

Variables	Intervention		Control			
	n=76	%	n=71	%	x^2	p
Gender						
Girls	40	52.6	33	46.5	0.55	0.281
Boys	36	47.4	38	53.5		
Economic status						
Low-medium	18	23.7	25	35.2	2.64	0.266
Good	49	64.5	37	52.1		
Very good	9	11.8	9	12.7		
Hair colour						
Red-yellow	10	13.2	5	7.0	2.11	0.549
Light brown-hazel	16	21.1	20	28.2		
Brown	28	36.8	26	36.6		
Black-dark brown	22	28.9	20	28.2		
Eye colour						
Blue-green	11	14.5	10	14.1	7.01	0.072
Light brown	17	22.4	7	9.9		
Brown	41	53.9	39	54.9		
Black-dark brown	7	9.2	15	21.1		
Skin colour						
Freckled-fair	30	39.5	23	32.4	1.21	0.545
Brown-wheat	27	35.5	25	35.2		
Brown-dark skin	19	25.0	23	32.4		
Skin type						
Type 1-2 Light	13	17.1	14	19.7	2.79	0.424
Type 3White	24	31.6	14	19.7		
Type 4Wheat	15	19.7	18	25.4		
Type 5-6Dark	24	31.6	25	35.2		

x2=Chi-square

Table 2. Intervention effect on groups at pre and post tests

Instruments	Groups	Test			Statistic	
		Pre-test	Post test	Adjusted post test	F	p
		Means±SD	Means±SD	Means±SE		
Sunscreen use stage	Intervention	2.52±1.69	3.14±1.47	3.10±0.15	13.31	<001
	Control	2.30±1.42	2.25±1.46	2.29±0.16		
Sun protection stage	Intervention	2.35±1.57	2.71±1.44	2.71±0.16	3.66	058
	Control	2.35±1.53	2.26±1.48	2.27±0.17		
Pros of perception	Intervention	13.62±4.47	15.10±3.88	15.29±0.41	6.04	015
	Control	14.97±3.85	14.06±3.53	13.85±0.42		
Cons of perception	Intervention	11.00±4.58	8.99±4.44	8.87±0.41	2.95	.088
	Control	10.04±4.24	9.66±3.65	9.89±0.42		
Sun avoidance	Intervention	8.06±3.53	9.55±3.10	9.79±0.33	16.43	<001
	Control	9.06±3.27	7.99±3.05	7.86±0.34		
Sunscreen use	Intervention	11.96±4.60	13.85±3.74	14.02±0.48	5.35	022
	Control	13.52±4.32	12.66±4.90	12.42±0.50		
Hat use	Intervention	5.55±2.68	6.39±2.20	6.54±0.23	6.41	012
	Control	6.48±2.40	5.80±2.05	5.68±0.24		

Note: Pre-test was taken as covariate. Sample size with complete data at pre, post test points included in analyses, n =147, F= Analysis of covariance, SD=Standart Deviation, SE= Standart Error (Intervention n=76, control n = 71), significant level= p<.05

Table 3. Intervention effect on stage progression of intervention and control groups

Groups	Tests	Ranks	N	Mean Rank	Sum of Ranks	Z	p
Intervention	Post test sun protection stage – Pre-test sun protection stage	Negative	15a	33.40	501.00	-1.33	.183
		Positive	35b	22.11	774.00		
		Ties	26c				
		Total	76				
	Post test sunscreen use stage – Pre-test sunscreen use stage	Negative	13d	21.00	273.00	-2.95	.003
		Positive	33e	24.48	808.00		
		Ties	30f				
		Total	76				
Control	Post test sun protection stage – Pre-test sun protection stage	Negative	18a	15.69	282.50	-.35	.726
		Positive	14b	17.54	245.50		
		Ties	39c				
		Total	71				
	Post test sunscreen use stage – Pre-test sunscreen use stage	Negative	17d	14.97	254.50	-.13	.898
		Positive	14e	17.25	241.50		
		Ties	40f				
		Total	71				

a. Post test sun protection stage < Pre-test sun protection stage
b. Post test sun protection stage > Pre-test sun protection stage
c. Post test sun protection stage = Pre-test sun protection stage
d. Post test sunscreen use stage < Pre-test sunscreen use stage
e. Post test sunscreen use stage > Pre-test sunscreen use stage
f. Post Test sunscreen use stage = Pre-test sunscreen use stage
Note: Sample size with complete data at pre, post test points included in analyses, n =147, z= Wilcoxon signed rank test (Intervention n=76, control n = 71), significant level= p<.05

Results

Descriptive results

The mean age of the intervention group was 12.15±0.58 years; that of the control group was found to be 12.05±0.77 years.

Stages of Change

In the sun protection stages of change, the changes exhibited by the intervention and control groups in terms of the pre – and post-test were not found to be statistically significant (F(2144)=13.31; p<.001) (Table 2). In the sunscreen use stages of change, however, the differences in the post-test scores of the intervention group compared to the pretest were more significant than in the control group (F(2,144)=3.66; p=.058) (Table 2). The analysis performed

to measure the progress or regression in the stages of changes in terms of sun protection and sunscreen use showed that the posttest did not display significant changes as compared to the pretest in the control group either in terms of sun protection (p=.726), or in terms of sunscreen use (p=.898) (p>.05). In the intervention group, it was found that the stages of change did not show significant differences in terms of sun protection (p=.183), but that the changes taking place in the stages of change in terms of sunscreen use were statistically significant (p=.003) (Table 3).

Perception of pros and cons

The results of the comparisons of the pros and cons subscales of the Decisional Balance Scale showed that the pros perceptions of the intervention group displayed a statistically significant rise in the posttest compared to the pretest (F(2,144=6.04; p=.015), but that the cons perceptions of the intervention group did not display a significant difference (F(2,144=2.95; p=.088) (Table 2). It was found that there was no significant difference in the changes in either the pros or in the cons perceptions of the control group (Table 2).

Self-efficacy

The results of the comparisons of the subscales of the self-efficacy scale showed that the intervention group had higher scores on the posttest compared to the pretest in terms of the subscale mean scores of sun avoidance (F(2,144=16.43; p<.001), sunscreen use (F(2,144=5.35; p=.022) and wearing a hat (F(2,144=6.41; p=.012), but that in the control group, the changes that appeared in each of the 3 subscales were not statistically significant (Table 2).

Discussion

This study is the first nurse-led study in Turkey aiming to increase sun protection behavior in adolescents. The study involved the implementation of a school-based sun protection program that aimed at protecting adolescents from the detrimental effects of the sun. The results of the analysis of covariance in this study showed that the SPP was effective in the intervention group in the post-test in terms of the sunscreen use stage, self-efficacy and perceiving pros; it was not effective in the perceiving cons. These findings indicate that the sun protection program may be used as an effective program to increase sun protection behavior in adolescents.

Stages of Change

An examination of the distribution of the sunscreen use stages of change on the pretest in the study indicates that close to half of the students were in the contemplation age while one-third were in the advanced stages. The study of Weinstock et al. (21, 29) with adults and Rapley and Coulson's (33) research with adolescent girls revealed pretest results similar to ours.

The fact that the students in our study's intervention group showed significantly more progress in the sunscreen use stage of change compared to the control group is an important finding. It is clear that this progress, when compared, signifies almost double the progress in the control group. In their study with adults, Pagota et al. (20) reported, similar to our results, that the intervention group had progressed more in the stages of change of the transtheoretical model than the control group (20). In another studies on adults, it was also shown that the rate of progress of the intervention group in the stages of change regarding sun protection and sunscreen use was higher than in the control group (21-23).

Perception of pros and cons

The increase in the pros scores on the posttest of the students in the intervention group is significant. Although no difference could be found between the groups, when it is considered that the pros scores of the intervention group on the pretest were lower than those of the control group and that their cons scores were higher, it can be said that the experiment was effective on the posttest in terms of pros scores.

A study that examined the effect of the transtheoretical model on adolescent behavior reported that the adolescents in the intervention group displayed increases in their pros scores in the 6th, 12th and 24th month, decreases in their cons scores in the 6th month, but that there were slight increases in their cons scores in the 12th and 24th month. Based on the increase of sun protection behavior and in the pros scores as well as the decrease in the cons scores, the study concluded that the experiment had been effective in changing the adolescents' sun protection behavior (34). The results of this study are parallel to the results of our own research.

When it is considered that the decision to protect oneself from the sun is a positive attitude and that taking a sunbath for the purpose of tanning without protection against the sun is a negative attitude, the pros represent positive attitudes and the cons represent negative attitudes. A sun protection program implemented in France revealed a significant improvement in students' sun protection attitudes. While at the start of this program, the sun protection behavior of the control group was at a better level that the implementation group, one year after the implementation of the program, the sun protection behavior of the intervention group displayed a significant improvement compared to the control group (28). In a study that made use of email messaging to improve sun protection behavior, the participants showed no significant change in their use of sunscreen but a significant change to the positive in their attitudes and opinions about exposure to the sun (35).

In the present study, it may be said that the increase in the perception of pros in the students in the intervention group following the intervention are indications of the effectiveness of the implemented program.

Self-efficacy

Some of the impressive results of our study were that the sun protection self-efficacy of the intervention group was statistically

greater than the control group and that in group comparisons, it was found that self-efficacy in terms of both sun avoidance and use of a sunscreen and hat revealed a significant increase in the posttest as compared to the pretest.

The findings in the literature have shown that sun protection programs have an impact on adolescents' self-efficacy. Parallel to the findings of this study, it has been reported in an interventional study that both self-efficacy with respect to using sunscreen and general self-efficacy of the intervention group are significantly higher than in the control group (27).

An examination of the studies in the literature conducted on the basis of the transtheoretical model reveals that in experimental research carried out with 819 adolescents of ages 10-16, adolescents in the intervention group displayed improvements in their sun protection behavior scores in the 6th, 12th and 24th month (34). In another study based on the transtheoretical model with 819 adolescents of the ages 11-15, it was also shown that at the end of 24 months, the intervention group's mean scores on both sun avoidance and using sunscreen were higher and displayed a significant difference compared to the control group (19).

In some studies where education was provided on skin cancer and sun protection, it was found that adolescents, ages 12-17, displayed positive results as a result of the interventions organized to develop sun protection behavior (26, 28). Similarly, in a study by Mays et al. (36), measurements taken one month after the implementation program indicated that the sun protection behavior of the child subjects, their regular use of sunscreen, their habits of wearing long-sleeved clothing, staying in the shade and avoiding exposure to the sun in the noon hours had all shown significant improvements. An interventional study carried out in Spain found that after an Internet-based educational program, there were significant increases in the intervention group's use of sun protection creams in terms of repeating the application of sunscreens every 2 hours and even in the shade (24). A study comprising 11-14 year-old primary school children used SMS'es in an intervention group and after the 12-week intervention, positive changes had been noted in behaviors related to sun avoidance, using sunscreens, wearing hats and sunglasses as well as in knowledge about protection against the sun (37).

It is very clear that in all of these interventional studies, sun protection has showed progress and improvement in all dimensions. In the present study, sun avoidance, sunscreen and hat use were found to have improved. It can be seen that the results of our study and the improvements attained are more impressive than those of the mentioned studies. While the other studies could not find any significant change in terms of self-efficacy scores, it is significant that our study revealed improvement and progress in the intervention group in terms of three behaviors on the posttest as compared with the pretest.

Strengths and limitations

This study is a first in that it is the first nurse-led initiative to improve sun protective behavior in the Turkish adolescent population. The sun protection program that was implemented and its contribution to the literature are other strengths of the study. There were certain limitations however. The primary limitation was that as much as the study reflected the behavior of adolescents, its implementation took place in only 2 private schools. Another limitation was that the study could only be conducted in a 6-week period due to the start of the summer vacation and the difficulty of reaching the students because of this. It will be seen from an examination of the posttest results that a lengthier study will have an impact and an improving effect on students' sun protective behavior. The last limitation of the study was the restricted time that could be allotted to the study in the private schools, given that students were more inclined to skip attendance in the study for fear of missing classwork.

Conclusion

The study showed that a school-based SPP was effective in the short term in achieving progress in the Transtheoretical Model (TTM) sunscreen use stages of change, the pros and cons, and in sun avoidance and sunscreen use self-efficacy, meaning that the program may be used in the schools to increase sun protection behavior. School-based, nurse-led, short-term studies that encompass group interventions are successful in developing sun protection behavior and will be useful in the future in the context of school nursing activities.

In line with this conclusion, the recommendation is that nurses working in schools implement the SPP before the start of summer vacation. In addition, future TTM-based studies with longer interventions may be more effective in developing sun protection behavior in adolescents.

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