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The Effect of Educational Intervention Based on PRECEDE Model on Promoting Skin Cancer Preventive Behaviors in High School Students

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Abstract
School-based education programs can be an effective way of educating adolescents about the dangers of exposure to sunlight and about preventive measures against this exposure and its relation to skin cancer. The aim of this study is to survey the effect of educational intervention based on the PRECEDE model on promoting skin cancer preventive behaviors in high school students of Fasa City, Fars Province, Iran. In this quasi-experimental study, 300 students (150 in experimental group and 150 in control group) in Fasa City, Fars Province, Iran, were selected in 2016–2017. The educational intervention for the experimental group consisted of six training sessions. A questionnaire consisting of demographic information, PRECEDE constructs (knowledge, attitude, self-efficacy, enabling factors, and social support), was used to measure skin cancer preventive behaviors before and 4 months after the intervention. Data were analyzed using SPSS 22 and paired *t* test, independent *t* test, and chi-square test at a significance level of $p < 0.05$. The mean age of the students was 16.05 ± 1.76 years in the experimental group and 16.20 ± 1.71 years in the control group. Four months after the intervention, the experimental group showed a significant increase in the knowledge, attitude, self-efficacy, enabling factors, social support, and skin cancer preventive behaviors compared to the control group. This study showed the effectiveness of the intervention based on the PRECEDE constructs in adoption of skin cancer preventive behaviors in 4 months post-intervention in students. Hence, this model can act as a framework for designing and implementing educational intervention for the prevention of skin cancer.

Keywords Enabling factors · Fasa City · PRECEDE model · Students · Skin cancer

Introduction

Skin cancer is characterized with uncontrolled growth of skin cells and the formation of malignant cells in skin layers [1]. It is one of the most common cancers in the world [2] as well as in the Middle East region [3] and it is the most common cancer in men and the second most common cancer in women after breast cancer [4]. In the white population, the incidence of skin cancer is increasing worldwide [5]. In Iran, cancers are the third leading cause of death after cardiovascular disease and accidents, and skin cancer is the most prevalent cancer with an estimated prevalence of 14.6% [6]. More than one third of cancers are preventable, and one third of them can be treated if diagnosed early [7]. The causes of skin cancer include ultraviolet radiation, genetic predisposition, chemical carcinogens such as tar, mineral oils and chemical fertilizers, and lead, and immunosuppression, age, gender, chronic inflammation, and tobacco [8]. Exposure to sunlight causes sunburn, which has the most important role in the development of skin cancer [9] and the maximum time that the person is exposed to the sun's rays is before the age of 20 [10]. In Iran, due to intense sunlight in most seasons of the year, especially in the southern regions of the country, the ultraviolet radiation of the sun is at a high level [11] leading to a high prevalence of skin cancer due to lack of appropriate protective measures such as wearing appropriate clothing and hats outdoor [12]. In addition to the prevalence and incidence, the financial impact of each cancer can significantly affect the resources of a community. The cost of skin cancer in the USA exceeds $500 million annually [13].

One of the World Health Organization's strategies for controlling cancers is to raise awareness among people about cancer [14]. Studies have confirmed the positive impact of educational programs on the promotion of skin cancer prevention

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behaviors [15, 16]. Adolescence is a period in which people are more affected by the urge to take part in risky behaviors and experiences [17]. These factors can lead to behaviors, which increases the risk of skin cancer during life. Therefore, school-based education programs can be an effective way of educating adolescents about the dangers of exposure to sunlight, and about preventive measures against this exposure and its relation to skin cancer. Adolescents spend several hours during the week at school and do activities in the school yard for some hours exposing themselves to sunlight. Schools are a good place to educate and shape patterns of health behaviors. Therefore, considering the important role of teachers and schools as an appropriate place for educating students and their families, school-based educational programs can be used for teaching health-related topics in order to improve their awareness and attitudes and develop healthy behaviors among them [18].

Such training programs should be created to meet the needs of adolescents at a socio-psychological and educational level. In this regard, the PRECEDE model, which is basically a planning model, was used in order to guide the preparation of such programs to ensure that the program will meet the needs of this important group of people in the prevention of skin cancer. The PRECEDE model was developed by Greene and colleagues and is a systematic process for planning, presenting, and evaluating health promotion programs for defined populations. This process takes into account the various factors that shape health status and behavior and helps planers to reach a centralized set of these factors for intervention purposes. The planning process based on the PRECEDE model has been used for a wide range of health promotion issues [19]. Since our ultimate goal for students is to promote skin cancer preventive behaviors, using such model as a framework for designing an educational program to promote skin cancer preventive behaviors is essential.

Effectiveness of the PRECEDE model has been proved in various studies [20, 21]. Therefore, the aim of this study was to present an educational program based on the PRECEDE model in order to promote the preventive behaviors of skin cancer in male high school students in 2016–2017.

Materials and Methods

The present study was a quasi-experimental study on 300 male high school students (second and third grade) in Fasa City, Fars Province, Iran, in 2016 and 2017. The research is gender restricted. A sample size of 300 subjects was determined based on the review of related literature [18] with a 95% confidence level and statistical power of 80%. The subjects were divided into two groups of 150 subjects (experimental and control).

For sampling purposes, four schools (two as experimental group and two as control group) were selected randomly out of all male high schools in the area ($N = 22$). Seventy-five subjects were selected from each high school. The subjects were enrolled in one of the state male high schools and voluntarily entered the study. In order to comply with ethical principles, the study was approved at the Research Council of Fasa University of Medical Sciences and related permission was obtained from Fasa County Department of Education.

The students were justified before completing the questionnaire, and if they did not want to participate in the project, they were excluded from the sample. The data collection instrument was selected based on previous studies and review of the literature [18, 22] that included the subjects' demographic characteristics and the PRECEDE-based questionnaire.

To assess the subjects' knowledge status, a questionnaire with four sub-scales, 19 items, and 59 options was used that evaluated their awareness in four domains. The sub-scales measured awareness of causes of illness (items 1–10, 14, and 15), recognition of symptoms [11–13], awareness of treatment [16], and awareness of preventive methods [17–19]. The items were answered by three options of correct/incorrect/I do not know. Finally, a score of 0–59 was obtained for each subject with higher scores indicating a higher awareness levels.

The attitude was measured by 11 items asking subjects to specify their level of agreement or disagreement with the 11 statements that came in a table. The answers were scored on a 5-point Likert scale (totally disagree (0) to totally agree (4)). So the score on this construct was in the range of 0–44.

The self-efficacy scale was also designed by the researchers the instruction for which read: "It does not matter whether you are currently doing the following activities, just specify how confident you are that …:" following by 7 questions (e.g., "Can you use a sunscreen every 2-3 hours?"

The questions were answered based on Likert scale (not at all (0) to very often (4)), with the score of 0 indicating the lowest level of self-efficacy. Therefore, the score on this construct was between 0 and 28. Social support scale was also measured by the instrument developed by the researcher and measured in two sections of general perceived social support and supportive family behaviors. The perceived social support subscale was measured via a question on the level of social support that a person receives from his family, relatives, and community.

This question, which included six sections, measured the general social support by the parents, friends, siblings, other dependents, physicians, health workers, and school teachers. The answers were scored on a 5-point Likert scale from "not at all" (0) to "very often." The score on this construct was in the range of 0–24.

The second part was supportive family behavior, which included 6 questions measuring the individual's perception about the extent to which family members help him/her in tasks such as going to a doctor in case of suspected symptoms

on the skin and encouraging the person to follow skin care. In this second section too, the answers were scored on a 5-point Likert scale from "not at all" (0) to "very often." The score on this construct was in the range of 0–24. Thus, by aggregating the score from both sections, the score for the total social support scale was in the range 0–48.

The enabling factors scale included 6 items developed by the researchers and measured the subjects' perception about, for example, the extent to which they deemed their income adequate, the extent to which their access to preventive equipment or a specialist was easy, or the extent to which they know how much and how long to use sunscreen. The answers were on a 5-point Likert scale (not at all (0) to very often (4)), with the score of 0 indicating the lowest level of self-efficacy. Therefore, the score on this construct was between 0 and 24.

Questions related to skin cancer preventive behaviors were evaluated with 7 items and 17 options. Answers to items 1 through 4, as well as all options in item 5 (including 5 options), were yes/no.

Items 6 and 7 each had 4 options; therefore, every subject achieved a score between 0 and 3, with 0 indicating lack of preventive behaviors. Finally, the acquired scores in this section were in the range of 0–15.

The validity of items was confirmed by item score impact above 0.15 and content validity ratio (CVR) above 0.79. In order to determine the face validity of the instrument, a list of developed items was piloted to 40 high school students with the same demographic, economic, and social characteristics as the target population. In order to determine the content validity, the opinions of 12 subject matter expert raters (SMEs) (outside the research team) in the field of health education and health promotion (10 people) and dermatology (2 people) were used.

Based on Lawshe table, the items with CVR above 0.56 (for 12 SMEs) were considered essential and included for further analysis. The CVR values calculated in this study for most items were higher than 0.70.

The overall reliability of the research instrument was confirmed with Cronbach's alpha of 0.89. The reliability values for other constructs were 0.78 for awareness, 0.84 for attitude, 0.82 for self-efficacy, 0.77 for social support, 0.77 for enabling factors, and 0.79 for skin cancer preventive behaviors. The questionnaire was administered before the intervention and 4 months after the intervention by both experimental and control groups. The educational intervention for the experimental group consisted of six sessions of 45 to 50 min including group discussions, questions and answers, practical presentation, and the use of videos, PowerPoint, and instruction booklets. The program was implemented by a Ph.D. holder in Health Education and Health Promotion and a dermatologist in collaboration with two cancer experts working in the field of non-communicable disease prevention at Fasa Health Center. These sessions focused on the importance of skin and its health, the prevalence of skin cancer and its risk factors, sunlight damages, sun protection, use of sunscreen, use of physical protection, use of UV-blocking glasses, etc.; the sessions were held on a weekly basis. A meeting was held with teachers and school officials and one with the family members and employees of the related health centers as subjective norms and social supporters.

At the end of the training sessions, a manual was given to the individuals. In order to track the activities, monthly sessions were organized for students. A telegram group was formed for the students' parents to exchange information. Data were analyzed using SPSS 22 and paired t test, independent t test, and chi-square test at a significance level of $p < 0.05$.

Results

The participants of this study included 300 male high school students. The mean age of the experimental group was 16.05 ± 1.76 years and that of the control group was 16.20 ± 1.71 years. There was no significant difference between the two groups in this regard based on independent t test ($p = 0.214$). The chi-square test showed that there was no significant difference between the two groups in terms of education level ($p = 0.116$), the household's monthly income ($p = 0.206$), the fathers' education level ($p = 0.178$), mothers' education level ($p = 0.125$), and the history of skin cancer in the family ($p = 0.252$) (Table 1). The results showed no significant difference before the intervention between the two groups in terms of knowledge, attitude, self-efficacy, social support, enabling factors, and skin cancer preventive behaviors. However, 4 months after the intervention, the experimental group showed a significant increase in all of these variables (Table 2).

Discussion

Reducing exposure of kids to sunlight, either occasionally or continuously, is important to reduce the risk of skin cancer especially if it reduces sunburn [10]. The purpose of this study was to determine the effect of PRECEDE-based educational intervention on skin cancer preventive behaviors in male students in Fasa City, Fars Province, Iran. In the present study, there were no significant differences between the experimental and control groups in terms of demographic characteristics, and mean scores of knowledge, attitude, self-efficacy, social support, enabling factors, and preventive behaviors of skin cancer before intervention. The results of this study showed that the mean score of knowledge increased significantly in the experimental group during the 4 months after intervention, while it did not change in the control group. Holding

Table 1 Comparison of frequency distribution of demographic variables in experimental and control groups

Variable		Experimental group ($N = 150$)		Control group ($N = 150$)		p value
		Number	Percentage	Number	Percentage	
Education level	2nd grade, high school	65	43.33	68	45.33	0.116
	3rd grade, high school	85	56.67	82	54.67	
Household monthly income	Below 10 million Rials	26	17.33	20	13.33	0.206
	10–20 million Rials	74	49.33	84	56	
	Over 20 million Rials	50	33.34	46	30.67	
Father's education	Illiterate	2	1.33	1	0.66	0.178
	Elementary	25	16.67	21	14	
	Junior high school	34	22.67	34	22.67	
	High school	65	43.33	73	48.67	
	Academic	24	16	21	14	
Mother's education	Illiterate	4	2.66	2	1.33	0.125
	Elementary	24	16	28	18.66	
	Junior high school	56	37.34	53	35.34	
	High school	50	33.34	48	32	
	Academic	16	10.66	19	12.67	
History of skin cancer in the family	Yes	8	5.34	6	4	0.252
	No	142	94.66	144	96	

educational sessions for students, providing educational materials through film screenings, forming a small group for the exchange of information, and providing instruction booklets for the subjects in the experimental group increased their awareness of skin cancer.

In a study by Erkin et al., educational intervention using photographs and posters led to increased knowledge and self-examination of skin among nursing students [23].

Burns' study showed that the Train and Equip method increased nurses' and teachers' knowledge of skin cancer [24].

Table 2 Comparison of the mean scores of the PRECEDE model in the experimental and control groups before and 4 months after the educational intervention

Variable	Group	Before intervention ($M \pm SD$)	4 months after the intervention ($M \pm SD$)	p-value
Knowledge	Experimental	21.34 ± 5.26	49.34 ± 5.35	0.001
	Control	20.78 ± 5.81	21.34 ± 5.76	0.514
	p value	0.152	0.001	
Attitude	Experimental	23.34 ± 5.11	39.25 ± 4.11	0.001
	Control	24.92 ± 5.08	25.23 ± 5.22	0.351
	p value	0.119	0.001	
Self-efficacy	Experimental	5.32 ± 3.72	22.39 ± 3.74	0.001
	Control	4.96 ± 3.87	5.70 ± 3.28	0.108
	p value	0.310	0.001	
Social support	Experimental	24.40 ± 4.65	40.11 ± 4.90	0.001
	Control	24.12 ± 4.80	25.52 ± 4.76	0.163
	p value	0.225	0.001	
Enabling factors	Experimental	5.12 ± 3.16	18.35 ± 3.29	0.001
	Control	5.84 ± 3.02	6.16 ± 3.09	0.121
	p value	0.146	0.001	
Skin cancer preventive behaviors	Experimental	4.11 ± 3.65	11.65 ± 3.09	0.001
	Control	4.26 ± 3.82	4.70 ± 4.10	0.104
	p value	0.417	0.001	

In a study by Alberg et al., conducted on 2775 subjects of 10–19 years of age, the results showed that while most people responded to questions of knowledge correctly, a significant proportion of them did not protect themselves adequately against the sun. About one third of them had severe sunburn twice or more last summer. One third of the young people considered tanning of the skin in the sunlight as natural, and half of them considered it attractive. Those who had a poor attitude regarding skin protection suffered from sunburn more than others [25]. In this study, the post-intervention results showed a significant increase in the mean score of attitude in the experimental group indicating the effect of the PRECEDE model on increasing their positive attitudes. In this model, predisposing factors like attitudes are prior to behavior and form a motivating factor for behavior. In this study, positive attitude facilitated the adoption of appropriate behaviors for prevention of skin cancer. In study by Boer et al. [15], educational intervention increased the subjects' attitude about protecting against sunlight. Cassel et al. tested the effectiveness of a school-based skin cancer prevention intervention entitled "Sun Safe in the middle school Years" adapted for multiethnic high school students. At posttest, improvements were found in 13 of 18 survey items and retained in 10 items at 12 months following baseline assessments; sun protection attitudes and intended tanning behavior did not show improvement [26]. Davis et al. conducted Students are Sun Safe (SASS) project, which increased awareness, attitudes, and protective behaviors of the subjects under study [27]. The results of other studies are consistent with our research [28, 29]. The results of this study showed that the subject's belief in their efficiency and ability before the intervention was lower than average. The beliefs of subjects about their ability to use protective devices (such as sunscreen, glasses, gloves, and caps) and the ability to visit a doctor if there is a suspicious symptom were at a low level. It should be noted that the subjects under study were high school students who were passing or had passed puberty. Therefore, they had not yet reached a level of self-confidence that can assess their effectiveness in activities such as prevention against skin cancer as high. However, in general, in order to achieve a high level of skin cancer prevention in students and, finally, to improve their level of health, they must first try to improve their self-efficacy. Four months after the intervention, the mean score of self-efficacy in the experimental group increased, while that of the control group did not change. Babazadeh's study showed that self-efficacy was predictive of skin cancer prevention in 238 Iranian farmers [30]. In Werk's study, awareness and self-efficacy were predictive of cancer prevention behaviors [31]. In Jeihooni et al.'s study, PRECEDE-based educational intervention increased the mean score of self-efficacy 6 months after the intervention in the experimental group [29]. The results of this study indicated a significant difference in terms of enabling factors between the experimental and control groups after the intervention. Providing a booklet and access to a doctor for students, keeping follow-up contacts, creating a telegram group for the students' parents for the exchange of information, and submitting contents via question and answer, practical presentation, screening videos, and teaching aids increased students' ability to perform skin cancer preventive behaviors.

Tudiver and Talbot found that a lack of access to physicians was one of the most common preventive barriers to help-seeking by men [32].

The results of this study showed a significant difference between the experimental and control groups in terms of social support (reinforcing factors) in the 4 months after the intervention, indicating the impact of applying the PRECEDE model in boosting reinforcing factors. Organizing a training session for teachers, school officials, family members, and health center staff as subjective norms and social supporters, as well as providing group discussions, creating groups of friends and peers, and forming a Telegram group, increased the score on social support in the experimental group. In the study by Moshki et al., PRECEDE-based educational intervention increased the mean score of reinforcing factors [33]. Studies have shown that the training of effective subjective norms, including teachers, peers, and the family, has increased the subjects' participation in the behavior change process [28, 29].

A cross-sectional study by Duarte mentioned the role of general practitioners as a supportive factor for combating skin cancer [34].

According to the results of this study, it is possible to involve the students' families in group discussions, self-help groups, and training programs or even holding in-person or telephone counseling at schools or health centers for these individuals or their first-degree relatives could increase their level of support. It is also possible to arrange group meetings with peers for students to increase their understanding of the social support they receive. The present study showed that in the 4 months after intervention, the mean score of skin cancer preventive behaviors in the experimental group showed a significant increase, while there was no significant change in the control group. The increase in the behavior score in the experimental group indicates the effect of awareness, attitude, self-efficacy, supportive factors, and enabling factors on promoting skin cancer prevention strategies. In this study, a significant increase in the behavior of the experimental group was created by using educational training sessions, providing a training booklet, and involving supporters such as family members, physicians, teachers, school officials, and health care staff. In a cross-sectional study conducted by Celik et al. on 965 Turkish nursing students, the level of the subjects' awareness was moderate and they had more negative skin care behaviors than positive ones [35]. Heranandez et al. [36], Trotter [37], and Guevara et al. [38] showed that educational intervention changed the skin cancer prevention behavior.

An intervention study by Brain et al. conducted on 61 psychologists who tanned their skins in the sunshine showed that after the intervention, most of them (72%) stopped doing that, and educational interventions led to an increase in the protection against sunlight among the students in the experimental group [39].

One of the limitations of this study was gender restriction that was carried out only on male students. Further research is needed to make gender comparisons on the use of skin cancer prevention means. Another limitation was that the data were self-report.

Conclusion

Given that skin cancer is the most common type of cancer and harmful changes leading to cancer start from adolescence, and even childhood, and given the priority of prevention over treatment, especially for skin cancer, the use of such training programs that follow a specific model and framework can improve awareness, attitude, and self-efficacy and ultimately promote skin cancer prevention behaviors. Finally, it can be concluded from the results of this study that the PRECEDE model can be used as a framework for designing interventions to enhance skin cancer prevention behaviors.

Compliance with Ethical Standards

In order to comply with ethical principles, the study was approved at the Research Council of Fasa University of Medical Sciences and related permission was obtained from Fasa County Department of Education.

References

1. Ezzedine KH, Latreille J, Kesse-Guyot E et al (2010) Incidence of skin cancers during 5-year follow-up after stopping antioxidant vitamins and mineral supplementation. Eur J Cancer 4(6):3316–3322
2. Kim RH, Armstrong AW (2011) Nonmelanoma skin cancer. Dermatol Clin 30:125–139
3. Printz C (2015) Middle East war veterans experience higher skin cancer risk. Cancer 121(21):3753. https://doi.org/10.1002/cncr.29724
4. Gross CP, Smith BD, Wolf E, Andersen M (2008) Racial disparities in cancer therapy: did the gap narrow between 1992 and 2002? Cancer 112(4):900–908. https://doi.org/10.1002/cncr.23228
5. Geller AC, Greinert R, Sinclair C, Weinstock MA, Aitken J, Boniol M, Capellaro M, Doré JF, Elwood M, Fletcher SW, Gallagher R, Gandini S, Halpern AC, Katalinic A, Lucas R, Marghoob AA, Nolte S, Schüz J, Tucker MA, Volkmer B, Breitbart E (2010) A nationwide population-based skin cancer screening in Germany: proceedings of the first meeting of the International Task Force on Skin Cancer Screening and Prevention (September 24 and 25, 2009). Cancer Epidemiol 34:355–358
6. Mousavi SM, Gouya MM, Ramazani R, Davanlou M, Hajsadeghi N, Seddighi Z (2009) Cancer incidence and mortality in Iran. Ann Oncol 20(3):556–563
7. Siegel R, Naishadham D, Jemal A (2012) Cancer statistics, 2012. CA Cancer J Clin 62(1):10–29
8. Greinert R, Boniol M (2011) Skin cancer-primary and secondary prevention (information campaigns and screening) with a focus on children & sunbeds. Prog Biophys Mol Biol 107:473–476
9. Bränström R, Kasparian NA, Y-m C, Affleck P, Tibben A, Aspinwall LG et al (2010) Predictors of sun protection behaviors and severe sunburn in an international online study. Cancer Epidemiol Biomark Prev 19(9):2199–2210
10. Glasser A, Shaheen M, Glenn BA, Bastani R (2010) The sun sense study: an intervention to improve sun protection in children. Am J Health Behav 34(4):500–510
11. Heidari M, Najafi F (2013) Trends of skin cancer incidence in 6 geographical regions of the Islamic Republic of Iran, 2000-2005. East Mediterr Health J 19(1):59–65
12. Demire MF, Maguire Eisen M, O'Donnell N, Sorensen J, Berger J, Williams C et al (2009) A sun protection community intervention in Quincy middle schools. J Dermatol Nur Asso 1(2):111–118
13. Rigel DS (2008) Cutaneous ultraviolet exposure and its relationship to the development of skin cancer. J Am Acad Dermatol 58:129–132
14. Omar S, Alieldin NHM, Knatib OMN (2007) Cancer magnitude, challenges and control in the Eastern Mediterranean region. Health Journal 13(6):1486–1499
15. Boer H, Ter Huurne E, Taal E (2006) Effects of pictures and textual arguments in sun protection public service announcements. Cancer Detect Prev 30(5):432–438
16. Gilaberte Y, Alonso JP, Teruel MP, Granizo C, Gállego J (2008) Evaluation of a health promotion intervention for skin cancer prevention in Spain: the SolSano program. Health Promot Int 23(3):209–219. https://doi.org/10.1093/heapro/dan020
17. McIntosh N, Helms PJ, Symth RL (2003) Adolescent medicine. In: For far and Arneil's textbook of pediatrics, 6th Ed. Churchill-Livingstone, London
18. Sümen A, Öncel S (2015) Effect of skin cancer training provided to maritime high school students on their knowledge and behaviour. Asian Pac J Cancer Prev 16(17):7769–7779
19. Green L, Health KMW (2005) Program planning: an educational and ecological approach. 4th Ed. McGraw-Hill publication, New York
20. Cannick GF, Horowitz AM, Garr DR, Reed SG, Neville BW, Day TA, Woolson RF, Lackland DT (2007 Winter) Oral cancer prevention and early detection: using the PRECEDE-PROCEED framework to guide the training of health professional students. J Cancer Educ 22(4):250–253
21. Morowatisharifabad MA, Nadrian H, Mazloomy mahmoodabad SS, Soleimany salehabadi H, Asgarshahi M (2010) Utilizing the PRECEDE model to predict factors related to self-care behaviors in people with rheumatoid arthritis. J Nurs Healthc Chronic Illn 2:32–40
22. Ho BK, Reidy K, Huerta I, Dilley K, Crawford S, Hultgren BA, Mallett KA, Turrisi R, Robinson JK (2016) Effectiveness of a multicomponent sun protection program for young children: a randomized clinical trial. JAMA Pediatr 170(4):334–342. https://doi.org/10.1001/jamapediatrics.2015.4373
23. Erkin Ö, Ardahan M, Temel AB (2018) Effects of creating awareness through photographs and posters on skin self-examination in nursing students. J Cancer Educ 33(1):52–58. https://doi.org/10.1007/s13187-16-1037-y
24. Burns ER (2017 Mar) Healthy skin: cancer education for school teachers and nurses using a "train and equip" method. J Cancer Educ 32(1):72–78. https://doi.org/10.1007/s13187-016-1020-7

25. Alberg AJ, Herbst RM, Genkinger JM, Duszynski KR (2002) Knowledge, attitudes, and behaviors toward skin cancer in Maryland youths. J Adolese Health 31(4):372–377
26. Cassel KD, Tran DA, Murakami-Akatsuka L, Tanabe-Hanzawa J, Burnett T, Lum C (2018) Adapting a skin cancer prevention intervention for multiethnic adolescents. Am J Health Behav 42(2):36–49. https://doi.org/10.5993/AJHB.42.2.4
27. Davis R, Loescher LJ, Rogers J, Spartonos D, Snyder A, Koch S, Harris RB (2015) Evaluation of project Students are Sun Safe (SASS): a university student-delivered skin cancer prevention program for schools. J Cancer Educ 30(4):736–742. https://doi.org/10.1007/s13187-014-0742-7
28. Kashfi SM, Khani Jeihooni A, Rezaianzade A (2012) Effect of health workers' training programs on preventive behavior of leishmaniosis based on BASNEF model. J Res Health Sci 12(2):114–118
29. Jeihooni AK, Kashfi SM, Hatami M, Avand A, Bazrafshan MR (2017) The effect of educational program based on PRECEDE model in promoting prostate cancer screening in a sample of Iranian men. J Cancer Educ. https://doi.org/10.1007/s13187-017-1282-8.
30. Babazadeh T, Nadrian H, Banayejeddi M, Rezapour B (2017) Determinants of skin cancer preventive behaviors among rural farmers in Iran: an application of protection motivation theory. J Cancer Educ 32(3):604–612. https://doi.org/10.1007/s13187-016-1004-7
31. Werk RS, Hill JC, Graber JA (2017) Impact of knowledge, self-efficacy, and perceived importance on steps taken toward cancer prevention among college men and women. J Cancer Educ 32(1):148–154. https://doi.org/10.1007/s13187-016-0996-3
32. Tudiver F, Talbot Y (1999) Why don't men seek help? Family physicians' perspectives on help-seeking behavior in men. J Fam Pract 48(1):47–52
33. Moshki M, Dehnoalian A, Alami A (2017) Effect of precede-proceed model on preventive behaviors for type 2 diabetes mellitus in high-risk individuals. Clin Nurs Res 26(2):241–253. https://doi.org/10.1177/1054773815621026
34. Duarte AF, da Costa-Pereira A, Del-Marmol V, Correia O (2018). Are general physicians prepared for struggling skin cancer?-cross-sectional study. J Cancer Educ 33(2):321–324. https://doi.org/10.1007/s13187-016-1078-2
35. Çelik S, Ilçe A, Andsoy II (2017) Knowledge and protective behaviors about skin cancer among nursing students in the west Black Sea region of Turkey. J Cancer Educ. https://doi.org/10.1007/s13187-017-1188-5
36. Hernandez C, Kim H, Mauleon G, Ruiz A, Robinson JK, Mermelstein RJ (2013) A pilot program in collaboration with community centers to increase awareness and participation in skin cancer screening among Latinos in Chicago. J Cancer Educ 28(2):342–345. https://doi.org/10.1007/s13187-013-0454-4
37. Trotter SC, Louie-Gao Q, Hession MT, Cummins D (2014 Jun) Skin cancer education for massage therapists: a novel approach to the early detection of suspicious lesions. J Cancer Educ 29(2):266–269. https://doi.org/10.1007/s13187-013-0589-3
38. Guevara Y, Gaber R, Clayman ML, Gordon EJ, Friedewald J, Robinson JK (2015) Sun protection education for diverse audiences: need for skin cancer pictures. J Cancer Educ 30(1):187–189. https://doi.org/10.1007/s13187-014-0661-7
39. Brain T, Mc C, Prentice-Dunn S (2001) Reducing skin cancer risk: an intervention based on protection motivation theory. J H Psych 6(3):321–328