Effects of an Education Intervention on Nursing Students' Knowledge and Attitudes Regarding Skin Self-Examination and Skin Cancer Risks

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ABSTRACT

Background: The incidence of skin cancers is increasing in Turkey as well as worldwide. Nurses have a potentially influential role to play in educating the public about skin cancer prevention.

Purpose: The purpose of this study was to teach nursing students the risks of skin cancer and the steps involved in conducting related skin self-examinations to encourage positive attitudes toward skin cancer protection and early detection.

Methods: This research used a quasi-experimental, single-group, pretest-posttest design. The study population was composed of all the nursing students who were currently enrolled in a university in Muğla, a city in southern Turkey (n = 900). The study analysis included the 332 nursing students who had completed both the pretest and posttest assessments. An intervention to raise awareness about skin cancer risks and skin self-examination was carried out using educational materials that included posters/pictures, brochures, a PowerPoint slideshow, and a video. The posttest assessment was done 6 weeks after the pretest.

Results: The participants were 18–23 years old, and 67.5% were female. Furthermore, 3.6% had undergone a routine (external) screening for skin cancer, and 14.5% believed that they were at risk for skin cancer. The mean score for knowledge of skin cancer risks for those participants who had completed the program was 5.75 ± 1.20 in the pretest and 6.84 ± 1.17 in the posttest (minimum: 0, maximum: 8). The mean posttest score was higher than the pretest score in this group, $t(1, 329) = 6.49, p = .011$, and a significant difference was found between the mean pretest and posttest score for knowledge of the ABCDE rule ($p < .05$).

Conclusions: Educating nursing students about skin self-examination increased their level of knowledge about both skin cancer risks and the ABCDE rule. We believe that this and similar educational programs are an effective way to increase the knowledge and awareness of nurses regarding skin cancer and to improve their attitudes toward performing skin self-examination.

KEY WORDS:
early detection, education, nurse, skin self-examination, student.

Introduction

The incidence of skin cancer in predominantly fair-skinned populations has risen steadily over the last 50 years. Recent reports indicate that this increase has leveled off in North America, Australia, New Zealand, and various European countries (Erdmann et al., 2013). In 2014, skin cancers were the third most common cancer in Turkey, with an incidence of 29.2 per 100,000 in men and 19.1 per 100,000 in women (Gültekin & Boztas, 2014).

Certain types of skin cancer have been associated with skin, hair, and eye color; familial history; the presence of numerous moles; sensitivity to sunlight; and long-term exposure to ultraviolet radiation (Etzkorn et al., 2013). The best way to diagnose skin cancer early is to recognize new skin growths or changes in the skin, especially those that look different from existing moles. Although most nonmelanoma skin cancers develop on sun-exposed parts of the body, many melanomas appear on parts of the body that are normally covered by clothing. Therefore, skin should be examined at regular intervals, and any changes should be evaluated by a physician (Nikolaou & Stratigos, 2014). Because of the increased incidence of melanoma worldwide, adherence to preventive measures such as skin self-examination (SSE) must be improved (Secker, Bergman, & Kukutsch, 2016). Anyone aged 20 years or older should be able to perform SSE easily at home (Arnold & DeJong, 2005). The steps involved in SSE include examination of the front upper body, especially the face and neck, as well as the arms, shoulders, chest, and stomach; the front lower body (the groin/genital region, legs, and feet); and the back of the body, including the back of the neck, upper back, lower back, and legs (Arnold & DeJong, 2005). One study suggested that SSE could reduce melanoma mortality by 63% (Berwick, Oliveria, Luo, Headley, & Bolognia, 2000). Any moles or pigmented spots detected in SSE should be evaluated according to the ABCDE rule.

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which includes the following criteria: Asymmetry, Border, Color, Diameter, and Evolving (American Society for Dermatologic Surgery, 2010).

Community educational campaigns aimed at reducing melanoma mortality rates in North America, Australia, and Europe have had positive impacts on SSE performance (Arnold & DeJong, 2005). Moreover, several studies have revealed that campaigns to raise awareness and encourage SSE facilitate earlier skin cancer detection, which may improve prognosis (Etzkorn et al., 2013; Gordon, 2014; Yagerman & Marghoob, 2013). The goal of primary prevention is to educate the public and healthcare providers to increase skin cancer awareness and reduce risky behaviors (Göl & Erkin, 2018). Secondary prevention promotes early diagnosis using strategies such as SSE and skin screening to reduce mortality and morbidity (Erkin, Ardahan, Temel, & Temel, 2018; Roman, Lugo-Somolinos, & Thomas, 2013).

The role of health professionals in prevention has been highlighted in various studies and guidelines. Educational campaigns conducted by nurses in the community have successfully raised awareness of the risks and early warning signs of skin cancer and of how to perform SSE (Oliveria et al., 2004). Nurses are accepted as more influential sources of information in the community than many other healthcare professionals. Thus, nurses should play a key role in community-based interventions that promote both primary and secondary skin cancer prevention. To this end, nurses should be provided specific education and training on skin cancer prevention to bring this crucial information to the public (Mahon & Yackzan, 2011). In one study, a nurse-led education program on SSE was shown to increase the rate of SSE performance (Berwick et al., 2000). However, nurses have expressed a belief that they do not have sufficient training to enable them to integrate skin cancer detection activities into their practice and stated that they desire more training on this topic (Christos, Oliveria, Mäße, McCormick, & Halpern, 2004).

Nurses contribute to individual, family, and societal health by serving as role models (Özçam et al., 2014; Siegel, 2010). Thus, it is important that nursing students are equipped with adequate knowledge of SSE so that they are prepared to fulfill their roles as public educators and advisers (Erkin et al., 2018).

The purpose of this study was to teach nursing students the risks of skin cancer and the steps involved in SSE to encourage positive attitudes toward skin cancer protection and early detection. In line with this aim, the subaims of this study were to (a) determine the participants' knowledge and attitudes regarding skin cancer risks and the steps involved in SSE, (b) evaluate their changes in knowledge regarding the risks of skin cancer after training, and (c) determine what percentage of the participants were able to perform SSE effectively and accurately.

**Methods**

**Design and Sample**

The study used a quasi-experimental, single-group, pretest/posttest design and was carried out between March and April 2016 in the Faculty of Health Sciences at Mugla Sitki Kocman University in southern Turkey. The study population was composed of all the nursing students at this school (n = 900). To determine the sample size required for covariance analysis, selecting the effect size as 0.25 and the sampling error as 0.05 within a 95% confidence interval, it was calculated that 323 persons would be required to obtain a power of 95%. The G*power 3.1 software program was used to perform all of the related calculations (Faul, Erdfelder, Buchner, & Lang, 2009). The data of all the 332 students who attended the training program, participated in both the pretest and posttest evaluations, and volunteered to participate were used in the analysis (Figure 1).

**Measures**

Data were collected using a questionnaire developed by the researchers based on previous studies (Balyaci, Koştu, & Temel, 2012; Erkin et al., 2018; Koştu, Erkin, & Bayık Temel, 2014). The questionnaire consisted of two sections: The first section (descriptive characteristics) included 13 questions about age, gender, natural hair color, eye color, complexion, number of freckles and moles, skin reaction to ultraviolet radiation, use of tanning beds/solariums, family history of skin cancer, self-perceived skin cancer risk, and whether or not the participant was currently seeing a dermatologist for skin cancer screening. The second section contained another 17 items assessing knowledge of skin cancer risk (eight questions) and knowledge and practice of SSE (nine questions). Knowledge of skin cancer risk was assessed based on their ability to correctly identify the following as risk factors: light skin; light-colored eyes; a blood relative diagnosed with skin cancer; large, brown moles on the body; birthmarks; history of blistering sunburn (even once); using a tanning bed/solarium; and lifetime sun exposure experience. Correct answers received 1 point, and wrong answers received no points, resulting in a possible total score of 0–8, with higher scores indicating better knowledge of skin cancer risks (Balyaci et al., 2012). Knowledge of the SSE ABCDE rule was evaluated using the following questions and expected (correct) answers: “Who should perform a skin self-exam?” (“everyone”), “How frequently should a skin self-exam be performed?” (“once a month”), “Should a full-length mirror be used in skin self-exams?” (“yes, always”), “Should a hand mirror be used in SSE?” (“yes, always”), and “Which parts of the body should be examined in a skin self-exam?” (“every part of the body”). Furthermore, each participant was asked if they had performed SSE and to explain why not if they answered no. These questions were not scored. Content validity (.81) and the Kuder–Richardson value (.85) were calculated for the questionnaire.

**Intervention**

The intervention that was implemented in this study was designed to raise awareness of skin cancer risks and SSE using educational materials including posters and pictures, brochures, a PowerPoint slideshow, and a video (Figure 1).
The posters and pictures contained information about the steps required to perform SSE, skin cancer risks, and early detection. The materials were created based on a guide developed by Friedman, Rigel, and Kopf (1985). The eight-step SSE guide from the Skin Cancer Foundation and pictures illustrating the steps were translated into Turkish and adapted for Turkish cultural settings (Koştu et al., 2014). The guide was pilot tested on 30 students, and its content validity was found to be .98 based on the opinions of nine experts (Koştu et al., 2014) who had backgrounds in medical nursing, public health nursing, fundamentals of nursing, and dermatology (Balyacı et al., 2012).

The handouts used in the program were prepared in line with the literature and distributed to all of the students. This brochure explained how, at what frequency, and by whom SSE should be performed and provided information about the ABCDE rule. The students were then shown an hour-long PowerPoint presentation (in two, 30-minute parts) containing information about the effects of the sun on health, skin problems related to sun exposure, and how to practice SSE. Finally, the 5-minute David Cornfield Melanoma Fund video entitled “Dear 16-Year-Old Me” was sent as a short message by mobile phone to the students.

Data Collection
Data collection was carried out in two stages: pretest and posttest. The students were asked about their descriptive characteristics, self-perceived risk of skin cancer, and knowledge about skin cancer risk and SSE before and after the education intervention. The posttest was conducted 6 weeks after the pretest. Codes assigned to each student at the beginning of the study were used to pair the pretest and posttest questionnaires (Figure 1).

Data Analysis
The data were analyzed using the SPSS 20.0 (IBM, Armonk, NY, USA) program and descriptive statistics, Wilcoxon signed rank test, and covariance analysis. Skewness and kurtosis values showed that the data had a normal distribution, and parametric tests were utilized in their analysis. Asymmetry and kurtosis values between \(-2\) and \(+2\) are considered acceptable to prove normal univariate distribution (Gravetter)

### Figure 1

Data collection and intervention flow of the study. SSE = skin self-examination; ABCDE = asymmetry, border, color, diameter, and evolving.

| Time    | Activity                                                                 |
|---------|--------------------------------------------------------------------------|
| Pretest | Volunteer students participated                                          |
| 1 Week  | Posters/pictures were hung in the restrooms, the cafeteria, and the classrooms, and remained in place for six weeks |
| 2 Week  | PowerPoint presentation (30-minute) containing information about the effect of the sun on health, the skin problems related to sun exposure, and how to practice SSE  
  - One class was organized for up to 80 people for 5 days a week  
  - Totally 368 students joined  
  - Monday \( n = 80 \), Tuesday \( n = 78 \), Wednesday \( n = 70 \), Thursday \( n = 79 \), Friday \( n = 61 \) |
| 3 Week  | PowerPoint presentation (30-minute) containing information about how to practice SSE  
  - One class was organized for up to 80 people for 5 days a week  
  - Totally 346 students joined  
  - Monday \( n = 73 \), Tuesday \( n = 76 \), Wednesday \( n = 68 \), Thursday \( n = 65 \), Friday \( n = 64 \) |
| 4 Week  | The handouts/brochures were given to students which explained how SSE should be performed, at what frequency and by whom, and provided information about the ABCDE rule |
| 5-6 Weeks | 5-minute David Cornfield Melanoma Fund video entitled “Dear 16-Year-Old Me” was sent as a short message by mobile phone to the students |
| Posttest | Volunteer students participated                                          |
A McNemar test was used in pretest comparison of binary variables such as yes–no and true–false. Wilcoxon signed rank test was used to examine the change in knowledge and attitudes in the posttest according to the pretest. The variables in Table 4 were reclassified and then subjected to the Wilcoxon signed rank test. These classifications are as follows: “Who should perform SSE? “(1 = women, 2 = men, 3 = young people, 4 = children, 5 = old people, 6 = all), “How often should SSE be performed?” (1 = every day, 2 = once a week, 3 = every 6 months, 4 = once a year, 5 = once a month), “Using a wall and hand mirror” (1 = no, 2 = sometimes, 3 = yes, always), “Body parts in SSE?” (1 = only the mole regions of the body, 2 = only sun-exposed areas of the body, 3 = all regions of the body), and “Reasons for not performing SSE?” (1 = I do not know, 2 = I’m busy and forget, 3 = I’m afraid of finding something, 4 = I do not believe it is effective, 5 = I do).

In covariance analysis, the pretest was considered as the covariate and seeing the educational material, participating in the program in full (all 6 weeks) or in part, and discussing the educational material with others were considered the main factors. The confidence interval was 95%, and $p < .05$ was considered significant.

### Ethics

Written permission for conducting the study was obtained from the scientific ethics committee (Mugla Sitki Kocman University Ethics Committee Decision No. 159) and the Nursing Department. The participants were informed about the study, and their consent was obtained.

### Results

The participants were 18–23 years old; 67.5% were female ($n = 224$), and 32.5% were male ($n = 108$). In terms of descriptive characteristics, 15.7% had sandy red/blond hair; 10.2% had blue, gray, or light-colored eyes; 36.7% had fair skin; and 42.2% had 1–10 moles. Responses regarding skin cancer family history, screening, and perceived risk indicated that 0.6% of the participants had a blood relative who had been diagnosed with skin cancer, 3.6% of the participants had received physical checkups for skin cancer screening, and 14.5% of the participants believed that they were at risk for skin cancer. Furthermore, 25.0%, 66.7%, and 8.3% of the participants were at low, medium, and high risk, respectively. The descriptive characteristics of the participants are presented in Table 1. The skewness and kurtosis values, which indicate the normal distribution suitability of the data, were between $\pm 2$ and symmetry.

A comparison of the numbers of respondents who responded correctly to the pretest and posttest for their skin cancer risk information and for their protection against skin cancer is presented in Table 2. When skin cancer risk information was examined, the number of participants who gave a correct response of light skin was 278 in the pretest and 298 in the posttest ($\chi^2 = 5.30, p = .021$), the number of correct responders to light eye color was 116 in the pretest and 140 in the posttest ($\chi^2 = 5.08, p = .024$), the number of those who correctly responded to the number of freckles/moles on their body was 304 in the pretest and 326 in the posttest ($\chi^2 = 14.70, p < .001$), the number of participants who gave a correct response for birthmarks was 114 in the pretest and

| Characteristic                                      | $n$  | %    |
|----------------------------------------------------|------|------|
| Natural hair color                                 |      |      |
| Sandy red, blond                                   | 52   | 15.7 |
| Chestnut or dark blond                             | 68   | 20.5 |
| Brown                                              | 118  | 35.5 |
| Black                                               | 94   | 28.3 |
| Eye color                                           |      |      |
| Light                                               | 10   | 3.0  |
| Blue, gray, or green                                | 24   | 7.2  |
| Dark                                                | 130  | 39.2 |
| Brown                                               | 116  | 34.9 |
| Black                                               | 52   | 15.7 |
| Skin color                                          |      |      |
| Reddish                                             | 122  | 36.7 |
| Pale                                                | 56   | 16.9 |
| Beige or olive                                      | 60   | 18.1 |
| Brown                                               | 30   | 9.0  |
| Black                                               | 64   | 19.3 |
| Freckles, moles                                     |      |      |
| $\geq 31$                                           | 13   | 3.9  |
| 11–30                                               | 139  | 41.9 |
| 1–10                                                | 140  | 42.2 |
| None                                                | 40   | 12.0 |
| Skin turns brown                                    |      |      |
| Never                                               | 24   | 7.2  |
| Rarely                                              | 76   | 22.9 |
| Sometimes                                           | 122  | 36.8 |
| Frequently                                          | 82   | 24.7 |
| Always                                              | 28   | 8.4  |
| A blood relative diagnosed with skin cancer         |      |      |
| Yes                                                 | 2    | 0.6  |
| No                                                  | 330  | 99.4 |
| Self-perceived skin cancer risk                     |      |      |
| Yes                                                 | 48   | 14.5 |
| No                                                  | 284  | 85.5 |
| Level of risk ($n = 48)^{a}$                        |      |      |
| Low                                                 | 12   | 25.0 |
| Medium                                              | 32   | 66.7 |
| High                                                | 4    | 8.3  |
| Skin cancer screening: seeing a dermatologist       |      |      |
| Yes                                                 | 12   | 3.6  |
| No                                                  | 320  | 96.4 |

^{a}Participants believed they were at risk for skin cancer.
190 in the posttest ($\chi^2 = 40.17, p < .001$), the number who gave a correct response for blistering sunburn experience was 208 in the pretest and 274 in the posttest ($\chi^2 = 35.80, p < .001$), and the number who gave a correct response to the sun exposure/ultraviolet radiation question was 312 in the pretest and 324 in the posttest ($\chi^2 = 4.32, p = .038$), which all represented statistically significant changes. However, no statistically significant pretest–posttest change was noted for either the number of respondents providing a correct family history of skin cancer (312 vs. 314; $\chi^2 = 0.04, p = .845$) or the number of correct responses to tanning bed/solariums (316 vs. 322; $\chi^2 = 0.12, p = .286$). When the participants were assessed for protection from skin cancer, the number of respondents who correctly answered the knowledge of ABCDE question was only 12 in the pretest and 90 in the posttest ($\chi^2 = 65.87, p < .001$). Furthermore, the number of participants performing SSE significantly increased from 58 in the pretest to 96 in the posttest ($\chi^2 = 22.08, p < .001$; Table 2).

The mean score for recognition of skin cancer risks among the participants with complete program participation was 5.75 ± 1.20 in the pretest and 6.84 ± 1.17 in the posttest (minimum: 0, maximum: 8). In the covariance analysis, the mean pretest scores were used as a covariate and seeing the educational materials, attending the entire program, and discussing the program with friends were accepted as the main factors affecting scores for recognition of skin cancer risks. Posttest scores increased significantly compared with pretest with complete program participation, $F(1, 329) = 6.49, p = .011$ (Table 3). However, seeing the educational materials or discussing them with friends was not associated with significant differences in mean scores for recognition of skin cancer risks, $F(1, 329) = 3.61, p = .058$, and $F(1, 329) = 2.48, p = .116$, respectively (Table 3).

Table 4 shows the distribution of pretest and posttest responses related to knowledge and practices of SSE. The differences in pretest and posttest scores of those participants who reported knowing who should perform SSE (Negative
Ranks = 22.79, \( p = .432 \) and the body parts involved in SSE (Negative Ranks = 17.50, \( p = .066 \)) were not significant. However, significant differences were found between the pretest and posttest scores of participants who reported knowing how often SSE should be performed (Positive Ranks = 101.81, \( p < .001 \)) and knowing to use a wall mirror (Positive Ranks = 48.93, \( p < .001 \)) and a hand mirror (Positive Ranks = 63.52, \( p < .001 \)) in SSE as well as those who reported a reason for not performing SSE (Positive Ranks = 67.90, \( p = .019 \); Table 4).

**Discussion**

In this study, providing SSE education resulted in positive changes in the participants in terms of knowledge of the risks of skin cancer. There were also significant changes between

### TABLE 3.

*Pretest–Posttest Comparison of Mean Scores on Knowledge of Skin Cancer Risks (N = 332)*

| Main Effect                              | n   | Pretest   | Posttest  | df  | Mean Square | F    | p   |
|------------------------------------------|-----|-----------|-----------|-----|-------------|------|-----|
| Seeing the educational materials        | 142 | 5.81      | 1.21      | 6.72| 1.19        | 1    | 5.66|    |
| Not seeing the educational materials    | 190 | 5.97      | 1.21      | 6.41| 1.40        |      |     |    |
| Complete program participation          | 136 | 5.75      | 1.20      | 6.84| 1.17        | 1    | 10.09| .001*|
| Partial program participation           | 196 | 6.09      | 1.21      | 6.40| 1.36        |      |     |    |
| Discussing about the education          | 46  | 5.80      | 1.42      | 6.50| 1.30        | 1    | 3.90| .116 |
| Not discussing about the education      | 286 | 6.50      | 1.15      | 6.60| 1.30        |      |     |    |

Note. The sample size with complete data at baseline and the posttest scores were included in analyses. \( F \) = analysis of covariance.

*\( p < .05 \).*

### TABLE 4.

*Pretest–Posttest Change in Knowledge and Practices of Skin Self-Examination (SSE; N = 332)*

| Variable/Ranks                          | n   | Pretest–Posttest Median | Mean Rank | Sum of Ranks | Z    | p   |
|-----------------------------------------|-----|-------------------------|-----------|--------------|------|-----|
| Who should perform SSE?                 | 14  | 5.75–5.81               | 22.79     | 319.00       | −0.78| .432|
| Negative Ranks                          | 14  | 5.75–5.81               | 22.79     | 319.00       |      |     |
| Positive Ranks                          | 24  | 5.75–5.81               | 17.58     | 422.00       |      |     |
| Ties                                    | 294 |                        |           |              |      |     |
| How often should SSE be performed?      | 68  | 3.71–4.13               | 76.62     | 5,210.00     | −4.61| < .001|
| Negative Ranks                          | 68  | 3.71–4.13               | 76.62     | 5,210.00     |      |     |
| Positive Ranks                          | 116 | 3.71–4.13               | 101.81    | 11,810.00    |      |     |
| Ties                                    | 148 |                        |           |              |      |     |
| Using a wall mirror                     | 20  | 2.56–2.77               | 42.20     | 844.00       | −5.58| < .001|
| Negative Ranks                          | 20  | 2.56–2.77               | 42.20     | 844.00       |      |     |
| Positive Ranks                          | 74  | 2.56–2.77               | 48.93     | 3,621.00     |      |     |
| Ties                                    | 238 |                        |           |              |      |     |
| Using a hand mirror                     | 38  | 2.42–2.59               | 63.45     | 2,411.00     | −4.19| < .001|
| Negative Ranks                          | 38  | 2.42–2.59               | 63.45     | 2,411.00     |      |     |
| Positive Ranks                          | 88  | 2.42–2.59               | 63.52     | 5,590.00     |      |     |
| Ties                                    | 206 |                        |           |              |      |     |
| Body parts in SSE                       | 16  | 2.77–2.92               | 17.50     | 280.00       | −1.84| .066|
| Negative Ranks                          | 16  | 2.77–2.92               | 17.50     | 280.00       |      |     |
| Positive Ranks                          | 12  | 2.77–2.92               | 10.50     | 126.00       |      |     |
| Ties                                    | 304 |                        |           |              |      |     |
| Reasons for not performing SSE          | 20  | 1.84–2.54               | 65.20     | 1,304.00     | −7.24| < .001|
| Negative Ranks                          | 20  | 1.84–2.54               | 65.20     | 1,304.00     |      |     |
| Positive Ranks                          | 114 | 1.84–2.54               | 67.90     | 7,741.00     |      |     |
| Ties                                    | 198 |                        |           |              |      |     |
pretest and posttest in level of knowledge of the ABCDE rule, performance of SSE, accurate knowledge of body parts to be examined in SSE, and awareness of the necessity to use both a full-length mirror and a hand mirror during SSE. These findings indicate that the students learned about skin cancer risk and prevention through the intervention.

At present, nurses play an increasingly significant role in the detection of early-stage skin cancer and in advocating primary and secondary prevention (Lucas, Chung, Marchetti, & Marghoob, 2016; Siegel, 2010). Nurses should be aware of the risk factors and early signs of skin cancer to provide the best patient care (Erkin et al., 2018; Koştu et al., 2014; Lucas et al., 2016; Özçam et al., 2014). More than half of the participants in this study reported that they did not consider themselves at risk for skin cancer. Close to half of the participants said that they had fewer than 10 moles on their bodies. Perceived risk of future skin cancer and awareness of early symptoms of skin cancer have been associated in the literature with willingness to perform SSE (Janda et al., 2004). In this study, more than half of the participants displayed low-to-moderate perceived skin cancer risk, suggesting that they were aware of skin types and skin cancer risks. Furthermore, nurses must be aware of the necessity of taking a detailed patient history to identify those patients who are at a higher risk of developing skin cancer (Gordon, 2014).

The pretest assessment of our study showed that using tanning beds/solariums was the most known skin cancer risk for a large majority of the students, whereas birthmarks were the least known risk. In the posttest assessment, however, the students showed significantly more knowledge of skin cancer risks and were able to recognize more of the risks. A previous study reported a significant and positive relationship between the presence of four or more risk factors and SSE (Arnold & DeJong, 2005). Similarly, another study stated that a personal history and knowledge of the ABCDE criteria for skin cancer protection, they must be thoroughly knowledgeable about these criteria themselves. Before healthcare professionals teach the community about the ABCDE criteria for skin cancer protection, they must be thoroughly knowledgeable about these criteria themselves.

In this study, awareness that a full-length mirror should be used when performing SSE increased between pretest and posttest. Previous studies have found associations between using a mirror, having a partner, and personal risk perceptions and the frequency of performing SSE (Oliveria et al., 2011; Secker et al., 2016). A mirror is important in SSE to check the entire body, especially high-risk areas. It has been reported that the back is the least examined area, despite being the most common location of melanomas (Arnold & DeJong, 2005). Most of the participants in this study knew that SSE should be performed monthly. Another study reported that 77.1% of high-risk individuals had performed SSE at least once during the previous 1-year period and that 14.5% of these individuals did so regularly every month (Secker et al., 2016). In this study, the intervention was found to be effective in teaching the participants how, when, and what to look for during SSE.

There is currently no screening test for detecting skin cancer other than the direct examination of an individual’s skin by a trained professional (Loescher et al., 2013). Both healthcare professionals and laymen have utilized the ABCDE rule widely during the past 30 years (Lucas et al., 2016). This study increased the awareness among participants of the ABCDE rule between pretest and posttest. A previous Turkish study similarly reported that education tools such as posters and photographs helped reduce the proportion of nursing students who did not know the ABCDE rule from 94.5% to 20.9% (Erkin et al., 2018). Approximately 75% of melanomas are either self-detected by patients or detected by a spouse or friend (Berwick et al., 2000; Körner, Coroiu, Martins, & Wang, 2013). Therefore, it is important that individuals know what to look for and what warning signs and skin changes occur so that patients may detect skin cancers themselves. Before healthcare professionals teach the community about the ABCDE criteria for skin cancer protection, they must be thoroughly knowledgeable about these criteria themselves.

In this study, awareness that a full-length mirror should be used when performing SSE increased between pretest and posttest. Previous studies have found associations between using a mirror, having a partner, and personal risk perceptions and the frequency of performing SSE (Oliveria et al., 2011; Secker et al., 2016). A mirror is important in SSE to check the entire body, especially high-risk areas. It has been reported that the back is the least examined area, despite being the most common location of melanomas (Arnold & DeJong, 2005). Most of the participants in this study knew that the entire body must be examined during an SSE. A study conducted in the United States found that only 35.3% of students who reported performing SSE checked their entire body (Arnold & DeJong, 2005). The comparatively higher...
The proportion of participants in this study who knew that all areas of the body must be checked may be related to the fact that the participants were nursing students.

In this study, a relatively high proportion of participants already performed SSE. Moreover, this proportion increased further after the intervention. A previous study reported that 33.2% of university students performed SSE (Arnold & DeJong, 2005). A French study determined that approximately 60% of university students performed SSE at least once a year (Isvy, Beauchet, Saiag, & Mahé, 2013). Another study stated that 22% of Hispanic people performed SSE (Roman et al., 2013). A different Turkish study revealed that, of a group of Turkish university students who knew about SSE ($n = 40$), only 18 students actually practiced it (Uğrulu et al., 2016). The prevalence of SSE among general and high-risk populations is influenced by healthcare-provider-related factors such as physician and nurse recommendations (Loescher et al., 2013). Of particular note, previous studies have shown the positive effects of nursing interventions on SSE performance (Erkin et al., 2018; Oliveria et al., 2004). In a different study of Turkish nursing students, 6.0% performed SSE in the pretest and 42.3% did so in the posttest (Erkin et al., 2018). Another study reported an increase in the rate of SSE performance from 10% to 61% after an intervention (Oliveria et al., 2004). Consistent with the literature, this study further showed the positive effects of an intervention on SSE performance.

The number of participants who cited “not knowing what to look for” as their reason for not performing SSE declined between pretest and posttest. In another study, of the 78% of the participants who stated that they did not perform SSE, 49% stated that it was because they were not told to do so and 29% stated that it was because they did not know what to look for (Roman et al., 2013). Another study of young adults revealed that more than half of the participants did not know what to look for or never thought about performing SSE (Arnold & DeJong, 2005). In this study, the participants being healthcare providers may have made it easier for the intervention to raise awareness about skin cancer and SSE. In addition, encouraging active learning through posters and brochures may have had a positive effect on SSE performance. When health professionals know about self-examinations and practice it themselves, they will be better equipped to advocate for and support positive health-promoting behaviors.

Nurses are not currently considered successful agents in skin cancer prevention (Roebuck et al., 2015). Therefore, nurses should become more familiar with the warning signs and risk factors of skin cancer as well as with SSE to enable them to design and implement public education campaigns (Lucas et al., 2016). This study shows that awareness of skin cancer and SSE skills may be raised easily through nursing education.

**Limitations**

This study had several limitations. One was that the research was conducted at only one institution, which precludes the generalization of the findings. Furthermore, the design and sample selection also represent study limitations. Matching numbers of participants were necessary to compare pretest and posttest results. Therefore, data obtained from those participants who were unable to take either the pretest or the posttest were not included in the analysis. A further limitation is that the results of this study were based on individual self-reporting. Nevertheless, the authors believe that the data collection tool that was used was useful in evaluating SSE education in the context of skin cancer detection. Finally, another limitation was that the SSE education intervention was restricted to the use of posters and images.

**Conclusions**

This study showed that SSE education for the early detection of skin cancer had a positive influence on the knowledge and practices of SSE in the sample of nursing students. Moreover, the education intervention increased knowledge or awareness of the ABCDE rule and of skin cancer risks. Nurses should educate the community regarding skin cancer prevention and early detection and act as role models. If nurses are able to further raise awareness about skin cancer and SSE, they will make a substantial additional contribution to public health. One strategy that may be used to improve skin cancer and SSE counseling among nurses is to use the screening guidelines for skin cancer SSE in primary care settings. Furthermore, nurses should play a more active role in the primary care setting for screening patients and detecting skin cancer at early stages. In addition, nurses should increase their skin-cancer-related knowledge and skills and should specialize in continuing education and dermatology nursing.

**Acknowledgments**

Portions of this article were presented in an oral presentation given at the II. International Graduate Education Congress in Manisa, Turkey, on May 12–14, 2017. The authors acknowledge the cooperation of the university management, teaching staff, and students who participated in this study.

**References**

Arnold, M. R., & DeJong, W. (2005). Skin self-examination practices in

Cite this article as: Erkin, Ö. & Aygün, Ö. (2020). Effects of an education intervention on nursing students’ knowledge and attitudes regarding skin self-examination and skin cancer risks. The Journal of Nursing Research, 28(1), e62. https://doi.org/10.1097/jnr.0000000000000326
a convenience sample of US university students. *Preventive Medicine*, 40(3), 265–273. https://doi.org/10.1016/j.ympmed.2004.05.031

Balyaci, O. E., Koştu, N., & Temel, A. B. (2012). Training program to raise consciousness among adolescents for protection against skin cancer through performance of skin self examination. *Asian Pacific Journal of Cancer Prevention*, 13(10), 5011–5017. https://doi.org/10.7314/APJCP.2012.13.10.5011

Berwick, M., Oliveira, S., Luo, S. T., Headley, A., & Bologna, J. L. (2000). A pilot study using nurse education as an intervention to increase skin self-examination for melanoma. *Journal of Cancer Education*, 15(1), 38–40.

Christos, P. J., Oliveira, S. A., Mässle, L. C., McCormick, L. K., & Halpern, A. C. (2004). Skin cancer prevention and detection by nurses: Attitudes, perceptions, and barriers. *Journal of Cancer Education*, 19(1), 50–57.

Erdmann, F., Lortet-Tieulent, J., Schüz, J., Zeeb, H., Greinert, R., Breitbart, E. W., & Bray, F. (2013). International trends in the incidence of malignant melanoma 1975–2008—Are recent generations at higher or lower risk? *International Journal of Cancer*, 132(2), 385–400. https://doi.org/10.7314/APJCP.2012.13.10.5011

Erkin, Ö., Ardanahan, M., Temel, A. B., & Temel, A. B. (2018). Effects of creating awareness through photographs and posters on skin self-examination in nursing students. *Journal of Cancer Education*, 33(1), 52–58. https://doi.org/10.1007/s13187-016-1037-y

Etzkorn, J. R., Parikh, R. P., Marzban, S. S., Law, K., Davis, A. H., Rawal, B., ... Lien, M. H. (2013). Identifying risk factors using a skin cancer screening program. *Cancer Control*, 20(4), 248–254.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149–1160. https://doi.org/10.3758/BRM.41.4.1149

Friedman, R. J., Rigel, D. S., & Kopf, A. W. (1985). Early detection of malignant-melanoma: The role of physician examination and self-examination of the skin. CA: *A Cancer Journal for Clinicians*, 35(3), 130–151. https://doi.org/10.3322/canjclin.35.3.130

Göl, İ., & Erkin, Ö. (2018). Knowledge and practices of primary care providers on skin cancer and skin self-examination. *Revista da Escola de Enfermagem da USP*, 52, e03359. https://doi.org/10.1590/s1980-220x2017039703359

Gordon, R. (2014). Skin cancer: Increasing awareness and screening in primary care. *The Nurse Practitioner*, 39(5), 48–54. https://doi.org/10.1097/NPN.0000446024.75941-y

Gravetter, F., & Wallnau, L. (2014). *Essentials of statistics for the behavioral sciences* (8th ed.). Belmont, CA: Wadsworth.

Gültekin, M., & Boztaş, G. (2014). *Cancer statistics of Turkey* (p. 43). Ankara, Turkey: Ministry of Health, Public Health Institution of Turkey. (Original work published in Turkish).

Işvy, A., Beaufacht, A., Saiag, P., & Mahé, E. (2013). Medical students and sun protection: Knowledge and behaviours in France. *Journal of the European Academy of Dermatology and Venereology*, 27(2), e247–e251. https://doi.org/10.1111/j.1468-3083.2012.04621.x

Janda, M., Youl, P. H., Lowe, J. B., Elwood, M., Ring, I. T., & Atiken, J. F. (2004). Attitudes and intentions in relation to skin checks for early signs of skin cancer. *Preventive Medicine*, 39(1), 11–18. https://doi.org/10.1016/j.ypmed.2004.02.019

Körner, A., Coroiu, A., Martins, C., & Wang, B. (2013). Predictors of skin self-examination before and after a melanoma diagnosis: The role of medical advice and patient’s level of education. *International Archives of Medicine*, 6(1), 8. https://doi.org/10.1186/1755-7682-6-8

Koştu, N., Erkin, Ö., & Bayk Teme, A. (2014). Turkish validity study of skin self examination. *Dokuz Eylul University Faculty of Medicine, 7(1), 7–11. Retrieved from http://www.deuhyoedergi.org/index.php/DEUHYOED/article/view/38273 (Original work published in Turkish)

Loesch, L. J., Janda, M., Soyer, H. P., Shea, K., & Curiel-Lewandrowski, C. (2013). Advances in skin cancer early detection and diagnosis. *Seminars in Oncology Nursing*, 29(3), 170–181. https://doi.org/10.1016/j.soncn.2013.06.003

Lucas, A. S., Chung, E., Marchetti, M. A., & Marghoob, A. A. (2016). A guide for dermatology nurses to assist in the early detection of skin cancer. *Journal of Nursing Education and Practice*, 6(10), 71–79. https://doi.org/10.5430/jnep.v6n10p71

Mahon, S. M., & Yackzan, S. G. (2011). Skin cancer. In C. H. Yarbro, W. Boesky, L. Garay, J. F. (2004). *Attitudes and intentions in relation to skin checks for early signs of skin cancer*—The patient’s perspective. *Cancer Therapy*, 11, 197–204.

Nikolau, V., & Stratigos, A. J. (2014). Emerging trends in the epidemiology of melanoma. *British Journal of Dermatology*, 170(1), 11–19. https://doi.org/10.1111/bjd.12492

Oliveria, S. A., Dusz, S. W., Phelan, D. L., Ostroff, J. S., Berwick, M., & Halpern, A. C. (2004). Patient adherence to skin self-examination. effect of nurse intervention with photographs. *American Journal of Preventive Medicine*, 26(2), 152–155. https://doi.org/10.1016/j.amepre.2003.10.006

Oliveria, S. A., Heneghan, M. K., Cushman, L. F., Ughetta, E. A., & Halpern, A. C. (2011). Skin cancer screening by dermatologists, family practitioners, and internists: Barriers and facilitating factors. *Archives of Dermatology*, 147(1), 39–44. https://doi.org/10.1001/archdermatol.2010.414

Özgüm, H., Çimen, G., Uzunçakmak, C., Aydin, S., Özcan, T., & Boran, B. (2014). Evaluation of the knowledge, attitude, and behavior of female health workers about breast cancer, cervical cancer, and routine screening test. *Istanbul Medical Journal*, 15(3), 154–160. (Original work published in Turkish).

Roebuck, M., Moran, K., MacDonald, D. A., Shumer, S., & McCabe, R. L. (2015). Assessing skin cancer prevention and detection educational needs: An andragogical approach. *The Journal for Nurse Practitioners*, 11(4), 409–416. https://doi.org/10.1016/j.jnpr.2015.01.036

Roman, C., Lugo-Somolinos, A., & Thomas, N. (2013). Skin cancer knowledge and skin self-examinations in the Hispanic population of North Carolina: The patient’s perspective. *JAMA Dermatology*, 149(1), 103–104. https://doi.org/10.1001/2013.jamadermatol.263

Saitta, P., Cohen, D. E., Rigel, D., Grekin, S. K., & Brancaccio, R. (2011). The frequency of self-skin examination and full body skin examination in dermatologists. *The Journal of Clinical and Aesthetic Dermatology*, 4(6), 20–24.

Secker, L. J., Bergman, W., & Kukutsch, N. A. (2016). Total body photography as an aid to skin self-examination: A patient’s perspective. *Acta Dermato-Venereologica*, 96(2), 186–190. https://doi.org/10.2340/00015555-2228

Siegel, V. (2010). The role of the nurse in skin cancer prevention, screening, and early detection. *Dermatology Nursing*, 22(6), 18–22.

Uğurlu, Z., İşık, S. A., Balanuy, B., Budak, E., Elbaş, N. O., & Kay, S. (2016). Awareness of skin cancer, prevention, and early detection among Turkish university students. *Asia-Pacific Journal of Oncology Nursing*, 3(1), 93–97. https://doi.org/10.4103/2347-5625.170969

Yagerman, S., & Marghoob, A. (2013). Melanoma patient self-detection: A review of efficacy of the skin self-examination and patient-directed educational efforts. *Expert Review of Anticancer Therapy*, 13(12), 1423–1431. https://doi.org/10.1586/14737140.2013.856272