FEATURE ARTICLE

CE 1.5 Contact Hours

Assessing Knowledge, Attitudes, and Behaviors Regarding Sun Safety in Female Collegiate Athletes

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ABSTRACT: Across the United States, there is a rising incidence of melanoma in the adolescent and young adult population. Collegiate athletes are at an increased risk of skin cancer because of prolonged, frequent exposure to ultraviolet radiation. The aim of this quantitative study was to evaluate an improvement in knowledge, attitudes, and sun safety behaviors after an educational intervention for female collegiate athletes (N = 81). Data collection occurred in three phases: a pretest was issued before the face-to-face educational intervention and a posttest was issued immediately after the intervention. A final posttest was distributed 3 months after the intervention. After an educational intervention, the collegiate athletes showed an increase in knowledge and an improvement in attitudes and behaviors. The difference in knowledge between the pretest and the posttest was statistically significant ($p < .000$). The increase in knowledge at the final posttest was also statistically significant ($p < .000$). After an educational intervention, female collegiate athletes experienced an improvement in knowledge, attitudes, and sun safety behaviors. Establishing routine sun safety education may potentially reduce the risk of melanoma in this vulnerable population.

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As the incidence of melanoma continues to rise in the United States, healthcare providers seek the most cost-effective, preventative measures to reduce morbidity and mortality. Melanoma is the most common form of cancer in young adults aged 25–29 years and is the second most common form of cancer in adolescents and young adults aged 15–29 years (Diao & Lee, 2013; DiStefano, Sincek, & Stieler, 2014). The rate of melanoma has been steadily increasing for the past 30 years, and researchers project the rate increase to continue (Bandi, Cokkinides, Weinstock, & Ward, 2010). The rising incidence of skin cancer correlates to infrequent clinical counseling and examinations as well as poor implementation of sun protective behaviors (Bagatti, Englert, & Cline, 2016). Evidence-based research has shown that behavioral counseling and routine inspections during young adulthood may reduce the incidence of melanoma in later years. The United States Preventive Services Task Force clinical guidelines published in 2011 recommend behavioral counseling targeted to specific groups, such as appearance-focused educational counseling in young adults specifically female collegiate athletes (Hobbs, Nahar, Ford, Bass, & Brodell, 2014; Lin, Eder, & Weinmann, 2011).

PROBLEM

The problem is the knowledge deficit in the collegiate athlete population regarding sun safety practices as well as the rising incidence of melanoma in young adults (Bagatti et al., 2016; Diao & Lee, 2013; DiStefano et al., 2014). Collegiate athletes have limited knowledge of their risk for melanoma, sun protective behaviors, and harm from ultraviolet radiation (Bagatti et al., 2016). Inadequate and infrequent education from healthcare providers and athletic trainers may contribute to inadequate knowledge of skin cancer

and poor sun safety practices (Hobbs et al., 2014; Lin et al., 2011). Protective behaviors such as properly applying sunscreen, seeking shade, and wearing protective clothing have increased in use over time, but the prevalence of sunburns remains high in young female adults (Julian, Palestro, & Thomas, 2015). Without frequent education and promotion of sun safety behaviors, female collegiate athletes will continue to experience irreversible skin damage, including premature aging and skin cancer (Haluza, Simic, Holtge, Cervinka, & Moshammer, 2014). Establishing routine education has the potential to reduce the incidence of melanoma by improving knowledge and sun protective behaviors (Lin et al., 2011).

CLINICAL QUESTION

This evidence-based study aimed to answer the following question: In female collegiate athletes, does an educational intervention lead to an increase in knowledge, attitudes, behaviors, and improvement in sun protective behaviors? The problem is the lack of knowledge regarding melanoma risk, sun protective behaviors, and harm related to ultraviolet radiation exposure. In addition, the attitudes related to sun protection and tanning illustrate a great knowledge deficit in young female adults (Schüz & Eid, 2013).

Knowledge regarding sun protective behaviors and identification of abnormal lesions enhances safety, promotes skin cancer prevention, and may potentially reduce the incidence of melanoma in later years (Bagatti et al., 2016; DiStefano et al., 2014; Hobbs et al., 2014; Lin et al., 2011). Multiple studies have shown the positive effects of tailored, behavioral counseling in the female collegiate athlete population (Buller et al., 2006; Lin et al., 2011; Schüz & Eid, 2013). The evidence attributes the desire to tan to the feeling of attractiveness and lack of education regarding sun safety education (Lin et al., 2011). When young adults visualized the effects of sun damage such as wrinkles, sunspots, and melanoma, indoor tanning as well as other negative behaviors decreased by 33% (Schüz & Eid, 2013). Routine sun safety education has been shown to positively influence risk perception and sun safety behaviors (Buller et al., 2006; Lin et al., 2011; Schüz & Eid, 2013). Implementing routine education for collegiate athletes may effectively promote sun protective behaviors.

SIGNIFICANCE

According to the Centers for Disease Control and Prevention (2014), approximately 65% of young adults aged 18–29 years experience sunburn each year; collegiate athletes average 1,000 hours of unprotected sun exposure every year (Bagatti et al., 2016). In a study assessing knowledge related to melanoma risk, only 20% of collegiate athletes understood the risk of prolonged, unprotected exposure such as sunburn or skin cancer (Bagatti et al., 2016). Another study revealed that 85% of athletes do not apply sunscreen before practice or games (Hobbs et al., 2014). This evidence-based study aimed to improve sun protective behaviors and to increase knowledge of skin cancer in collegiate athletes.

METHODOLOGY

Population

Young adults are the most vulnerable population—specifically female collegiate athletes—because of prolonged sun exposure to ultraviolet radiation (U.S. Preventative Services Task Force, 2016). According to Bagatti et al. (2016), collegiate athletes spend at least 4 hours outdoors per day over a 10-month period, which equates to about 1,000 hours of sun exposure per year. In one study of 343 collegiate athletes, only 20.7% understood the risks of unprotected sun exposure such as risk of melanoma (Bagatti et al., 2016). The population in this study included the University of North Carolina at Charlotte female collegiate athletes from the following fall athletic teams: track, cross-country, tennis, softball, and soccer. These five athletic teams practice for approximately 10–14 hours every week in the sun. The athletes compete outdoors without adequate shade, which increases their risk for skin cancer. Furthermore, cross-country, soccer, track, and tennis athletes wear minimal clothing when competing; the amount of exposed skin, in addition to the time outdoors, increases the risk of sun damage (Bagatti et al., 2016; Hobbs et al., 2014). Because of the numerous hours spent outdoors with minimal sun protection, female collegiate athletes are at an increased risk for developing skin cancer.

Setting

The setting of this study is the University of North Carolina at Charlotte Department of Athletics. The University of North Carolina at Charlotte's athletic teams compete in Conference USA and on the National Collegiate Athletic Association (NCAA) Division I level. Within the athletic department, there are 17 sports teams including men's and women's soccer, men's baseball, men's football, men's and women's track, men's and women's cross-country, men's and women's golf, men's and women's tennis, softball, and volleyball.

Measurement Tools

A hard-copy pretest and posttest was issued to the female collegiate athletes to measure the efficacy of the evidence-based educational presentation. The pretest gauged the athletes' knowledge, attitudes, and behaviors regarding sun safety before the educational intervention at the beginning of the fall season. Questions also determine knowledge of melanoma risk (Appendix A).

The first posttest (Appendix B), identical to the pretest, was issued immediately after the educational intervention to determine the efficacy of the education. At the end of the fall season, the athletes were given the posttest (Appendix C)

to evaluate a change in behaviors. The measurement tools were designed by the primary investigator and were modified versions of the Melanoma Risk Behavior Survey (Cottrell, McClamroch, & Bernard, 2005). The pretest and posttest were reviewed for validity and reliability.

Intervention

During the summer of 2016, the athletes participated in a pretest and posttest and a face-to-face 15-minute educational presentation. This educational intervention was conducted in the Athletic Department at the University of North Carolina at Charlotte in a classroom setting. The hard-copy pretest and posttest assessed current attitudes and practices relating to sun safety (Appendices A and B). Approval from the University of North Carolina at Charlotte Institutional Review Board was obtained before implementation of the educational intervention. Written informed consents were also obtained from each athlete before implementation.

Subsequently, athletes participated in an evidence-based, 15-minute educational presentation. The education was conducted via PowerPoint presentation. The content of the presentation included the following topics: (a) definition of basal cell carcinoma, squamous cell carcinoma, and melanoma; (b) the dangers of unprotected sun exposure such as premature aging and skin cancer; (c) appropriate sunscreen application; (d) assessment of individual risk factors for melanoma; (e) myths regarding tanning behaviors and sunscreen use; and (f) role of athletic trainer and healthcare providers in promoting sun safety. For numerous hours each day, athletes expose themselves to harmful ultraviolet radiation without basic knowledge of the harmful implications (Bagatti et al., 2016; Diao & Lee, 2013; Hobbs et al., 2014). The education emphasized that routine sun safety education, in addition to sun protective measures—specifically sunscreen use—and annual clinical examinations can minimize collegiate athletes' risk for developing sun damage. Furthermore, encouraging sunscreen use during practices provides an opportunity to routinely educate athletes on sun protective behaviors (Hobbs et al., 2014; Wickenheiser, Baker, Gaber, Blatt, & Robinson, 2013). Sunscreen was distributed to the trainers of the five collegiate teams to encourage sunscreen use; in addition, trainers were educated on the frequency of application.

At the conclusion of the season, the posttest was distributed to the athletes to evaluate the effectiveness of the intervention in improving attitudes and adherence to sun protective behaviors. The goal of routine sun safety education is to eradicate the current negative tanning behaviors and replace them with positive sun protective behaviors. Changing the culture of sun exposure and tanning behaviors at the team level is critical to increasing sun protective behaviors and, potentially, reducing the incidence of melanoma.

Data Collection

Comparative statistics evaluated the outcomes of the sun safety education. Specifically, descriptive, frequency, and paired *t*-test analyses compared the athletes' knowledge, attitudes, and behaviors regarding sun safety preintervention and postintervention. The independent variable was the educational intervention. The dependent variable was a change in behavior in the same group of individuals before and after intervention. Nominal- and ordinal-level data were used to determine change in behaviors versus no change in behaviors.

Confidentiality

The athletes' demographical information and responses were anonymous. Numerical coding was used to ensure anonymity. Pretests and posttests were stored in a locked cabinet at the residence of the primary investigator. The only researcher with access to the files was the primary investigator. After statistical analysis, the pretests and the posttests were shredded to ensure the athletes' opinions and identities remain anonymous.

RESULTS

Demographics

The study sample consisted of 81 female collegiate athletes at the University of North Carolina at Charlotte. All athletes willingly participated in the study; there were no declinations. The athletes' ages range from 18 to 25 years; most athletes are between the ages of 18 and 20 years (80.2%), followed by 21–23 years (18%) and female athletes older than 23 years (1%). Of the 81 study participants, 33.3% compete in track, 29.6% compete in soccer, 19.8% compete in softball, 11.1% compete in tennis, and 6.2% compete in cross-country. Regarding the hours spent practicing outdoors, 61.1% of female collegiate athletes practice outdoors for greater than 10 hours per week. Furthermore, 33.3% of athletes practice outdoors 5–10 hours per week, and 3.7% of athletes practice outdoors less than 5 hours per week. Most study participants have olive-toned skin (48.1%), whereas 25.9% of study participants are fair-skinned, and 25.9% are dark-skinned. Ethnicity was specifically included to determine if there is a difference in knowledge, attitudes, and behaviors among athletes of different races. Ethnicity will be the primary focus of future studies.

Knowledge

To evaluate an improvement in knowledge, attitudes, and behaviors regarding sun safety, a paired *t*-test analysis was used to compare the pretest, which evaluated baseline knowledge, with the first posttest, which evaluated the efficacy of the educational intervention. The pretest and the posttest were composed of 26 identical questions to evaluate the efficacy of the education. The final posttest was composed of 19 questions to evaluate a knowledge and behavior change. Compared with the pretest, the first

TABLE 1. Pretest and Posttest Comparison

Paired-Samples Statistics

		Mean	*N*	*SD*	*SEM*
Pair 1	pre_know	11.8765	81	2.29337	0.25482
	post_know	14.6667	81	1.83030	0.20337

Paired-Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	*SD*	*SEM*	Lower	Upper	*t*	*df*	Sig. (two-tailed)
Pair 1	pre_know - post_know	−2.79012	1.64861	0.18318	−3.15466	−2.42559	−15.232	80	.000

posttest showed an increase in knowledge after an educational intervention (Table 1). The mean number of correct answers increased from 11.8765 (preintervention) to 14.6667 (postintervention). The paired *t*-test analysis that compared the pretest and the posttest was statistically significant ($t = 15.232$, $p = .000$).

At the conclusion of the season, the final posttest evaluated change in behavior as well as the level of knowledge 3 months after the educational intervention (Table 2). Compared with the initial test, the final test showed an increase in knowledge. The mean number of correct answers increased from 7.2346 (preintervention) to 9.5185 (final posttest). The paired *t*-test analysis that compared the pretest with the final posttest was statistically significant ($t = 14.366$, $p = .000$).

To identify a difference in knowledge 3 months after the educational intervention, a paired *t*-test analysis compared the initial posttest with the final posttest (Table 3). The mean number of correct answers on the posttest (9.8025) and the final posttest (9.5185) remained the same, showing no meaningful difference. The paired *t*-test analysis that compared the posttest with the final posttest was not statistically significant ($t = 1.889$, $p = .063$).

The data analysis assessed the knowledge of the 81 individual athletes before intervention, postintervention, and at 3 months postintervention. When comparing the cross-country, track, tennis, soccer, and softball teams, there was minimal difference. The mean number of correct answers for the cross-country team was 7.4000 (pretest), 10.2000 (posttest), and 9.8000 (final posttest). The mean number of correct answers for the softball team was 6.8750 (pretest), 9.2500 (posttest), and 9.3125 (final posttest). The mean number of correct answers for the tennis team was 6.1111 (pretest), 8.6667 (posttest), and 8.6667 (final posttest). The mean number of correct answers for the track team was 8.0741 (pretest), 10.3704 (posttest), and 9.9259 (final posttest). The mean number of correct answers for the soccer team was 6.9167 (pretest), 9.8750 (posttest), and 9.4583 (final posttest). The mean number of answers for the pretest, posttest, and final posttest showed

TABLE 2. Pretest and Final Posttest Comparison

Paired-Samples Statistics

		Mean	*N*	*SD*	*SEM*
Pair 1	pre_final	7.2346	81	1.37178	0.15242
	final	9.5185	81	1.23603	0.13734

Paired-Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	*SD*	*SEM*	Lower	Upper	*t*	*df*	Sig. (two-tailed)
Pair 1	pre_final - final	−2.28395	1.43383	0.15931	−2.60100	−1.96691	−14.336	80	.000

TABLE 3. Posttest and Final Posttest Comparison

Paired-Samples Statistics

		Mean	*N*	*SD*	*SEM*
Pair 1	post_final	9.8025	81	1.23915	0.13768
	final	9.5185	81	1.23603	0.13734

Paired-Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	*SD*	*SEM*	Lower	Upper	*t*	*df*	Sig. (two-tailed)
Pair 1	post_final - final	0.28395	1.35309	0.15034	−.01524	.58314	1.889	80	.063

no difference in knowledge between the five female collegiate athletic teams. The comparison illustrated the decline in correct responses from the posttest to the 3-month final posttest. The athletes were more knowledgeable than before the educational intervention, but reinforcing the education throughout the season may be required for sustained change.

BEHAVIORS

In the final posttest, five questions were included to assess a positive change in behavior after an educational intervention. The objective was to identify improved sun protective behaviors as well as improved attitudes toward sun safety practices. The first question was "Did you apply sunscreen more often?" The responses were coded as 1 = *yes* and 2 = *no*. When the five female collegiate teams were asked if they applied sunscreen more often, 79.1% replied "yes," whereas 21% replied "no." The results indicate an improvement in sun safety behaviors such as applying sunscreen more often after the educational intervention (Figure 1).

The second question was "If [you applied sunscreen more often], how often did you apply?" The measure was composed of a 4-point interval scale (1 = *every 2–3 hours*, 2 = *every 4–6 hours*, 3 = *every 6–8 hours*, and 4 = *never*). The results illustrated an increased frequency of sunscreen application. According to the findings, 35.8% applied sunscreen every 2–3 hours, 29.6% applied sunscreen every 6–8 hours, 19.8% applied sunscreen every 4–6 hours, and 14.8% never applied sunscreen (Figure 2).

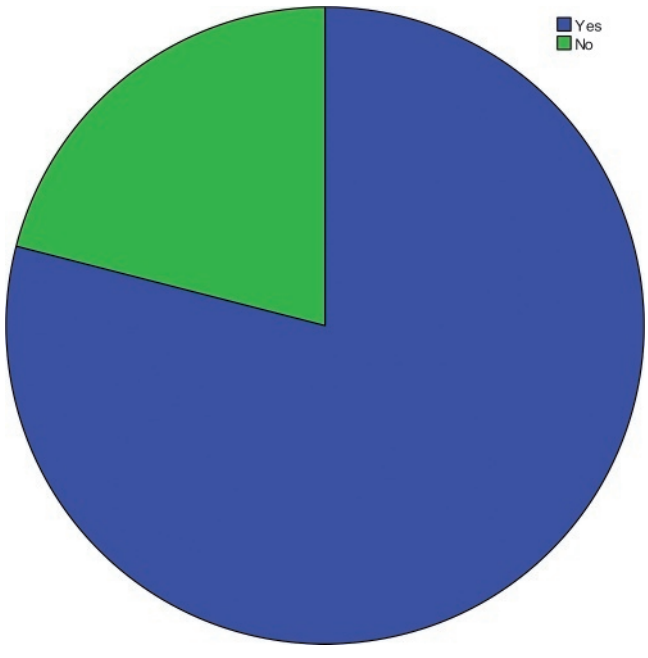

FIGURE 1 Did you apply sunscreen more often?

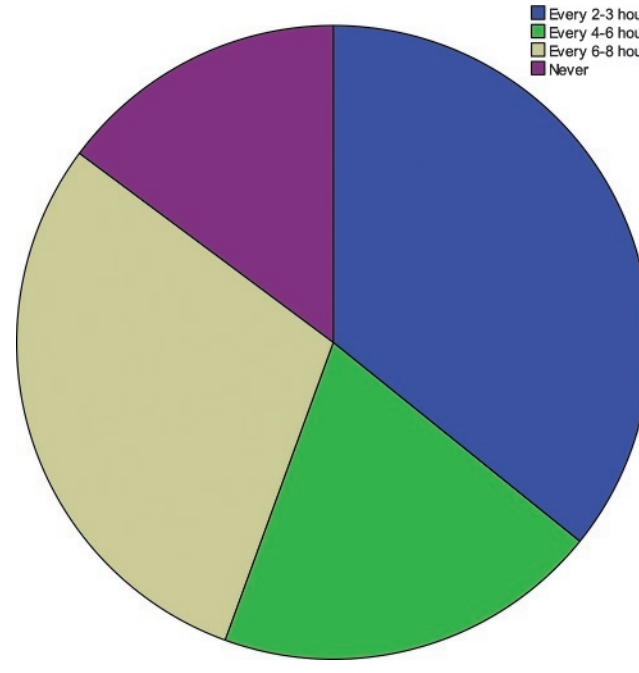

FIGURE 2 How often did you apply sunscreen?

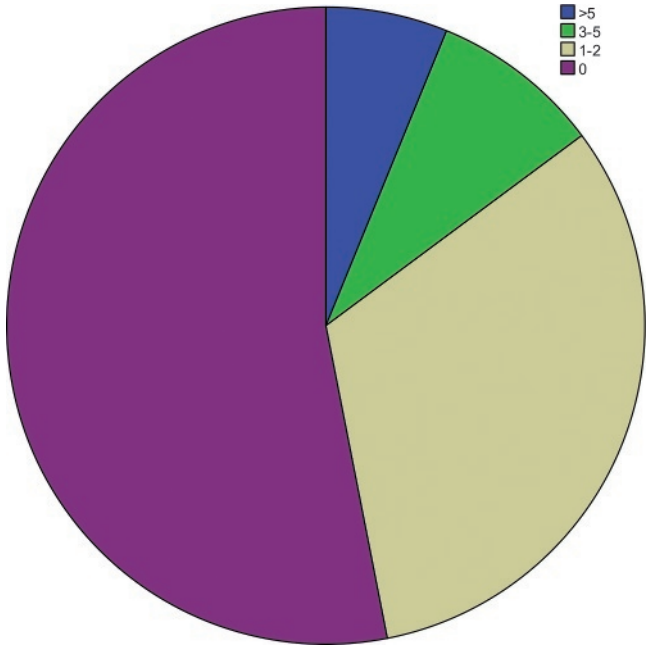

FIGURE 3 Number of sunburns.

The third question asked the female collegiate athletes to quantify the number of sunburns they experienced during the season after the educational intervention (Figure 3). The results indicate fewer sunburns experienced throughout the season. The measure was composed of a 4-point interval scale (1 = *>5*, 2 = *3–4*, 3 = *1–2*, and 4 = *0*). According to the data analysis, 53.1% of athletes never experienced sunburn, 32.1% of athletes experienced 1–2 sunburns, 8.6% experienced 3–4 sunburns, and 6.2% experienced >5 sunburns during the fall athletic season.

The fourth question assessed whether the athletes would continue to apply sunscreen in subsequent seasons (Figure 4). The responses were coded as 1 = *yes* and 2 = *no*. According to the findings, 91.4% responded "yes," whereas 8.6% responded "no." The results illustrate a commitment to applying sunscreen and practicing sun protective behaviors in the following athletic seasons.

The fifth question asked: "How likely are you to continue sun protective behaviors?" The measure was composed of a 4-point interval scale (1 = *always likely to continue practicing sun protective behaviors*, 2 = *more likely to continue practicing sun protective behaviors*, 3 = *less likely to continue practicing sun protective behaviors*, and 4 = *never practice sun protective behaviors*). According to the findings, 67.9% are more likely to continue practicing sun protective behaviors, 30.9% are always likely to continue practicing sun protective behaviors, and 1.2% will never practice sun protective behaviors. None of the athletes responded with "less likely to continue practicing sun safety behaviors." The responses indicate a positive attitude and behavior change after the educational intervention. As a result of the educational intervention, most of the 81 female collegiate athletes will continue to apply sunscreen and are more likely to continue practicing sun protective behaviors (Figure 5).

DISCUSSION

Strengths

Strengths of the study include the conciseness of the educational intervention. The targeted population is female collegiate athletes or young adults ranging from 18 to 24

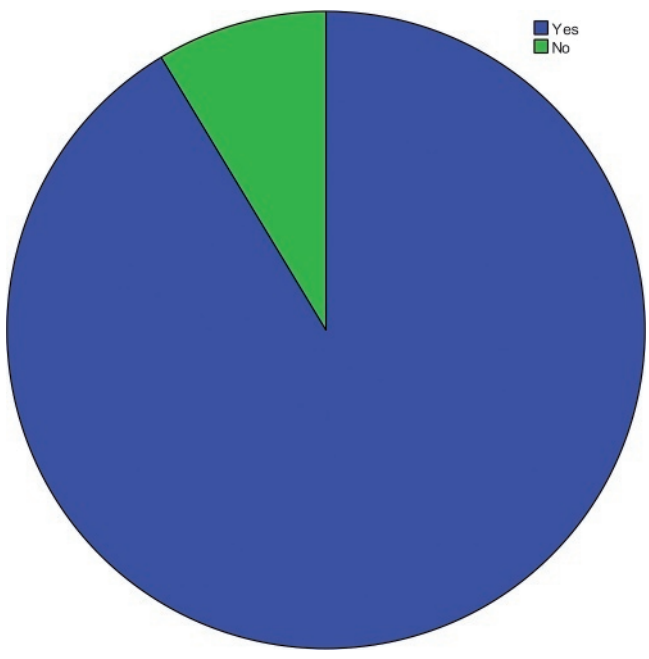

FIGURE 4 Will you continue to apply sunscreen.

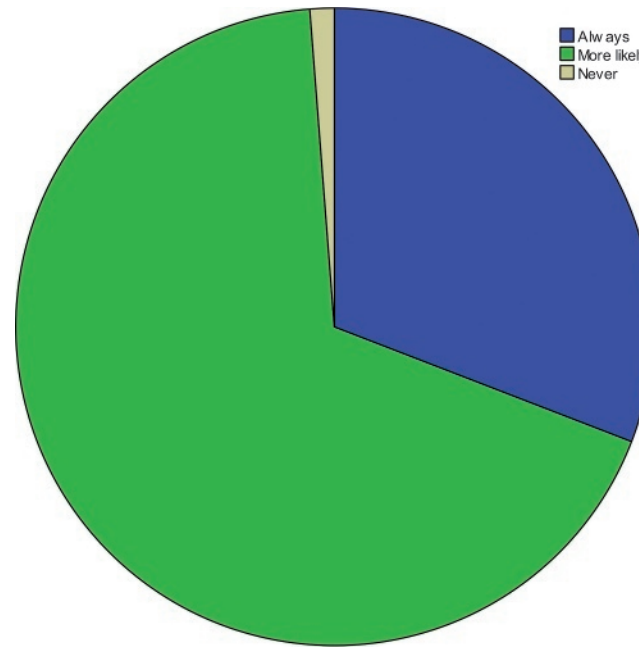

FIGURE 5 How likely are you to continue sun protective behaviors?

years old. The intervention, pretest, and posttest were designed to be informative as well as concise to promote learning and to retain the attention of the population. The pretest and first posttest included 26 questions, whereas the final test included 19 questions; the educational intervention was 15 minutes in length, which was enough time to appropriately educate the athletes without losing their attention (Bradbury, 2016).

Furthermore, the use of visual imagery was a strength. Consistent with the findings of previous studies, the female athletes positively responded to various images of the potential harms related to repeated, excessive sun exposure (Lin et al., 2011; Schüz & Eid, 2013). Because of the American, westernized culture, young adults perceive tanned skin as beautiful (Haluza & Cervinka, 2013). Images of bronzed women grace the cover of popular magazines; however, the advertisements do not reveal the consequences of repeated exposure to ultraviolet radiation (Sare & Ogilvie, 2010; Schneider et al., 2013). Visual images of premature aging, sunspots, wrinkles, basal cell carcinoma, squamous cell carcinoma, and melanoma were included to illustrate the damage of long-term sun exposure. During the educational presentation, the female athletes began examining one another and looking at lesions on their own skin. One athlete with a suspicious lesion made an appointment with the team physician immediately after the presentation. The female athletes positively responded to the visual images and reported an increased frequency of sun protective behaviors at the conclusion of the season.

Sunscreen distribution increased the likelihood for success of the study's primary objectives—to increase the frequency of sun protective behaviors and positively influence behaviors to reduce the incidence of skin cancer. Without sunscreen, the athletes would be less likely to adopt sun safety behaviors. Athletes are less likely to apply sunscreen; reasons include sunscreen interference during games, forgetting to apply sunscreen, and the desire to achieve a tan (Wickenheiser et al., 2013). Because the accessibility of sunscreen was a perceived barrier, sunscreen was provided (Wickenheiser et al., 2013). At the conclusion of the season, the athletic trainers stated that the athletes would not have applied sunscreen had it not been provided for locker room use. The availability of sunscreen was essential to achieving positive outcomes. Finally, the University of North Carolina Athletic Department voiced enthusiasm for the study and ensured complete access to the athletes. Their willingness to participate in the study was a valuable strength.

Limitations

A primary limitation of the study included the size of the study sample. The athletes were female and were composed of a white majority, limiting the understanding of the efficacy of sun safety education among minorities. Multiple African American athletes discussed a desire to learn more about their risk for skin cancer, as they believed they could not develop skin cancer. Furthermore, the association of tanning with beauty was a barrier to change. After the sun safety education, a portion of the young female athletes still believed that tanning improves one's appearance as well as their overall health.

Other limitations included the uncertainty of the trainer's role in the study's implementation. Trainers were not present for the educational intervention; by not fully understanding the purpose of the study, the trainers were less likely to encourage sunscreen use during practices and competitions. Finally, the time of day was a barrier to the implementation. Because of scheduling conflicts, the education occurred either in the early morning or immediately after practices. The athletes exhibited exhaustion and an inability to remain alert for the duration of the education.

Implications

Implications for future research include a larger sampling of study participants that include males and females. Future studies could also widen the search criteria to include a more diverse population of collegiate athletes, including males and different ethnicities. In addition, the study would provide greater knowledge of attitudes and behaviors among collegiate athletes if the study sample included athletes from multiple universities. To identify a reduction of melanoma in the collegiate athlete population, future research could follow the athletes for more than 20 years after the implementation of sun safety education.

In addition, future research could focus on the difference in knowledge, attitudes, and behaviors among athletes of diverse ethnicities. A misconception among the collegiate athletes in this study was concerning the population at risk for developing melanoma. Athletes with fair skin were the primary population believed to be at risk. Athletes with dark skin, for example, stated that they did not need to apply sunscreen. Future studies could focus on educating non-white athletes on their personal risk for melanoma.

Another implication for future research is trainer education. Trainers and coaching staff are essential to the success of a sun safety program. The athletic training staff is present at each practice and competition to optimize the athletes' safety and health. By creating an annual educational program for trainers, the collegiate athletic teams will be continuously educated and reminded to practice sun safety through the entire season.

Implications for clinical practice include the implementation of frequent sun safety education as well as annual clinical examinations. Because of the positive response to the sun safety education, clinicians and athletic departments could establish annual education for the collegiate athletes and athletic trainers. Routine education may effectively reduce the incidence of melanoma in the collegiate athlete population (Bagatti et al., 2016; Buller et al., 2006; Lin et al., 2011; Sattler et al., 2014; Schüz & Eid, 2013).

Summary

A significant problem is the knowledge deficit in the collegiate athlete population regarding sun safety practices and, subsequently, the rising incidence of melanoma in young adults (Bagatti et al., 2016; Diao & Lee, 2013; DiStefano et al., 2014). Collegiate athletes have limited knowledge of their risk for melanoma, sun protective behaviors, and harm from ultraviolet radiation (Bagatti et al., 2016). Inadequate and infrequent education from healthcare providers and athletic trainers results in poor sun safety practices (Bagatti et al., 2016; Hobbs et al., 2014; Lin et al., 2011).

Protective behaviors such as applying sunscreen, seeking shade, and wearing protective clothing are essential to reducing the incidence of melanoma and sun damage (Bagatti et al., 2016; Cleary et al., 2014; Hobbs et al., 2014; Wood, 2011). Without frequent education and promotion of sun safety behaviors, female collegiate athletes will continue to experience irreversible skin damage, including premature aging and skin cancer. Focus on health promotion education is essential to ensuring female collegiate athletes remain safe and protected (Bagatti et al., 2016; Lin et al., 2011; Schüz & Eid, 2013).

RECOMMENDATIONS

Recommendations from previous studies include the development of NCAA guidelines that are specific to each sport and the amount of sun exposure athletes receive during play. For example, minimizing practice times during times of intense radiation (10 A.M.–4 P.M.) may reduce risk of sun damage (Wood, 2011). Sun safety education and annual dermatologic screening before the start of the season may reduce an athlete's risk for developing skin cancer (Jinna & Adams, 2013).

In addition, ensuring funds for sunscreen as well as permissible protective gear such as sunglasses is essential for each collegiate athletic program. Athletic departments may issue sunscreen to athletic trainers for use during practices and competitions, which may encourage the athletes to increase their frequency of application (Hobbs et al., 2014; Wickenheiser et al., 2013). Application of sunscreen in addition to other positive sun safety behaviors may become a positive behavior change for the team as a unit. The implications of this study may extend to other universities as well as high schools.

CONCLUSION

For the past several decades, the incidence of melanoma has steadily increased in the adolescent and young adult population (Diao & Lee, 2013; Hobbs et al., 2014). Collegiate athletes are at an increased risk of melanoma and premature aging because of frequent, prolonged exposure to ultraviolet radiation during practices and competitions (Bagatti et al., 2016; Hobbs et al., 2014). After an educational intervention, the female collegiate athletes experienced an increase in knowledge, attitudes, and sun protective behaviors. The implementation of routine sun safety education may improve sun safety behaviors and reduce the risk of melanoma in this vulnerable population of female collegiate athletes (Bagatti et al., 2016; Schüz & Eid, 2013). ■

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For another continuing education article related to sun protective behaviors, go to NursingCenter.com/CE.

APPENDIX A. Pretest: Assessing Attitudes, Behaviors, and Knowledge Regarding Sun Safety in

Female Collegiate Athletes
Please select one answer for each of the following questions:

Demographical Information

1. Age:
   A. 18–20
   B. 21–23
   C. >23
2. Sport:
   A. Cross-country
   B. Track
   C. Soccer
   D. Tennis
   E. Softball
3. Number of hours per week that you practice outdoors:
   A. <5
   B. 5–10
   C. >10
4. Skin type:
   A. Fair
   B. Olive
   C. Dark
5. Tanning improves one's appearance.
   A. True
   B. False
6. A nice tan makes me feel healthy.
   A. True
   B. False
7. Self-skin examinations decrease my risk for melanoma.
   A. True
   B. False
8. Sunscreen use decreases my risk for skin cancer.
   A. True
   B. False
9. Sunscreen is only effective during the summer when it is most hot.
   A. True
   B. False
10. Only people with pale/fair skin should worry about skin cancer.
    A. True
    B. False
11. All people should practice sun safety behaviors, such as wearing hats and applying sunscreen.
    A. True
    B. False
12. I believe that I practice good sun safety behaviors.
    A. True
    B. False
13. I believe that I should improve my sun safety behaviors.
    A. True
    B. False
14. What is the most common form of skin cancer?
    A. Basal cell carcinoma
    B. Squamous cell carcinoma
    C. Melanoma
    D. Kaposi's sarcoma
    E. Actinic keratosis
15. What is the most dangerous form of cancer?
    A. Basal cell carcinoma
    B. Squamous cell carcinoma
    C. Melanoma
    D. Kaposi's sarcoma
    E. Actinic keratosis
16. What age group is most affected by skin cancer?
    A. Children
    B. Adolescents (13–18)
    C. Young adults (18–29)
    D. Adults (30–65)
    E. Older adults (>65)
17. What factors increase your risk for skin cancer? (Select all that apply)
    A. Fair skin
    B. Family history of skin cancer
    C. Ultraviolet radiation exposure
    D. Age
    E. Gender
18. Do you apply sunscreen before practice or games?
    A. Yes
    B. No
19. If so, how often do you apply?
    A. Every 2–3 hours
    B. Every 4–6 hours
    C. Every 6–8 hours
    D. Never
20. Do you reapply sunscreen during practice/games?
    A. Yes
    B. No
21. How often should you reapply sunscreen?
    A. Every 2–3 hours
    B. Every 4–6 hours
    C. Every 6–8 hours
    D. Never

22. How often does your sport practice outdoors between 10 A.M. and 2 P.M.?
    A. Daily
    B. 5–6 days per week
    C. 3–4 days per week
    D. 1–2 days per week
    E. Never
23. How often do you visit a dermatologist for skin examinations?
    A. Annually
    B. Every 1–3 years
    C. Every 5 years
    D. Never
24. Lifetime number of sunburns
    A. None
    B. 1–5
    C. 5–19
    D. >20
25. Do you use tanning beds?
    A. Ever
    B. Never
26. How often do you apply sunscreen before or during practice or games?
    A. Always
    B. Sometimes
    C. Rarely
    D. Never

APPENDIX B. Posttest 1: Assessing Attitudes, Behaviors, and Knowledge Regarding Sun Safety in Female Collegiate Athletes

Please select one answer for each of the following questions:

Demographical Information:

1. Age:
   A. 18–20
   B. 21–23
   C. >23
2. Sport:
   A. Cross-country
   B. Track
   C. Soccer
   D. Tennis
   E. Softball
3. Number of hours per week that you practice outdoors:
   A. <5
   B. 5–10
   C. >10
4. Skin type:
   A. Fair
   B. Olive
   C. Dark
5. Tanning improves one's appearance.
   A. True
   B. False
6. A nice tan makes me feel healthy.
   A. True
   B. False
7. Self-skin examinations decrease my risk for melanoma.
   A. True
   B. False
8. Sunscreen use decreases my risk for skin cancer.
   A. True
   B. False
9. Sunscreen is only effective during the summer when it is most hot.
   A. True
   B. False
10. Only people with pale/fair skin should worry about skin cancer.
    A. True
    B. False
11. All people should practice sun safety behaviors, such as wearing hats and applying sunscreen.
    A. True
    B. False
12. I believe that I practice good sun safety behaviors.
    A. True
    B. False
13. I believe that I should improve my sun safety behaviors.
    A. True
    B. False
14. What is the most common form of skin cancer?
    A. Basal cell carcinoma
    B. Squamous cell carcinoma
    C. Melanoma
    D. Kaposi's sarcoma
    E. Actinic keratosis
15. What age group is most affected by skin cancer?
    A. Children
    B. Adolescents (13–18)
    C. Young adults (18–29)
    D. Adults (30–65)
    E. Older adults (>65)
16. What is the most dangerous form of cancer?
    A. Basal cell carcinoma
    B. Squamous cell carcinoma
    C. Melanoma
    D. Kaposi's sarcoma
    E. Actinic keratosis
17. What factors increase your risk for skin cancer? (Select all that apply)
    A. Fair skin
    B. Family history of skin cancer
    C. Ultraviolet radiation exposure
    D. Age
    E. Gender
18. Do you apply sunscreen before practice or games?
    A. Yes
    B. No
19. If so, how often do you apply?
    A. Every 2 hours
    B. Every 4 hours
    C. Every 6–8 hours
    D. Never
20. Do you reapply sunscreen during practice/games?
    A. Yes
    B. No
21. How often should you reapply sunscreen?
    A. Every 2 hours or sooner if swimming or heavily sweating
    B. Every 4 hours or sooner if swimming or heavily sweating
    C. Every 6 hours or sooner if swimming or heavily sweating
    D. Never

22. How often does your sport practice outdoors between 10 A.M. and 2 P.M.?
    A. Daily
    B. 5–6 days per week
    C. 3–4 days per week
    D. 1–2 days per week
    E. Never
23. How often do you visit a dermatologist for skin examinations?
    A. Annually
    B. Every 1–3 years
    C. Every 5 years
    D. Never
24. Lifetime number of sunburns
    A. None
    B. 1–5
    C. 5–19
    D. >20
25. Do you use tanning beds?
    A. Ever
    B. Never
26. How often do you apply sunscreen before or during practice or games?
    A. Always
    B. Sometimes
    C. Rarely
    D. Never

APPENDIX C. Posttest 2: Assessing Attitudes, Behaviors, and Knowledge Regarding Sun Safety in Female Collegiate Athletes

Please select one answer for each of the following questions:

Demographical Information

1. Age:
   A. 18–20
   B. 21–23
   C. >23
2. Sport:
   A. Cross-country
   B. Track
   C. Soccer
   D. Tennis
   E. Softball
3. Number of hours per week that you practice outdoors:
   A. <5
   B. 5–10
   C. >10
4. Skin type:
   A. Fair
   B. Olive
   C. Dark
5. Sunscreen use decreases my risk for skin cancer.
   A. True
   B. False
6. Tanning improves one's appearance.
   A. True
   B. False
7. A nice tan makes me feel healthy.
   A. True
   B. False
8. Self-skin examinations decrease my risk for melanoma.
   A. True
   B. False
9. Sunscreen is only effective during the summer when it is most hot.
   A. True
   B. False
10. I believe that I should improve my sun safety behaviors.
    A. True
    B. False
11. Only people with pale/fair skin should worry about skin cancer.
    A. True
    B. False
12. What is the most common form of skin cancer?
    A. Basal cell carcinoma
    B. Squamous cell carcinoma
    C. Melanoma
    D. Kaposi's sarcoma
    E. Actinic keratosis
13. What is the most dangerous form of cancer?
    A. Basal cell carcinoma
    B. Squamous cell carcinoma
    C. Melanoma
    D. Kaposi's sarcoma
    E. Actinic keratosis
14. What age group is most affected by skin cancer?
    A. Children
    B. Adolescents (13–18)
    C. Young adults (18–29)
    D. Adults (30–65)
    E. Older adults (>65)
15. What factors increase the risk of developing skin cancer? (Select all that apply)
    A. Fair skin
    B. Family history of skin cancer
    C. Ultraviolet radiation exposure
    D. Age E. Gender
16. At the end of this season, did you apply sunscreen more often?
    A. Yes B. No
17. How often did you apply sunscreen during practices and competitions?
    A. Every 2–3 hours
    B. Every 4–6 hours
    C. Every 6–8 hours
    D. Never
18. How often did you experience sunburn during this fall athletic season?
    A. >5 C. 1–2
    B. 3–5 D. 0
19. Will you continue to apply sunscreen during athletic games?
    A. Yes B. No
20. Has your attitude toward sun safety changed?
    A. Always practice sun safety behaviors (apply sunscreen, avoid tanning beds, etc.)
    B. More likely to practice sun safety behaviors (apply sunscreen, avoid tanning beds, etc.)
    C. Less likely to practice sun safety behaviors (apply sunscreen, avoid tanning beds, etc.)
    D. Never practice sun safety behaviors (apply sunscreen, avoid tanning beds, etc.)

Suggestions for improvement:

Additional comments: