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Association Between Sports Team Participation and Sunburn Among U.S. High School Students, National Youth Risk Behavior Survey, 2021

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Abstract

Sunburn during adolescence increases a person's lifetime skin cancer risk. This study examines the association between sports team participation and sunburn prevalence among U.S. high school students. Using cross-sectional data from the 2021 National Youth Risk Behavior Survey, we compared sunburn prevalence among students who participated in one or more sports teams during the past 12 months to those who did not. Nationwide, 64.4% of high school students experienced one or more sunburns during the past 12 months, and 49.1% had played on one or more sports teams during the past 12 months. Sports team participation was associated with higher sunburn prevalence overall (adjusted prevalence ratio [aPR], 1.2; 95% CI [1.2, 1.3]) and among female (aPR, 1.2; 95% CI [1.2, 1.3]) and male (aPR, 1.2; 95% CI [1.1, 1.3]) students. Sunburn prevalence is higher among student athletes than those who do not participate on sports teams.

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The authors completed this work as part of their official duties as employees of the Centers for Disease Control and Prevention. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Ethics Approval: Centers for Disease Control and Prevention's institutional review board approved the protocol for the national Youth Risk Behavior Survey.

The authors declare no conflict of interest.

Consent to Participate: Survey procedures allowed for anonymous participation to protect students' privacy, participation was voluntary, and the study followed local procedures for obtaining parental permission before the survey was administered.

Evidence-based organizational policies and practices are available to help keep student athletes sun-safe while allowing them to enjoy the benefits of sports participation. Future research could examine the contexts in which high school students experience sunburn and why student athletes are at an increased risk.

Keywords

Adolescents; Skin Cancer Prevention; Sun Safety; Sunburn

Sunburn during adolescence increases a person's lifetime risk of developing skin cancer (Dennis et al., 2008; Lashway et al., 2023; U.S. Department of Health and Human Services, 2014), including melanoma (Dennis et al., 2008), which can be deadly (U.S. Department of Health and Human Services, 2014). Analyses of surveillance data among both U.S. high school students and adults have demonstrated an association between physical activity and sunburn (Holman et al., 2018; Wei et al., 2021). Although physical activity is associated with a lower risk of many cancer types (Moore et al., 2016; U.S. Department of Health and Human Services, 2018), it is associated with a higher risk of melanoma (Moore et al., 2016). This link between physical activity and both sunburn and skin cancer risk is likely due to the challenges of adequate sun safety practices during outdoor physical activity. The limited research on sunburn in the context of sports participation has been conducted among very specific adult athlete populations such as collegiate athletes, Ironman triathletes, and elite aquatic athletes (Gilaberte et al., 2022). The objective of this study was to examine the association between sports team participation and sunburn prevalence among U.S. high school students.

METHODS

Sample

We used data from the national Youth Risk Behavior Survey, a nationally representative, anonymous, school-based survey administered in the fall of 2021 (N = 17,232). More information about the study sample is provided in Mpofu, 2023. The school response rate was 72.7%, and the student response rate was 79.1%, making the overall response rate 57.5%. The Centers for Disease Control and Prevention's institutional review board approved the protocol for the national Youth Risk Behavior Survey (Brener et al., 2002; Mpofu et al., 2023).

Measures

Sunburn prevalence was based on the question, "During the past 12 months, how many times have you had a sunburn? (Count the number of times even a small part of your skin turned red or hurt for 12 hours or more after being outside in the sun or after using a sunlamp or other indoor tanning device.)" Responses were dichotomized as 0 versus 1 or more times. Sports team participation was determined by the question, "During the past 12 months, on how many sports teams did you play? (Count any teams run by your school or community groups.)" Responses were dichotomized as 0 versus 1 or more teams. In addition, students self-reported their sex (female or male), race and ethnicity (categorized

as Hispanic or Latino [hereafter Hispanic] and the following non-Hispanic race categories: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or other Pacific Islander, and white), and grade (9, 10, 11, or 12). Census region (Northeast, Midwest, South, and West) also was used in the analysis.

Analysis

A weight based on student sex, race and ethnicity, and grade was applied to each record to adjust for school and student nonresponse and oversampling of Black and Hispanic students. All analyses accounted for the complex sample design and weighting. Logistic regression models with a statement for predicted marginal proportions were used to estimate adjusted prevalence ratios (aPRs) of having had a sunburn among students who played on a sports team compared with students who had not played on a sports team. Previous research findings indicate that sunburn tends to vary by sex, race, ethnicity, and geographic region (Holman et al., 2018; Wei et al., 2021), so we included these variables in our final models. Models controlled for sex (in the overall model only), grade, race and ethnicity, and geographic region.

RESULTS

Nationwide, 64.4% of high school students (67.9% of female students and 61.5% of male students) experienced one or more sunburns during the past 12 months. Almost half (49.1% overall, 46.4% of female students, and 52.0% of male students) had played on one or more sports teams during the past 12 months. Sports team participation was associated with higher sunburn prevalence overall (aPR, 1.2; 95% CI [1.2, 1.3]) and among female (aPR, 1.2; 95% CI [1.2, 1.3]) and male (aPR, 1.2; 95% CI [1.1, 1.3]) students (Table 1).

DISCUSSION

Each year, an estimated 6.1 million U.S. adults are treated for skin cancer at a cost of $8.9 billion (Kao et al., 2023), making skin cancer prevention an important public health priority (U.S. Department of Health and Human Services, 2014). Skin cancer risk can be reduced by practices that limit sun exposure and help to prevent sunburn, such as the use of protective clothing, shade, and sunscreen when spending time outdoors (U.S. Department of Health and Human Services, 2014). This study found that nationwide, nearly two-thirds of U.S. high school students had experienced a sunburn during the past year. Sunburn prevalence was higher among students who played on a school or community sports team compared to students who did not play on a sports team. Given the link between sunburn during adolescence and risk for skin cancer in adulthood (Dennis et al., 2008; Lashway et al., 2023), this finding highlights the importance of sun protection for student athletes.

Sports team participation has many potential benefits for adolescents, including feeling closer to people at school (Michael et al., 2023) and higher self-esteem and life satisfaction (Guddal et al., 2019), in addition to the many mental, physical, and cognitive health benefits that physical activity can provide for adolescents (U.S. Department of Health and Human Services, 2018). Adequate sun protection during outdoor sports activities allows athletes

to enjoy these benefits while avoiding overexposure to ultraviolet radiation from the sun (Gilaberte et al., 2022).

Evidence-based organizational policies and practices offer strategies schools and community organizations can consider to help student athletes and nonathletes stay sun-safe during their participation in outdoor sporting activities. For example, the Guide to Community Preventive Services Task Force notes that “student-focused sun-protective environmental and policy changes include increasing the availability of sun-protective items (e.g., sunscreen or protective clothing); adding sun-protective features to the physical environment (e.g., shade structures); and implementing sun-protection policies (e.g., clothing guidelines, restrictions on outdoor activities during peak sunlight hours)” (The Community Guide, 2023).

Even with such guidance on potential interventions, outdoor sports create unique challenges to adequate sun protection. For example, staying in the shade is often not practical while playing certain outdoor sports. However, shade can be incorporated into outdoor spaces where players take water, food, and sunscreen breaks. Another potential barrier is that recommendations to wear protective clothing and wide-brimmed hats may be seen as counter to recommendations to prevent heat illness, potentially interfering with performance or not aligning with the traditional uniform for the given sport (U.S. Department of Health and Human Services, 2014). New advances in ultraviolet-protective clothing may help to address some, but not all, of these concerns (Aguilera et al., 2014). Sunscreen may raise additional concerns among athletes, such as the potential for sunscreen on one’s hands to interfere with grip or other aspects of performance, concerns about skin reactions to sunscreen or the appearance of sunscreen on the skin (e.g., white cast), and perceptions among male athletes that sunscreen use is a “feminine” behavior (U.S. Department of Health and Human Services, 2014). Additional research could explore opportunities to address these potential barriers to adequate sun protection during outdoor sports participation.

Limitations

This study has some important limitations to consider. The self-reported survey data are subject to biases including recall bias and social desirability bias. Additionally, the cross-sectional nature of the study design and inability to distinguish between indoor and outdoor sports team participation make it impossible to know whether the higher prevalence of sunburns among student athletes was because of sun exposure during team sports-related activities. Schools, sports organizations, and coaches have unique opportunities to encourage young athletes to make sun safety a habit both on and off the field. Future research could examine why student athletes are at an increased risk for sunburn and the contexts in which high school students most frequently experience sunburn.

CONCLUSION

The prevalence of sunburn was higher among U.S. high school students who participated in sports teams compared to those who did not participate in sports teams. Given the association between sunburn and skin cancer risk, sunburn prevention is an important strategy for promoting lifetime skin health among student athletes. A variety of

organizational policies and practices are available for consideration to help keep student athletes sun-safe and avoid increasing their skin cancer risk while allowing them to enjoy the many benefits of sports participation.

Data Availability:

The national Youth Risk Behavior Survey data are publicly available for download on the Centers for Disease Control and Prevention website at https://www.cdc.gov/healthy/youth/data/yrbs/data.htm.

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TABLE 1.

Prevalence and Adjusted Prevalence Ratios of Experiencing One or More Sunburns During the Past 12 Months by Participation on a Sports Team, National Youth Risk Behavior Survey, 2021

	Experienced Sunburn[a]	
	% (95% CI)	**Adjusted Prevalence Ratio (95% CI)**
Total	64.4 (61.3, 67.3)	
Played on sports team[b]		
Yes	72.5 (69.1, 75.6)	1.2 (1.2, 1.3)[c]
No	56.7 (52.9, 60.4)	Referent
Female		
Total	67.9 (64.3, 71.4)	
Played on sports team		
Yes	78.3 (74.6, 81.6)	1.2 (1.2, 1.3)[d]
No	58.9 (54.3, 63.4)	Referent
Male		
Total	61.5 (58.6, 64.3)	
Played on sports team		
Yes	68.1 (64.5, 71.6)	1.2 (1.1, 1.3)[d]
No	54.5 (50.8, 58.1)	Referent

[a] During the past 12 months, experienced a sunburn one or more times.

[b] During the past 12 months, played on one or more sports teams run by their school or a community group.

[c] Adjusted prevalence ratio based on a logistic regression model controlling for sex, grade, race and ethnicity, and geographic region.

[d] Adjusted prevalence ratio based on a logistic regression model controlling for grade, race and ethnicity, and geographic region.