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## Indoor Tanning Among Young Non-Hispanic White Females

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Indoor tanning is associated with an increased risk of skin cancer, especially among frequent users and those initiating use at a young age.<sup>1,2</sup> Indoor tanning before age 35 years increases melanoma risk by 59% to 75%,<sup>1</sup> while use before age 25 years increases nonmelanoma skin cancer risk by 40% to 102%.<sup>2</sup> Moreover, melanoma risk increases by 1.8% with each additional tanning session per year.<sup>1</sup> Melanoma incidence rates are steadily increasing, especially among young non-Hispanic white females, which may be due, in part, to indoor tanning.<sup>1,3</sup> Currently, prevalence estimates of indoor tanning among this population are limited. Therefore, we examined the prevalence of indoor tanning and frequent indoor tanning (≥ 10 times) using nationally representative data among non-Hispanic white female high school students and adults ages 18 to 34 years.

### Methods

We used data from the 2011 national Youth Risk Behavior Survey (YRBS) of high school students and the 2010 National Health Interview Survey (NHIS) for adults aged 18 to 34 years. We estimated the prevalence of indoor tanning and frequent indoor tanning, overall and by age and US census region. Indoor tanning was defined as using an indoor tanning device (eg, a sunlamp, sunbed, or tanning booth, not including a spray-on tan) at least 1 time during the 12 months before each survey. Frequent indoor tanning was defined as using an indoor tanning device at least 10 times during the same period. Differences in prevalence

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**Author Contributions:** Dr Guy and Ms Berkowitz had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

*Study concept and design:* All authors.

*Acquisition of data:* Guy, Berkowitz.

*Analysis and interpretation of data:* Guy, Berkowitz, Holman.

*Drafting of the manuscript:* Guy.

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*Statistical analysis:* Guy, Berkowitz.

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between subgroups were assessed with  $\chi^2$  tests. Data were analyzed with SUDAAN software (version 10.1; RTI International) to account for sampling design and nonresponse.

## Results

Among non-Hispanic white female high school students, 29.3% engaged in indoor tanning and 16.7% engaged in frequent indoor tanning during the previous 12 months. The prevalence of indoor tanning and frequent indoor tanning increased with age (Table 1).

Among non-Hispanic white women ages 18 to 34 years, 24.9% engaged in indoor tanning and 15.1% engaged in frequent indoor tanning during the previous 12 months. The prevalence of indoor tanning and frequent indoor tanning decreased with age (Table 2).

## Discussion

Indoor tanning is widespread among non-Hispanic white female high school students and adults ages 18 to 34 years, and the frequent use of indoor tanning is common. This widespread use is of great concern given the elevated risk of skin cancer among younger users and frequent users.<sup>1,2</sup>

Reducing exposure to UV radiation from indoor tanning is an important strategy for reducing the burden of skin cancer. The US Preventive Services Task Force recommends counseling fair-skinned individuals ages 10 to 24 years to minimize exposure to UV radiation to reduce skin cancer risk.<sup>5</sup> Appearance-focused interventions, such as self-guided booklets, videos on photoaging, and peer counseling sessions, have been shown to reduce indoor tanning among young adults by up to 35%.<sup>5</sup> Changing the social norms related to tanned skin and attractiveness may also be an effective strategy in reducing indoor tanning.

Other approaches to reducing UV exposure from indoor tanning include the US Food and Drug Administration's proposed reclassification of indoor tanning devices from low- to moderate-risk devices requiring premarket notification and labels designed to warn young people not to use them,<sup>6</sup> the 10% excise tax on indoor tanning services established through the Patient Protection and Affordable Care Act,<sup>7</sup> limiting deceptive advertising claims about indoor tanning, and limiting indoor tanning among minors.

Limitations of this study include its reliance on self-reported data, which are subject to various biases. In addition, the NHIS is generalizable only to the noninstitutionalized civilian adult population, and the YRBS is generalizable only to high school students. Despite these limitations, this study provides nationally representative estimates, allowing for the continued monitoring of indoor tanning and evaluation of efforts aimed at curbing the widespread use of indoor tanning among young women and reducing the burden of skin cancer.

## References

1. Boniol M, Autier P, Boyle P, Gandini S. Cutaneous melanoma attributable to sunbed use: systematic review and meta-analysis. *BMJ*. 2012; 345:e4757. [PubMed: 22833605]

2. Wehner MR, Shive ML, Chren MM, Han J, Qureshi AA, Linos E. Indoor tanning and non-melanoma skin cancer: systematic review and meta-analysis. *BMJ*. 2012; 345:e5909. [PubMed: 23033409]
3. Jemal A, Saraiya M, Patel P, et al. Recent trends in cutaneous melanoma incidence and death rates in the United States, 1992-2006. *J Am Acad Dermatol*. 2011; 65(5):S17–S25. suppl 1. e1-e3. [PubMed: 22018063]
4. Centers for Disease Control and Prevention. Use of indoor tanning devices by adults—United States, 2010. *MMWR Morb Mortal Wkly Rep*. 2012; 61(18):323–326. <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6118a2.htm>. Accessed July 13, 2013. [PubMed: 22572978]
5. Moyer VA. Behavioral counseling to prevent skin cancer: US Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2012; 157(1):59–65. [PubMed: 22751761]
6. US Food and Drug Administration. Proposed order: reclassification of ultraviolet lamps for tanning, henceforth to be known as sunlamp products. <https://www.federalregister.gov/articles/2013/05/09/2013-10982/general-and-plastic-surgery-devices-reclassification-of-ultraviolet-lamps-for-tanning-henceforth-to>. Accessed July 22, 2013
7. Patient Protection and Affordable Care Act, pl 111-148, sec. 10907(b)

**Table 1**

Prevalence of Indoor Tanning (IT) Among Non-Hispanic White Female High School Students, Youth Risk Behavior Survey, 2011

Characteristic	No. <sup>a</sup>	Prevalence						
		IT <sup>b</sup>		Frequent IT <sup>c</sup>		Frequent IT <sup>c</sup> Among Those Engaging in IT		
		% (95% CI)	P Value	% (95% CI)	P Value	No. <sup>a</sup>	% (95% CI)	P Value
Total	2527	29.3 (25.1-33.9)		16.7 (13.4-20.7)		720	57.0 (51.1-62.8)	
Age, y								
14	264	14.2 (9.9-19.7)		6.2 (3.2-11.7)		35	43.5 (25.3-63.6)	
15	618	17.8 (13.8-22.7)		9.0 (6.1-13.0)		104	50.6 (38.6-62.5)	
16	700	31.1 (24.5-38.4)	<.001	15.7 (10.8-22.2)	<.001	204	50.6 (41.3-59.8)	.04
17	630	39.3 (33.5-45.3)		24.2 (19.2-30.0)		246	61.6 (55.0-67.8)	
18	315	43.8 (36.0-52.0)		29.9 (23.0-37.8)		131	68.2 (56.3-78.1)	
US census region								
Northeast	413	22.5 (13.6-34.8)		12.7 (5.9-25.2)		79	56.3 (39.5-71.7)	
Midwest	934	30.8 (25.0-37.4)		17.8 (13.0-24.0)		300	57.8 (48.9-66.3)	
South	722	34.0 (26.0-43.0)	.31	21.7 (15.8-29.0)	.04	249	63.8 (54.5-72.1)	.12
West	458	24.0 (15.4-35.4)		8.4 (5.1-13.4)		92	34.8 (28.4-41.9)	

<sup>a</sup>Number of respondents (unweighted). Unknown and missing responses were excluded from the analysis. Percentages are weighted to account for survey design.

<sup>b</sup>Indoor tanning defined as using an IT device (eg, a sunlamp, sunbed, or tanning booth) at least 1 time during the 12 months before the survey. Does not include getting a spray-on tan.

<sup>c</sup>Frequent IT defined as using an IT device (eg, a sunlamp, sunbed, or tanning booth) at least 10 times during the 12 months before the survey. Does not include getting a spray-on tan.

**Table 2**

Prevalence of Indoor Tanning (IT) Among Non-Hispanic White Women Ages 18 to 34 Years, National Health Interview Survey, 2010<sup>a</sup>

	No. <sup>b</sup>	Prevalence						
		IT <sup>c</sup>		Frequent IT <sup>d</sup>		Frequent IT <sup>d</sup> Among Those Engaging in IT		
		% (95% CI)	P Value	% (95% CI)	P Value	No. <sup>c</sup>	% (95% CI)	P Value
Total	1857	24.9 (22.5-27.5)		15.1 (13.3-17.5)		464	61.0 (55.9-65.9)	
Age, y								
18-21	332	31.8 (25.7-38.7)		21.3 (16.5-27.2)		112	67.6 (56.9-76.7)	
22-25	479	29.6 (24.6-35.1)	<.001	16.5 (13.1-20.7)	<.001	145	56.3 (46.1-66.0)	.49
26-29	473	22.1 (18.0-26.8)		13.1 (9.9-17.0)		109	59.2 (48.2-69.3)	
30-34	573	17.4 (14.1-21.2)		10.5 (8.1-13.5)		98	60.6 (49.2-71.0)	
US census region								
Northeast	241	22.1 (15.3-30.8)		10.7 (7.5-15.2)		49	48.5 (36.4-60.7)	
Midwest	583	28.7 (24.5-33.3)	.04	19.1 (15.9-22.9)	.01	173	67.0 (58.9-74.2)	.13
South	648	25.9 (22.2-30.0)		15.8 (12.9-19.3)		170	61.5 (52.8-69.5)	
West	385	19.4 (14.9-24.8)		11.0 (7.5-15.9)		72	57.0 (41.8-71.0)	

<sup>a</sup> A portion of these results as well as more detailed information on adult indoor tanning have previously been published (Centers for Disease Control and Prevention<sup>4</sup>).

<sup>b</sup> Number of respondents (unweighted). Unknown and missing responses were excluded from the analysis. Percentages are weighted to account for survey design.

<sup>c</sup> Indoor tanning defined as using an indoor tanning device (eg, a sunlamp, sunbed, or tanning booth) at least 1 time during the 12 months before the survey. Does not include gettingaspray-on tan.

<sup>d</sup> Frequent indoor tanning defined as using an indoor tanning device (eg, a sunlamp, sunbed, or tanning booth) at least 10 times during the 12 months before the survey. Does not include gettingaspray-on tan.