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Racial differences in sun-protective behaviors: a retrospective, cross-sectional analysis of the National Health and Nutrition Examination Survey (NHANES) 2003-2018.

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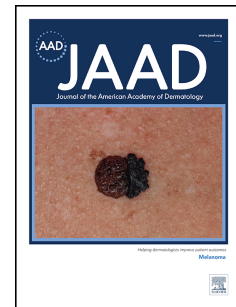
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Title. Racial differences in sun-protective behaviors: a retrospective, cross-sectional analysis of the National Health and Nutrition Examination Survey (NHANES) 2003-2018.

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To the editor: Sun-protective behaviors (SPBs), such as wearing long sleeve shirts, seeking shade, and using sunscreen, are protective against UV-dependent skin conditions.¹ People with skin of color face increased morbidity and mortality from skin conditions due in part to different sun-protective behaviors, secondary to reduced risk perception, inconvenience, and cost.^{2,3} Few studies characterize these differences and fewer track their evolution over time. In this retrospective cross-sectional analysis, we use National Health and Nutrition Examination Survey (NHANES) data from 2003-2006, 2009-2012, and 2015-2018 to track changes in SPBs in three CDC-defined racial groups over a 15-year period.

Three SPB questions were assessed in the NHANES dermatology questionnaire: “When you go outside on a very sunny day, for more than one hour, how often you: (1) Stay in the shade? (2) Wear a long-sleeved shirt? (3) Use sunscreen?” All NHANES data are publicly available at <https://www.cdc.gov/nchs/nhanes/>. The relationship between race (Hispanic, non-Hispanic White, and non-Hispanic Black) and frequent engagement in SPBs (always, most of the time, or sometimes) was adjusted by age, sex, annual household income, education level completed, marriage status, sun sensitivity, and sunburns in the past year. We used a multinomial logistic regression adjusted with a Bonferroni correction and weighted according to NHANES analytical guidelines; adjusted odds ratios were reported. The complete, restricted dataset included 16,859 individuals.

SPBs increased across all racial groups though differences in behavior persist. Congruent with past findings⁴, we observed that across all years, Hispanics and non-Hispanic Blacks were more likely than non-Hispanic Whites to stay in the shade (OR: 1.792, 95% CI: 1.790, 1.794; OR:

2.432, 95% CI: 2.428, 2.435; respectively) and wear a long sleeve shirt (OR: 2.199, 95% CI: 2.196, 2.201; OR: 1.666, 95% CI: 1.663, 1.668; respectively), but less likely to use sunscreen (OR: 0.946, 95% CI: 0.945, 0.947; OR: 0.228, 95% CI: 0.228, 0.229; respectively) (**Table 1**). Interestingly, Hispanics reported using sunscreen less frequently than non-Hispanic Whites in 2003-2006 (31.1% vs. 54.7% respectively) but equally as frequently in 2015-2018 (44.6% vs 54.5%). After conducting a subgroup analysis, we found that this effect was *not* driven by Hispanics whose skin burned or peeled after sun exposure (OR: 0.893, 95% CI: 0.890, 0.896), but rather by Hispanics whose skin darkened but did not sunburn (OR: 1.340 95% CI: 1.337, 1.343) when compared to non-Hispanic Whites with the corresponding skin reaction (**Table 2**). These data suggested that sunscreen use among Hispanics may be motivated by factors other than sunburn and skin cancer risk and is supported by other focus group research.⁵ Non-Hispanic Blacks remained significantly less likely to use sunscreen in 2015-2018, regardless of sun reaction.

Our analysis demonstrates that SPBs have changed from 2003-2018. Understanding the factors that motivate SPBs may facilitate tailored efforts for skin self-examinations and increased SPB compliance in all populations. Widespread engagement in SPBs can help narrow differences in dermatologic outcomes in patients with skin of color.

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Table 1. Weighted odds of frequent or moderate engagement in sun-protective behavior

Behavior	Race*	Odds Ratios (95% Confidence Interval)			
		2003-2006 (n = 5,724)	2009-2012 (n = 6,112)	2015-2018 (n = 5,023)	All years (n = 16,859)
Stay in Shade	Hispanic	1.774 (1.772, 1.776)	1.480 (1.479, 1.482)	1.937 (1.935, 1.939)	1.792 (1.790, 1.794)
	Non-Hispanic Black	2.528 (2.525, 2.531)	2.439 (2.436, 2.442)	2.163 (2.160, 2.166)	2.432 (2.428, 2.435)
Wear Long Sleeve Shirt	Hispanic	2.314 (2.311, 2.317)	1.680 (1.679, 1.682)	2.334 (2.331, 2.336)	2.199 (2.196, 2.201)
	Non-Hispanic Black	2.075 (2.072, 2.078)	1.185 (1.183, 1.186)	1.744 (1.742, 1.746)	1.666 (1.663, 1.668)
Sunscreen Use	Hispanic	0.857 (0.856, 0.859)	0.900 (0.899, 0.901)	1.031 (1.029, 1.032)	0.946 (0.945, 0.947)
	Non-Hispanic Black	0.212 (0.212, 0.212)	0.217 (0.217, 0.218)	0.251 (0.250, 0.251)	0.228 (0.228, 0.229)

All effects were adjusted for age, sex, annual household income, marital status, sun reactivity, and sunburns in the last year. *White race as reference category for corresponding years. All findings had $p < 0.0001$.

Table 2. Odds of behavior engagement by skin reactivity and sunburn in the last year

Behavior	Race*	Skin reactivity, Odds Ratios (95% Confidence Interval)				Sunburn in last year
		Severe (n = 1,810)	Mild burn with some tanning (n = 4,254)	Darkened, no sunburn (n = 3,751)	Not reactive (n = 7,044)	
Stay in Shade	Hispanic	2.627 (2.612, 2.642)	1.688 (1.683, 1.692)	1.898 (1.893, 1.902)	1.777 (1.774, 1.780)	2.247 (2.243, 2.251)
	Non-Hispanic Black	3.396 (3.348, 3.445)	2.783 (2.764, 2.802)	2.436 (2.430, 2.443)	2.481 (2.476, 2.485)	2.189 (2.182, 2.195)
Wear Long Sleeve Shirt	Hispanic	1.824 (1.817, 1.830)	2.209 (2.204, 2.214)	2.575 (2.569, 2.581)	2.073 (2.069, 2.077)	2.205 (2.201, 2.210)
	Non-Hispanic Black	1.812 (1.799, 1.825)	2.191 (2.181, 2.201)	2.046 (2.041, 2.051)	1.539 (1.537, 1.542)	3.025 (3.014, 3.037)
Sunscreen Use	Hispanic	0.893 (0.890, 0.896)	0.903 (0.901, 0.905)	1.340 (1.337, 1.343)	0.838 (0.836, 0.839)	0.972 (0.971, 0.974)
	Non-Hispanic Black	0.285 (0.283, 0.287)	0.321 (0.319, 0.322)	0.368 (0.367, 0.369)	0.191 (0.191, 0.192)	0.363 (0.362, 0.365)

All effects were adjusted for age, sex, annual household income, and marital status. *White race as the reference category for corresponding skin reactions. All findings had $p < 0.0001$.