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Beliefs Associated with Sunscreen use among non-Hispanic white Older Adults

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Abstract

This study examines beliefs about sunscreen use among non-Hispanic white adults aged 50 years or older using online survey data (n=237). Multiple logistic regression analyses were conducted to examine beliefs associated with sunscreen use, adjusted by age, gender, education, geographic location, and skin cancer risk score. Those who believed sunscreen use would prevent them from getting sunburned (odds ratio [OR]=1.84) and those who believed that their romantic partners thought they should use sunscreen (OR=1.72) were more likely to report sunscreen use. Those who believed sunscreen use would "take too much time" were less likely to report sunscreen use (OR=0.65). These findings can inform future research and messaging efforts, including the evaluation of intervention approaches that highlight the immediate benefits of sunscreen use, address concerns about sunscreen use taking too much time, and tap into the potential influence that older adults may have on the sunscreen use of their romantic partners.

Keywords

sunscreen; sun safety; older adults; sunburn; skin cancer; prevention

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Introduction

Exposure to ultraviolet (UV) radiation is an important risk factor in the development of most skin cancers (US Department of Health and Human Services, 2014). The DNA damage caused by UV exposure is cumulative, and most skin cancers are diagnosed in older adulthood (US Department of Health and Human Services, 2014). For example, among non-Hispanic white adults, more than 70% of melanomas are diagnosed among adults aged 55 years and older (Holman, Freeman et al., 2018). Epidemiological research findings indicate that the number of sunburns during adulthood and the lifetime number of sunburns are both important risk factors for melanoma (Dennis et al., 2008). Given that adults in the United States (US) who reach the age of 65 can expect to live, on average, another two decades (Murphy et al., 2017; Social Security Administration, 2016), a person's skin cancer risk over a lifetime can be influenced by events that occur during older adulthood (White et al., 2019). Yet primary skin cancer prevention efforts have largely ignored this demographic group (US Department of Health and Human Services, 2014). Non-Hispanic white older adults are more likely to have been sunburned (Holman et al., 2019) and more likely to be diagnosed with skin cancer compared to older adults of other races and ethnicities (US Department of Health and Human Services, 2014; Rogers et al., 2015). When used as directed, sunscreen can prevent sunburn and reduce skin cancer risk and is recommended for children (over the age of six months) and adults of all ages, races, and ethnicities (US Food and Drug Administration, 2021). In this study, we describe sunscreen use among non-Hispanic white adults aged 50 years or older and examine beliefs about sunscreen as possible predictors of sunscreen use within this demographic group, after adjusting for age, gender, education, geographic location, and skin cancer risk score.

Methods

Survey questions to assess beliefs about sunscreen use were grounded in the Integrative Model of Behavioral Change and Prediction (Ajzen, 2020) and based on findings from semi-structured interviews with non-Hispanic white adults ages 18–49 years. Specific constructs related to sunscreen use included beliefs about outcomes (i.e., behavioral beliefs), beliefs about what others think (i.e., injunctive normative beliefs), and beliefs about what others do (i.e., descriptive normative beliefs). The corresponding survey questions are provided in Table 1. Additional details about the formative research used to elicit relevant beliefs associated with sunscreen use and develop the survey questions were previously published (Bleakley et al., 2018). To assess sunscreen use (the primary outcome), participants were asked to use a five-point scale to indicate how often they used sunscreen when outside during the summer on a warm sunny day for more than one hour (one=*never*; two=*rarely*; three=*sometimes*; four=*often*; five=*always*). This item has been used in previous research (Glanz et al., 2008). We used the Brief Skin Cancer Risk Assessment Tool and the corresponding risk tertiles that were previously established to categorize participants' skin cancer risk as low, medium, or high (Glanz et al., 2003). This tool quantifies skin cancer risk based on skin cancer history, number of moles, skin color, hair color, ability to tan, ease of burning, latitude of childhood residence, sunburn history, and the presence of freckles (Glanz et al., 2003). Demographic characteristics included in the analyses were age, gender, education, and geographic location.

Survey respondents were recruited from a probability-based online sample called KnowledgePanel (IPSOS KnowledgePanel, 2021). The sampling frame for this online panel is the United States Postal Service Delivery Sequence File which covers nearly 100% of the US population. The survey was conducted during October-December 2015 and March 2016 among 1,742 US adults age 18 or older. The overall response rate was 44%. Findings for non-Hispanic white participants under the age of 50 years were previously reported (Bleakley et al., 2018). The present analysis focuses on non-Hispanic white respondents aged 50 years or older (N=238) and excludes one participant with missing data resulting in a final analytic sample of 237. The study was approved by the University of Pennsylvania Institutional Review Board.

Statistical Analyses

We computed descriptive statistics for all study variables. Differences between demographic groups were tested using chi-square tests. To check for multicollinearity across the study variables, we calculated correlation coefficients and variance inflation factor for each variable. All correlation coefficients were less than 7, and all variables had a variance inflation factor of less than 3. Multiple logistic regression analyses were conducted to examine which beliefs were associated with *often* or *always* using sunscreen, after adjusting for all variables in the model. Scales were treated as ordinal variables in the regression analyses, so the odds ratios for the beliefs about outcomes and beliefs about what others think indicated the increased (or decreased) likelihood of *often* or *always* using sunscreen for each point increase on the belief scale. Differences in adjusted odds ratios for each predictor variable in the model were tested by exploring Wald tests. All the statistical analyses were performed using SAS v 9.4 (Cary, NC).

Results

Participant ages ranged from 50 to 87 years, with 34.6% aged 50–59, 39.2% aged 60–69, and 25.2% aged 70 and older. Just over half (54.0%) were women, and most (60.3%) had at least some college education. Slightly more than half (54.4%) were in the northern part of the United States. Participants were evenly distributed across the three skin cancer risk categories, with 35.4% categorized as being at low risk for skin cancer, 33.3% at medium risk, and 31.2% at high risk.

Table 2 shows the results from bivariate analyses to examine sunscreen use by demographic characteristics. Overall, 30.8% of participants reported *often* or *always* using sunscreen “when outside during the summer on a warm sunny day for more than an hour.” There were no significant differences in sunscreen use by age group or geographic location. However, there were differences in sunscreen use by gender, education, and skin cancer risk category. Women were more likely to report *often* or *always* using sunscreen (39.8%) compared to men (20.2%). Those with some college education were more likely to report *often* or *always* using sunscreen (39.7%) compared to those with high school or lower education (21.3%). Those with a high risk for skin cancer were more likely to report *often* or *always* using sunscreen (46.0%) compared to those at medium (26.6%) or low risk (21.4%).

Although there were demographic differences in sunscreen use in the bivariate analyses, the demographic differences did not remain statistically significant in the multivariate regression models (Table 3). Two of the beliefs about outcomes were significantly associated with sunscreen use. Specifically, the more likely a respondent thought it was that sunscreen use would prevent them from getting sunburned, the more likely they were to report *often* or *always* using sunscreen (odds ratio [OR]=1.84; 95% CI=1.16, 2.93). The more likely a respondent thought it was that sunscreen use would "take too much time," the less likely they were to report *often* or *always* using sunscreen (OR=0.65; 95% CI=0.43, 0.98). The only belief about what others think that was statistically significant related to respondents' romantic partner. Individuals who believed that their romantic partners thought they should use sunscreen were more likely to report *often* or *always* using sunscreen (OR=1.72; 95% CI=1.07, 2.77). Respondents who believed that *most* or *all* men or women their age use sunscreen were more likely to report *often* or *always* using sunscreen (OR=2.75; 95% CI=0.88, 8.38), but this finding was not statistically significant.

Discussion

This study provides new information about sunscreen use among non-Hispanic white adults aged 50 years and older, a demographic group at elevated risk for skin cancer. While some national surveillance data on sunscreen use are available for this demographic group, this is the first study to examine their sunscreen use in the context of sunscreen-related beliefs. The prevalence of sunscreen use was similar to findings from other national data (Holman, Ding et al., 2019; Holman et al., 2018) with just under one-third of participants reporting the behavior.

Only two behavioral beliefs were significantly associated with sunscreen use. Although most skin cancers are diagnosed among older, non-Hispanic white adults (Centers for Disease Control and Prevention, 2019; Rogers et al., 2015), the belief that sunscreen use could prevent skin cancer was not associated with a greater likelihood of sunscreen use. In contrast, the belief that sunscreen use could prevent sunburn was associated with a greater likelihood of sunscreen use. This finding suggests that messages focused on the immediate benefits of sunscreen use, and in particular, the prevention of sunburn, may be more salient to older adults than messages about reducing their skin cancer risk.

The belief that sunscreen use takes too much time was significantly associated with reduced frequency in sunscreen use. Given the wide range of sunscreen products featuring different characteristics on the market, there may be a benefit to tools or information that helps consumers find a sunscreen product that fits with their personal application preferences. For example, those concerned about sunscreen use taking too much time might prefer a sunscreen in a solid stick formulation that could be quickly rubbed over skin (similar to popular deodorant applications) or a spray-on formulation to quickly spray large sections of skin at one time. Such communications could also advise sunscreen users about potential concerns with certain application methods. For example, aerosol spray on sunscreens can be challenging to apply in outdoor settings, particularly in windy weather, and should not be applied directly to the face because of inhalation concerns (US Food and Drug Administration, 2021).

Of the beliefs examined about what others think, only the belief that one's romantic partner thinks they should use sunscreen was significantly associated with sunscreen use. These results suggest that beliefs about the opinions of friends, people who have had skin cancer, and medical professions may be less influential on this demographic group's sunscreen use. Future research could evaluate messages that invite older adults to encourage their partner to engage in sun-safe behaviors with them.

Study limitations and strengths

This study has important limitations and strengths to consider when interpreting the results. The online survey had a low response rate, and the final sample of non-Hispanic white adults aged 50 years and older was small. This small sample size limits the statistical power of the study and the ability to measure effects as statistically significant. The small sample size also limits the generalizability of the study findings. The data were self-reported and thus subject to social desirability bias. The beliefs we examined were based on data from structured interviews with adults ages 18–49 years and may not fully capture the most salient beliefs regarding sunscreen use among older age groups. However, very little work has been done to examine sun protection behaviors among older US adults, and this is the first study of its kind to examine beliefs associated with sunscreen use among older US non-Hispanic white adults. These study findings begin to fill a gap in the current literature and expand the sun-safety dialogue to include opportunities to promote sun-safety among older age groups.

Conclusion

Given the elevated incidence rates of skin cancer at older ages in the United States, effective sun-safety intervention strategies are needed for older adults to lower their risk of developing skin cancer. The current findings can help to shape and inform the focus of such efforts, including the evaluation of messaging strategies that highlight the benefits of sunscreen use for sunburn prevention and address concerns about sunscreen use taking too much time. Additionally, the findings point to the potential for older adults to have an important influence on the sunscreen use of their romantic partners – a concept that could also be further examined through the evaluation of novel messaging and intervention approaches that tap into this influence.

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Table 1.

Survey questions

Behavioral beliefs (i.e., the person's belief that sunscreen use will lead to a certain outcome or provide a certain experience)	**Response Options**
If I use sunscreen the next time I am outdoors on a sunny day for more than an hour, it would...	
Prevent me from getting sunburned	Scale 1=*extremely unlikely* to 7=*extremely likely*
Prevent me from getting skin cancer	
Feel uncomfortable or feel hot/sweaty	
Be inconvenient	
Not be worth the trouble	
Take too much time	
Injunctive normative beliefs (i.e., perceptions of whether or not certain groups approve of sunscreen use)	
The people listed below think you should use sunscreen when outdoors on a sunny day for more than an hour...	
Friends	Scale 1=*should not* to 7=*should*
People I know who have had skin cancer	
Doctors/Medical professionals	
Romantic partner	
Descriptive normative beliefs (i.e., perceptions of whether other people use sunscreen)	
How many females your age do you think use sunscreen when they are outdoors on a sunny day for more than an hour?	*None, a few, about half, most, all*
How many males your age do you think use sunscreen when they are outdoors on a sunny day for more than an hour?	
Sunscreen use	
For the following question, think about what you do when you are outside during the summer on a warm sunny day for more than an hour. How often do you wear sunscreen?	*Never, rarely, sometimes, often, always*

Table 2.

Prevalence of sunscreen use among the study sample (N=237)

	Use Sunscreen Often or Always [a]	Use Sunscreen Sometimes, Rarely, or Never	
	n (%)	**n (%)**	**P-Value [b]**
Overall	73 (30.8)	164 (69.2)	
Age (years)			
50 – 59	31 (37.8)	51 (62.2)	0.193
60 – 69	27 (29.0)	66 (71.0)	
70 – 87	15 (24.2)	47 (75.8)	
Gender			
Men	22 (20.2)	87 (79.8)	**0.001**
Women	51 (39.8)	77 (60.2)	
Education			
High school or lower	20 (21.3)	74 (78.7)	**0.031**
Some college	23 (39.7)	35 (60.3)	
Bachelor or higher	30 (35.3)	55 (64.7)	
Geographic Location			
North	35 (27.1)	94 (72.9)	0.181
South	38 (35.2)	70 (64.8)	
BRAT Score			
0–26 (low risk)	18 (21.4)	66 (78.6)	**0.002**
27–35 (medium risk)	21 (26.6)	58 (73.4)	
36–85 (high risk)	34 (46.0)	40 (54.1)	

BRAT, Brief Skin Cancer Risk Assessment Tool

a. When outside during the summer on a warm sunny day for more than an hour.

b. P-value of chi-square test for association

Table 3.

Factors associated with sunscreen use among non-Hispanic white adults aged 50+ years (N=237)

	Sunscreen Use [a]	
	OR (95% CI)	**P-Value**
Age (years)		
50 – 59	*Ref*	
60 – 69	0.58 (0.20, 1.66)	0.309
70 – 87	0.52 (0.16, 1.73)	0.286
Gender		
Men	*Ref*	
Women	2.09 (0.80, 5.48)	0.134
Education		
High school or lower	*Ref*	
Some college	1.43 (0.45, 4.54)	0.539
Bachelor or higher	1.23 (0.42, 3.63)	0.708
Geographic Location		
North	*Ref*	
South	1.18 (0.45, 3.11)	0.739
BRAT Score (M=34.5, SD= 17.62)		
0–26 (low risk)	*Ref*	
27–35 (medium risk)	1.53 (0.43, 5.43)	0.509
36–85 (high risk)	3.09 (0.81, 11.82)	0.100
Behavioral beliefs [b] ***(scale 1=extremely unlikely to 7=extremely likely): If I use sunscreen the next time I am outdoors on a sunny day for more than an hour, it would…***		
Prevent me from getting sunburned (M=5.56, SD=1.40)	1.84 (1.16, 2.93)	**0.009**
Prevent me from getting skin cancer (M=5.39, SD=1.34)	1.10 (0.71, 1.70)	0.673
Feel uncomfortable or feel hot/sweaty (M=3.57, SD=1.73)	1.08 (0.80, 1.47)	0.600
Be inconvenient (M=3.46, SD=1.71)	1.11 (0.98, 1.57)	0.568
Not be worth the trouble (M=3.10, SD=1.80)	0.91 (0.65, 1.26)	0.555
Take too much time (M=3.09, SD=1.64)	0.65 (0.43, 0.98)	**0.040**
Injunctive normative beliefs [b] ***(scale 1=should not to 7=should): The people listed below think you should use sunscreen when outdoors on a sunny day for more than an hour...***		
Friends (M=5.32, SD= 1.45)	1.09 (0.70, 1.69)	0.694
People I know who have had skin cancer (M=6.21, SD=1.33)	0.97 (0.49, 1.90)	0.927
Doctors/Medical professionals (M=6.24, SD= 1.28)	0.53 (0.25, 1.13)	0.099
Romantic partner (M=5.75, SD=1.41)	1.72 (1.07, 2.77)	**0.024**
Descriptive normative beliefs [C] ***: How many females/males your age do you think use sunscreen when they are outdoors on a sunny day for more than an hour?***		

	Sunscreen Use [a]	
	OR (95% CI)	**P-Value**
None/A few	*Ref*	
About Half	0.99 (0.29, 3.34)	0.985
Most/All	2.75 (0.88, 8.38)	0.082

BRAT, Brief Skin Cancer Risk Assessment Tool; Ref, reference group

[a] Adjusted odds of reporting *always* or *often* using sunscreen when outside during the summer on a warm sunny day for more than an hour. Odds ratios are adjusted for all other variables in the model.

[b] Behavioral beliefs and injunctive normative beliefs show results for each point increase in the scale.

[c] Females were asked about “females your age” and males were asked about “males your age.”