Prevalence and Correlates of Indoor Tanning among U.S. Adults

Carolyn J. Heckman, Ph.D., **Elliot J. Coups, Ph.D.**, and **Sharon L. Manne, Ph.D.**
Division of Population Science Fox Chase Cancer Center, Philadelphia, PA

Abstract

Background—Little is known about the prevalence of indoor tanning among the U.S. general adult population.

Objectives—This study sought to (1) describe the prevalence of indoor tanning throughout adulthood, (2) identify demographic and psychosocial correlates of indoor tanning, and (3) determine whether these correlates vary by age group.

Methods—This study used data from the 2005 National Health Interview Survey, an annual health survey of the U.S. adult population.

Results—Indoor tanning rates were higher among individuals who were young, white, and female. Rates of indoor tanning in the last year varied from 20.4% for 18−29 year-olds to 7.8% for those 65 years and older. A variety of demographic, health, and behavioral health risk factors correlated with indoor tanning.

Limitations—The study design was cross-sectional and all data were self-reported.

Conclusions—Health care providers should address indoor tanning as a health risk factor across the lifespan.

Keywords

Skin cancer prevention; indoor tanning

Skin cancer is the most common form of cancer in the U.S., accounting for half of all human malignancies.[1] The incidence of skin cancer has been increasing several percents annually for the past four decades,[2] and the incidence of malignant melanoma is increasing faster than any other cancer.[3] Ninety percent of all skin cancers are thought to be caused by ultraviolet radiation (UVR).[2] One source of UVR is indoor tanning booths, which is a known carcinogen. [4] The medical community has advocated banning indoor tanning for non-medical purposes. [1] Unfortunately, the commercial indoor tanning business has been one of the fastest growing industries in the U.S.[5, 6]

Women aged 20 to 39 years appear to be the most frequent users of indoor tanning booths.[1] Based on the available studies, approximately 40−60% of college students have used indoor tanning booths, with higher rates among women.[7-9] Although rarely discussed in the literature, older adults also tan indoors. The only national study of indoor tanning across adult age groups in the U.S. analyzed data from approximately 5,500 participants in the Health Information

National Trends Survey (HINTS) and found rates of past year indoor tanning of 14.2% for 18−34 year olds, 9.2% for 35−39 year olds, 10.6% for 40−44 year olds, and 3.9% for those 45 and older.[10] The study examined a limited number of demographic variables in relation to indoor tanning behavior.

Previous studies have identified a number of demographic, phenotypic, and behavioral risk or psychosocial correlates of indoor tanning among Caucasian adolescents and young adults. Correlates have included demographics such as increased age (among teen girls), living in the American Midwest or South, female gender, having a less educated mother, and attending a rural high school.[11] Tanning booth use has been associated with greater tanning ability.[11,12] Indoor tanning is also associated with a variety of behavioral health risk factors such as outdoor UVR exposure (sunbathing), lack of routine exercise, eating disordered behavior, smoking, and other substance use, particularly among adolescent females.[9,11,13,14] However, body mass index was not found to correlate with indoor tanning behavior among adolescents.[11,13] Similar results were found in two studies of Swedish adolescents.[15,16] Indoor tanning was associated with female gender, age, sunbathing, smoking, and low perceived physical attractiveness.[15,16] However, one Swedish study found indoor tanning to be related to moderately sensitive skin type (rather than greater tanning ability) among female adolescents.[16]

Previous studies have not addressed other potentially important correlates of indoor tanning, such as a family history of skin cancer (which may discourage indoor tanning) and perceived cancer risk (which may be inversely associated with indoor tanning). Healthcare utilization and physician skin examinations may also be inversely associated with indoor tanning, since some healthcare providers do provide advice about reducing skin cancer risk and related services.[17,18] This is particularly true for high-risk patients and among dermatologists.[19-21] Moreover, patients report behavioral change after such interventions.[22]

The current study used a large nationally representative sample to describe the prevalence of indoor tanning throughout adulthood, to identify correlates of indoor tanning behavior, and to determine whether these correlates varied by age group. Based on previous research, we hypothesized that indoor tanning would be more prevalent among Caucasians (although individuals with the fairest skin would be unlikely to tan indoors), younger adults, individuals with other skin cancer risk behaviors and lower utilization of sun protection practices, those with no family history of skin cancer, lower perceived cancer risk, or less healthcare utilization, individuals who are less active or consume fewer fruits and vegetables, and those who smoke or engage in risky drinking. Based on the literature, we anticipated that the potential correlates would be significantly associated with indoor tanning among the younger groups, but we were uncertain whether these associations would hold up among the older age groups due to the dearth of research in this area. Although not found to be significant in previous studies of youth, we also explored the relationship between body mass index and indoor tanning behavior, which has not previously been assessed among general adult populations.

Methods

Procedure

This study used data from the 2005 National Health Interview Survey (NHIS), which is a national probability health survey of the U.S. adult population. Participants were interviewed in their own homes. The NHIS uses a multistage, clustered, cross-sectional design, with stratification at the state level and over-sampling of Hispanic and Black populations. The response rate for the Sample Adult data used in this study was 69.0%.[23] The methodology of the 2005 NHIS is described in detail elsewhere.[23]

Participants

The sample size for the Sample Adult section of the 2005 NHIS was 31,428. We excluded 2,034 individuals from the current study because they were missing data on the indoor tanning variable, leaving a sample size of 29,394 participants.

Measures

Indoor Tanning Practices—. Participants answered an open-ended question regarding the number of days in the past year that they had used an indoor tanning device (sunlamp, sunbed, or tanning booth). For the purposes of the current study, we dichotomized this variable into whether individuals reported engaging in indoor tanning on one or more days versus no days in the past year.

Demographics—. Participants' region of residence in the U.S. was recorded. Participants also indicated their gender, age, race/ethnicity, and education level.

Health Access and Family History—Participants indicated whether they had visited a doctor in the previous year. Participants were asked whether a first-degree relative had ever been diagnosed with skin cancer, and if so, what kind of cancer it was (melanoma, non-melanoma, or unknown type).

Perceived Cancer Risk—. Participants answered a single question about their likelihood of developing cancer compared to other individuals their same age and gender.

Skin Reaction to Sun Exposure—One item asked participants how much they would burn if they went out in the sun for an hour with no sun protection. A second item asked participants how dark of a tan they would get if they were to go out in the sun every day for two weeks without sun protection.

Skin Cancer Risk Behaviors—Participants indicated how many times they had a sunburn in the past year. Five items asked individuals to report how often they engage in the sun protection behaviors of staying in the shade, wearing a hat, wearing a long-sleeved shirt, wearing long pants, and using sunscreen when outside on a warm sunny day for more than one hour. Each item used a five-point response scale, from never to always, and we trichotomized responses into the following categories: rarely/never, sometimes, always/most of the time. Participants also indicated what sun protection factor (SPF) sunscreen they usually use. We denoted individuals as either using or not using sunscreen with an SPF of 15 or more. One item asked individuals whether they had ever had a total skin exam performed by a physician.

Behavioral Health Risk Factors—Each participant's body mass index (BMI) was calculated based on their self-reported height and weight, and standard cutoffs were used to denote individuals as being not overweight/obese, overweight, or obese.[24] Based on responses to a validated 17-item food frequency questionnaire,[25] we denoted individuals as consuming five or more versus fewer than five daily servings of fruits and vegetables.[26] Participants answered questions about the weekly frequency and average duration of moderate and vigorous intensity physical activities. Responses were aggregated (using the formula: $4.5 \times$ weekly minutes of moderate activity $+ 7.0 \times$ weekly minutes of vigorous activity) to calculate weekly metabolic equivalent expenditure. Individuals were denoted as engaging in no physical activity (metabolic equivalents [METS] = 0), some physical activity (METS greater than 0 but less than 675), or meeting physical activity recommendations (METS equal to or greater than 675). [27] We followed established guidelines for categorizing individuals as current, former, or never smokers.[28] Women who reported consuming an average of 8 or more drinks per week and

men who reported an average intake of 15 or more drinks per week were denoted as being risky drinkers.[26, 29]

Data Weighting and Statistical Analyses

All statistical analyses were conducted using SUDAAN (version 9.0.1; Research Triangle Institute, Research Triangle Park, NC) and were weighted based on design, ratio, and non-response adjustments, with post-stratification adjustments for census-based estimates of age, gender, and race/ethnicity. All percentages reported in the Results section are weighted and all sample sizes are unweighted.

Given the multiple associations examined and the large sample size, we used a cutoff of $p < .001$ to determine statistical significance for all analyses. A series of chi-square tests examined whether individuals who were missing data on the indoor tanning variable differed on demographic factors compared to individuals who were not missing data for that variable. Next, we examined the demographic characteristics of the sample. We then conducted a series of age-stratified chi-square analyses to examine the extent to which each potential correlate was associated with past year indoor tanning. To examine the unique correlates of indoor tanning, we conducted a multiple logistic regression separately for each age group, with the statistically significant correlates from the age-stratified chi-square analyses included as independent variables and the dichotomous past year indoor tanning variable as the outcome variable in each analysis.

Results

Missing Data Analyses and Sample Demographic Characteristics

Individuals missing data for the indoor tanning item were less likely to be non-Hispanic white individuals (66.2%) than those who were not missing data for that variable (71.7%) ($\chi^2 = 20.18$, $p = .0002$). There were no differences in missing data for the indoor tanning variable according to gender, age, or education (χ^2s ≤ 8.88, ps $\geq .03$). The demographic characteristics of the sample are shown in Table 1.

Age-Stratified Correlates of Engaging in Indoor Tanning in the Past Year

The results of a series of chi-square analyses examining age-stratified correlates of having engaged in indoor tanning at least once in the past year are shown in Table 2. Selected results are highlighted here. As shown at the top of the table, reported engagement in indoor tanning declined with increasing age, from a high of 20.4% among 18−29 year olds to 7.8% among those aged 65 years and over ($\chi^2 = 347.44$, $p < .0001$). Among 18−29 year olds, individuals in the Northeast and Midwest were more likely to report past year indoor tanning than those in the South and West. Among 18−49 year olds, a higher percentage of women than men reported having engaged in past year indoor tanning. Among participants aged 18−49 years, non-Hispanic white individuals reported a higher prevalence of past year indoor tanning than members of other racial/ethnic groups. Individuals aged 18−39 years who did not complete high school reported a lower prevalence of past year indoor tanning than those with a higher level of education. Among 18−29 and 30−39 year olds, those who had visited a physician in the last year were more likely to have tanned indoors. Individuals aged 18−29 years who perceived themselves as being at a higher risk of developing cancer (compared to others their own age and gender) reported a higher prevalence of past year indoor tanning.

With regard to the sun exposure variables, there was evidence in all except the oldest age group (age 65 and older) that individuals reporting that they do not go out in the sun were less likely to engage in indoor tanning. Also, among those aged 18−39 years, there was a higher prevalence of past year indoor tanning among individuals who reported that they would get a sunburn if

they went out in the sun for an hour. Across all of the age groups, individuals who reported being sunburned in the past year were more likely to have engaged in past year indoor tanning. With regard to sun protection behaviors, there was consistent evidence across most age groups that individuals who reported not practicing the sun protection behaviors of staying in the shade, wearing a long-sleeved shirt, and wearing long pants were more likely to have engaged in past year indoor tanning. However, individuals aged 18−49 years who reported frequent use of sunscreen when out in the sun were more likely to have engaged in past year indoor tanning than individuals reporting infrequent sunscreen use. Similarly, individuals aged 18−39 years who reported using sunscreen with an SPF of 15 or more were more likely to have engaged in past year indoor tanning.

The only age group for which BMI was associated with reported engagement in past year indoor tanning was 30−39 year olds, for whom indoor tanning was more prevalent among those who were not overweight or obese. Among 18−29 and 40−49 year olds, more physically active individuals reported a higher prevalence of past year indoor tanning. For individuals aged 18−49 years, low consumption of fruit and vegetables was associated with a higher reported prevalence of past year indoor tanning. Additionally, among 18−29 year olds, there was a higher prevalence of indoor tanning among individuals who smoked or engaged in risky drinking.

Separately for each age group, the statistically significant correlates of reported engagement in indoor tanning identified in the chi-square analyses were included as independent variables in a single logistic regression analysis, with the dichotomous outcome variable of engagement in past year indoor tanning (see Table 3). Among 18−49 year olds, gender and race/ethnicity were each unique correlates of past year indoor tanning, with a higher prevalence of indoor tanning reported among women and non-Hispanic white individuals. Among 18−39 year olds, individuals who did not complete high school had a lower prevalence of past year indoor tanning. Individuals aged 18−29 years who reported less skin sensitivity to two-week sun exposure were more likely to report past year indoor tanning. Across all age groups, individuals who had one or more sunburns in the past year were more likely to report past year indoor tanning. Among individuals aged 30−64 years, those who reported less frequently staying in the shade when out in the sun reported a higher prevalence of past year indoor tanning.

Discussion

This is the largest study to date investigating indoor tanning in a cohort extending in age throughout adulthood, stratifying by age, and examining a variety of potential correlates. As expected, we found that indoor tanning behavior decreased with age. We were able to identify a number key correlates of indoor tanning in the U.S. population, particularly among the younger age groups. The current study found similar patterns, yet higher rates of indoor tanning across all age groups than the study by Stryker and colleagues that used the HINTS dataset. [10] Both studies used a similar item to assess indoor tanning; however, HINTS used a telephone interview, whereas NHIS used an in-person interview format. The HINTS sample size was 5,491 with a 20.9% response rate, and the current sample size was 29,394 with a 69.0% response rate. Therefore, the results of the current study may better capture prevalence of indoor tanning in the U.S. adult population.

Indoor tanning prevalence for younger individuals ranged from 20.4% among 18−29 year olds to 13.6% among 40−49 year olds. Correlates associated with a higher prevalence of indoor tanning among younger individuals in the univariate analyses included living in the Northeastern or Midwestern U.S., being female, Caucasian, having a higher level of education, visiting a physician in the past year, and higher perceived cancer risk. Additionally, individuals with moderate to high tanning ability; with mild burning likelihood; who sunburned one or

more times in the last year; or who do not stay in the shade, wear long-sleeved shirts, or long pants when out in the sun, were more likely to tan indoors.

We will briefly discuss several interesting findings from the univariate analyses that are not reported in the multivariate analysis section. Younger individuals who reported using sunscreen with an SPF of 15 or more were more likely to have engaged in past year indoor tanning. This result is counter-intuitive but suggests that some indoor tanners may be concerned about the damage they may be doing to their skin and therefore protect some parts of their skin. Details about how and when sunscreen was used were not assessed. To our knowledge, no study has queried indoor tanners as to whether they use sunscreen or what SPF they use during indoor tanning. As in the current study, items often do not distinguish between sunscreen use on the face and the rest of the body. It is possible that some indoor tanners commonly use high SPF sunscreen on their faces but use little or no sunscreen on their bodies or use sunscreen while sunbathing but not while indoor tanning. Future research should investigate such issues.

Behavioral health risk factors were associated with indoor tanning, but our findings were not always in agreement with our predictions. Consistent with our hypothesis, fruit/vegetable intake was associated with less likelihood of indoor tanning among those under 50 years of age. Also consistent with our hypotheses and previous research,[9,11,13-16] there was a higher prevalence of indoor tanning among individuals who smoke cigarettes or engage in risky drinking. Prior research has found that indoor tanning and substance use behaviors often co-occur, particularly among youth.[9,11,13-16] Among the 30−39 year old group only, those who were not overweight/obese were more likely to be indoor tanners. Contrary to our hypotheses, individuals who were physically active were more likely to be indoor tanners. One potential explanation for the positive association between exercise and indoor tanning is that those who exercise outside may receive incidental sun exposure and then seek to maintain a tanned appearance via indoor tanning. On the other hand, a previous study found that adolescents who participated in routine physical activity were less likely to have tanned indoors (among females) but that teens with a healthy diet were more likely to have tanned indoors.[11] More research is needed in this area.

In the multivariate analyses, the most important factors associated with higher indoor tanning rates among those under 50 years of age were being female, Caucasian, having a higher education level, moderate to high tanning ability, reporting more past year sunburns, and not staying in the shade when outside. The gender difference is likely due to higher levels of appearance concern and cultural pressure to be attractive for females.[11,13,15,16] High rates of indoor tanning and UV exposure are problematic because increasing rates of melanoma, non-melanoma skin cancers, and photo-aging have been found among young female indoor tanners.[30-34] There is more pressure for women and whites to tan for appearance enhancement, and it is more socially acceptable for women to seek such cosmetic treatments. Darker-skinned individuals who are not sensitive to burning may not need to make an effort to tan or do not perceive tanning as culturally appropriate,[35] and very fair individuals who burn severely may not be able to tan or refrain from tanning because they are aware of their high risk for burning and other skin damage. Those with higher education levels may have higher incomes, making indoor tanning more affordable. In fact, Stryker et al.[10] found that moderate to high levels of education and income were associated with indoor tanning. Those who have moderate to high tanning ability seek UVR exposure and are therefore more likely to experience burns due to high levels of exposure. Avoiding the shade when outside suggests a desire to achieve a tanned appearance, which is consistent with the decision to engage in indoor tanning. The behavioral health risk variables (diet, exercise, and substance use) were not significant in the multivariate model. Likewise, protective clothing and sunscreen use were significant in the univariate but not the multivariate model. One reason for this finding may be that the associations between

the skin protection variables and indoor tanning behavior are accounted for by other variables in the model such as sunburn frequency.

Compared to the younger groups, indoor tanning was less common among older individuals, and fewer variables were found to correlate with engagement in this behavior. However, indoor tanning continued throughout the lifespan with a prevalence of 9.8% among those aged 50−64 years and 7.8% among those aged 65 years and older. Among those 50−64 years of age, the univariate analyses indicated that individuals who reported not going out in the sun had a lower prevalence of indoor tanning. Correlates of higher indoor tanning rates in the univariate analyses for 50−64 year olds were a greater number of sunburns in the last year, and rarely or never staying in the shade or wearing long pants when out in the sun. The most important correlates according to the multivariate analyses were past year sunburns and not staying in the shade. Among those aged 65 years and older, having a greater number of sunburns in the past year was the only variable associated with a higher rate of indoor tanning in either the univariate or the multivariate analyses. It would be interesting to investigate other potential correlates that might explain indoor tanning among older persons, such as perceived appearance enhancement.

Study Limitations

The study design was cross-sectional which limits conclusions made regarding age differences (e.g., differences may represent cohort effects) and causal associations. Behaviors were assessed by self-report, which may not correspond with actual engagement in these behaviors. There were high standard errors (and thus low reliability) for some of the indoor tanning prevalence estimates for individuals with a family history of skin cancer (melanoma, non-melanoma, or unknown type of skin cancer). Future research is needed to establish more reliable estimates of these prevalences among this population. As in several previous studies, indoor tanning behavior was assessed using one item. Future studies could benefit from assessing this behavior in more detail. Skin cancer risk is cumulative, and some of the risk measures including indoor tanning only evaluated behavior in the past year.

Implications and Conclusions

This study's major strengths are that it focuses on the important public health issue of indoor tanning in a large and representative sample of adults across the lifespan. Based on the current data, groups reporting the highest prevalence of indoor tanning included Caucasian women, more highly educated individuals, individuals with lower skin sensitivity, a greater history of recent sunburns, and greater engagement in outdoor tanning. Healthcare providers and the public at large may be surprised at the prevalence of indoor tanning, particularly among certain groups (e.g., older adults). Since indoor tanners are more likely to see a physician than non-tanners, healthcare providers should address indoor tanning (and sun exposure) in their patients, even among those over 65 years of age. Such intervention efforts could also be targeted toward other settings such as high schools and universities. Indoor tanning is prevalent among adolescents and young adults, and these environments offer community forums and activities in which public health issues such as indoor tanning can be addressed.

More data should be gathered to help inform the development of effective interventions to reduce the prevalence of indoor tanning and the incidence of melanoma and other skin cancers in the U.S. One possible direction concerns the content of large population-based studies. The NHIS and other future national studies could include measures of psychosocial factors that may be associated with UVR exposure, such as appearance-oriented variables and the perceived value of having a tan based on messages from family, friends, and the media. Likewise, other national studies such as the National Health and Nutrition Examination Survey (NHANES) could consider strategies for objective monitoring of UVR exposure such as

spectrophotometry, dosimetry, or mole inspection. A second possible research direction relates to age-related patterns. Future studies should attempt to identify predictors of indoor tanning among older individuals, who, despite a lower prevalence of indoor tanning, are at higher risk of skin cancer than younger people. Longitudinal studies should be conducted to determine which effects are longitudinal versus cohort effects. Finally, associations among various health risk behaviors (such as tanning, substance use, diet, and exercise) should continue to be explored, particularly with respect to issues around appearance and body image. Taken together, these suggestions for future research would greatly enhance our understanding of indoor tanning behavior and its correlates throughout the lifespan.

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Table 1

Demographic Characteristics of Sample (*N* = 29,394), 2005 National Health Interview Survey

	Sample %
Gender	
Male	48.1
Female	51.9
Missing (*n*)	0
Age (years)	
18−29	21.8
30−39	18.6
40−49	20.4
50−64	23.1
≥ 65	16.1
Missing (*n*)	0
Race/ethnicity	
Non-Hispanic white	71.7
Non-Hispanic black	11.2
Non-Hispanic other	4.5
Hispanic	12.7
Missing (*n*)	0
Education level	
Some high school or less	16.3
High school graduate	29.4
Some college	28.4
College graduate	25.8
Missing (*n*)	250

Note. All percentages are weighted. Data Source: National Center for Health Statistics.[25]

Table 2

Age-Stratified Correlates of Engaging in Indoor Tanning in the Past Year, 2005 National Health Interview Survey

| | Prevalence of Indoor Tanning During the Past Year % ±95% CI | | | | |
	Age 18-29 (n = 5,461)	Age 30-39 (n = 5,574)	Age 40-49 (n = 5,737)	Age 50-64 (n = 6,927)	Age 65+ (n = 5,695)
Full sample	20.4 ± 1.3	16.7 ± 1.2	13.6 ± 1.1	9.8 ± 0.9	7.8 ± 0.9
Demographics					
Region					
Northeast	25.0* ± 4.2	17.8 ± 3.0	14.5 ± 2.7	11.4 ± 2.7	9.7 ± 2.3
Midwest	26.2 ± 2.8	20.4 ± 2.8	15.8 ± 2.5	11.3 ± 2.0	8.2 ± 2.0
South	17.4 ± 1.9	15.4 ± 1.9	12.5 ± 1.9	8.3 ± 1.3	6.0 ± 1.3
West	15.2 ± 2.2	14.0 ± 2.4	12.0 ± 1.8	9.2 ± 1.6	8.7 ± 1.9
Gender					
Male	13.2* ± 1.8	11.6* ± 1.4	11.3* ± 1.4	9.3 ± 1.3	8.4 ± 1.3
Female	27.3 ± 1.8	21.9 ± 1.8	15.7 ± 1.5	10.3 ± 1.1	7.3 ± 1.1
Race/ethnicity					
Non-Hispanic white	26.6* ± 1.9	21.1* ± 1.7	15.7* ± 1.4	10.5 ± 1.1	7.8 ± 1.0
Non-Hispanic black	5.6 ± 2.0	8.6 ± 2.6	5.0 ± 1.6	5.7 ± 2.2	6.3 ± 3.1
Non-Hispanic other	11.4 ± 4.8	10.1 ± 4.4	12.3 ± 5.0	8.2 ± 4.0	§
Hispanic	12.3 ± 2.2	8.7 ± 2.1	9.2 ± 2.3	9.1 ± 2.5	9.3 ± 4.0
Education level					
Some high school or less	14.2* ± 2.5	10.2* ± 2.4	10.7 ± 2.6	7.8 ± 2.0	8.2 ± 1.7
High school graduate	19.4 ± 2.5	16.7 ± 2.3	15.0 ± 1.9	10.5 ± 1.6	8.4 ± 1.5
Some college	24.7 ± 2.3	20.9 ± 2.3	15.0 ± 1.9	11.2 ± 1.8	6.7 ± 1.7
College graduate	20.0 ± 2.8	15.8 ± 1.9	11.9 ± 1.8	8.7 ± 1.5	7.3 ± 1.7
Health Access and Family History					
Visited a physician in the last year					
Yes	22.9* ± 1.6	18.1* ± 1.4	14.3 ± 1.3	9.8 ± 1.0	7.7 ± 0.9
No	12.6 ± 2.1	11.8 ± 2.2	10.6 ± 2.1	9.6 ± 2.1	8.2 ± 3.8
Skin cancer family history					
No skin cancer	20.1 ± 1.3	16.6 ± 1.2	13.3 ± 1.1	9.5 ± 1.0	7.7 ± 0.9
Melanoma	29.1 ± 14.4	15.7 ± 8.4	19.1 ± 7.3	7.8 ± 4.3	§
Non-melanoma	28.6 ± 12.4	17.2 ± 7.7	13.3 ± 5.4	13.9 ± 5.6	§
Unknown type	26.5 ± 11.2	24.8 ± 9.2	16.8 ± 6.4	13.2 ± 4.7	8.8 ± 4.7
Perceived Cancer Risk					
Perceived cancer risk compared to others					
Less likely	17.1* ± 2.5	14.3 ± 2.1	13.0 ± 1.9	9.2 ± 1.4	7.9 ± 1.3
As likely	20.0 ± 1.8	17.2 ± 1.6	13.2 ± 1.5	10.3 ± 1.3	7.8 ± 1.3
More likely	31.3 ± 4.2	20.2 ± 3.1	16.4 ± 3.0	9.2 ± 2.0	7.7 ± 2.4
Don't know	19.4 ± 5.8	16.2 ± 5.1	12.8 ± 4.6	9.5 ± 2.9	7.4 ± 2.6
Skin Reaction to Sun Exposure					
Skin reaction after 1 hour in the sun					
Moderate/severe sunburn	24.0* ± 2.9	19.2* ± 2.4	14.5* ± 2.0	9.4* ± 1.5	8.3 ± 1.7
Mild sunburn	25.5 ± 2.9	22.0 ± 2.5	15.7 ± 2.3	12.1 ± 1.8	8.5 ± 2.0
No sunburn	16.6 ± 1.8	12.6 ± 1.5	12.4 ± 1.7	9.5 ± 1.5	7.5 ± 1.4
Do not go out in the sun	4.9 ± 3.4	5.3 ± 3.7	4.7 ± 2.3	5.8 ± 2.3	6.6 ± 1.9
Skin reaction after two weeks in the sun					
Sunburn repeatedly/freckle	18.3* ± 3.0	16.6* ± 2.9	11.1* ± 2.3	8.6* ± 1.8	8.4 ± 2.2
Mild tan	19.0 ± 2.4	16.4 ± 2.2	14.4 ± 2.1	9.8 ± 1.6	8.3 ± 1.8
Moderate tan	23.6 ± 2.5	19.8 ± 2.2	15.8 ± 2.0	12.0 ± 1.5	7.5 ± 1.6
Very dark tan	23.0 ± 3.7	13.9 ± 2.8	13.3 ± 2.5	10.6 ± 2.7	7.9 ± 3.1
Do not go out in the sun	4.9 ± 2.9	7.7 ± 3.9	6.6 ± 2.5	4.5 ± 1.7	6.8 ± 1.8
Skin Cancer Risk Behaviors					
Number of sunburns in the past year					
0	11.9* ± 1.5	10.0* ± 1.2	9.6* ± 1.2	7.1* ± 0.8	5.6* ± 0.8

	Prevalence of Indoor Tanning During the Past Year % ± 95% CI				
	Age 18–29 (n = 5,461)	Age 30–39 (n = 5,574)	Age 40–49 (n = 5,737)	Age 50–64 (n = 6,927)	Age 65+ (n = 5,695)
1	27.9 ± 3.2	25.3 ± 3.2	17.6 ± 2.5	16.2 ± 2.9	14.0 ± 4.3
≥ 2	32.1 ± 3.0	25.1 ± 2.8	21.1 ± 2.9	18.6 ± 3.2	34.7 ± 6.7
Frequency of staying in the shade when out in the sun					
Always/most of the time	13.6* ± 2.2	13.0* ± 1.8	10.4* ± 1.6	7.7* ± 1.2	7.9 ± 1.4
Sometimes	21.4 ± 2.1	17.4 ± 1.9	13.7 ± 1.6	10.5 ± 1.4	7.6 ± 1.6
Rarely/never	24.3 ± 2.5	20.4 ± 2.3	17.6 ± 2.2	13.0 ± 1.9	8.9 ± 2.1
Frequency of wearing a hat when out in the sun					
Always/most of the time	15.9* ± 3.9	13.2 ± 3.7	9.8 ± 2.6	8.7 ± 1.8	8.2 ± 2.0
Sometimes	12.5 ± 3.6	13.3 ± 3.1	12.8 ± 3.1	10.6 ± 2.2	7.4 ± 2.1
Rarely/never	21.7 ± 1.5	18.1 ± 1.4	14.6 ± 1.3	10.3 ± 1.2	8.3 ± 1.4
Frequency of wearing a long-sleeved shirt when out in the sun					
Always/most of the time	12.5* ± 4.0	9.6* ± 3.6	9.0* ± 2.7	7.6 ± 2.1	8.5 ± 1.9
Sometimes	13.0 ± 2.8	12.6 ± 2.6	10.7 ± 2.5	10.2 ± 1.9	8.5 ± 2.3
Rarely/never	22.4 ± 1.6	18.5 ± 1.4	15.1 ± 1.4	10.4 ± 1.2	8.1 ± 1.3
Frequency of wearing long pants when out in the sun					
Always/most of the time	15.1* ± 2.1	11.3* ± 2.2	11.1* ± 1.8	7.8* ± 1.4	7.8 ± 1.4
Sometimes	17.7 ± 2.6	16.1 ± 2.3	11.9 ± 2.1	8.5 ± 1.6	8.4 ± 2.3
Rarely/never	24.4 ± 2.0	19.6 ± 1.6	16.0 ± 1.7	12.4 ± 1.5	8.8 ± 1.7
Frequency of sunscreen use when out in the sun					
Always/most of the time	26.4* ± 3.0	21.1* ± 2.2	14.7* ± 1.9	11.0 ± 1.5	8.9 ± 1.9
Sometimes	21.3 ± 3.1	18.8 ± 2.7	17.6 ± 2.6	11.4 ± 2.0	8.7 ± 2.5
Rarely/never	17.8 ± 1.7	13.4 ± 1.5	11.5 ± 1.5	9.0 ± 1.3	7.7 ± 1.2
Use sunscreen with sun protection factor ≥ 15					
Yes	23.6* ± 2.1	18.9* ± 1.7	14.9 ± 1.5	10.4 ± 1.1	8.8 ± 1.5
No	17.3 ± 1.9	14.2 ± 1.7	12.7 ± 1.7	9.5 ± 1.5	7.6 ± 1.2
Ever had a total skin exam					
Yes	29.5 ± 5.5	17.8 ± 3.2	15.1 ± 2.7	10.2 ± 1.9	7.3 ± 1.5
No	19.7 ± 1.4	16.6 ± 1.3	13.2 ± 1.2	9.6 ± 1.1	8.0 ± 1.1
Behavioral Health Risk Factors					
Body mass index					
Not overweight/obese	22.6 ± 1.8	18.4* ± 2.0	15.5 ± 1.8	11.2 ± 1.6	7.8 ± 1.4
Overweight	18.0 ± 2.4	16.9 ± 2.0	13.4 ± 1.8	9.4 ± 1.3	7.0 ± 1.2
Obese	17.4 ± 2.9	13.4 ± 1.8	10.9 ± 1.9	8.4 ± 1.4	9.1 ± 2.1
Physical activity					
None	16.0* ± 2.0	14.0 ± 1.8	11.2* ± 1.7	8.7 ± 1.3	8.4 ± 1.3
Some	23.3 ± 3.2	18.1 ± 2.6	13.7 ± 2.1	10.9 ± 1.8	5.9 ± 1.5
Meet recommendations	22.9 ± 2.1	18.5 ± 1.8	15.7 ± 1.7	10.6 ± 1.4	8.0 ± 1.6
Fruit and vegetable intake					
≥ 5 daily servings	17.5* ± 1.9	14.3* ± 1.7	11.5* ± 1.5	10.1 ± 1.4	7.3 ± 1.4
< 5 daily servings	22.9 ± 1.9	18.5 ± 1.6	15.1 ± 1.5	9.6 ± 1.1	7.7 ± 1.1
Smoking status					
Current smoker	25.1* ± 2.8	20.1 ± 2.6	13.6 ± 2.0	10.2 ± 1.7	5.9 ± 2.3
Former smoker	23.0 ± 4.3	18.1 ± 3.3	14.8 ± 2.3	9.4 ± 1.6	8.5 ± 1.4
Never smoker	18.2 ± 1.5	15.1 ± 1.4	13.2 ± 1.4	9.8 ± 1.3	7.5 ± 1.2
Alcohol use					
Risky drinker	32.6* ± 5.5	17.9 ± 5.6	14.5 ± 4.3	10.2 ± 4.2	9.2 ± 4.6
Not risky drinker	19.5 ± 1.4	16.7 ± 1.2	13.4 ± 1.1	9.8 ± 0.9	7.7 ± 0.9

Note. CI = confidence interval. All percentages are weighted. Data Source: National Center for Health Statistics.[25]

§Estimate suppressed due to low reliability (coefficient of variation > 30%)

*
p < .001 for the association between the variable and prevalence of indoor tanning during the past year

Table 3

Age-Stratified Multiple Logistic Regression Analyses Examining Unique Correlates of Engaging in Indoor Tanning in the Past Year, 2005 National Health Interview Survey

	Age 18–29		Age 30–39		Age 40–49		Age 50–64		Age 65+	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Demographics										
Region										
Northeast	Ref									
Midwest	1.01	0.73–1.39								
South	0.82	0.60–1.11								
West	0.73	0.51–1.03								
Gender										
Male	Ref*		Ref*		Ref*					
Female	3.38	2.69–4.25	2.42	1.99–2.94	1.72	1.40–2.10				
Race/ethnicity										
Non-Hispanic white	Ref*		Ref*		Ref*					
Non-Hispanic black	0.18	0.11–0.30	0.54	0.35–0.83	0.33	0.21–0.51				
Non-Hispanic other	0.41	0.25–0.69	0.68	0.39–1.18	0.89	0.53–1.48				
Hispanic	0.59	0.44–0.78	0.51	0.38–0.70	0.69	0.50–0.96				
Education level										
Some high school or less	Ref*		Ref*							
High school graduate	1.12	0.83–1.52	1.26	0.89–1.79						
Some college	1.37	1.03–1.82	1.44	1.02–2.03						
College graduate	0.84	0.60–1.19	0.91	0.63–1.32						
Health Access										
Visited a physician in the last year										
Yes	Ref		Ref							
No	0.74	0.58–0.94	0.85	0.65–1.10						
Perceived Cancer Risk										
Perceived cancer risk compared to others										
Less likely	Ref									
As likely	0.89	0.71–1.12								
More likely	1.34	1.01–1.77								
Don't know	1.15	0.70–1.88								
Skin Reaction to Sun Exposure										
Skin reaction after 1 hour in the sun										
Moderate/severe sunburn	Ref		Ref		Ref		Ref			
Mild sunburn	1.09	0.84–1.41	1.26	1.01–1.59	1.01	0.77–1.31	1.32	1.03–1.69		
No sunburn	1.16	0.90–1.50	1.08	0.82–1.41	1.20	0.94–1.54	1.25	0.97–1.61		
Do not go out in the sun	0.74	0.27–2.04	0.71	0.22–2.27	0.60	0.22–1.62	2.23	0.98–5.07		
Skin reaction after two weeks in the sun										
Sunburn repeatedly/freckle	Ref*		Ref		Ref		Ref			
Mild tan	1.53	1.13–2.06	1.17	0.86–1.57	1.57	1.14–2.18	1.05	0.79–1.40		
Moderate tan	2.28	1.73–3.00	1.36	1.03–1.81	1.70	1.27–2.28	1.25	0.95–1.63		
Very dark tan	2.52	1.74–3.66	1.14	0.80–1.61	1.65	1.15–2.36	1.17	0.80–1.72		
Do not go out in the sun	0.44	0.15–1.30	0.87	0.38–2.00	2.01	1.00–4.06	0.46	0.23–0.92		
Skin Cancer Risk Behaviors										
Number of sunburns in the past year										
0	Ref*		Ref*		Ref*		Ref*		Ref*	
1	2.22	1.71–2.86	2.29	1.74–3.03	1.74	1.36–2.23	2.41	1.91–3.05	2.76	1.91–4.00
≥ 2	2.88	2.24–3.69	2.38	1.89–3.00	2.27	1.78–2.89	2.84	2.15–3.75	8.97	6.37–12.64
Frequency of staying in the shade when out in the sun										
Always/most of the time	Ref		Ref*		Ref*		Ref*			
Sometimes	1.29	0.99–1.69	1.21	0.96–1.52	1.13	0.90–1.43	1.17	0.93–1.47		
Rarely/never	1.36	1.03–1.81	1.63	1.25–2.12	1.59	1.26–2.01	1.38	1.09–1.76		
Frequency of wearing a hat when out in the sun										

	Age 18–29		Age 30–39		Age 40–49		Age 50–64		Age 65+	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Always/most of the time	Ref									
Sometimes	0.53	0.32–0.89								
Rarely/never	0.80	0.53–1.20								
Frequency of wearing a long-sleeved shirt when out in the sun										
Always/most of the time	Ref		Ref		Ref					
Sometimes	0.60	0.33–1.08	0.89	0.50–1.59	0.95	0.59–1.54				
Rarely/never	0.81	0.47–1.42	1.03	0.61–1.73	1.09	0.73–1.61				
Frequency of wearing long pants when out in the sun										
Always/most of the time	Ref		Ref		Ref		Ref			
Sometimes	1.31	0.97–1.77	1.17	0.85–1.60	0.93	0.69–1.25	1.00	0.75–1.35		
Rarely/never	1.50	1.18–1.92	1.19	0.89–1.58	1.07	0.83–1.38	1.2	1.52–1.93		
Frequency of sunscreen use when out in the sun										
Always/most of the time	Ref		Ref		Ref					
Sometimes	0.77	0.59–1.00	0.84	0.66–1.07	1.23	0.95–1.59				
Rarely/never	1.06	0.78–1.43	0.68	0.49–0.94	0.97	0.76–1.24				
Use sunscreen with sun protection factor ≥ 15										
Yes	Ref		Ref							
No	1.10	0.81–1.50	1.36	1.00–1.87						
Behavioral Health Risk Factors										
Body mass index										
Not overweight/obese			Ref							
Overweight			1.15	0.94–1.41						
Obese			0.85	0.69–1.05						
Physical activity										
None	Ref				Ref					
Some	1.26	0.96–1.65			1.01	0.78–1.30				
Meet recommendations	1.16	0.92–1.46			1.20	0.95–1.52				
Fruit and vegetable intake										
≥ 5 daily servings	Ref		Ref		Ref					
< 5 daily servings	0.93	0.77–1.12	1.07	0.88–1.31	1.29	1.07–1.57				
Smoking status										
Current smoker	Ref									
Former smoker	0.82	0.59–1.14								
Never smoker	0.81	0.65–1.01								
Alcohol use										
Risky drinker	Ref									
Not risky drinker	0.65	0.48–0.87								

Note. OR = adjusted odds ratio from multiple logistic regression analysis. CI = confidence interval. Ref = reference category. Data Source: National Center for Health Statistics.[25]

Due to missing data on independent variables, the sample size for each multiple logistic regression analysis was as follows: age 18–29, *n* = 4,789; age 30–39, *n* = 4,806; age 40–49, *n* = 5,095; age 50–64, *n* = 6,081; age 65+, *n* = 5,664.

*
$p < .001$ for the association between the variable and prevalence of indoor tanning during the past year