HHS Public Access

Author manuscript

Am J Health Educ. Author manuscript; available in PMC 2018 March 10.

Published in final edited form as:

Am J Health Educ. 2017 ; 48(2): 90–99. doi:10.1080/19325037.2016.1271755.

Prevalence of Sun Protection at Outdoor Recreation and Leisure Venues at Resorts in North America

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Abstract

Background—Exposure to solar ultra violet radiation (UVR) is a primary risk factor for skin cancer. Vacationers often fail to protect themselves from harmful UVR.

Purpose—The study assessed the sun protection practices of resort guests in various outdoor leisure and recreation venues during warm-weather seasons.

Method—41 North American resorts were enrolled in a quasi-experimental randomized controlled trial. Adult guests were observed (n=4091) and surveyed (n=3694) in a cross sectional sample. Data collection was conducted in recreation and leisure venues with outdoors commons/ reception areas acting as the comparison condition.

Results—The mean percent of vacationers at pools and beaches were more likely ($p < 0.001$) to wear sunscreen than in commons areas but less likely ($p < 0.001$) to wear cover-up clothing or use shade. In both samples, the combined sun protection scores were higher in commons areas compared to all venues except for outdoor dining ($p < 0.001$).

Discussion—Sun safety was suboptimal in all venues and was potentially mitigated by venue type.

Translation to Health Education Practice—Approaches are needed to encourage vacationers to practice comprehensive sun protection and to work with resorts to construct built environments that facilitate rather than act as barriers to sun safety.

Keywords

Cancer and Cancer Education; Health Communication

BACKGROUND

Over 50 years of cross disciplinary research demonstrates that the social ecology in which people live significantly influences their behavior, including decisions about their personal health.[1] Grounded in the thesis that individual behavior is the result of the hierarchical influence of public policy, community, organizations, and interpersonal interactions and attitudes, the social ecological model (SEM) is highly applicable to sun protection and skin cancer prevention. Individuals are not entire free agents, instead their decisions are made in an environment of sociocultural and physical surroundings. SEM's have been effectively applied to interventions designed to promote healthy nutrition, increased physical activity, tobacco control and injury prevention.[2–4] Of particular interest to the present study are specific components of SEMs, the community and organizational levels that impact the structures and activities in which people interact and recreate. The built environment has been shown to impact physical activity, diet, recreation behavior and ultimately the deaths of millions of people[5,6] and can promote healthy behaviors such as outdoor recreation.[7] It is also true that the configuration of one's physical surroundings can undermine healthy lifestyle behaviors.[8]

This investigation focused on the effect of the built environments of resorts operating in warm weather on vacationers taking measures to protect themselves from excessive exposure to ultraviolet radiation (UVR), a known cause of skin cancer.[9]

The Built Environment of Resorts

Environmental factors such as the availability of defined spaces for outdoor recreation or the absence of shade for sun protection can have demonstrable effects on people's health.[10]

The built environments of resorts pose unique challenges to the design and implementation of public health interventions, including those intended to encourage vacationers to practice sun safety. Resorts not only provide vacationers with healthy outdoor recreational opportunities ranging from swimming and tennis to golf to hiking, but in the process of taking advantage of such opportunities the environment could put vacationers at greater risk for excessive UVR exposure and harmful sunburning.

Skin Cancer Risk and Warm Weather Vacations

Skin cancer is the most common cancer in the United States.[9] The effects of excessive UVR and its relationship to harmful skin damage are the primary cause of skin cancer.[9] Public health authorities recommend easily implemented prevention practices for sun safety, notably, reducing UVR exposure by limiting time in the sun when UVR is high (e.g. at midday, lower latitudes, higher elevations, and close proximity to the summer solstice), using shade, wearing protective clothing and applying/re-applying broad-spectrum sunscreens with a minimum, 15 SPF.[11]

With 60% of U.S. adults traveling out-of-town for vacations[12] and spending 75% of their leisure time while vacationing recreating outdoors, vacationers at warm weather resorts are especially at risk for exposure to excessive UVR. One study estimated that beach-going vacationers receive on average 500% more UVR than required to sunburn,[13] so it is not surprising that research on three continents links vacationing in sunnier climates (e.g. mountains, beaches, sea, and waterside) and lifetime recreational sun exposure during such vacations with melanoma, the most serious type of skin cancer.[14–17] Similarly, children and young adults with a history of warm weather vacations present with increased nevi development, a risk factor for melanoma.[18–20]

The majority of U.S. spring and summer vacationers book commercial resorts featuring outdoor recreation venues with abundant sunshine.[12] As a result of the design and differing purposes of these venues, there is considerable variability in such factors as their hours of availability, clothing requirements, shade options, and potential time spent in the sun while at the venue. Thus, these venues not only provide vacationers with the opportunity to spend time in the sun under differing conditions, but also may provide them with diverse or even contradictory environmental cues about the degree to which they should practice sun safety.

PURPOSE

There is growing evidence to suggest that vacationers in general, and those engaged in outdoor activities specifically, fail to take measures to protect themselves from the effects of high UVR.[13,21,22] Furthermore, given that “fun in the sun” is often the *raison d’être* for vacationing at resorts purposefully designed to facilitate outdoor leisure and recreation, interventions designed to promote sun safety may face an especially difficult task.

The purpose of this study is to describe the sun safety behaviors by vacationers in various outdoor leisure and recreation areas at a sample of resorts during warm-weather seasons (i.e., spring and summer). Differences in sun protection by sex and age were also examined.

METHODS

Sample and Recruitment

Adult vacationers at destination resorts with outdoor leisure and recreation venues were observed and surveyed. Resorts were initially recruited from member hotels/resorts of two leading travel industry trade associations (American Hotel and Lodging Association and the Hospitality Sales and Marketing Association International) to participate in a randomized trial evaluating a sun protection intervention. Resorts met the following inclusion criteria: a) featured at least three outdoor recreation areas, b) had at least one waterside recreation area, c) were located in the continental United States or Canada, d) provided overnight lodging, and e) agreed to participate. To boost recruitment, ski areas with extensive summer recreation that met our criteria were recruited from the National Ski Areas Association membership. The list was randomly ordered and resorts were enrolled in two annual waves in 2012–13 and 2013–14 to control for seasonality and to make data collection feasible. All procedures were approved by the authors’ Institutional Review Boards. Sample and recruitment details are previously published.[23]

Measures

Guest sun safety practices were assessed by observation (Sample 1) and intercept surveys plus observation (Sample 2) in outdoor leisure and recreation areas in two annual cross-sectional panels at resorts enrolled in a group-randomized, pair-matched pretest-posttest controlled quasi-experimental design. Both the observational measure and intercept survey were employed to provide objective observations and self report data (e.g., use of sunscreen) of sun protection practices and because these measures have proven to be the most compatible.[24] Assessments were conducted by trained research staff during two-day visits to the resorts on days when managers confirmed that the number of registered guests was high. All data were collected in teams of two or three interviewers and coders drawn from our staff of 4 females and 4 males. In each case the team was headed by the Principal Investigator or a Co-principal Investigator that had each conducted thousands of such observations over the past 20 years in outdoor recreation environments.[25–27] Other team members were trained in real and simulated field collections before collecting data for this study and began the study by observing the investigators.

Resorts in southern or desert regions with higher summer temperatures were visited in spring months (March to May) to avoid conditions driving guests indoors. Resorts in northern regions or at higher elevations were visited between June and September, peak summer and vacation months. Nearly all visits occurred between March 20 and September 20, and within three months of the summer solstice, an astronomical marker of high UV. Data reported here came from the pretest data collection that occurred in the initial cross-sectional panel at each resort in 2012 and 2013.

Observations were performed between 12 pm and 2 pm (± 1 hours of solar noon during daylight savings time) and intercept surveys were conducted each day between 10 am and 4 pm (±3 hours of solar noon) or until either the guest quotas were met or the two-day period allotted for surveying ended. All observations and surveys were anonymous. On the few days when guest numbers were low or weather was inclement, interviews outside a priori time frames were conducted. Guests were selected for assessment by plotting as straight a line as possible across the outdoor venue and observing/interviewing guests located on either side of the line.

Observation of Vacationers' Sun Safety Practices—The observation protocol was modified from a published measure used in observational studies of sun protection in Australia.[24,28,29] The measure drawn from these studies had a reported intra-class correlation above .90.[24,28] Observers recorded sex (male/female) and age (18–34/35–60/60 or older) of each vacationer and recorded their use of head covering (no hat/visor/narrow hat/baseball cap/legionnaire hat/wide-brimmed hat), sunglasses (yes/no), shirts (yes/no), sleeve length (strapless/sleeveless/¼ length/elbow length/¾ length/wrist length); collar (yes/no); neckline (low/high); midriff coverage (covered/cut-out/partially exposed/exposed), leg covering (bikini/short shorts or skirt/mid-thigh/knee length/¾ cover/ankle length), socks (no socks/ankle length/calf length/knee length), and shoes (no shoes/sandals/shoes). Observers also recorded whether the individual was in no shade, partial shade (25%/50%/75%), or full shade. Observers did not record sunburns. All team members were trained to accurately

observe the age of the participants, the amount of shade, head covering, clothing, sunglasses, and the degree of cloud cover prior to data collection until reliability of the coding in these simulated sessions exceeded a Cohen's Kappa coefficient of .70; typically, they exceeded . 90.

The observational assessment was programmed in a mobile app for Android tablet computers (paper versions were available if the sun created too much screen reflection). To increase accuracy, a human figure was displayed on the screen and "dressed" as the observer recorded hats, clothing, and sunglasses. Observers visually checked that the dressed figure on the screen matched what the vacationer was wearing. Each day, observations were first performed at low-use recreation areas (e.g., courts and marinas) and then at high-use areas (e.g., swimming pools/beaches and outdoor dining areas). The individual hat and clothing items were combined to estimate the percentage of skin covered, using Wallace's "rules of nine" clinical assessment of amount of burned skin area.[30]

Intercept Survey With Vacationers—The intercept survey was modified from a previous one used in a series of studies of sun safety by vacationers at ski areas.[23,25–27] Same-day self-reported sun protection has been validated by observation[31] and observations of sun protection have had adequate reproducibility in previous studies.[31,32] Vacationers were asked if they were wearing sunscreen with SPF 15 or higher and if so, what time they first applied it and if they had reapplied it. The time when they first came outdoors was recorded and used to estimate whether sunscreen was applied before going outdoors (no/15 minutes prior/30 minutes prior). Reapplication was defined as reapplying sunscreen if the vacationer was interviewed within two hours after first applying it. Vacationers were asked the number of times they had been sunburned in the past 12 months and whether they had been sunburned during the current visit to the hotel/resort (defined as red and/or painful from exposure to the sun, following published guidelines).[33,34] Vacationers' perceived importance of sun protection, injunctive norms for sun protection (i.e., "most people who matter to me think people should protect their skin from the sun"), and intention to sun tan were assessed with three 5-point Likert-type questions (strongly agree/strongly disagree). A fourth Likert-type question measured disinhibition during vacation ("I'm a different person when I'm on vacation than when I'm at home"[35]). Skin phenotype based on a validated measure of melanoma risk was measured combining eye color, skin tanability, and natural hair color.[36] Vacationers identified their home zip code (to determine latitude of home), date of first arrival at hotel/resort (if a member of a resort, date first arrived/year-round resident), age, education, Hispanic ethnicity, and race. Finally, interviewers recorded vacationers' sun protection attire using the observation measure described above. Interviews were collected at both low-use and high-use recreation areas. The interviewer's name, hotel/resort name, date, time interview started, and the outdoor recreation area were also recorded.

Environmental Information on Resorts—Research staff also collected environmental information for the data collection days. At the time of each observation and survey, research staff estimated cloud fraction by indicating if the sky was clear (0%), had high thin clouds, was partly cloudy, or was overcast (100%). For high thin or partly cloudy, staff estimated the amount of sky covered by clouds in 10% increments (10% to 90%). The UV

Index in 15-minute intervals and high temperature and average humidity for the day were gathered from public databases from the closest weather station reported by weather.org or ground-based UV sensor in the U.S. Department of Agriculture's UV-B Monitoring and Research Program. The latitude and elevation of the hotel/resort was recorded.

Outdoor Leisure and Recreation Venues

Seven outdoor recreation and leisure venues, where guests would be likely to recreate or spend time outdoors, were selected as data collection areas. They included: beaches, pools, marinas, golf courses, court and lawn games (e.g., tennis, volleyball), activity areas (e.g., rock climbing walls, alpine slides, hiking trails) and outdoor dining. An eighth outdoor venue, an outdoor commons/reception area, where guests gather but are not involved in any resort activity was selected as a comparison venue.

Statistical Analysis

Guests' sun protection practices were recorded and subsequently compared across the eight outdoor venues. Several measures were used to sun protection practices.[23] For the composite score, scales were converted to standard z-scores and the average z-score from various sun protection practices was calculated. In Sample 1, the combined sun protection practices score was the average z-score for body coverage and shade and in Sample 2, the combined sun protection practices score was the average z-score for sunscreen use, sunscreen pre-application and reapplication, body coverage, and shade. We also used two indexes of **any** sun protection practice: (1) in both Sample 1 and 2, the index was based on the use of ***either*** 85% clothing coverage ***or*** full shade, and (2) in Sample 2, an additional index was based on 85% clothing coverage ***or*** full shade, ***or*** sunscreen of +15 SPF.

Comparisons were performed using analysis of covariance (ANCOVA) and controlling for resort enrollment wave, guests' demographics, resort characteristics, and environmental cues (identified by stepwise model selection at $p < 0.10$, two-tailed). Logistic regression models were employed for dichotomous sun protection practices and the commons/reception area was the reference group. General linear models were used for continuous sun protection practices. The effects of sex and gender and their interactions with outdoor recreation venues were probed in the ANCOVA models, respectively. All analyses were performed in SAS. Alpha criterion levels were set at 0.05 (two-tailed).

RESULTS

Sample of Resort Guests

Observations (n=4,091) and surveys (n=3,694) were conducted with adult vacationers whose demographic characteristics are reported in Table 1. Of the 362 resorts invited to the trial, 41 (11%) agreed to participate. Of the non- participating resorts, 12 were ineligible, 83 never responded to the invitation, 76 refused [20%]) and 38 (11%) failed to commit in the time needed to be included in the study. Participating resorts were located in 17 states (Arizona, California, Colorado, Florida, Georgia, Michigan, Minnesota, Missouri, New Hampshire, New Mexico, New York, Ohio, Oregon, Utah, Vermont, West Virginia, and Wyoming) and one Canadian province (British Columbia). Nearly all of the resorts were privately owned

(17 independent, 4 part of large hotel chains, 14 ski areas, and 1 dude ranch) and 5 were state park lodges.

Comparison of Sun Safety Practices in Outdoor Venues to Commons and Reception Areas

Sun safety practices for Sample 1 (observation) and Sample 2 (observation plus intercept survey) at all outdoor venues are reported in Table 2. All comparisons between the outdoor venues and the commons/reception areas (comparison area) reported below are significant at $p < 0.001$.

Body and Shade Coverage—For Samples 1 and 2, respectively, the mean percent of body coverage at swimming pools 49.9%, 51.5%, beaches 51.8%, 54.8%, marinas 64.9%, 66.4%, and outdoor dining 69.5%, 66.7% was lower than at the commons/reception areas 71.7%,73.7%. The mean percent of shade coverage for Samples 1 and 2 at pools 23%, 34.2%, beaches 16.6%%, 26.2%, marinas 15.6%, 20.1% court and lawn games 16.3%, 34.5%, golf courses: 17.2%, 34.3%, and activity areas: 22.6%, 34.4% was lower than at the commons/reception areas 32.7%, 44.8%, and higher at outdoor dining areas 65.2%, 67.3%.

Sunscreen use, Pre-application, and Reapplication—In Sample 2, guests at swimming pools 63.9%, beaches 75.6%, golf courses 51.7%, and activity areas 59.6% were more likely to use sunscreen with an SPF15+ than guests in the commons/reception areas, 49.2%. Pre-application rates of sunscreen were lower at pools 37.9%, beaches 47.2% and activity areas 45.3% compared to commons/reception areas 61.3%. Only guests at pools 77.9%, beaches 73.4%, and marinas 72.9% were more likely to reapply sunscreen compared to commons/reception areas 37.8%.

Combined Sun Protection Z-Scores—For Sample 1, the z-scores of combined sun protection practices (body and shade coverage) for pools −22.03, beaches −26.43, marinas −7.77, court/lawn games −2.38, golf courses 8.25, and activity areas 9.17 were lower than the commons/reception areas 21.73, and higher for outdoor dining 45.53. For Sample 2, the combined sun protection scores (sunscreen SPF 15+, body coverage, and shade) were lower at pools −9.48, beaches −7.24, marinas −5.41, and court and lawn games −2.90 than the commons/reception areas 5.24, and higher at outdoor dining 9.92.

Any Sun Protection (shade or clothes)—The percent of individuals having 85% of clothing coverage or in 100% shade in Sample 1 was significantly lower at pools 13.7%%, beaches 12.8%%, marinas 14%, court/lawn games 16.3%, golf courses 22.3%, compared to the common area 38.4%, but higher at outdoor dining 59.8%. Similarly, in Sample 2 the percent of individuals using any sun protection at pools 23.1%, beaches 22.8%, marinas 22.4%, court/lawn 35.6%, golf course 33%, activity areas 36.6% was lower than in the common/reception areas 50.6%, but higher in outdoor dining 61.8%.

Any Sun Protection (Shade, Clothes, or Sunscreen)—In Sample 2, the percent of individuals using any sun protection (85% clothing, 100% shade, or SPF 15+) was lower at marinas 60.9% and court/lawn 65.5% than the the common/reception areas 75.3%.

Sex and Age Differences

Sex and age were associated with several sun protection behaviors, but only age was associated with sun protection practices in all the various outdoor leisure and recreation areas. Generally, females engaged in more sun protection than males; however, as a percentage women exposed more skin than men (lower percentage of skin covered by clothing) and were less likely to re-apply sunscreen. There was no gender difference in the use of shade (Table 3). Adults over 60 also practiced the most sun protection, while those 18–34 engaged in the least sun safety (Table 3). Finally, middle-aged adults (35–60 years) were more likely to use use sunscreen than the younger cohort but less than the older one.

Specifically, for the observation measure, sun protection practices across the outdoor venues among men and women were very consistent (all interactions between recreation and gender were statistically non-significant, i.e., $p > 0.05$). However, in Sample 1 the observation measure revealed differences between men and women across the age groups sampled. Observations showed that guests over 60 used more shade in nearly all venues (**18–34 years:** pool 18.1%, beach 12.2%, marina 14.7%, golf 15.0%, court/lawn games 9.4%, dining 63.9%, commons/reception 26.4%; **35–60 years:** pool 22.4%, beach 11.4%, marina 11.4%, golf 15.1%, court/lawn games 11.7%, dining 61.5%, commons/reception 27.1%; **over 60 years:** pool 26.7%, beach 31.8%, marina 25.3%, golf 21.8%, court/lawn games 30.8%, dining 70.8%, commons/reception 46.0%). The one exception was in activity areas where middle-aged adults used the most shade ($p < 0.018$; **18–34 years:** 16.1%, **35–60 years:** 24.6%; **over 60 years:** 18.5%). Also, the two composite scores combining body coverage and shade from the observation measure showed that guests over 60 were the most sun protected. When these two practices were added (converting them first to z-scores), the oldest cohort practiced the most sun protection ($p = 0.038$; pool −10.94, beach −4.40, marina 21.87, golf 18.86%, court/lawn games 20.72, activity area 14.82, dining 56.29, commons/reception 19.97). In waterside areas, middle aged adults were generally least sun protected (**18–34 years:** pool −33.15, beach −38.05, marina −12.06; **over 60 years:** pool z=−23.28, beach −31.79, marina −15.88). In the remaining outdoor recreation venues, the youngest cohort was least sun protective (**18–34 years:** golf 2.14, court/lawn games −18.51, activity area −3.06, commons/reception 9.00; **35–60 years:** golf 5.42, court/lawn games −5.42, activity area 9.88, commons/reception 15.07). The same pattern emerged in the composite score where individuals were classified as sun protected if they were had more than 85% of their skin covered or were in the shade ($p < 0.001$): The oldest cohort also had the most individuals sun protected in all venues; the younger two cohorts varied in whether they had the lowest number of individuals protected (**18–34 years:** pool 10.9%, beach 9.4%, marina 14.3%, golf 17.4%, court/lawn games 5.7%, activity area 22.9%, dining 58.8%, commons/reception 30.6%; 35–60 years: pool 15.4%, beach 8.8%, marina 8.1%, golf 16.4%, court/lawn games 11.7%, activity area 31.3%, dining 53.6%, commons/reception 37.0%; over 60 years: pool 17.9%, beach 31.8%, marina 50.0%, golf 32.0%, court/lawn games 41.5%, activity area 48.7%, dining 70.5%, commons/reception 55.1%).

In the intercept surveys (Sample 2), guests over age 60 were less likely to use sunscreen at waterside venues, including swimming pools (54.4%), beaches (70.0%) and marinas (44.0%). Younger age groups tended to use sunscreen more at these areas (**18–34 years:**

62.9%, 79.2%, 45.4%; **35–60 years:** 66.7%, 75.7%, 50.5%, respectively). By contrast, older guests were more likely to use sunscreen at golf courses (**35–60 years:** 54.3%; over 60 years: 53.9%), court and lawn games (35–60 years: 55.1%; **over 60 years:** 50.0%), and outdoor dining areas (**35–60 years:** 50.6%; **over 60 years:** 58.5%) than the youngest guests (**18–34 years:** 31.2%, 44.0%, 41.4%, respectively). The oldest (**over 60 years:** 43.1%) and youngest (**18–34 years:** 47.7%) guests were les likely to wear sunscreen in activity areas than middle-aged guests (**35–60 years**: 69.1%). No other significant interactions with age occurred in the intercept surveys ($p > 0.05$).

DISCUSSION

Across the outdoor recreation and leisure venues, sun protection was suboptimal. A partial explanation may be provided by consideration of the differences in intended use and design of the built environment as a potentially rich source of behavioral cues people use in making decisions about their personal health.[1] The participating resorts were required to feature at least one waterside venue, most commonly featuring one or more swimming pools, a beach and/or a marina. Vacationers sampled across waterside venues relied most on sunscreen (both application and re-application) to reduce the effects of UVR. Given the design and purpose of these waterside venues, however, we also found that the value of sun protection practices such as using cover-up clothing and shade was marginalized. The composite sun protection scores in both samples were significantly lower in waterside areas when compared to the commons/reception area. While we know the protective value clothing and shade provide from the sun, they are at odds with the activities waterside venues are designed to encourage, e.g., swimming, boating and “sunbathing.”

In fact, the waterside venues provided behavioral cues that invited vacationers to wear a “uniform” specific to the activities in that venue – bathing suits and clothing that did not cover much of the skin – which may have been more comfortable and practical when immersed in water. The same is true, moreover, for most of the venues sampled in this study. Golfers and those using game venues such as tennis courts, for example, generally wore more sun protective clothing than those at waterside, but also used less sunscreen to protect themselves. Golfers most commonly wore knee length shorts, an elbow length shirt with a collar, anklets, sunglasses and a baseball cap. While fashion certainly dictated some of the clothing choices, this attire by golfers may have interfered less with swinging motions and the sunglasses and hats enabled them to better track the flight of the ball. By contrast, sunscreen may have interfered with gripping the clubs and rackets needed to participate in these games or, in the case of tennis, the moderate to vigorous physical exertion may have caused perspiration to wash the sunscreen into the eyes, irritating them.

The venue at which comprehensive sun protection was most pronounced by guests, outdoor dining, differed significantly in design (typically including tables and dining chairs and often umbrellas) and primary function (relatively sedentary eating and drinking) from the preceding venues. Cover-ups over bathing attire are often required in such venues and shade is often part of their built environment. It’s not surprising, then, that outdoor diners would take advantage of shade devices and wear more clothing than cohorts entering and exiting the water or actively engaged in a sport such as golf or tennis.

When comparing guests in the venues associated with resort activities to those in the commons/reception areas, we found that while guests in the common areas used less sunscreen, they had a greater percentage of their bodies covered. This behavior adds weight to our conclusion that apparel is significantly influenced by the “uniform” dictated by the activities performed in a venue. Similarly, guests in the commons/reception areas were significantly less likely to use shade than those in outdoor dining, demonstrating again that the built environment of the outdoor dining venue may influence the use of shade. Programs to encourage changes in sun protection such as long pants on the golf course and rash guards while swimming could substantially enhance sun protection.

The analysis of sun safety practices by gender and age provided results similar to other outdoor recreation studies. Simply put, women engaged in more sun protection than did men.[25,26] While, as a percentage, men covered more of their body than women, we think this too aligns with specific venues, as well as the fashion norms for the venue and the tendency for women’s fashions to reveal more of the skin generally than men’s fashions.[37] Finally, we found more evidence for the alarming trend that younger people were significantly less likely to practice sun safety than older ones. Less experience with sunburns or fewer concerns about poor health and mortality may make younger adults less motivated to protect their skin in all outdoor venues than older adults. It also may be that popular fashions for younger individuals are more revealing or there is a greater desire to show more skin to look attractive among younger individuals than for older individuals.

TRANSLATION TO HEALTH EDUCATION PRACTICE

With so many people in the United States, as well as in other countries, traveling away from home to vacation in sunny environments combined with risk for skin cancer in those destinations, the need to impress upon vacationers the importance of comprehensive sun protection should be a priority of public health practitioners. Yet, as we learned in this study, comprehensive personal sun protection (application and reapplication of sunscreen, use of shade, cover-up clothing, sunglasses, and hats) may be mediated by built environments such as the outdoor venues we investigated. These venues often pose barriers to sun safety that need to be considered when promoting sun protection.

Strategies to increase sun safety at resorts and hotels should be a priority of skin cancer prevention. Health educators should consider initiating programs that remind individuals about the need for sun protection when traveling away from home and collaborate with resorts to insert sun safety messages across their communication channels (e.g., websites, emails, guest books). In the future, resorts could be rated for the commitment to sun protection. Given that health and wellness are a major trend at resorts, and wellness tourism is the fastest growing sector of the resort market in the US and around the world,[38,39] programs and interventions should be designed to make the resort environment more sun safe. Specifically related to the built environment, programs should encourage resorts to provide large amounts of shade at waterside venues and to also encourage guests to use shade when out of the pool to compensate for their skimpy clothing. In particular, resorts need to provide shade structures, large umbrellas, and trees to give vacationers at pools and

beaches options for sun protections. Similarly, planting trees around tees on golf courses and tennis courts can provide more shade and greater sun protection.

Golfers and tennis players who are reluctant to get sunscreen on their hands might be instructed to wipe their hands after applying sunscreen to their maintain grip. It could also be suggested to resorts shops to stock and promote fashions that are more sun protective, yet attractive and functional, for various activities such as long-sleeved Lycra rash guards for swimming, wide brimmed hats for golf, and tennis tops that cover the shoulders (rather than sleeveless tops).

Other approaches might include partnering with travel agencies, travel clinics,[40] and the airlines to promote sun safety as part of their communication with their customers. Finally, while acknowledging and reinforcing the importance of even a single sun safe practice, we need to discover ways to encourage people to take the next step and begin practicing more comprehensive sun protection regardless of the built environment.

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Table 1

Demographics of hotel/resort guests at pretest and time and location of observations and intercept surveys

Characteristics	Observation		Survey	
	N	Percent	N	Percent
Guest Demographics				
Age				
18–34	4091	29.7%	3469	20.4%
35–60		47.9%		58.2%
60+		22.4%		21.4%
Gender				
Female	4339	49.6%	3520	61.2%
Male		50.4%		38.8%
Education				
High school or less	N/A	N/A	3519	10.6%
Technical education or some college				21.1%
4-year college graduate				40.8%
Postgraduate degree				27.5%
Ethnicity and race				
Non-Hispanic White	N/A	N/A	3457	93.1%
Hispanic White				2.3%
Non-White				4.6%
Skin phenotype				
darkest skin and lowest risk - 1	N/A	N/A	3516	19.0%
2				24.9%
3				33.7%
4				20.3%
lightest skin and highest risk - 5				2.1%

Table 2

Percentage of hotel/resort guests performing sun protection practices by recreation area

Recreation Area	Sunscreen with SPF 15+	Pre-app of Sunscreen (15 min. before going outdoors)	Reapplication of Sunscreen	Percentage of Body Covered	Percent of Shade Coverage	Combined Sun Protection Practices (z-score)	Any Sun Protection (shade or clothes)	Any Sun Protection (shade or clothes or sunscreen)
Observation								
Swimming Pool	N/A	N/A	N/A	49.9%*	23.5%*	−21.73*	13.7%*	N/A
Beach	N/A	N/A	N/A	51.8%*	16.7%*	−26.43*	12.6%*	N/A
Marina	N/A	N/A	N/A	64.9%*	16.0%*	−7.70*	14.0%*	N/A
Court/Lawn	N/A	N/A	N/A	67.5%*	16.1%*	−2.57*	16.3%*	N/A
Golf Course	N/A	N/A	N/A	71.5%	17.6%*	8.27*	22.3%*	N/A
Activity Area	N/A	N/A	N/A	71.6%	23.2%*	9.84*	31.8%	N/A
Outdoor Dining	N/A	N/A	N/A	69.5%*	65.7%*	45.81*	59.8%*	N/A
Common/Reception (Reference Group)	N/A	N/A	N/A	71.7%	33.6%	22.05	38.4%	N/A
Overall p-value for model				<0.001 *1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15*	<0.001 *1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13*	<0.001 *1, 2, 3, 4, 6, 8, 10, 11, 13*	<0.001 *1, 2, 4, 5, 8, 11, 12*	
Survey								
Swimming Pool	63.9%*	37.9%*	77.9%*	51.5%*	34.2%*	−9.48*	23.1%*	72.8%
Beach	75.6%*	47.2%	73.4%*	54.8%*	26.2%*	−7.24*	22.8%*	80.4%
Marina	48.3%	43.8%	72.9%*	66.4%*	20.1%*	−5.41*	22.4%*	60.9%*
Court/Lawn	51.7%	55.9%	54.4%	70.5%	34.5%*	−2.90*	35.6%*	65.5%*
Golf Course	51.7%*	47.7%	42.2%	71.1%*	34.3%*	2.32	33.0%*	67.1%
Activity Area	59.6%*	45.3%*	55.2%	71.1%*	34.4%*	2.30	36.6%*	74.9%
Outdoor Dining	52.7%	66.0%	34.4%	68.7%*	67.3%*	9.92*	61.8%*	81.4%
Common/Reception (Reference Group)	49.2%	61.3%	37.8%	73.7%	44.8%	5.24	50.6%	75.3%
Overall p-value for model	<0.001 *1, 3, 4, 6, 8, 9, 11, 14, 15, 16, 17, 18, 19*	<0.001 *1, 2, 3, 11, 15*	<0.001 *1, 2, 14, 15, 16, 17, 19*	<0.001 *1, 2, 3, 5, 6, 7, 8, 10, 14, 15, 16, 17, 18*	<0.001 *1, 2, 3, 6, 9, 10, 14, 16, 17, 18, 19*	<0.001 *1, 2, 3, 4, 6, 11, 15, 16, 17*	<0.001 *1, 2, 3, 4, 6, 8, 9, 11, 13, 14, 15, 16, 17*	<0.001 *1, 2, 5, 6, 8, 14, 15, 16, 17, 19*

Covariates controlled in the model:

[1]Resort enrollment wave;

[2]Age;

[3]Gender;

[4]Resort use (low vs. high);

[5]Percent of water recreation at the resort;

[6]Annual sunshine hours at the resort;

[7]Summer resort or winter resort;

[8]Size of resort (number of summer employees);

[9]Proximity to summer solstice (June 20);

[10]Proximity to solar noon (1 pm in daylight savings time);

[11]Elevation;

[12]Latitude;

[13]Cloud cover;

[14]Maximum temperature on the visit date (°F);

[15]UV Index.

Covariates controlled in the model:

[1]Resort enrollment wave;

[2]Age;

[3]Gender;

[4]Education;

[5]Ethnicity and race;

[6]Skin phenotype;

[7]Disinhibition(agree you are a different person when you're on vacation than when you're at home);

[8]Resort use (low vs. high);

[9]Percent of water recreation at the resort;

[10] Annual sunshine hours at the resort;

[11] Summer resort or winter resort;

[12] Resort size (number of summer employees);

[13] Proximity to summer solstice (June 20);

[14] Proximity to noon (1 pm in daylight savings time);

[15] Elevation;

[16] Latitude;

[17] Cloud cover;

[18] Maximum temperature on the visit date (°F);

[19] UV Index.

N/A=Could not be estimated because sunscreen use was not assessed in the observational measure.

[*] Statistically significantly different ($p<0.05$, 2-tailed) from reference group, i.e., Commons an Reception

Table 3

Percentage of hotel/resort guests performing sun protection practices by gender and age

	Sunscreen with SPF 15+	Pre-app of Sunscreen (15 min. > going outdoors)	Reapplication of Sunscreen	Percentage of Body Covered	Percent of Shade Coverage	Combined Sun Protection Practices (z-score)	Any Sun Protection: (shade, clothes or sunscreen)	Any Sun Protection: (shade or clothes)
				Observation				
Female	N/A	N/A	N/A	63.4%	25.7%	0.13	N/A	27.7%
Male	N/A	N/A	N/A	68.1%	26.8%	8.99	N/A	29.6%
p-value	N/A	N/A	N/A	<0.001	0.426	<0.001	N/A	0.283
18–34 years old	N/A	N/A	N/A	61.6%*	22.5%*	−4.57*	N/A	23.9%
35–60 years old	N/A	N/A	N/A	65.1%*	22.5%*	1.21*	N/A	25.9%
Over 60 years old	N/A	N/A	N/A	71.6%	32.8%	19.66	N/A	43.2%
p-value				<0.001	0.018	<0.001		<0.001

				Survey				
Female	69.8%	51.0%	63.7%	63.4%	36.8%	1.91	79.0%	30.2%
Male	44.1%	31.4%	66.2%	68.6%	37.7%	−3.23	64.2%	33.8%
p-value	<0.001	<0.001	0.004	<0.001	0.647	<0.001	<0.001	0.916
18–34 years old	56.8%	44.2%	76.0%	62.2%*	32.0%*	−4.23*	68.8%	26.7%
35–60 years old	63.4%	44.2%	64.6%	65.0%*	36.7%	−0.91*	74.5%	28.5%
Over 60 years old	53.3%	49.2%	51.7%	71.9%	42.6%	4.17	74.3%	44.8%
p-value	0.007	0.897	0.026	<0.001	0.002	<0.001	0.040	<0.001

Covariates controlled in the model:

[1]Resort enrollment wave;

[2]Age;

[3]Gender;

[4]Resort use (low vs. high);

[6]Percent of water recreation at the resort;

[6]Annual sunshine hours at the resort;

[16] Latitude;

[17] Cloud cover;

[18] Maximum temperature on the visit date (°F);

[19] UV Index.

N/A=Could not be estimated because sunscreen use was not assessed in the observational measure.

* Statistically significantly different ($p<0.05$, 2-tailed) from reference group, i.e., over 60 years old.