Indoor Tanning Knowledge, Attitudes, and Behavior Among Young Adults From 1988-2007

June K. Robinson, MD; Julie Kim, BS; Sara Rosenbaum, BA; Sara Ortiz, BA

**Objective:** To compare knowledge, attitudes, and behavior about indoor tanning and sources of information among young adults in the summer of 1988, 1994, and 2007.

**Design:** Convenience survey of 100 Chicago, Illinois, beachgoers aged 18 to 30 years who were age- and sex-matched with Chicago-area residents who participated in random-digit-dialed telephone interviews in 1988 and 1994.

**Setting:** Lakefront beach on weekday afternoons in July 2007.

**Main Outcome Measures:** Knowledge of melanoma/skin cancer link with tanning, and limiting tanning to help prevent melanoma/skin cancer; attitude about the appearance of tanned people; and knowledge of relevant information sources; and UV indoor tanning use in the past year.

**Results:** Knowledge of the melanoma/skin cancer link with tanning changed from 1988 (42%) to 1994 (38%) to 2007 (87%). Knowledge of limiting tanning to help prevent melanoma increased from 1988 (25%) to 1994 (77%), but decreased from 1994 to 2007 (67%). This decline in knowledge about limiting tanning was concurrent with an increase in the attitude that having a tan looks better (1994, 69%; 2007, 81%). Use of indoor tanning beds increased from 1988 (1%) to 1994 (26%) and remained at the same level in 2007 (27%). Although physicians, especially dermatologists, were sources of information about tanning (1988, 2%; 1994, 18%; 2007, 31%) and were considered the most trusted source, only 14% of respondents in 1994 and 2007 reported ever talking to a doctor about indoor tanning.

**Conclusion:** Because young adults report that physicians are their most trusted source of information about tanning, a potential opportunity exists for physicians to influence indoor tanning behavior by counseling their patients.

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There is an increase in risk for melanoma in people who first use UV indoor tanning in their 20s or teenage years, and a 75% increase in risk of melanoma for users of artificial tanning devices. Indoor tanning is especially common in the Midwest, where extremes in the availability of natural light appear to send intentional tanners indoors. In a 2005 US telephone survey of 5491 people, exclusive indoor tanning or combined sunless tanning and indoor tanning bed use was more common in the Midwest, and exclusive sunless tanning was more prevalent in the West. Thus, the Midwest is an ideal location for examining young adults’ attitudes, behaviors, and sources of information about indoor tanning.

**METHODS**

**SUBJECTS**

People sitting or lying on the beach who were estimated to be aged 18 to 30 years were invited to participate in a study about indoor tanning and were informed that the study was supported by Northwestern University’s De-
department of Dermatology. Surveys were administered on 3 separate weekday afternoons in late July 2007 by 2 research assistants (J.K. and S.R.) who were independently recruiting subjects in different sections of Oak Street Beach, downtown Chicago. Each participant completed a 1-page survey and returned it to a research assistant.

The participants in this 2007 survey were age- and sex-matched with young adults from the Chicago area who participated in 2 prior random-digit–dialed telephone surveys conducted by Leo J. Shapiro and Associates, a professional polling organization. The first telephone survey, conducted in the summer of 1988, included 1000 adults in Illinois (age range, 18-50 years) and was designed to determine awareness of how the sun affects the skin, attitudes about the appearance of someone with a tan, sources of information about tanning, and recall of indoor tanning use in the past year. The second survey, conducted in July and August 1994, included 658 teens (age range, 11-19 years) and 300 young adults (age range, 20-30 years) from the Chicago metropolitan area and rural areas of Illinois. The institutional review board of Northwestern University approved the 3 research protocols.

MEASURES

In 2007, subjects were asked a series of 10 questions about their age and sex; knowledge of a link between tanning and melanoma/skin cancer and limiting tanning to help prevent melanoma/skin cancer; the appearance of people with a tan; sources of information about the safety of indoor tanning and the link between indoor tanning and melanoma/skin cancer; trusted sources of information about the safety of indoor tanning; and whether they had ever talked with a doctor about tanning. Identical questions were asked in both 1994 and 1988, with the exception that in 1988 participants were asked an open-ended question about how sun affects the skin. Also, in 1988, the questions about the information sources on the safety of indoor tanning and whether participants had ever talked with a doctor about indoor tanning were not included.

Over the years, the question about indoor tanning use changed from “Have you used artificial light to tan in the past year?” in 1988, to “Have you used a tanning salon in the last year?” in 1994, to “Do you use indoor tanning at least 10 times a year?” in 2007. All 3 surveys asked the participant to recall an event in the past year, which allows for comparison of the responses over time despite the frequency of the event being measured differently. By asking about indoor tanning use at least 10 times a year, we intended to separate frequent tanners from event tanners.

STATISTICAL ANALYSIS

The frequency distribution of responses for each question was determined for the 1988, 1994, and 2007 surveys. Differences in response frequencies between groups were evaluated with χ² tests. Probability values were reported as significant at P ≤ .05. Analyses were conducted with SPSS statistical software, version 3.1 (SPSS Inc, Chicago).

RESULTS

SUBJECTS

At Oak Street Beach, 144 potential subjects were approached. Of these, 29 declined to participate, and 15 completed surveys but their responses were discarded because they did not meet the inclusion criteria. Of 100 subjects included in the study, 38 were male and 62 were female (age range, 18-30 years; mean [SD] age, 22 [3.8] years). Subjects were age- and sex-matched with participants in telephone surveys from 1988 and 1994.

KNOWLEDGE, ATTITUDE, AND BEHAVIOR

The knowledge that tanning is associated with developing a melanoma/skin cancer decreased from 1988 to 1994 (42% to 38%) and increased from 1994 to 2007 (38% to 87%). Limiting tanning to help prevent the development of melanoma or skin cancer initially increased from 1988 to 1994 (25% to 77%) and then declined from 1994 to 2007 (Table).

In each successive interval, there was an almost equivalent increase in the perception that people looked better with a tan (Table). From 1994 to 2007, a 12% increase in the belief that people looked better with a tan occurred, whereas knowledge that limiting tanning may help to prevent melanoma/skin cancer decreased 10% (Figure 1). Use of indoor tanning beds markedly increased from 1988 (1%) to 1994 (26%), then remained about the same in 2007 (27%) (Figure 2 and Figure 3).

Table. Young Adult Attitude, Knowledge, Information Sources, and Use of Indoor Tanning

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
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<tr>
<td>Tanning associated with melanoma/skin cancer</td>
<td>42</td>
<td>38</td>
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<tr>
<td>Limiting tanning can help prevent melanoma/skin cancer</td>
<td>25</td>
<td>77</td>
<td>67</td>
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<tr>
<td>Attitude</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People look better with a tan</td>
<td>58</td>
<td>69</td>
<td>81</td>
</tr>
<tr>
<td>Source of information</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Tanning associated with melanoma/skin cancer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Media (television, radio, or print)</td>
<td>81</td>
<td>74</td>
<td>168</td>
</tr>
<tr>
<td>Family</td>
<td>21</td>
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<td>50</td>
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<tr>
<td>Friends</td>
<td>8</td>
<td>7</td>
<td>37</td>
</tr>
<tr>
<td>Family doctor</td>
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<tr>
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<td>18</td>
<td>31</td>
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<tr>
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<td>75</td>
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<tr>
<td>Family</td>
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<td>21</td>
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<td>Hair stylist</td>
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<td>0</td>
</tr>
<tr>
<td>Health care provider</td>
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<tr>
<td>Tanning salon worker</td>
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<td>23</td>
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<tr>
<td>Trusted information source</td>
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<tr>
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<td>3</td>
</tr>
<tr>
<td>Family doctor</td>
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<td>41</td>
<td>46</td>
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<tr>
<td>Dermatologist</td>
<td>60</td>
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<tr>
<td>Hair stylist</td>
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<td>0</td>
</tr>
<tr>
<td>Ever talked with a doctor about indoor tanning</td>
<td>14</td>
<td>15</td>
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</table>

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In all years, media were the greatest sources of information about the association of tanning with melanoma/skin cancer. A significant increase in family (38% to 50%) and friends (7% to 37%) as sources of information occurred from 1994 to 2007. The role of family doctors (1988, 9%; 1994, 15%; 2007, 28%) and dermatologists (1988, 2%; 1994, 18%; 2007, 31%) as sources of information about the carcinogenic risk of tanning increased in each interval (Figure 2). These physicians were deemed the most trusted source of information in all years (Figure 3). Since family doctor and dermatologist were responses in a category that also included media as sources of information, it is possible that respondents were referring to physicians quoted in the media rather than information provided by their own doctor. This confusion may explain why 28% of respondents in 2007 identified family doctor and 31% identified dermatologists as sources of information about the association of tanning with melanoma/skin cancer, whereas only 15% of respondents reported ever talking with their doctor about indoor tanning (Figure 3).

In 1994 and 2007, the single greatest source of information on the general safety of indoor tanning beds was friends or social group (71% to 75%). Family (18% to 21%), physicians (21% to 28%), and tanning salon workers (24% to 23%) were equally represented as information sources in 1994 and 2007 (Table).

This study, which spans almost 2 decades, demonstrates a remarkable increase in the attitude that a person looks better with a tan, and an increase in indoor tanning among young adults. During the last 2 decades of this study, media campaigns placed emphasis on different messages to communicate the harmful effects of tanning. The shifts in knowledge represent changes in the predominant message during each period (Figure 1). The failure of knowledge-based interventions to influence tanning attitudes is also reflected in the increase in indoor tanning use.

Indoor tanning beds can be found in private homes, apartment buildings, recreational facilities, fitness clubs, and beauty salons. In the early 1980s, the US indoor tanning industry was established with about 50 facilities per large city. In 2003, the national estimate of indoor tanning use in the past 12 months among US adults was reported to be about 10%9 and was about the same in US adolescents aged 14 to 17 years11; however, approximately 50% of college-aged adults have reported cur-
rent use of indoor tanning in some samples. The 2007 estimate is that nearly 2 million Americans use indoor tanning beds each day, with the number of US individual users having doubled to nearly 30 million in the past decade.

Most young adults valued the appearance of a tan in all years of this study. The 12% increase in this attitude from 1994 to 2007 is similar to the 11% increase from 1988 to 1994. A limitation of the study design is that in 2007 subjects were recruited at the beach, which may have a selection bias for those intentionally tanning, whereas in previous years subjects were randomly selected and interviewed on the telephone. In theory, those who intentionally tan at the beach are more likely to also tan indoors. However, since the rate of indoor tanning was similar in 1994 among those randomly selected for a telephone interview and those interviewed on the beach in 2007, there are 3 possible explanations for a true increase in adults who value the appearance of a tan: (1) there was no selection bias in 2007 and the numbers reflect a true increase in this attitude, (2) intentional outdoor tanning is not associated with indoor tanning, or (3) people at the beach were not intentionally tanning. The limitations of this study do not allow resolution of this point.

Certain segments of the population, especially teenagers and young adults, view the purported benefits of UVL exposure (eg, tanned skin, opportunity for socialization, fitting in socially, conforming to normative beliefs, or elevated mood) as outweighing the risk for skin cancer or might not be concerned about the effects of overexposure to UVL on their future appearance (eg, wrinkle formation). Most teenagers and young adults self-report that their motivation for intentional tanning is to look better, relax, get a protective base tan, look better for a special event, feel healthy, and increase social activity with friends. More than 50% report going to a tanning salon for the first time with friends, and 14% went with their parents. The values established during these formative midteenage years through early adulthood last a lifetime and may only be altered if the individual experiences a significant life event, such as developing a melanoma.

Teenagers who regularly tan indoors self-report difficulty in quitting tanning. Ultraviolet light is a reinforcing stimulus causing endorphin release, which may account for the results of a study of Texas beach sunbathers who met the criteria for having substance-related disorder with respect to UVL. Even those who undergo spray-on sunless tanning treatments to obtain the appearance of a tan report that they would not change the time spent in the sun or their sunscreen use as a result of using sunless tanning. In a separate report, 4 of 8 frequent tanners (8-15 tanning sessions per month) experienced withdrawal-like symptoms when given the opiate blocker naltrexone. For some, intentional tanning provides relief from seasonal affective disorder. The potentially addictive nature of UVL tanning, especially with UV-A, may explain why educational knowledge-based prevention messages have been largely unsuccessful in altering attitudes and behavior to reduce UVL tanning.

Although family physicians and dermatologists are trusted sources of information about indoor tanning, young adults talk to them infrequently. An important barrier to delivering counseling or education is the limited duration of the dermatology visit and its focus on treating existing skin disease. In 2001, the mean (SD) time spent by a dermatologist with a patient was 15.8 (0.8) minutes. Because of time constraints, counseling about skin cancer prevention is often limited to a single recommendation offered by the dermatologist, who may supplement this with videotapes viewed in the office and pamphlets that are intended to be taken home, but are often left behind unread. Counseling young adult patients to cease indoor tanning represents an opportunity to prevent UV radiation exposure that may cause melanoma. Although the importance of physician counseling is well established in other preventive health areas, such as smoking cessation, many physicians do not believe that they are particularly adept in this role, which requires different physician skills than the customary treatment recommendations for skin diseases currently provided by dermatologists. In addition, health plans usually do not provide reimbursement for preventive counseling in dermatology.

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Author Contributions: Dr Robinson had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Robinson. Acquisition of data: Kim, Rosenbaum, and Ortiz. Analysis and interpretation of data: Robinson, Kim, and Rosenbaum. Drafting of the manuscript: Robinson. Critical revision of the manuscript for important intellectual content: Kim, Rosenbaum, and Ortiz. Statistical analysis: Robinson. Obtained funding: Robinson. Administrative, technical, or material support: Kim, Rosenbaum, and Ortiz. Study supervision: Robinson.

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5. International Agency for Research on Cancer, Working Group on Artificial Ultraviolet Light and Skin Cancer. The association of use of sunbeds with cutaneous


Notable Notes

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