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Youth Access to Artificial Ultraviolet Radiation Exposure: Practices of 3,647 U.S. Indoor Tanning Facilities

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Abstract

Objective—To assess indoor tanning facility practices in a sample of facilities in 116 cities representing all 50 states.

Design—Cross-sectional study

Setting—United States

Participants—Employees of 3,647 indoor tanning facilities were contacted by telephone. Data collectors (i.e., confederates) posed as prospective, fair-skinned, 15-year-old customers who had never tanned before.

Main Outcome Measures—Confederates asked respondents about their facility's practices related to parental consent, parental accompaniment, and allowable tanning session frequency.

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Results—Approximately 87% of the facilities required parental consent, 14% required parental accompaniment, 5% said they would not allow the confederate to tan due to her age, and 71% would allow tanning every day the first week of indoor tanning. In Wisconsin, which bans indoor tanning among those younger than 16 years, 70% of facilities would not allow the confederate to tan. Multivariate analyses indicated that facilities in states with a youth access law were significantly more likely to require parental consent and parental accompaniment than those in states without a youth access law. Law was not significantly related to allowable tanning frequency.

Conclusions—We recommend that additional states pass youth access legislation, preferably in the form of bans.

Introduction

Ultraviolet radiation (UVR) exposure from indoor tanning lamps has been linked with both melanoma and squamous cell cancer, and first exposure before age 35 may increase melanoma risk by as much as 75%.[1] In the U.S., indoor tanning is especially popular among adolescent girls,[2-4] and this may help explain the recently reported rise in melanoma incidence among U.S. young adult women (ages 15-39).[5] As of 2005, 28 states had an indoor tanning law regulating tanning facility practices, with 21 of these having some sort of youth access restriction.[6] The Food and Drug Administration (FDA) recommends, but does not require or enforce, an exposure schedule not exceeding a 0.75 minimal erythemal dose (MED) three times the first week of tanning.[7]

Several recent studies have characterized the practices of indoor tanning facilities with emphasis on youth access and exposure levels.[8-13] However, to our knowledge, no study had included facilities in a large number of cities representing all geographic regions. Thus, our goal for this study, which was part of the CITY100 Project (Correlates of Indoor Tanning in Youth), was to assess facility practices in a large sample of facilities representing 116 large cities in all 50 U.S. states. We focused on practices (when interacting with a 15-year-old girl) related to requirements for parental consent, parental accompaniment, forbidding her to tan at all because of her age (i.e., ban), and tanning session frequency allowed.

Methods

Selection of Cities and Tanning Facilities

Our sample consisted of indoor tanning facilities in 116 U.S. cities. The cities were the 100 most populous cities, which represented 34 states and the District of Columbia, plus the most populous city in each of the 16 remaining states.[14]

Because residents living within the formal boundaries of an incorporated city likely travel beyond those boundaries, we defined the city boundary as a three-mile buffer zone surrounding the formal boundary. Using a multi-step process with Geographic Information Systems (GIS) data described in detail elsewhere,[15] we created these boundaries and identified indoor tanning facilities within them. Our inclusion criteria for a facility were that it must offer indoor UVR tanning, be open to the public, and not require membership. With the term “tanning salons” as the key word, in March, 2006 we identified all facilities within each city using ReferenceUSA.com as the primary source and Superpages.com as the secondary source. If an indoor tanning facility was shared by more than one city plus three-mile buffer area, we assigned the main city affiliation to the city whose center was closest to the facility.

Assessment of Outcomes and Potential Correlates

We hired and trained five young-sounding female college students (i.e., confederates) to pose as 15-year-old potential clients, phone the facilities, and follow a script for ascertaining facility

practices. During the confederate interview process, we evaluated whether applicants sounded like teens using blinded telephone screening, as well as Sona-Speech II voice software Version 2.7.0 (KayPENTAX, Lincoln Park, NJ) to assess the fundamental voice frequency (i.e., pitch). All five confederates' voice frequencies fell within the acceptable ranges for a female aged 15 years (179 – 310 Hz).[16]

Confederates phoned all potentially eligible facilities in June through September of 2006; respondents were tanning facility staff who answered this phone call. Up to 10 attempts were made to reach each tanning business. At the beginning of each 5-minute phone contact, the confederate stated that she was planning to visit the facility that day, and described herself as being 15 years old, having fair skin, and having never used indoor tanning. She then asked several scripted questions to assess indoor tanning facility practices and characteristics, and recorded all responses verbatim on a data collection form. In a previous study, we had found that data collected in-person versus by telephone had acceptable concordance.[12] The key questions were: 1) “Does my mom need to sign anything so I can tan?” 2) “Does my mom need to be there while I tan?” and 3) “How many times can I tan the first week?” The practice of banning due to the customer's age was not asked about directly, but was coded when the respondent replied that the confederate could not tan due to age when asked question #1 and a separate variable for banning (yes/no) was then created.

We also measured potential correlates of practices, including facility type, number of tanning beds, respondent sex, whether the state had any tanning law, and whether the state had any youth access tanning law. Facility type, coded during the facility identification process, consisted of tanning salon (i.e., sole or main service is indoor UV tanning), beauty salon/day spa (i.e., provides UV tanning as a service), and “other” (i.e., provides UV tanning but does not fit into the first two categories). Towards the end of the phone call, the confederate asked “How many tanning beds or booths do you have?” (recorded and used in analyses as a continuous variable). Once data were collected, we recoded the various responses to confederates' queries using a priori protocols. For law data, we systematically reviewed two legal databases and analyzed the content of existing indoor tanning laws.[6]

To assess inter-rater reliability, the confederates' supervisors (KDH and LCP) listened to a random 20% of the calls on a second phone line and recorded the respondent's comments. All study procedures were approved by the San Diego State University Institutional Review Board.

Statistical Analysis

Data were analyzed with SPSS 15.0 for Windows and SAS 9.1.3.[17, 18] Facility was the unit of analysis. We examined the data using two perspectives: 1) practices of all facilities, irrespective of whether the state had an indoor tanning law, and 2) compliance of facilities under the jurisdiction of specific state laws (i.e., a “report card”).

Descriptive statistics were computed for each facility practice (i.e., parental consent, parental accompaniment, tanning ban for a 15-year-old, and frequency allowed to tan); number of UV indoor tanning beds or booths; type of facility; and respondent sex. We tested the bivariate relationship between each facility practice and each potential correlate using generalized estimating equations (GEE) [19, 20] that adjusted for city clustering. Potential correlates were number of beds, facility type, respondent sex, presence of any state indoor tanning law, and presence of state youth access restriction law. Multivariate analyses using GEE --one for each practice--were conducted to test the relationship between each facility practice and multiple potential predictors simultaneously, adjusting for city clustering and confederate. The “any state law” variable was excluded and “youth access law” was included as a predictor in the multivariate models, because the latter was more relevant (and was nested within the former).

Respondent sex also was excluded from multivariate tests because it was consistently unrelated to outcomes in the bivariate analyses. A significance level of 0.05 was used for all analyses.

For the report card, we assessed the percentage of facilities in 1) the 20 relevant states that complied with their parental consent laws, 2) the 2 relevant states that complied with their parental accompaniment laws, and 3) the 1 relevant state that complied with its ban for those under age 16 years. Using chi square tests, we compared these percentages with the percentages of facilities in states without these specific regulations.

We evaluated interrater agreement on select variables for a subset of the data using Kappa for the categorical variables and intraclass correlation coefficients (ICCs) for the continuous variables.

Results

Characteristics of the Sample

A total of 4,561 indoor tanning facilities were initially identified. For the current analysis, 79 facilities were excluded because the telephone number and business name resembled other businesses and our research team did not want to raise any suspicion when calling. An additional 835 facilities were excluded due to disconnected telephone lines (n=408), no answer after 10 calling attempts (n=104), an answering machine picked up (n=27), the facility no longer had UV tanning (n=180), the telephone number was wrong (n=67), and other reasons, including hang up, out of business, and fax number (n=40). This resulted in 3,647 facilities with usable data.

Approximately 80% of the tanning facilities were tanning salons (n=2,895), 17% were beauty salons/day spas (n=616), and 3% were “other” (n=106); in analyses the latter two categories were combined. Thirty of the facilities had missing data for facility type. The number of tanning beds ranged from 1 to 50 (Mean=9.94; SD=6.81). The facility respondents were primarily female (84.3%).

Inter-Rater Reliability

The Kappas for parental consent and parental accompaniment were 0.98 and 0.95, respectively. The ICCs for number of sessions allowed and number of tanning beds were 0.99 and 0.97, respectively.

Facility Practices

As shown in the left side of Table 1, approximately 87% of facilities required our confederates to get parental consent, 14% required parental accompaniment, and 5% did not allow tanning at all due to the confederates' stated age. Only around 11% followed the FDA recommendations of 3 or fewer sessions the first week. The mean number of sessions allowed the first week was 6.02 (SD=1.61). About 71% of respondents said they would allow a teen to tan 7 days a week.

In bivariate analyses (see Table 2), there were no significant associations between respondent's sex and any of the outcome variables. State law and youth access law each were significantly related to parental consent and parental accompaniment, with facilities in states with a law more likely to require these than facilities in states without such a law. Neither type of law was associated with the two other practices. The number of tanning beds was significantly associated with each outcome variable, with the exception of tanning ban. More specifically, facilities with more beds were significantly more likely to require parental consent and parental accompaniment, and significantly less likely to follow the FDA tanning session frequency recommendations. Tanning facility type was significantly related only to tanning session

frequency allowed, with tanning salons less likely to follow FDA frequency recommendations than other facility types.

Multivariate analysis results indicated that for parental consent, youth access law and number of beds were significant predictors (see Table 3). Facilities in states without a youth access law had only around one-third the odds of requiring consent than facilities in states with a law. For each 5-bed increase, facilities were 14% more likely to require parental consent. For parental accompaniment, the following variables were significant predictors: facility type, youth access law, and number of beds. Non-salons were 53% more likely to require parental accompaniment than salons. Facilities in states without a youth access law were 58% less likely to require accompaniment than facilities in states with a law. Facilities were 19% more likely to require accompaniment with each 5-bed increase. For frequency allowed to tan, number of beds was the only significant predictor; facilities were 29% less likely to follow the FDA frequency recommendations for each 5-bed increase. Similar to the bivariate results, none of the variables tested significantly predicted age-related banning.

Compliance of Select Facilities with Specific Law Content

We also assessed compliance of select facilities with their specific state laws. The right side of Table 1 shows comparisons between facilities in states with versus without specific laws on practices related to parental consent, parental accompaniment, and banning underage youth. As indicated, although compliance varied across the three practices, facilities in states with a specific law were significantly more likely to implement the practice compared with facilities in states without the specific law. Of the 20 parental consent law states, facilities in four states (i.e., Louisiana, Maine, New Hampshire, and South Carolina) had perfect compliance, and facilities in Georgia had the lowest level of compliance (i.e., 72.5%). Using data we had collected previously on inspections conducted in states with tanning laws,[21] we found that facilities in parental-consent states with annual (or more frequent) inspections were significantly more likely to require parental consent than those in parental-consent states with less-than-annual inspections (95% vs. 91%; χ^2=12.19, df=1, p<0.001). Rates of requiring parental accompaniment in Indiana and Texas were 45.3% and 42.8%, respectively. Wisconsin was the only state with a ban on tanning for individuals under age 16.

Comment

To our knowledge, this study is the largest study to date assessing indoor tanning facility practices regarding youth access. Our data on the proportion of facilities requiring parental consent—approximately 87% of all facilities—were encouraging. Two previous studies also found relatively high rates of facilities requiring parental consent. [11, 22] In both of those studies, as in ours, the confederates' ages were explicitly provided at the beginning of the interaction. In contrast, studies using face-to-face methods have found more lenient parental consent practices. [9, 10] The different patterns in findings between these phone versus in-person data collection methods may be due to facilities' tendency to be stricter during the phone call (when a “sale” is more abstract).

Results from our multivariate analysis suggested that being in a state with any type of youth access law made it significantly more likely that a facility would require written consent. Also, the more tanning beds a facility had, the more likely the facility was to require consent. This latter finding may be due to the association between facility type and number of beds, with sole-purpose tanning salons having more beds than other types of facilities. It is these salons that are most likely to be part of a well-organized tanning industry network, in which facility owners are encouraged to comply, at least on the surface, with existing laws.[10, 23]

Although banning a 15-year-old prospective customer was infrequent among all facilities in our sample, the Wisconsin facilities had a moderately high rate of complying with this aspect of their law. Our rate of 70% for banning a 15-year-old in Wisconsin was comparable to the 77% rate in Wisconsin found by Hester et al.[11] Moreover, Hester et al. reported that for a prospective 12-year-old client, 89% of Wisconsin facilities claimed they would implement a ban.[11] Banning by facilities was substantially less common than requiring parental consent. Unlike a parental consent policy, which still provides the possibility of a sale as long as the parent agrees,[24] imposing an absolute ban on adolescents, who may constitute a considerable proportion of a facility's profits, would be “bad for business”.

Compliance with FDA recommended session-per-first-week frequency was less than 11% in the present study, with 71% of facility staff allowing the confederate to tan every day, and these findings are similar to results from several previous studies. [8,12,13,22] These data highlight the deficiencies in having recommendations versus enforceable requirements. Not only do facilities allow frequent tanning, but they promote it using “unlimited tanning” discount price packages; these packages are ubiquitous in the U.S. tanning industry.[13] Unfortunately, frequent use of indoor tanning is likely to increase melanoma risk of individual customers by promoting greater cumulative UVR exposure.[25, 26]

Our study had several methodological limitations. First, we were not able to send confederates in person to assess practices. However, when we attempted to validate our telephone method against in-person visits in a pilot study, concordance was acceptable.[12] A second limitation is that our confederates were older than 15 years, and even though their voices were relatively high-pitched and youthful sounding, they may have produced different reactions from facility staff than actual teens. Third, we conducted only one contact, with only one respondent, per facility. Therefore, it is possible that our data may not represent the “typical” practices of all personnel at a given facility. Fourth, our results may not generalize to facilities in smaller cities or rural areas. Fifth, there may be potential confounders (that we neglected to measure) of the associations we found in the analyses. Finally, the cross-sectional design precludes making definitive conclusions about causal relationships between correlates and the facilities' practices. Methodological strengths of our study included a wide geographic area and large numbers of cities and facilities, assessment of several key practices that could influence exposure to artificial UVR by youth, inclusion of current legislative data as a potential correlate, and highly reliable data.

These data have important implications related to the safety of adolescent indoor tanners. The majority of facility personnel stated that a teen could tan every day the first week. This finding highlights the high level of UV exposure teens may be getting from indoor tanning. Non-regulated indoor tanning frequency schedules potentially could result in overexposure and burning. Therefore, regulation and enforcement of tanning schedules are warranted.

Are youth access laws, in general, and parental involvement laws, in particular, effective? Should more states pass these types of legislation? As noted above, having any youth access law was associated with significantly higher rates of requiring parental consent and parental accompaniment, and facilities in states with laws specific to these practices had considerably higher rates than facilities in states without comparable law content. Thus, at one level, if one defines success as facility compliance, our data could mean that the laws are having an impact. However, given the relatively high rates of indoor tanning by adolescent girls, as well as the potentially important gatekeeping function of parents, [24, 27] apparently many parents are allowing their teens to tan and are providing written consent or accompaniment.

Therefore, we encourage more states to adopt indoor tanning bans for minors. In fact, the World Health Organization (WHO) has recommended banning those under 18 years from commercial

indoor tanning.[28] To date, three Australian states and France have banned those under age 18.[29-34] In the U.S., as of June, 2008, a pending law in Ohio would ban those under 18 years old.[35] Bans such as these may both reduce youth access in a direct way and more forcefully educate parents about the real dangers of indoor tanning.

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Table 1

Facility Practices Regarding Parental Consent, Parental Accompaniment, Tanning Ban, and Tanning Session Frequency

Practice		All Facilities[a]		Facilities in States with this Legislative Requirement		Facilities in States without this Legislative Requirement		χ^{2} [h]
		N	%	N	%	N	%	
Required parental consent		N	%	N (n=20 states)[d]	%	N (n=30 states)	%	
	Yes	3008	86.9	1966	92.8	1042	77.5	169.86*
	No	455	13.1	152	7.2	303	22.5	
Required parental accompaniment				(n=2 states)[e]		(n=48 states)		
	Yes	495	14.3	203	43.4	292	9.8	373.41*
	No	2967	85.7	265	56.6	2702	90.2	
Would not allow confederate to tan, due to age (15 years)[b]				(n=1 state)[f]		(n=49 states)		
	Yes	182	5.0	56	70.0	126	3.5	728.65*
	No	3463	95.0	24	30.0	3439	96.5	
Allowed only 3 or fewer sessions first week[c]				not applicable[g]		not applicable[g]		
	Yes	320	10.8					
	No	2642	89.2					

[a] Missing data were 184 for parental consent, 185 for parental accompaniment, 2 for confederate not allowed to tan, and 685 for session frequency. Session frequency missing data primarily were missing due to respondent saying they needed to see confederate's skin and skip pattern (when they told confederate she could not tan due to age).

[b] Confederate did not ask this directly; respondent stated this when being asked about parental consent.

[c] Recommended by Food and Drug Administration.

[d] Arizona, California, Florida, Georgia, Illinois, Indiana, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, New Hampshire, North Carolina, Ohio, Oregon, Rhode Island, South Carolina, Tennessee, Texas

[e] Indiana and Texas

[f] Wisconsin

[g] None of the state laws explicitly regulated tanning session frequency.

[h] χ^2 with 1 degree of freedom

* $p<0.001$

Table 2

Bivariate Associations Between Facility Practices and Predictors, Adjusted for City Clustering Using Generalized Estimating Equations

Predictors	Required Parental Consent (N=3463)		Required Parental Accompaniment (N=3462)		Confederate not allowed to tan due to age (15 years) (N=3645)		Allowed only 3 or fewer sessions (N=2962)	
	% Complying	χ^2	% Complying	χ^2	% Complying	χ^2	% Complying	χ^2
Facility Type		3.65		3.17		0.03		20.07**
Tanning Salons	87.8		14.2		4.9		9.7	
Other	84.3		15.0		5.7		15.4	
Respondent's Sex		0.16		0.09		0.61		0.16
Female	86.9		14.1		5.1		10.6	
Male	86.8		15.4		4.4		11.8	
Any State Law		14.44**		8.88**		0.85		0.11
Yes	88.8		15.8		5.3		11.1	
No	79.7		8.9		3.9		9.7	
Youth Access Law		38.94**		16.97**		0.61		0.72
Yes	92.3		17.3		5.6		9.7	
No	78.0		9.4		4.1		12.5	
Number of tanning beds		12.60**		10.69**		0.40		32.83**

χ^2 with 1 degree of freedom

* $p<0.05$

** $p<0.01$

Table 3

Multivariate Analyses Between Facility Practices and Predictors, Adjusted for City Clustering Using Generalized Estimating Equations

Predictors	Parental Consent		Parental Accompaniment		Tanning Ban		Tanning Frequency	
	O.R.[a]	95% C.I.[b]	O.R.[a]	95% C.I.[b]	O.R.[a]	95% C.I.[b]	O.R.[a]	95% C.I.[b]
Facility Type								
Tanning Salons	1.00		1.00		1.00		1.00	
Other	0.91	0.67, 1.22	1.53	1.20, 1.95*	0.95	0.65, 1.39	1.27	0.95, 1.70
Youth Access Law								
Yes	1.00		1.00		1.00		1.00	
No	0.35	0.25, 0.49**	0.42	0.28, 0.63**	0.85	0.36, 2.01	1.05	0.71, 1.54
Number of Beds: per 5-bed increase	1.14	1.05, 1.24**	1.19	1.11, 1.27**	0.98	0.80, 1.11	0.71	0.63, 0.81**

All models are adjusted for confederate.

[a] Odds Ratio

[b] Confidence Interval

* $p<0.05$

** $p<0.01$