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Contextual Factors, Indoor Tanning, and Tanning Dependence in Young Women

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Abstract

Objectives—The study's purpose was to investigate the association of contextual factors such as cost, tanning accessibility, regulations, or marketing and indoor tanning or tanning dependence.

Methods—One hundred thirty-nine college-aged female indoor tanners completed a questionnaire between 2009 and 2011.

Results—Higher scores on tanning dependence and assessment in the spring/summer (versus the fall/winter) were associated with more frequent indoor tanning in the last 30 days ($ps < .05$). More frequent indoor tanning, greater session length, and more trouble paying for tanning were associated with higher scores on tanning dependence ($ps < .05$).

Conclusions—Public health research and practice could benefit from attention to such contextual factors as tanning cost and regulations regarding session length.

Keywords

indoor tanning; tanning dependence; young adult women

Indoor tanning is currently a \$5 billion per year industry in the US with more than 40,000 indoor tanning establishments.^{1,2} Thirty million Americans indoor tan each year, and one million tan indoors each day.³ Hoerster and colleagues found more indoor tanning facilities

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Human Subjects Statement

This research was approved by the university's (IRB# 18370) and a cancer center's (IRB# 09-834) Institutional Review Boards.

Conflict of Interest Statement

The authors have no conflicts of interest to report.

in each of 116 large US cities than the number of Starbucks coffee shops and McDonald's restaurants in those cities.⁴

The Social Ecological Model has been used to help understand the various influences on health behaviors and includes intrapersonal, interpersonal, organizational, community, and public policy factors.⁵ Most research on indoor tanning thus far has focused on intrapersonal and interpersonal factors, indicating that individuals are motivated to tan most commonly for appearance-enhancement reasons.⁶ However, some individuals tan indoors due to social or normative factors or in order to improve mood or reduce stress.⁶ Much less attention has been paid to organizational, community, and public policy contextual factors.

As is the case with tobacco use and obesity, contextual factors such as accessibility, governmental regulation, marketing, or cost may also be associated with the prevalence of indoor tanning. Salon accessibility, for example, having a higher density of tanning facilities and living within 2 miles of a tanning facility, has been found to be associated with indoor tanning in the last year.⁷ However, indoor tanning has been found to be unrelated to state tanning regulations, likely due to low levels of enforcement,⁷⁻¹¹ suggesting that community norms and other factors may be more important in influencing indoor tanning behavior currently. Other contextual factors that have been found to encourage more frequent and continuous indoor tanning among tanning salon patrons include reasonable prices and the convenience of being able to tan anytime including at night.¹²

Ultraviolet radiation (UV) such as that emitted by indoor tanning devices is known to definitively increase skin cancer risk.¹³⁻¹⁶ However, there are additional contextual issues related to indoor tanning that may contribute to even greater levels of risk than would otherwise exist. UV-related guidelines and regulations regularly go un-enforced.⁸⁻¹¹ For example, very fair-skinned individuals at high risk for burning are often permitted to tan when they shouldn't be, and tanning session length guidelines based on skin types (ie, sensitivity to burning) are not followed. Additionally, many tanning devices are not monitored adequately and therefore may emit more UV than guidelines recommend. Salon staff sometimes do not even know what type or how much UV is emitted from their devices,⁹ thus, they would be unlikely to be able to follow Food and Drug Administration (FDA) or other guidelines regarding UV exposure. Moreover, indoor tanners are often adolescents and college-aged individuals, thus potentially leading to high levels of lifetime UV exposure.^{17,18}

Besides contextual factors, an additional intrapersonal reason for frequent tanning is tanning dependence or addiction, colloquially referred to as "tanorexia".¹⁹ Although tanning dependence is not an official disorder according to the American Psychiatric Association's Diagnostic and Statistical Manual,²⁰ tanning dependence has been defined based on traditional substance dependence criteria and measures (ie, tolerance, withdrawal, difficulty controlling the behavior despite negative consequences). A number of studies have provided evidence for the phenomenon of tanning dependence, with plausible biologic underpinnings, primarily related to the opioid system.¹⁹ The prevalence of tanning dependence varies by population and measurement strategy. Rates range from 22% to 45% among college indoor tanners and 18% among college sunbathers.²¹⁻²⁴ Among general college student samples in

the US, rates range from 5% to 27%.²¹⁻²⁵ Tanning dependent individuals may tan frequently and put themselves at even greater risk of skin cancer than other tanners. There are elements of the current indoor tanning context that may contribute to tanning dependence such as easy accessibility, lack of regulation/enforcement, marketing efforts by salons, and the relatively low cost of indoor tanning.

Although seemingly important, relatively few studies have focused on such contextual factors related to indoor tanning. These studies have been focused on adolescents rather than college-aged individuals, and the results have been mixed in terms of the impact of state indoor tanning laws and indoor tanning behaviors.²⁶ The purpose of the current study was to investigate the association of college-aged women's perceptions of contextual factors such as tanning salon accessibility, regulations, marketing, or cost and indoor tanning behavior or tanning dependence. We hypothesized that individuals who had tanned indoors in the last 30 days and/or women who scored higher on a measure of tanning dependence would be more likely to report greater salon accessibility, looser tanning regulations, more promotional efforts, and lower cost of individual indoor tanning sessions, yet more trouble paying for their tanning habit than others. Understanding the factors associated with more frequent indoor tanning may help inform policy and public health programming efforts. For example, the impact on young women's skin cancer risk of additional regulation and enforcement of contextual factors associated with frequent or dependent tanning could be investigated.

METHODS

Design

All female psychology students at a northeastern university were recruited via e-mail and web through a psychology department research subject pool. Psychology 101 is a required course for several majors at the university. Email invitations were sent at the beginning, middle, and end of each term asking students to go to the psychology department research webpage to view study information and complete an automatized online screener. After consenting via an online consent form, eligible students completed a one-time, hour-long, online questionnaire at their convenience. Written information about indoor tanning and health referrals was offered to all participants. Participants were given research participation extra credit for an academic course and a \$20 PayPal voucher as compensation for their participation. Data were collected during the academic school years between November, 2009 and March, 2011.

Sample

Five hundred forty-six women from a northeastern university consented to the original parent study that involved an online survey and telephone interview about the psychosocial correlates of behaviors associated with skin cancer. One hundred thirty-nine women who completed the online questionnaire and reported having ever tanned indoors were included in the analyses for the current paper. Based on our prior analyses of 2005 National Health Interview Survey data, we found that skin cancer risk behaviors, including sunburns, indoor tanning, and lack of skin protection peak among adults at 25 years of age.^{27,28} Therefore, eligible participants' ages ranged from 18 to 25 years ($M = 20.2$, $SD = 1.7$). Consistent with

the racial break-down of indoor tanners in general, the study racial distribution was as follows: 92.8% White, 2.2% Asian American, 0.7% Black, and 4.3% Other/Mixed. About 2% of the sample identified as Hispanic or Latino.

Measures

Participants were asked to indicate how many times they had used a tanning bed or booth in the last 30 days. As this variable was significantly skewed, a square root transformation was applied.

Participants were asked several questions about the context of their indoor tanning, most of which were adapted for the college setting from items previously used by Hoerster and colleagues²⁹ in their study of adolescent indoor tanning in the 100 largest US cities. The following items were used: length of typical indoor tanning session, number of dollars spent per session, and having trouble paying for indoor tanning. Participants were also asked to indicate why they chose the tanning place they visited most recently, with endorsement of “yes” or “no” for the following reasons: that it was close to home, close to school, regular price is low, special discount or promotion, just passed by it one day, had been there before, lenient limits on amount of tanning, and being able to fit it in one's schedule. Items referring to allowing minors to indoor tan were not included.

Symptoms of tanning dependence were assessed using The Tanning Pathology Scale (TAPS), which measures pathological tanning motives.³⁰ Constructs assessed include addictive symptoms that predict tanning intentions and behavior such as tolerance and lack of perceived control over the behavior despite awareness of negative consequences.³⁰ The TAPS subscales are: perceiving tanning as a problem (eg, “Sometimes I think my tanning is out of control”), opiate-like reactions to tanning (eg, “I feel tranquil after a tanning session”), dissatisfaction with skin tone (eg, “The natural color of my untanned skin is unattractive”), and tolerance to tanning (eg, “Tanning doesn't relieve my stress as well as it did when I started”). TAPS response options utilize a 5-point Likert-type scale of agreement (1 = strongly disagree, 5 = strongly agree). Item responses are summed for each subscale. TAPS scores correlate with intentions to tan.³⁰ In our previous work with college women, we found that the tolerance to tanning subscale had low internal reliability and eigenvalues and was not significantly correlated with measures of tanning attitudes and behaviors.³¹ Therefore, we examined the sum of scores for the remaining subscales (15 items) for the purpose of this study. The range of possible scores was 15-75, with higher scores indicating greater pathological motives for tanning (ie, more symptoms of tanning dependence). The measure used in this manner is internally consistent in our sample ($\alpha = 0.91$).

Participants were also asked to identify the color of their untanned skin, with options being very fair, fair, medium light, medium (olive), medium dark, very dark.⁵ Those who indicated that they had very fair or fair skin were dichotomized as fair skinned, with all others being categorized as darker than fair.⁵

Analyses

Descriptive statistics were calculated. Associations between study variables (having fair skin, length of indoor tanning session, amount spent per session, trouble paying for indoor

tanning, and reasons for choosing a tanning facility) and the outcomes of frequency of tanning indoors in the last 30 days and tanning dependence were examined using independent sample *t*-tests and Pearson's correlations. We also controlled for season in which participants were assessed: fall/winter (September-February) vs. spring/summer (March-August). Two multivariable linear regression analyses were conducted in order to examine associations between the aforementioned study variables and the outcome variables (frequency of indoor tanning in the last 30 days and tanning dependence).

RESULTS

The average number of times women tanned indoors in the last 30 days was 1.8 (SD = 4.5). With the square root transformation applied, the mean was 0.6 (SD = 1.2). The mean length of indoor tanning sessions was 9.9 minutes (SD = 5.2), and the mean number of dollars spent per tanning session was 5.6 (SD = 7.4). The reasons reported for choosing the most recent tanning facility were as follows from most to least frequently reported (see Table 1): close to home (87.6%), fits into schedule easily (78.1%), special discount or promotion (71.5%), regular price is low (70.6%), close to school (69.3%), been there before (55.9%), passed by it one day (34.6%), limits on tanning not strict (18.4%).

The first outcome we examined was frequency of indoor tanning in the last 30 days, using univariate analyses followed by multivariate analyses. Frequency of indoor tanning in the last 30 days was significantly associated with tanning dependence, $r(131) = 0.48$, $p < .001$. Indoor tanning was more frequent in those assessed in the spring or summer versus the fall or winter, $t(69) = -2.07$, $p < .05$. Frequency of tanning indoors in the last 30 days was also positively associated with choosing a tanning facility because it was close to school, $t(101) = -2.34$, $p < .05$, and because of having been there previously, $t(129) = -2.10$, $p < .05$, and negatively associated with choosing a facility due to simply passing by it one day, $t(129) = 2.00$, $p < .05$ (see Table 1). Multivariate linear regression analyses showed that a higher score on the tanning dependence measure was significantly positively associated with frequency of tanning indoors in the last 30 days, $t(114) = 5.29$, $p < .001$. Again, those assessed in the spring or summer reported a greater frequency of indoor tanning in the last month, versus those who were assessed in the fall or winter, $t(114) = 2.48$, $p < .05$ (see Table 2).

The second outcome we examined was tanning dependence. The mean score on the TAPS was 29.8 (SD = 11.4), with a range of 15 to 75. Scores on the tanning dependence measure were significantly positively correlated with the length of a typical indoor tanning session, $r(131) = 0.27$, $p < .01$. Independent samples *t*-tests showed that a higher score on the tanning dependence measure was associated with having trouble paying for indoor tanning, $t(129) = -3.45$, $p < .01$. Multivariable linear regression showed that frequency of tanning indoors in the last 30 days, $t(114) = 5.29$, $p < .01$, length of typical indoor tanning session, $t(114) = 2.21$, $p < .05$, and trouble paying for tanning, $t(114) = 3.23$, $p < .01$, were associated with higher scores on the tanning dependence measure (see Table 2).

DISCUSSION

The current study builds on the existing indoor tanning literature focused primarily on intrapersonal and interpersonal factors by investigating contextual variables associated with indoor tanning and tanning dependence among college-aged women. Women who tanned indoors in the last 30 days reported significantly higher scores on a measure of tanning dependence than women who had tanned longer ago. Women who reported higher scores on a measure of tanning dependence were more likely to have tanned indoors in the last 30 days and reported longer tanning sessions and trouble paying for these sessions. Although we would like to see indoor tanners decreasing their tanning over time, it is not particularly surprising that more recent indoor tanners report higher scores on a measure of tanning dependence and that greater tanning dependence was also associated with longer tanning sessions. Guidelines for indoor tanning session length by skin type exist, but few such guidelines are followed by the tanning industry.⁸⁻¹¹

One novel study finding pertains to paying for tanning sessions. The increasing cost (and taxation) of cigarettes is a well-known deterrent of smoking and could be a deterrent for tanning as well. The majority of participants reported that at the most recent tanning facility they visited, the regular price of tanning sessions was low and that they were attracted by special discounts and promotions. A recent study even found that of the top 125 colleges and universities listed in US New and World Report, 48% had indoor tanning facilities either on campus or in off-campus housing, and 14% of colleges allow campus cash cards to be used to pay for tanning.³² Women who reported higher scores on a measure of tanning dependence and tanning more recently were more likely to report trouble paying for their tanning. The average cost of one tanning session of \$5.60 may not seem expensive, but paying for multiple sessions per week during peak periods of tanning such as around academic breaks can begin to be cost-prohibitive for some college students. Tanning salon promotional packages often offer lower fees per tanning session with the purchase of “bulk” packages or more frequent tanning. However, in addition to potentially paying for more sessions, tanning dependent individuals may have had difficulty paying for their tanning because their sessions were longer, and they may have been paying for tanning by the minute rather than by the session. Difficulty paying for repeated tanning may be suggestive of a “maladaptive pattern” of behavior that is continued despite knowledge of negative consequences, an established criterion for diagnosis of substance dependence disorders²⁰ such as tanning dependence. On the other hand, it is also possible that individuals who paid more per indoor tanning session did not continue tanning for this reason.

One factor that may contribute to the cost per tanning session and cost of habitual tanning is the Affordable Care Act that was signed into law on March 23, 2010, which includes a 10% federal tax on indoor tanning services.³³ It was thought that this tax may be a particularly effective deterrent for adolescents, who are more affected by smaller market fluctuations than adults. Indoor tanning among adolescents has been found to be associated with increased personal spending money.³⁴ However, one study found that 78% of tanning salons reported that clients did not seem to care about the tanning tax, only 26% of salons reported experiencing fewer clients as a result of the tax, only 29% reported that clients were tanning less frequently, and salons reported that younger and first-time clients seemed less

concerned about the tax than older clients.³⁵ As the current study was ongoing when the tanning tax was implemented, we did compare our outcome variables before and after the tanning tax took effect. Though we did not collect exact dates of tanning episodes, we did not find a statistically significant difference in having indoor tanned in the last 30 days or tanning dependence scores, before versus after the tanning tax went into effect.

More indoor tanners reported tanning indoors in the fall/winter compared with the spring/summer; however, individuals who did tan indoors in the spring/summer did so more frequently. More young women may tan indoors in the fall/winter in the Northeast than the spring/summer because the climate limits outdoor tanning in the fall/winter. Individuals who tan indoors during the spring/summer may tan more frequently than those who tan indoors in the fall/winter for appearance reasons because their spring and summer clothing is more likely to expose their skin. Even one indoor tanning episode, which may only last about 10 minutes, during young adulthood has been found to increase risk of skin cancer.¹⁸ Several professional organizations have recommended banning indoor tanning for minors,² and it would also be useful to not promote indoor tanning to young adults, given its known association with melanoma,^{13-16,36} which is now the second most common cancer among young adults.³⁷

This study's findings are a helpful reminder that in addition to intrapersonal and interpersonal factors, key factors associated with health risk behaviors such as tanning and tobacco use are other Social Ecological contextual factors such as cost, marketing, and accessibility. Spending too much money engaging in a behavior can be a diagnostic indicator of the frequency and/or severity of the behavior. Industry pricing and promotional efforts to increase behaviors and governmental taxation designed to decrease behaviors may have their intended effects in some cases or potentially cancel out each other's effects in other cases. In the current study, the majority of the sample reported relatively easy access and availability of special discounts or promotions, even on or near their college campus. Although we did not find significant associations with the specific marketing and regulation items we included in this study, the health of the public may benefit from legislative efforts to further limit promotional advertising by the tanning industry, particularly ads directed to students and those promoting frequent or unlimited tanning. Advertising restrictions for tobacco, including prohibiting advertising directed to children, has been associated with decreased consumption,³⁸ and the decrease has been largest when several types of media are included in the restrictions.³⁹ Whereas only 18.4% of the sample reported that their reason for choosing the last tanning facility they visited was that the limits on tanning were not strict, this issue is still of concern. Moreover, we hope that the FDA's recent reclassification of indoor tanning devices from low-risk to moderate-risk will contribute to increased public awareness and legislative resolve.⁴⁰

This study's limitations are the convenience sample and the cross-sectional design. Although this study was conducted at only one university, college women are frequent indoor tanners and are an appropriate high-risk study population, and all female psychology students across several semesters were personally invited to participate in the study. The cross-sectional design is limited by not allowing us to make causal inferences. Continued research on contextual factors associated with indoor tanning is needed, and legislative efforts to reduce

tanning should continue to be made at national, state, and local levels. The current study adds to the literature suggesting that in addition to intervention efforts that emphasize the disadvantages of indoor tanning such as in terms of skin cancer risk, photo-aging, the potential for tanning dependence, and cost; regulation and enforcement should be directed at indoor tanning marketing and accessibility around colleges and universities.

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Table 1

Characteristics of a Sample of Female Indoor Tanners from a Northeastern University 2009-2011 (N = 139)

Variables	Frequency of Indoor Tanning in the Last 30 Days			TAPS score	Overall (N = 139)
	<i>M (SD)</i>			<i>M (SD)</i>	<i>M (SD)</i>
Length of indoor tanning session in minutes	Does not apply			Does not apply	9.9 (5.2)
Dollars spent per session	Does not apply			Does not apply	5.6 (7.4)
	<i>M (SD)</i>	<i>M (SD)</i>	<i>n (%)</i>		
Season assessed					
Fall/Winter	0.5 (1.0)	30.2 (10.2)	90 (66.2)		
Spring/Summer	0.9 (1.4)	29.2 (13.4)	46 (33.8)		
Fair skin					
Yes	0.6 (1.2)	29.7 (12.1)	67 (48.2)		
No	0.6 (1.2)	30.0 (10.7)	72 (51.8)		
Trouble paying for indoor tanning					
Yes	0.7 (1.2)	37.1 (12.4)	23 (16.9)		
No	0.6 (1.2)	28.5 (10.6)	113 (83.1)		
<i>Reasons for Choosing Tanning Facility</i>					
Close to home					
Yes	0.6 (1.2)	29.9 (11.3)	120 (87.6)		
No	0.5 (1.0)	30.1 (12.6)	17 (12.4)		
Close to school					
Yes	0.8 (1.2)	30.8 (10.3)	95 (69.3)		
No	0.3 (1.0)	27.8 (13.5)	42 (30.7)		
Regular price is low					
Yes	0.5 (1.1)	28.8 (9.4)	96 (70.6)		
No	0.8 (1.4)	32.2 (15.1)	40 (29.4)		
Special discount or promotion					
Yes	0.7 (1.2)	29.9 (10.5)	98 (71.5)		
No	0.5 (1.2)	29.8 (13.5)	39 (28.5)		
Passed by it one day					
Yes	0.4 (0.8)	27.9 (10.6)	47 (34.6)		
No	0.7 (1.3)	30.7 (11.7)	89 (65.4)		
Been there before					
Yes	0.8 (1.3)	31.4 (11.1)	76 (55.9)		
No	0.4 (0.9)	27.7 (11.5)	60 (44.1)		
Limits on tanning not strict					
Yes	0.8 (1.1)	33.2 (13.1)	25 (18.4)		
No	0.6 (1.2)	29.0 (10.9)	111 (81.6)		
Fits into schedule easily					
Yes	0.7 (1.2)	30.8 (11.1)	107 (78.1)		
No	0.4 (0.9)	26.8 (12.0)	30 (21.9)		

N = sample size, TAPS = Tanning Pathology Scale, M = mean, SD = standard deviation.

Table 2

Associations between Tanning Variables and Frequency of Indoor Tanning in the Last 30 days and Tanning Dependence in a Sample of Female Indoor Tanners from a Northeastern University 2009-2011 (N = 130)^a

Variable	Frequency of Indoor Tanning in the Last 30 Days ^b			Tanning Dependence ^c		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Frequency of indoor tanning in the last 30 days	Does not apply	Does not apply	Does not apply	4.05	0.77	<.001
Tanning dependence	0.05	0.01	<.001	Does not apply	Does not apply	Does not apply
Season assessed	0.49	0.20	0.015	-2.21	1.85	0.234
Fair skin	0.10	0.19	0.617	-0.96	1.77	0.588
Length of indoor tanning session in minutes	0.00	0.02	0.867	0.38	0.17	0.029
Dollars spent per session	0.00	0.01	0.999	-0.14	0.12	0.271
Trouble paying for tanning	-0.45	0.26	0.086	7.46	2.31	0.002
<i>Reasons for choosing tanning facility</i>						
Close to home	0.22	0.33	0.505	-3.39	2.98	0.257
Close to school	0.37	0.22	0.099	-0.34	2.07	0.871
Regular price is low	-0.32	0.23	0.178	-1.68	2.14	0.433
Special discount or promotion	0.16	0.23	0.479	-0.94	2.08	0.651
Passed by it one day	-0.31	0.22	0.159	-0.78	2.00	0.697
Been there before	0.14	0.22	0.536	1.09	1.99	0.586
Limits on tanning not strict	0.02	0.26	0.937	2.27	2.38	0.342
Fits into schedule easily	-0.04	0.27	0.870	3.37	2.40	0.163

N = sample size, *B* = beta, *SE* = standard error.

^a multiple linear regression

^b $F(14, 114) = 3.76, p < .001, R^2 = 0.23$

^c $F(14, 114) = 4.87, p < .001, R^2 = 0.30$