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Psychiatric and Addictive Symptoms of Young Adult Female Indoor Tanners

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Abstract

Purpose—Indoor tanning (IT) increases risk for melanoma and is particularly common among young adult women. IT has also been linked with some psychiatric symptoms, and frequent tanning may indicate tanning dependence (addiction) associated with endorphin release during ultraviolet (UV) radiation exposure. The objective of the current study was to investigate associations between IT, tanning dependence, and psychiatric and substance use symptoms in young adult women.

Design—Cross-sectional survey and psychiatric interview.

Setting—Online, except for the MINI International Neuropsychiatric Interview (MINI) that was completed over the telephone.

Subjects—Participants were 306 female university students aged 18–25 years.

Measures—MINI, Seasonal Scale Index, tanning dependence scales, reporting ever having used a tanning bed or booth with tanning lamps (single item), reporting smoking a cigarette in the last 30 days (single item).

Analysis—Descriptive statistics, chi square analysis, multivariate logistic regression.

Results—Forty-six percent of the sample reported a history of IT, and 25% were classified as tanning dependent. Multivariate logistic regression analyses showed that IT was significantly associated with symptoms of alcohol use disorders, generalized anxiety, and not having social anxiety. Tanning dependence was associated with symptoms of alcohol use disorders.

Conclusion—Tanning is of concern not only for its association with skin cancer but for its association with psychiatric and substance use symptoms. Young women with certain

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psychological problems may seek relief from their symptoms by IT. These findings suggest that indoor tanners may benefit from health behavior and other psychosocial interventions.

Keywords

indoor tanning; young adult women; skin cancer; psychiatric and addictive symptoms

Purpose

Skin cancer is the most common form of cancer in the US, accounting for half of all human malignancies, with over two million new cases diagnosed yearly.[1] Ultraviolet radiation (UV) exposure in general, and indoor tanning in particular, has been linked to the development of melanoma and non-melanoma skin cancers, and a disturbing increase in the incidence of melanoma among young adult women has been observed recently.[2–4] Much of the research on indoor tanning thus far has focused on teens; however, recent research suggests that 75% of lifetime UV exposure is accumulated after age 18.[5] Despite attempts to regulate the tanning industry, indoor tanning is a relatively common practice, particularly in the US and other Western countries. Among US college students, past year prevalence of indoor tanning ranges from 33% to 60%, with higher rates among female students.[6, 7]

Many individuals indoor tan despite awareness of the link between UV radiation and skin cancer, suggesting that there are important psychosocial motivations to tan that sometimes outweigh an individual's concern for health.[8–12] The immediate and potent rewards of tanning are often perceived as outweighing the delayed, and perhaps less salient, benefits of protecting one's health (or appearance) in the future.[13] Appearance enhancement is the most commonly-cited reason for intentional indoor tanning.[8, 14–20] Direct emotional effects such as relaxation, enhanced mood, stress relief, and improved energy comprise the second most often-cited category of motivations.[8, 15, 21–25] Indoor tanning behavior is also heavily influenced by the normative behavior of others including peers [6, 26, 27] and parents, particularly among girls and their mothers. [26, 28–30]

While infrequent tanners may attempt to enhance their appearance prior to special events, frequent tanners may tan both to enhance their appearance and to regulate negative affect through the physical and psychological reinforcement provided by tanning and UV. An additional reason for frequent tanning is tanning dependence or addiction, colloquially referred to as "tanorexia".[31] Although tanning dependence in not an official disorder according to the American Psychiatric Association's Diagnostic and Statistical Manual-Fourth Edition-Text Revision (DSM-IV-TR),[32] tanning dependence has been defined based on traditional substance dependence criteria and measures (i.e., 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.[31] Though there is strong evidence of addiction to tanning,[33] our knowledge of tanning dependence is still in its infancy. The prevalence of tanning dependence varies by population and measurement strategy. Rates are 22% to 45% among college indoor tanners and 18% among college sunbathers.[34–38] Among general college student samples in the US, rates range from 12–27%.[34–38] Tanning dependent individuals may tan frequently and put themselves at even greater risk of skin cancer than other tanners.

The physical experiences of tanning may improve tanners' psychological state or produce positive affect such as a feeling of relaxation or mild euphoria as with some recreational drugs. Individuals with psychological (e.g., personality, mood, emotion) and/or biological vulnerabilities may experience greater reinforcement from tanning in terms of relief of

psychological symptoms or distress. This reinforcement among vulnerable individuals may set the stage for tanning dependence, which consists of the need to increase the intensity of tanning to obtain the same effects as in the past (tolerance), discomfort when not having tanned recently (withdrawal), and tanning despite awareness of negative impact (e.g., burns, freckles). This biopsychosocial reinforcement may produce a cycle of using tanning as a form of affect regulation (i.e., self medication).

Prior studies have found indoor tanners to have more psychiatric and substance disorder symptoms than non-tanners. Addictive correlates of indoor tanning include greater use of alcohol, cigarettes, steroids (among male teens), and other substances.[36, 37, 39] Additionally, tanning and body dysmorphic disorder are common co-occurrences, and many individuals with body dysmorphic disorder focus on perceived skin imperfections such as paleness.[40, 41] Hillhouse and colleagues found a subset of frequent tanners who have seasonal affective disorder.[42] Additionally, a higher prevalence of obsessive compulsive tendencies has been found among adult tanners,[43] and anxiety has been reported by college students who were tanning-dependent based on self-report questionnaires.[36, 37]

Tanning has only recently begun to be explored as a serious behavioral health concern similar to other health behavior risks, addictions, and psychological disorders. The current study involved a survey/interview to evaluate psychosocial correlates of indoor tanning and tanning dependence among young adult women, specifically, substance use and psychiatric symptoms. This is the first investigation to include a comprehensive psychiatric interview of tanners rather than using a self-report survey and also the first to compare correlates of indoor tanning to correlates of tanning dependence. Identifying psychosocial characteristics of high risk tanners could facilitate the development of future tailored prevention and intervention efforts to reduce skin cancer risk in these populations.

Methods

Design

This research was approved by the university's and a cancer center's Institutional Review Boards. All 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. After consenting via an online consent form, students completed the questionnaire at their convenience. All scales were completed online except the MINI, which was completed over the telephone with a trained member of the research staff. Written information about indoor tanning and mental 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.

Sample

All female psychology students at a northeastern university across six academic terms over two years were invited to participate in the study by email. Eligibility criteria included female sex and ages 18–25 years (M = 19.9, SD = 1.6). Five hundred eighteen participants began the online survey, and 306 (59%) completed both the questionnaires and interview. Racial distribution was as follows: 68.2% White, 15.1% Asian American, 11.8% Other/Mixed, and 4.9% Black. Four percent of the sample identified as Hispanic or Latino.

Measures

To assess indoor tanning, participants were asked to indicate if they had ever used a tanning bed or a booth with tanning lamps.[44] Participants who had ever used a tanning bed or tanning lamps were considered indoor tanners. Participants were asked to indicate how

many cigarettes they smoked over the past 30 days.[45] Measures of having ever indoor tanned and cigarette smoking were single-item measures that have been cognitively tested and used in previous research.[44,45]

Tanning dependence was assessed using two scales developed by Warthan and colleagues,[46] who modified the substance dependence criteria from the American Psychiatric Association's Diagnostic and Statistical Manual-IV-TR [32] for tanning and those of the four-item CAGE scale,[47] traditionally used to screen for problematic alcohol use. CAGE is an acronym that refers to the four items: Cut down on drinking (in this case, tanning), feeling Annoyed when told to not do a behavior, feeling Guilty when doing the behavior too much, and wanting to participate in the behavior first thing in the morning (Eye-opener). The modified 7-item DSM-IV-TR criteria address tolerance and tanning despite negative consequences, key criteria of substance dependence. Sample items are: "Do you think you need to spend more and more time tanning to maintain your color?" and "Do your beliefs about skin cancer keep you from spending time in the sun or going to tanning beds?" Endorsing two out of the four mCAGE items indicates meeting criteria for tanning dependence, and endorsing three of the mDSM-IV-TR items indicates meeting criteria for tanning dependence. Previous research has found good internal consistency (Cronbach's alpha = 0.85), sensitivity (75–91%), and specificity (77–96%) for use of the CAGE for alcohol disorders[48] and good inter-rater reliability, test-retest reliability, and validity of measures used to assess DSM-IV criteria for the diagnosis of substance dependence.[49]

The 15-minute Mini International Neuropsychiatric Interview (MINI, version 6.0.0)[50] was used to assess symptoms of major depression, bipolar disorder, generalized anxiety disorder, social anxiety disorder, obsessive compulsive disorder, posttraumatic stress disorder, panic disorder, bulimia nervosa, anorexia nervosa, as well as alcohol, marijuana, and other illicit substance use disorders. Scores were created based on the number of symptoms reported. Scores for each disorder were dichotomized based on whether any symptoms were reported or not. We also indicated whether participants met criteria for any psychiatric disorder or substance abuse or dependence disorders. This standardized clinical interview demonstrates good test-retest reliability, with kappa coefficients ranging from 0.76 to 0.93.[50] Kappa coefficients between scores on the MINI and the Composite International Diagnostic Interview, have been found to be acceptable.[50] The MINI was administered over the telephone as has been done in prior studies,[51–53] which have reported acceptable reliability but have not made validity data for this modality available.

The Seasonal Scale Index (SSI) was used to assess symptoms of seasonal affective disorder.[54] This brief measure, which is a central feature of the Season Pattern Assessment Questionnaire,[54] prompts respondents to indicate the degree of change that occurs throughout the year for sleep length, social activity, mood, weight, appetite, and energy level. Scores can range from 6 to 24, with a score of 11 or above being considered presence of seasonal affective disorder.[54] This measure demonstrates good validity based on factor analysis and correlation with the longer scale [55] and was internally consistent in our study (α = 0.86).

Analysis

Data were assessed for normality, and descriptive statistics were calculated. Cases with missing data were deleted (i.e., listwise deletion). Chi square analyses were used to examine differences between indoor and non-indoor tanners, as well as those who met criteria for tanning dependence, on psychiatric and substance disorders. Multivariate logistic regression analyses were then conducted to examine associations between indoor tanning and tanning dependence and specific types of substance use (i.e., tobacco, alcohol, illicit drugs) and psychiatric symptoms (i.e., anorexia or bulimia, seasonal affective disorder, major

depressive disorder, social anxiety disorder, obsessive compulsive disorder, posttraumatic stress disorder, and generalized anxiety disorder).

Results

Table 1 displays frequencies for each variable by indoor tanning and tanning dependence status. Forty-six percent of the sample reported that they had used an indoor tanning booth or a bed with tanning lamps, and 25% met the criteria for tanning dependence based on either the DSM or CAGE.

Meeting criteria for any substance abuse or dependence disorder was associated with having ever indoor tanned, $p < .01$. When examining specific types of substance use, those who had indoor tanned were more likely to report tobacco use in the last 30 days, $p < .05$, and symptoms of alcohol use disorders, $p < .001$, than those who had never indoor tanned. Meeting criteria for any psychiatric disorder was not significantly associated with ever having indoor tanned, $p = 0.484$. However, ever indoor tanners were more likely to report symptoms of generalized anxiety disorder, $p < .01$, but less likely to report symptoms of social anxiety disorder, $p < .05$, than those who had never indoor tanned.

Meeting criteria for any substance abuse or dependence was not significantly associated with meeting criteria for tanning dependence, $p = 0.109$. However, those who met criteria for tanning dependence were more likely to report symptoms of alcohol use disorders, $p < .001$. Meeting criteria for any psychiatric disorder was associated with meeting criteria for tanning dependence, $p < .05$. When examining specific types of psychiatric disorders, tanning dependence was associated with being more likely to meet criteria for seasonal affective disorder, $p < .05$.

Multivariate Models

Multivariate logistic regression analyses showed that symptoms of alcohol use disorders (OR = 2.74, 95% CI = 1.64, 4.60), (absence of) social anxiety (OR = 0.22, 95% CI = 0.06, 0.77), and generalized anxiety (OR = 4.78, 95% CI = 2.19, 10.44) continued to be significantly associated with having ever indoor tanned, when also taking into account other substance and psychiatric symptoms (see Table 2). Symptoms of alcohol use disorders also continued to be significantly associated with tanning dependence (OR = 3.25, 95% CI = 1.72, 6.16) when taking into account other substance and psychiatric symptoms. There were trends toward tanning dependence being associated with greater symptoms of eating disorders, meeting criteria for seasonal affective disorder and decreased symptoms of major depressive disorder. However, these results were not statistically significant.

Discussion

Prior survey studies have demonstrated the association of indoor tanning or tanning dependence with psychiatric and substance use symptoms.[34–39] However, this is the first study to investigate both indoor tanning and tanning dependence in the context of a standardized psychiatric interview. Indoor tanning and tanning dependence were found to be associated with both psychiatric and substance use symptoms. Multivariate logistic regression analyses showed that indoor tanning was significantly associated with symptoms of alcohol use disorders, generalized anxiety, and not having social anxiety. Tanning dependence was associated with symptoms of alcohol use disorders. Non-significant trends also emerged toward tanning dependence being associated with symptoms of eating disorders, seasonal affective disorder, and decreased symptoms of major depressive disorder.

Symptoms of alcohol use disorders were consistently associated with both indoor tanning and tanning dependence, while taking into account other psychiatric and substance use variables. Perhaps general risk-taking accounts for this cluster of behaviors among young women. Alternatively, these women may be trying to "self-medicate" some other symptom with tanning or alcohol use. For example, indoor tanners were more likely to report symptoms of generalized anxiety disorder, and women who were tanning dependent were marginally more likely to report symptoms of seasonal affective disorder. Regarding social anxiety, individuals typically initiate indoor tanning for appearance reasons.[10,12,56,57] Socially anxious women may be less likely to indoor tan because they don't want to display their bodies or have others looking at their bodies.[58,59] While non-significant, the opposing direction of the relationships between tanning dependence and symptoms of seasonal affective disorder and major depressive disorder is interesting, but unexplained. Tanning may have more of an anxiolytic (i.e., anxiety-reducing) than an antidepressant effect. A larger sample of tanning dependent women could help elucidate this potential relationship as well as the potential association with eating disorders. Prior studies have demonstrated associations between tanning and eating and body image concerns.[40, 41, 60]

The high prevalence of indoor tanning and tanning dependence among young adult women is concerning. Not only is the association between tanning and skin cancer a significant public health concern, but the association between tanning and psychiatric and substance use disorders may represent an important mental health concern. A few interventions, particularly appearance-focused interventions including promotion of the use of sunless tanners, have been successful in reducing indoor tanning among young women.[57, 61, 62] Interventions to address tanning dependence have not yet been reported. It is likely that to successfully reduce indoor tanning among some young women, psychiatric and substance use symptoms such as alcohol use and anxiety would need to be addressed by providing these individuals with more adaptive emotional regulation, coping, or anxiety management skills. Additionally, tanners with seasonal affective disorder need to know that indoor tanning is harmful and has not been shown to be an effective treatment for seasonal affective disorder, but a different type of light therapy, namely bright light therapy,[63, 64] is safe and effective, as are other treatments such as counseling and antidepressants. [65, 66]

Strengths of the study are the use of a standardized psychiatric interview and the relatively large sample size. Limitations are the convenience sample and the cross-sectional design. Whereas this study was conducted at one university, college women are frequent indoor tanners and are an appropriate high risk study population. Future prospective and longitudinal studies of tanning behavior and psychiatric and substance disorders college women and other populations would be of interest as would development of interventions to address tanning and its associated symptoms.

SO WHAT?

What is already known on this topic?—Prior studies have found indoor tanners to have more psychiatric and substance disorder symptoms than non-tanners including tanning dependence, body dysmorphic disorder, seasonal affective disorder, and anxiety disorders.

What does this article add?—This is the first investigation to include a comprehensive psychiatric interview of tanners rather than using a self-report survey and also the first to compare correlates of indoor tanning to correlates of tanning dependence. Most prior survey findings were replicated in the current interview. The finding of a negative association between indoor tanning and social anxiety is novel.

What are the implications for health promotion practice or research?—Indoor tanners and tanning dependent individuals may have additional psychiatric or substance disorder symptoms that should be addressed. Future larger prospective and longitudinal studies of tanning behavior and psychiatric and substance disorders would be of interest, particularly those that further investigate relationships with mood, anxiety, and eating disorders.

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Table 1

Differences in Psychiatric and Substance Use Characteristics of College Women by Indoor Tanning and Tanning Dependence Status

Variables	Indoor Tanned (n = 139)	Never Indoor Tanned (n = 167)	Tanning Dependent (n = 75)	Not Tanning Dependent (n = 231)	Overall (N = 306)
	n (%)	n (%)	n (%)	n (%)	n (%)
Overall MINI Diagnosis					
Any psychiatric disorder	73 (52.5)	81 (48.5)	46 (61.3)*	108 (46.8)	154 (49.7)
No psychiatric disorder	66 (47.5)	86 (51.5)	29 (38.7)	123 (53.2)	152 (50.3)
Substance abuse or dependence	32 (23.0)**	15 (9.0)	16 (21.3)	31 (13.4)	47 (15.4)
No substance abuse or dependence	107 (77.0)	152 (91.0)	59 (78.7)	200 (86.6)	259 (84.6)
Symptoms of Substance Abuse or Dependence					
Smoked in past 30 days	31 (22.3)*	19 (11.4)	16 (21.3)	34 (14.7)	50 (16.3)
Did not smoke in past 30 days	108 (77.7)	148 (88.6)	59 (78.7)	197 (85.3)	256 (83.7)
Alcohol	98 (70.5)***	81 (48.5)	57 (76.0)***	122 (52.8)	179 (58.5)
Not alcohol	41 (29.5)	86 (51.5)	18 (24.0)	109 (47.2)	127 (41.5)
Illicit drugs	17 (12.2)	10 (6.0)	8 (10.7)	19 (8.2)	27 (8.8)
Not illicit drugs	122 (87.8)	157 (94.0)	67 (89.3)	212 (91.8)	279 (91.2)
Symptoms of Psychiatric Disorders					
Anorexia or bulimia	31 (22.3)	42 (25.1)	22 (29.3)	51 (22.1)	73 (23.9)
Not anorexia or bulimia	108 (77.7)	125 (74.9)	53 (70.7)	180 (77.9)	233 (76.1)
High seasonal affective	70 (50.4)	79 (47.3)	44 (58.7)*	105 (45.5)	149 (48.7)
Low seasonal affective	69 (49.6)	88 (52.7)	31 (41.3)	126 (54.5)	157 (51.3)
Major depression	37 (26.6)	42 (25.1)	18 (24.0)	61 (26.4)	79 (25.8)
Not major depression	102 (73.4)	125 (74.9)	57 (76.0)	170 (73.6)	227 (74.2)
Social anxiety	4 (2.9)*	16 (9.6)	4 (5.3)	16 (6.9)	20 (6.5)
Not social anxiety	135 (97.1)	151 (90.4)	71 (94.7)	215 (93.1)	286 (93.5)
Obsessive compulsive	19 (13.7)	22 (13.2)	13 (17.3)	28 (12.1)	41 (13.4)
Not obsessive compulsive	120 (86.3)	145 (86.8)	62 (82.7)	203 (87.9)	265 (86.6)
Posttraumatic stress	39 (28.1)	33 (19.8)	19 (25.3)	53 (22.9)	72 (23.5)
Not posttraumatic stress	100 (71.9)	134 (80.2)	56 (74.7)	178 (77.1)	234 (76.5)

Variables	Indoor Tanned (n = 139)	Never Indoor Tanned (n = 167)	Tanning Dependent (n = 75)	Not Tanning Dependent (n = 231)	Overall (N = 306)
	n (%)	n (%)	n (%)	n (%)	n (%)
Generalized anxiety	31 (22.3)**	14 (8.4)	14 (18.7)	31 (13.5)	45 (14.8)
Not generalized anxiety	108 (77.7)	152 (91.6)	61 (81.3)	199 (86.5)	260 (85.2)

* $p < .05$;

** $p < .01$;

*** $p < .001$;

[a] Group differences were assessed using chi square analyses.

Note: MINI = Mini International Neuropsychiatric Interview

Table 2

Associations between Psychiatric and Substance Use Symptoms and Indoor Tanning and Tanning Dependence (N = 306)[a]

	Indoor Tanning		Tanning Dependence	
Variable	**OR (95% CI)**	***p***	**OR (95% CI)**	***p***
Smoked in past 30 days	1.30 (0.65–2.63)	0.461	1.10 (0.52–2.30)	0.810
Alcohol	2.74 (1.64–4.60)	<0.001	3.25 (1.72–6.16)	<0.001
Illicit drug (includes marijuana)	1.62 (0.65–4.05)	0.303	1.01 (0.39–2.64)	0.986
Anorexia or bulimia	0.96 (0.53–1.74)	0.892	1.76 (0.92–3.38)	0.091
Seasonal affective	1.15 (0.71–1.89)	0.570	1.67 (0.95–2.93)	0.076
Major depressive	0.76 (0.42–1.41)	0.387	0.51 (0.25–1.03)	0.060
Social anxiety	0.22 (0.06–0.77)	0.018	0.62 (0.17–2.24)	0.467
Obsessive compulsive	1.24 (0.55–2.77)	0.607	1.72 (0.75–3.98)	0.203
Post traumatic stress	1.51 (0.86–2.66)	0.155	1.13 (0.59–2.18)	0.705
Generalized anxiety	4.78 (2.19–10.44)	<0.001	1.71 (0.79–3.67)	0.172

[a]Based on multivariate logistic regression analyses.