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The association of tanning behavior with psycho-tropic medication use among young adult women

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Abstract

Despite its known association with skin cancer, tanning remains popular among young adult women. Indoor tanning behavior has been found to be associated with affective and addictive disorders. To better understand potential psychological and biological mechanisms of tanning behavior, we investigated associations between tanning and medication (psychotropic and other) use among young women. Two hundred fifty three women age 18–29 years old were recruited from two northeastern university campus communities. Women self-reported tanning frequency and chronic medication use. In both univariate and multivariate analyses, indoor tanning 12 times last year was significantly associated with use of psychotropic medication, and anti-depressants in particular. Sunbathing was not associated with medication use. Potential reasons for associations between tanning and psychotropic medication use are discussed. Indoor tanners should be warned that some psychotropic medications are photosensitizing, thus increasing risk for burns and other skin damage from indoor tanning.

Keywords

tanning; young adult women; psychotropic medication; anti-depressants

Research has demonstrated that indoor tanning is associated with psychiatric and substance use symptoms such as seasonal affective disorder; anxiety; body dysmorphic disorder; as well as tobacco, alcohol, and drug use, suggesting the possibility that their etiologies are linked in some way (Harrington et al., 2011; C. J. Heckman, Egleston, Wilson, & Ingersoll,

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2008; Hillhouse, Stapleton, & Turrise, 2005; Lostritto et al., 2012; C.E. Mosher & Danoff-Burg, 2010a; C. E. Mosher & Danoff-Burg, 2010b; Phillips et al., 2006; Phillips, Dufresne, Wilkel, & Vittorio, 2000; Poorsattar & Hornung, 2007). Since those who exhibit psychiatric symptoms may also use psychotropic medications, especially medications for the treatment of depression and anxiety, we investigated whether indoor (and outdoor) tanning behavior among young women is also associated with medication use. We hypothesized that tanning would be associated with psychotropic medication use, especially medications used for the treatment of depression and anxiety. Finding such associations between tanning and specific medication use could suggest potential research avenues to help improve understanding of potential mechanistic links.

Method

Participants

The current preliminary study used screening data from another study of young adult female indoor tanners in which indoor tanning behavior was observed in a laboratory setting, and thus, individuals taking certain photosensitizing and other contra-indicated medications were disqualified from the parent study. Two-hundred fifty-three women from two northeastern urban university communities, aged 18–29 years (mean = 20.7, standard deviation = 2.48) who had ever indoor tanned completed the screener, of which 49% (n = 124) reported indoor tanning in the past month, 54% (n = 136) reported indoor tanning 12 times in the past year, 19% (n = 48) denied indoor tanning in the last year, and 49% (n = 124) reported sunbathing > 5 hours per week last summer. Participants were 85.6% (n = 217) White/Caucasian, 9.5% (n = 24) Asian-American, 5.1% (n = 13) Hispanic/Latino, and 13.4 % (n = 34) Other or Mixed.

Measures

Participants were asked about their indoor and outdoor tanning history in the last year and current medication use. Participants were asked to report the following regarding their tanning history: number of times indoor tanned in the last 12 months, number of times indoor tanned in the last 30 days, and typical hours per week sunbathed during the last summer (adapted from (Glanz et al., 2008; Lazovich et al., 2008). Participants listed each prescription and over-the-counter medications they take on a regular basis. Fitzpatrick skin type was assessed by having participants indicate how exposed skin on their back would burn and/or tan after an hour of midday sun on the first warm spring day of the season (Fitzpatrick, 1988). There are six skin types with I being the fairest and VI being the darkest.

Procedures

Women 18–29 years old were recruited for a study on indoor tanning via email, the web, school newspapers, and flyers distributed around the university campuses and surrounding communities (e.g., near tanning salons). Participants contacted study staff in response to study advertisements and completed a web- and/or telephone-based screener during the academic school-years between December, 2010 and June, 2012.

Results

The most commonly-used medications by young adult female indoor tanners were hormonal contraceptives and psychotropics (see Table 1). This medication use was comparable to that found in a general sample of young adult women: ~44% and ~14%, respectively (Lidell, Luepker, Baigi, Lagiou, & Hilding, 2008). Table 1 also includes other medications that were reported by more than one individual, also similar to rates in a general sample of young adult women (Lidell et al., 2008).

Because the tanning variables were not normally distributed with many participants reporting low levels of tanning, dichotomous variables were created for each tanning behavior such that there would be approximately equal numbers of participants in each group. We had hoped to evaluate whether the use of anxiolytics was associated with tanning, but too few participants endorsed the use of anxiolytics.

Descriptive data used for the chi square analyses are provided in Table 2. Chi square analysis showed that using some form of psychotropic medication was associated with more frequent indoor tanning in the past year [$\chi^2(1) = 3.86$, $p = 0.049$]. More specifically, using anti-depressants was associated with more frequent indoor tanning in the past year [$\chi^2(1) = 8.47$, $p = 0.004$]. Using medications was not significantly associated with sunbathing behavior.

Multivariate logistic regression analyses are reported in Table 3. Age, Fitzpatrick skin type as fair (types I, II, III) vs. dark (types IV, V, VI), and season assessed as fall/winter (October to February) vs. spring/summer (March to September) were controlled for in the multivariate model. Results showed that indoor tanning 12 or more times in the past year was significantly associated with having a darker skin type, $OR = 1.87$, 95% $CI = 1.08-3.25$, and taking anti-depressant medication, $OR = 4.24$, 95% $CI = 1.35-13.32$. Indoor tanning in the last month or sunbathing last summer was not associated with medication use in multivariate analyses (data not shown).

Discussion

This preliminary study found that use of anti-depressants was significantly associated with indoor tanning more than twelve times in the past year among this sample of college women. Sunbathing was not associated with medication use.

An association between indoor tanning and psychotropic medication use suggests that indoor tanning is more than simply an occasional behavior that some young women engage in to enhance their appearance (Heckman, 2011; Hillhouse, Turrissi, & Shields, 2007). It provides further support for the idea that indoor tanning has additional psychological components that may be associated with addiction, mood, and anxiety disorders (Harrington et al., 2011; C. J. Heckman et al., 2008; Hillhouse et al., 2005; Lostritto et al., 2012; C.E. Mosher & Danoff-Burg, 2010a; C. E. Mosher & Danoff-Burg, 2010b; Phillips et al., 2006; Phillips et al., 2000; Poorsattar & Hornung, 2007). In prior research, such psychiatric symptoms have been associated with indoor tanning behavior. Thus, it would make sense that the treatment of these symptoms would be associated with indoor tanning. Some young

women who indoor tan may find indoor tanning more reinforcing than others because of its perceived appearance enhancement effect (Amir, Wright, Kernohan, & Hart, 2000; Cafri, Thompson, & Jacobsen, 2006; Sjöberg, Holm, Ullen, & Brandberg, 2004), mood and relaxation (Feldman et al., 2004; Kourosh, Harrington, & Adinoff, 2010; Stapleton, Turrisi, Hillhouse, Robinson, & Abar, 2010; Zeller, Lazovich, Forster, & Widome, 2006), or even because they find tanning addictive. Tanning dependence (addiction) has been reported previously in several studies (Harrington et al., 2011; C. J. Heckman et al., 2008; C.E. Mosher & Danoff-Burg, 2010a; C. E. Mosher & Danoff-Burg, 2010b; Poorsattar & Hornung, 2007), and addictive, depressive, and anxiety disorders tend to co-occur. In terms of specific psychiatric symptoms, mood and anxiety problems have been associated with indoor tanning (Feldman et al., 2004; Kourosh et al., 2010; Stapleton et al., 2010; Zeller et al., 2006). The finding that indoor tanning was associated with antidepressant use suggests the possibility that some tanners may have altered levels of neurotransmitters associated with depression such as serotonin (Rao et al., 1992). Interestingly, prior research has found stronger associations with tanning and anxiety and seasonal affective disorder than depression (Hillhouse et al., 2005; C.E. Mosher & Danoff-Burg, 2010a; C. E. Mosher & Danoff-Burg, 2010b). In the current study, few women reported anxiolytic use, yet some may have been using anti-depressants to treat anxiety. Psychotropic medication including antidepressants would be a reasonable option to consider as an intervention to help reduce frequent or dependent indoor tanning among individuals with concomitant psychiatric symptoms, though such interventions have not been investigated to date. Future research is needed to clarify these relationships.

Certain medications such as anti-depressants (also hormonal contraceptives, antibiotics, psoralens, anti-fungals, anti-diabetics, etc.) can make the skin more photosensitive, thus decreasing the time it takes for the skin to burn when exposed to ultraviolet radiation (Food and Drug Administration, 2003; World Health Organization (WHO), 2003). We are certainly not suggesting that tanners should not take medications recommended by their healthcare providers but that women who take medications may have additional reasons to reduce their tanning (i.e., they may be taking photo-sensitizing medications).

Limitations

This study is limited by the relatively small convenience sample and the small number of screening variables included. For example, we did not ask women why they were taking various medications such as possibly taking anti-depressants to treat neuropathic pain. There are differences in medication usage by this sample and a general sample of young adult women (Lidell et al., 2008). It is unknown whether this difference is due to methodologic or population differences. Although the current study was conducted primarily with students from two local universities, such young adult and college women are frequent indoor tanners and are an appropriate high risk study population (Coups & Phillips, 2011).

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References

- Amir Z, Wright A, Kernohan EE, Hart G. Attitudes, beliefs and behaviour regarding the use of sunbeds amongst healthcare workers in Bradford. *European Journal of Cancer Care (Engl)*. 2000; 9(2):76–79.
- Cafri G, Thompson JK, Jacobsen PB. Appearance reasons for tanning mediate the relationship between media influence and UV exposure and sun protection. *Archives of Dermatology*. 2006; 142(8):1067–1069. [PubMed: 16924063]
- Coups EJ, Phillips LA. A more systematic review of correlates of indoor tanning. *Journal of the European Academy of Dermatology and Venereology : JEADV*. 2011; 25(5):610–616. author reply 617–618. [PubMed: 21349117]
- Feldman SR, Liguori A, Kucenic M, Rapp SR, Fleischer AB Jr, Lang W, Kaur M. Ultraviolet exposure is a reinforcing stimulus in frequent indoor tanners. *Journal of the American Academy of Dermatology*. 2004; 51(1):45–51. [PubMed: 15243523]
- Fitzpatrick TB. The validity and practicality of sun-reactive skin types I through VI. *Archives of Dermatology*. 1988; 124(6):869–871. [PubMed: 3377516]
- Food and Drug Administration. Don't be in the dark about tanning. 2003. Retrieved December 1,, 2012, from <http://dhh.louisiana.gov/assets/oph/Center-EH/sanitarian/fooddrug/Don%27tBeInTheDarkAboutTanning.pdf>
- Glanz K, Yaroch AL, Dancel M, Saraiya M, Crane LA, Buller DB, Robinson JK. Measures of sun exposure and sun protection practices for behavioral and epidemiologic research. *Archives of Dermatology*. 2008; 144(2):217–222. [PubMed: 18283179]
- Harrington CR, Beswick TC, Leitenberger J, Minhajuddin A, Jacobe HT, Adinoff B. Addictive-like behaviours to ultraviolet light among frequent indoor tanners. *Clinical and Experimental Dermatology*. 2011; 36(1):33–38. [PubMed: 20545951]
- Heckman. Indoor tanning: Tanning dependence and other health risks. *Household and Personal Care Today-Skin Care:Ethnic, whitening & tanning*. 2011; 1:20–22.
- Heckman CJ, Egleston BL, Wilson DB, Ingersoll KS. A preliminary investigation of the predictors of tanning dependence. *American Journal of Health Behav*. 2008; 32(5):451–464.
- Hillhouse J, Stapleton J, Turrise R. Association of frequent indoor UV tanning with seasonal affective disorder. *Archives of Dermatology*. 2005; 141(11):1465. [PubMed: 16301398]
- Hillhouse J, Turrise R, Shields AL. Patterns of indoor tanning use: implications for clinical interventions. *Archives of Dermatology*. 2007; 143(12):1530–1535. [PubMed: 18087003]
- Kourosh AS, Harrington CR, Adinoff B. Tanning as a behavioral addiction. *American Journal of Drug and Alcohol Abuse*. 2010; 36(5):284–290. [PubMed: 20545604]
- Lazovich D, Stryker JE, Mayer JA, Hillhouse J, Dennis LK, Pichon L, Thompson K. Measuring nonsolar tanning behavior: indoor and sunless tanning. *Archives of Dermatology*. 2008; 144(2): 225–230. [PubMed: 18283180]
- Lidell E, Luepker R, Baigi A, Lagiou A, Hildingh C. Medication usage among young adult women: a comparison between Sweden, the USA, and Greece. *Nursing & Health Sciences*. 2008; 10(1):4–10. [PubMed: 18257825]
- Lostritto K, Ferrucci LM, Cartmel B, Leffell DJ, Molinaro AM, Bale AE, Mayne ST. Lifetime history of indoor tanning in young people: a retrospective assessment of initiation, persistence, and correlates. *BMC Public Health*. 2012; 12:118. [PubMed: 22324969]
- Mosher CE, Danoff-Burg S. Addiction to indoor tanning: relation to anxiety, depression, and substance use. *Archives of Dermatology*. 2010a; 146(4):412–417. [PubMed: 20404230]
- Mosher CE, Danoff-Burg S. Indoor tanning, mental health, and substance use among college students: the significance of gender. *J Health Psychol*. 2010b; 15(6):819–827. [PubMed: 20453052]
- Phillips KA, Conroy M, Dufresne RG, Menard W, Didie ER, Hunter-Yates J, Pagano M. Tanning in body dysmorphic disorder. *Psychiatric Quarterly*. 2006; 77(2):129–138.

- Phillips KA, Dufresne RG Jr, Wilkel CS, Vittorio CC. Rate of body dysmorphic disorder in dermatology patients. *Journal of the American Academy of Dermatology*. 2000; 42(3):436–441. [PubMed: 10688713]
- Poorsattar SP, Hornung RL. UV light abuse and high-risk tanning behavior among undergraduate college students. *Journal of the American Academy of Dermatology*. 2007; 56(3):375–379. [PubMed: 17257709]
- Rao ML, Muller-Oerlinghausen B, Mackert A, Strebel B, Stieglitz RD, Volz HP. Blood serotonin, serum melatonin and light therapy in healthy subjects and in patients with nonseasonal depression. *Acta Psychiatrica Scandinavica*. 1992; 86(2):127–132. [PubMed: 1529735]
- Sjöberg L, Holm LE, Ullen H, Brandberg Y. Tanning and risk perception in adolescents. *Health, Risk & Society*. 2004; 6(1):81–94.
- Stapleton J, Turrisi R, Hillhouse J, Robinson JK, Abar B. A comparison of the efficacy of an appearance-focused skin cancer intervention within indoor tanner subgroups identified by latent profile analysis. *Journal of Behavioral Medicine*. 2010; 33(3):181–190. [PubMed: 20058183]
- World Health Organization (WHO). Artificial tanning beds:risks and guidance. Geneva, Switzerland: World Health Organization; 2003.
- Zeller S, Lazovich D, Forster J, Widome R. Do adolescent indoor tanners exhibit dependency? *Journal of the American Academy of Dermatology*. 2006; 54(4):589–596. [PubMed: 16546579]

Table 1

Participant characteristics (N = 253)

Variable	M (SD)
Age in years	20.7 (2.48)
Fitzpatrick skin type	% (N)
Fairer (types I–III)	34.8 (88)
Darker (types IV–VI)	65.2 (165)
Season Assessed	
Fall/Winter (October to February)	59.7 (151)
Spring/Summer (March to September)	40.3 (102)
<u>Tanning History</u>	
Indoor tanned last year	
< 12 times	46.2 (117)
12 times	53.8 (136)
Indoor tanned last month	
No	51.0 (129)
Yes	49.0 (124)
Sunbathed last summer	
5 hours per week	51.0 (129)
> 5 hours per week	49.0 (124)
<u>Medications</u>	
Psychotropic medications	15.0 (38)
Anti-depressants	9.1 (23)
For attentional disorders	4.0 (10)
Anxiolytics	2.8 (7)
For sleep-related disorders	2.0 (5)
Other psychotropics	1.6 (4)
More than one psychotropic	4.3 (11)
Other medications	
Hormonal contraceptives	43.1 (109)
For respiratory problems (e.g., allergies, asthma)	8.3 (21)
Antibiotics	6.7 (17)
Multivitamins	5.9 (15)
Analgesics	3.2 (8)

Table 2

Associations between tanning behavior and psychotropic medication use (N = 253)

Variable	All psychotropic medications			Anti-depressant medications		
	Yes % (n)	No % (n)	p value	Yes % (n)	No % (n)	p value
Indoor tanned last month			0.62			0.45
	8 (20)	41.1 (104)		5.13 (13)	43.8 (111)	
	7.1 (18)	43.8 (111)		4 (10)	47 (119)	
Indoor tanned 12 times last year			0.049			0.04
	10.27 (26)	43.47 (110)		7.5 (19)	46.24 (117)	
	4.74 (12)	41.5 (105)		1.58 (4)	44.66 (113)	
Sunbathed > 5 hours per week last summer			0.89			0.75
	7.5 (19)	41.5 (105)		4.74 (12)	44.26 (112)	
	7.5 (19)	43.5 (110)		4.34 (11)	46.6 (118)	

Table 3

Correlates of indoor tanning 12 times in the last year: multivariate model (N = 253)

Variable	OR (95% CI)	P
Age	0.95 (0.86–1.05)	0.33
Fitzpatrick skin type	1.87 (1.08–3.25)	0.03
Season assessed	0.67 (0.39–1.15)	0.14
Medications		
Anti-depressants	4.24 (1.35–13.32)	0.01
Other psychotropics	1.17 (0.43–3.17)	0.75