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Psychosocial Correlates of Frequent Indoor Tanning among Adolescent Boys

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Abstract

The aim of the current study was to assess psychosocial correlates (i.e., perceived weight, weight control strategies, substance use, and victimization) of frequent indoor tanning in adolescent boys—a group at high risk for developing skin cancer. Participants ($N = 7,907$) were drawn from a nationally-representative sample of adolescent boys attending high school in the United States. Binary logistic regression revealed that extreme weight control strategies, particularly steroid use (odds ratio = 3.67) and compensatory vomiting (odds ratio = 2.34), along with substance use and victimization, were significantly related to frequent indoor tanning. These results highlight the role of appearance-changing, and health-risk behaviors in the context of frequent indoor tanning. Skin cancer prevention interventions may benefit from adopting approaches that integrate the treatment of body dissatisfaction and subsequent maladaptive behaviors.

Keywords

indoor tanning; steroids; eating pathology; victimization; adolescent boys; skin cancer

Psychosocial Correlates of Frequent Indoor Tanning among Adolescent Boys Melanoma and other skin cancers (i.e., basal cell and squamous cell carcinomas) are the most prevalent forms of cancer in the U.S. (Rogers et al., 2006). Ultraviolet (UV) radiation exposure is the strongest risk factor for developing skin cancer (Narayanan, Saladi, & Fox, 2010), with meta-analytic studies indicating that indoor tanning before the age of 35 is significantly associated with increased risk of developing cancer of the skin (The International Agency for Research on Cancer Working Group on Risk of Skin Cancer and Exposure to Artificial Ultraviolet Light, 2006; Zhang et al., 2012). Reports have noted a lifetime prevalence rate of indoor tanning among adolescent boys in the U.S. at 39% (Lostritto et al., 2012) and males are less likely than females to engage in sun-protective habits (Cardinez, Cokkinides, Weinstock, & O'Connell, 2005), placing them at risk for skin cancer. Importantly, a dose-response relationship between the frequency of indoor tanning and the development of skin cancer has recently been reported (Boniol, Autier, Boyle, & Gandini, 2012; Narayanan et al., 2010; Zhang et al., 2012). Thus, identifying psychosocial correlates of frequent indoor tanning among adolescent males is salient for skin cancer prevention intervention development; however, few studies have focused on this population.

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Indoor tanning is strongly associated with motives to enhance appearance (Asvat, Cafri, Thompson, & Jacobsen, 2010; Cafri, Thompson, Jacobsen, & Hillhouse, 2009; Cafri et al., 2006, 2008). Body shape and weight concerns have also been associated with increased indoor tanning, perhaps due to individuals believing that a tan appearance makes their body shape appear more attractive (Cafri et al., 2008; O’Riordan et al., 2006; Yoo & Kim, 2012). Dieting has also been found to differ between boys who tan vs. boys who do not, with 33% and 21% of tanners trying to gain and lose weight, respectively, compared to 25% and 19% of non-tanners (Demko, Borawski, Debanne, Cooper, & Strange, 2003). Additionally, steroid use and unhealthy weight loss strategies were 4 and 2.5 times more likely, respectively, among high school males who used indoor tanning, compared to their non-tanning counterparts (Miyamoto, Berkowitz, Jones, & Saraiya, 2012). Taken together, these findings illustrate that appearance-changing behaviors are strongly associated with indoor tanning.

Substance use has also been linked with indoor tanning use. Among adolescent females, O’Riordan et al. (2006) found that frequent tanners were more likely to binge drink, smoke cigarettes and use recreational drugs compared to non-frequent tanners. Among adolescent males, substance use has also been associated with indoor tanning (Demko et al., 2003; Miyamoto et al., 2012). However, a limitation of this work has been a lack of focus on frequent male tanners—an at risk group for developing skin cancer.

Bullying and victimization are salient variables in the lives of many adolescent boys, though these constructs have yet to be explored in relation to tanning behaviors. Given that victimization based on appearance is commonly reported among this population (Nansel et al., 2001), it is possible that boys who are victimized are more likely to engage in appearance-changing behaviors (e.g., frequent indoor tanning) with aims of attempting to improve their appearance and subsequently reduce being targeted for victimization.

The current study sought to examine psychosocial correlates of frequent indoor tanning in adolescent boys. Much of the literature to date has focused on female adolescents and/or has operationally defined indoor tanning as any past tanning. This latter approach is limited, as it does not allow for the isolation of frequent tanners, who are by far the most at risk group for developing skin cancer, given the dose-response relationship between UV exposure and skin cancer (Narayanan et al., 2010). Consistent with literature reviewed above, it was hypothesized that frequent tanners would be more likely to report substance use, victimization, and maladaptive appearance-changing behaviors compared to non-frequent tanners.

Method

Participants

The demographic characteristics of the sample included: 59% non-Hispanic white, 14% non-Hispanic black, 17% Hispanic, and 10% other race/ethnicity. The average age of participants was 16 years-old ($SD = 1.2$). Participants’ school grade level was as follows: 28% in 9th grade, 26% in 10th grade, 23% in 11th grade, and 22% in 12th grade.

Procedure

Data were derived from the 2009 Youth Risk Behavior Survey (CDC, 2004; 2009). The YRBS is a nationally representative school-based survey conducted by the CDC to monitor the prevalence of health-related behaviors among U.S. high school students. The sampling design employed a three-stage cluster methodology that yielded a representative sample of 9th through 12th grade students enrolled at public, Catholic, and other private schools. Participation in the study was voluntary and anonymous. All study procedures for the 2009

survey were approved by the CDC's internal review board. A total of 16,410 students responded to the 2009 survey (88% return rate), from 158 schools (81% return rate). Only males were included in the current study ($N = 7,907$). See CDC (2004) for additional methodological information.

Measures

Weight and weight control—Weight status was assessed with the following item, “How do you describe your weight?” The response options were “very underweight,” “slightly underweight,” “about the right weight,” “slightly overweight,” and “very overweight.” From these responses, two binary variables were created: “very underweight” (very underweight vs. all other responses) and “very overweight” (very overweight vs. all other responses).

Weight control items included use of diet pills, fasting, and vomiting to lose weight over the previous 30 days, as well as lifetime steroid use. Response options to the use of diet pills, fasting, and vomiting were “yes” or “no.” Lifetime use of steroids was responded to with a scale ranging from 1 “never used steroids” to 6 “40 or more times.” Given the highly skewed nature of this data, responses were dichotomized into any use of steroids vs. none. Weight control strategy was assessed with the following item: “What are you trying to do about your weight?” The response options were “lose weight,” “gain weight,” “stay the same,” and “not trying to do anything.” From these responses two variables were created, “lose weight” (binary variable of those who reported attempting to lose weight vs. all other responses) and “gain weight” (binary variable of those who reported attempting to gain weight vs. all other responses).

Substance use—Substance use was evaluated with six items. Three items asked how many days in the last 30 days participants had drank alcohol, consumed five or more alcoholic beverages, and used cocaine. Three additional items assessed lifetime use of methamphetamine, cocaine, and MDMA (i.e., ecstasy). Because questions used different response scales, z -scores were calculated for each item and a composite z -score was created to obtain a global substance use score (i.e., the six individual z -score converted items were averaged to create a total score), with higher scores denoting increased use. Internal consistency for the current sample was $\alpha = .88$.

Victimization—Victimization was assessed via eight individual items, which included feeling unsafe, being threatened, and getting into fights at school, along with items that assessed intimate partner violence, sexual abuse, bullying and teasing. Most of these items included yes/no response options. For those that were assessed continuously, responses were dichotomized as “none/1 or more.” Next, a total victimization score was calculated based on the sum of the eight individual items, resulting in a possible range of scores of 0 to 8, with higher scores denoting increased victimization. Internal consistency for the current sample was $KR-20 = .70$.

Indoor tanning use—The frequency of indoor tanning use was assessed with the following item, “During the past 12 months, how many times did you use an indoor tanning device such as a sunlamp, sunbed, or tanning booth? (Do not include getting a spray-on tan.)” Response options were: 0 = “0 times,” 1 = “1 or 2 times,” 2 = “3 to 9 times,” 3 = “10 to 19 times,” 4 = “20 to 39 times,” and 5 = “40 or more times.” Given the dose-response relationship between the frequency of indoor tanning and the development of skin cancer (e.g., Boniol et al., 2012; Zhang et al., 2012), responses were combined to isolate frequent tanners from non-frequent tanners, thus this variable was dichotomized into “non-frequent tanners” (0 to 9 times), and “frequent tanners” (10 or more times), as is commonly done in the literature (e.g., O’Riordan et al., 2006).

Statistical analyses

Binary logistic regression was employed to assess the association of predictor variables to frequent indoor tanning status. All predictors were entered simultaneously into the model. To assess the overall model fit, the full model, with all predictor variables entered, was compared to the constant-only model. A statistically significant χ^2 indicates that the full model reliably distinguishes between frequent and non-frequent tanners. Further, the Nagelkerke R^2 was tested to determine the amount of variance in frequent indoor tanning status accounted for by the predictor variables.

Results

Table 1 provides percentages, frequencies, means, and standard deviations of study variables. The binary variable frequent tanner status (yes/no) was entered into a logistic regression as the criterion variable. Perceived weight, weight control strategies, substance use, and victimization were simultaneously entered as predictor variables. The comparison between the full and constant-only model was significant, $\chi^2_{(10)} = 572.97, p < .0001$, indicating the model fit the data well. The Nagelkerke $R^2 = .33$, indicating that roughly 33% of the variance in frequent tanning status was accounted for by the predictor variables. Table 2 presents the unstandardized regression coefficients, standard errors, Wald statistics, odds ratios, and the 95% confidence intervals for the odds ratios. Multiple predictor variables emerged significantly, including use of diet pills (odds ratio = 2.10, $p = .006$), fasting (odds ratio = 1.95, $p = .008$), vomiting (odds ratio = 2.34, $p = .004$), steroids (odds ratio = 3.67, $p < .0001$), desire to gain weight (odds ratio = 1.51, $p = .04$), substance use (odds ratio = 1.42, $p < .0001$), and victimization (odds ratio = 1.30, $p < .0001$). These findings suggest frequent indoor tanners are at increased odds of engaging in extreme and unhealthy means of weight-control in comparison to non-frequent tanners. Frequent tanners are also at increased odds of being victimized and using substances compared to non-frequent tanners.

Discussion

This was the first known study to examine psychosocial correlates of frequent indoor tanning among a nationally-representative sample of adolescent boys. The results were largely consistent with the study's hypotheses. Adolescent boys who were frequent indoor tanners were at increased odds to engage in maladaptive appearance-changing strategies (i.e., fasting, compensatory vomiting, use of diet pills, and steroid use), substance use, and be targets of victimization compared to non-frequent tanners. Further, a desire to gain weight, but not lose weight, emerged as a significant predictor of frequent indoor tanning. These results taken together suggest that boys who engage in frequent indoor tanning may also be attempting to achieve a lean, muscular appearance (e.g., Ridgeway & Tylka, 2005; Smolak & Murnen, 2008), as evidenced by behaviors that lead to weight loss (e.g., diet pills, vomiting, fasting) and muscle-building (e.g., steroid use).

Further, substance use was predictive of frequent tanning, which also corresponds to previous research in the area (e.g., Demko et al., 2003; O'Riordan et al., 2006) suggesting that frequent indoor tanning may be part of a larger cluster of health-risk behaviors. The significant role of victimization and frequent tanning is novel, and may represent boy's desire to improve their appearance in the face of victimization, which may be influenced by their appearance and/or weight/shape.

Although substance use and victimization did serve as significant individual predictors of frequent tanning status, appearance-changing behaviors proved to be the most salient in terms of their association with frequent tanning among adolescent boys. For instance, the odds of frequent tanners engaging in steroid use and compensatory vomiting were 3.67 and

2.34 greater than the odds of non-frequent tanners engaging in these behaviors. Thus, it is likely that frequent indoor tanning represents one, of several, maladaptive appearance-changing behaviors that adolescent males engage in to enhance the perception of their bodies. Given this, tanning prevention interventions would likely benefit from an approach that explicitly addresses and aims at reducing body dissatisfaction.

To date, appearance-based interventions for skin cancer prevention have focused primarily on female undergraduate students and many include manipulated computerized photographs of participants, to show current UV damage to skin and/or to show what UV exposure may do to one's skin in advancing years (cf. Dodd & Forshaw, 2010). In employing this intervention, one would aim to appeal to the individual's appearance orientation. That is, by highlighting the negative effects tanning has on one's appearance, tanning behaviors would theoretically decline, due to individuals wishing to avoid a perceived unattractive body. However, this intervention may also have the potential to reinforce the very ideals that initially lead to tanning behaviors—internalization of the appearance ideal. Thus, although these interventions have demonstrated modest to moderate effects in reducing tanning behavior (Dodd & Forshaw, 2010), addressing dissatisfaction with one's appearance, via cognitive behavioral strategies aimed at increasing body satisfaction (e.g., Cash, 2008), in the context of skin cancer prevention, may yield promising results.

Regarding limitations, data were cross-sectional, thus precluding temporal interpretations. Future studies employing prospective designs are needed to properly address the longitudinal relationships of weight control strategies, substance use, victimization and tanning behaviors. Additionally, the current study examined bivariate relationships; however, future research is also needed in exploring mechanisms (i.e., mediators) and buffers (i.e., moderators) in regard indoor tanning among adolescent boys. Illuminating more nuanced models will aid in refining prevention intervention development. The study is also limited in assessing one form of UV exposure—indoor tanning, thus, results are not necessarily generalizable to outdoor tanning behavior; however, indoor and outdoor tanning behaviors are significantly related to each other (e.g., Demko et al., 2003). Another methodological limitation is the nature in which weight status was assessed. This variable asked how participants perceived their weight, and thus, may not correspond perfectly with objective measures of weight; although, for the purposes of studying appearance-changing behaviors (e.g., tanning), individual's subjective perception of their body weight may be more salient than objective weight variables. Despite study limitations participants were from a large, nationally representative sample, thus, the findings from the current study can be generalized to all U.S. high school males.

In sum, substance use, victimization, and appearance-changing behaviors (e.g., steroid use and compensatory vomiting) are significantly related to frequent indoor tanning among adolescent boys. Skin cancer prevention interventions may benefit from integrative approaches that target body dissatisfaction and subsequent maladaptive behaviors (substance use, purging, steroid use), in tandem.

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Highlights

- Correlates of frequent indoor tanning in adolescent boys were examined.
- Steroid use and compensatory vomiting were strongly predictive of frequent tanning.
- Substance use and victimization were also predictive of frequent tanning.

Table 1
Percentages, Frequencies, Means, and Standard Deviations of Study Variables

Variable	Percentage (Frequency)
Frequent Tanners	2.5% (211)
Very Underweight	2.8% (242)
Very Overweight	3.1% (266)
Desire to Lose Weight	30.0% (2,560)
Desire to Gain Weight	25.7% (2,192)
Steroids	4.3% (363)
Fasting	6.8% (580)
Diet Pills	3.7% (316)
Vomiting	2.5% (217)
	<i>Mean (SD)</i>
Substance Use	.01 (.82)
Victimization	.96 (1.28)

Table 2

Binary Logistic Regression for Frequent Tanner Status

Variable	B	S.E.	Wald	p value	OR	95% C.I.
Very Underweight	.28	.34	.64	.42	1.32	.67, 2.58
Very Overweight	.37	.34	1.20	.27	1.45	.74, 2.82
Diet Pills	.74	.27	7.69	.006	2.10	1.24, 3.55
Fasting	.67	.25	7.12	.008	1.95	1.19, 3.21
Vomiting	.85	.30	8.22	.004	2.34	1.31, 4.17
Steroids	1.30	.25	26.25	.0001	3.67	2.17, 5.68
Lose Weight	-.26	.22	1.39	.24	.77	.50, 1.18
Gain Weight	.41	.20	4.32	.04	1.51	1.02, 2.21
Substance Use	.35	.06	32.98	.0001	1.42	1.25, 1.59
Victimization	.26	.05	27.55	.0001	1.30	1.17, 1.42

Note. OR = Odds Ratio.