
‘My friends love to tan’: examining sensation seeking and the mediating role of association with friends who use tanning beds on tanning bed use intentions

Smita C. Banerjee^{1*}, Kathryn Greene², Zhanna Bagdasarov² and Shelly Campo³

Abstract

This paper explored how sensation seeking contributes to the likelihood of tanning bed use intentions both directly and indirectly through the way it shapes interaction with peers who use tanning beds and attitudes toward tanning bed. Eight hundred and ninety six ($n = 896$) male and female college students were recruited for the study. Measured variables included sensation seeking, association with friends who use tanning beds, attitudes toward tanning and tanning bed use intentions. Structural equation modeling was performed to test the hypotheses. In general, results supported the proposed hypotheses and documented that sensation seeking is indirectly associated with tanning bed use intentions through the mediation of association with peers who use tanning beds and attitudes toward tanning. The article discusses theoretical and methodological implications of the findings demonstrating the pathways of influence of sensation seeking on tanning bed use intentions.

Introduction

Tanning bed use is associated with increasing skin cancer rates in the United States [1]. Skin cancer is the most common form of cancer in the United States. More than 1 million skin cancers are diagnosed annually [2]. Occasional use among 18–25 year olds almost triples the chances of developing skin cancer [3]. Use and prevalence of indoor tanning beds has become an issue of concern due to the associated formidable health risks [4]. World Health Organization [5] has issued a report warning people <18 to stay away from tanning beds because they can raise the risk of skin cancer. Research has shown that even moderate exposure to artificial ultraviolet radiation in tanning beds can lead to the development of various health problems, including skin cancer [6, 7]. These findings support the notion that tanning bed use is a significant health risk behavior.

While it is widely acknowledged that behaviors such as drinking, smoking, drug use are health risk behaviors, there has been less consensus about explicitly conceptualizing tanning as a risk behavior. Most studies recognize the health-related risk of tanning bed use but at the same time stop short of naming it a health risk behavior [8]. Use of tanning beds and sunbathing without protection is associated with a number of negative consequences, such as frequent occurrence of erythema or skin rash [8], sunburns and possible development of skin cancer. As a result, tanning can lead to substantial public expenditures for health care and social services. Although the nature and outcome of tanning behavior is quite different from smoking, drinking or drug use, recent studies have conceptualized tanning bed use as a high-risk health behavior [9]. Thus,

¹Communication and Health Issues Partnership for Education and Research, ²Department of Communication, Rutgers University, 4 Huntington Street, New Brunswick, NJ 08901, USA and ³Department of Community and Behavioral Health, University of Iowa, Iowa City, IA 52242, USA

*Correspondence to: S. C. Banerjee.

E-mail: smitach@rci.rutgers.edu

in this research, we framed tanning behavior as a health risk behavior and examined its association with sensation seeking, a personality variable. This paper examines both direct and indirect associations of sensation seeking on tanning bed use intentions.

Direct association between sensation seeking and tanning bed use

One variable that has been associated with risk behaviors is sensation seeking. Sensation seeking is a personality trait that regulates the tendency to seek varied, novel and intense sensations and experiences [10]. Several studies have examined the relationship between sensation-seeking traits and motivation to engage in risk behaviors such as alcohol consumption, drug use and delinquency [11–13]. A less studied behavior that has been linked to sensation seeking is tanning bed use [14]. Armes' hypothesized that sensation seeking would be inversely related to indoor tanning behavior due to the fact that indoor tanning is a relatively passive behavior. However, this hypothesis was not supported by the data. In fact, Armes [14] found that tanning behavior is related to higher levels of sensation seeking, particularly thrill seeking. Thus, we propose that sensation seeking is directly related to tanning bed use intentions.

Mediated associations between sensation seeking and tanning bed use intentions

Although research suggests that sensation seeking may be related to tanning bed use, it does not explain how this relationship might be unraveled. In particular, the possibility of indirect pathways to this relationship has not been previously examined. We aim to unpack the mediated pathways of influence that make sensation seekers more likely to use tanning beds. We are proposing that the relationship between sensation seeking and tanning bed use intentions is mediated through association with peers who use tanning beds and attitudes about tanning bed use. Figure 1 represents the proposed model. Besides the direct association between sensation seeking and tanning bed use intentions (Path 1), we are proposing three mediated pathways of influence between sensation seeking and tanning bed use intentions. These pathways of influence (labeled Paths 2–4) are presented below, and prior research in the area is reviewed.

Path 2: sensation seeking, association with peers who use tanning beds and tanning bed use intentions

High sensation seekers tend to have friends who engage in similar risk behaviors. For instance, recent research on marijuana use documented that

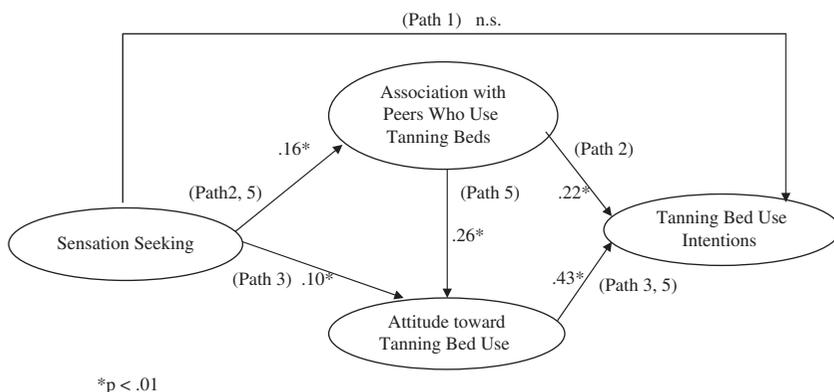


Fig. 1. Final model for direct and mediated effects of sensation seeking on tanning bed use intentions. * $P \leq 0.01$.

high sensation seekers associate more with delinquent friends, have more pro-marijuana discussions with friends and thereby have a greater tendency for engaging in marijuana consumption behaviors [15]. Therefore, in the context of tanning bed use, the pathway of influence for sensation seekers to engage in higher tanning bed use includes association with others who tan.

Sensation seeking has not been explored in relation to association with friends or acquaintances who use tanning beds. However, sensation seeking has been shown to relate to interaction with deviant peers [11, 15, 16], and association with deviant peers has been linked to drug use. High sensation seekers associate with deviant peers because this association may lead to experimenting with risk behaviors that fulfill the need for stimulation. Furthermore, association with deviant peers provides high sensation seekers with an opportunity of engaging in similar risky behaviors [11].

Results of a meta-analysis demonstrate that tanning bed use is a significant risk factor for skin cancer [17]. In the largest national survey on the skin cancer-related attitudes and practices of US children and adolescents, Geller *et al.* [6] found that a majority of teens is not following recommendations for safe skin behaviors including use of sunscreens, minimizing sunburns and avoidance of tanning beds. Using the same rationale as Yanovitzky [15], we propose that sensation seeking may contribute to tanning bed use indirectly, through mediation with friends and/or acquaintances that use tanning beds. Prinstein *et al.* [18] documented that adolescents' health risk behaviors such as, cigarette smoking, alcohol consumption and drug use are related to their friends' engagement in health risk behaviors. By applying the same principle to tanning bed use, we suggest that tanning bed use is a behavior that high sensation seekers in the same peer group perform (either together or separately) either because they find the act of using tanning bed use exciting or underestimate the risk associated with tanning bed use.

However, we clarify that use of tanning beds is not the same as using drugs because whereas use of

drugs is an illegal activity, use of tanning beds is legal (depending on age and parental consent). Nevertheless, association with peers and/or acquaintances who use tanning beds may be an important motivating factor in predicting tanning bed use. Thus, this study tested the proposition that the effect of sensation seeking on tanning bed use is mediated by friends and/or acquaintances that use tanning beds.

Path 3: sensation seeking, attitudes toward tanning and tanning bed use intentions

Various factors explain how and why sensation seekers engage in risk behaviors. Sensation seeking motivates individuals to engage in behaviors that are high in risk and thereby exciting for them, such as drug use [12]. High sensation seekers also tend to underestimate the risk associated with a particular health behavior and thereby engage in it more as compared with their low sensation-seeking counterparts [19]. Therefore, we propose that sensation seeking will be positively related to expectancies or attitudes toward tanning bed use. Studies have demonstrated that beliefs and attitudes associated with tanning are best predictors of tanning intentions [4, 20]. Additionally, beliefs concerning image and appearance (such as, I look more attractive when I tan, I feel more confident when I tan, I prefer to date someone who is tan) are stronger than beliefs concerning health-related motivations such as, I look healthier when I tan [20–22]. Therefore, we propose that attitudes toward tanning bed use will be directly related to tanning bed use intentions. Additionally, we forward the proposition that attitudes toward tanning will mediate the relationship between sensation seeking and tanning bed use intentions.

Path 4: sensation seeking, association with peers who use tanning beds, attitudes toward tanning and tanning bed use intentions

We have already hypothesized that sensation seeking may lead to association with peers who use tanning beds, which further relates with tanning

bed use intentions. Additionally, we have proposed that sensation seeking will positively relate with attitudes toward tanning bed use, and these attitudes will be conducive for tanning bed use intentions. We are now proposing that sensation seeking will be related to association with peers who use tanning beds, which will lead to formation of positive attitudes toward tanning bed use, and these attitudes will be conducive to tanning bed use intentions.

Research has documented that having friends who are tanned and positive attitudes about tanning are associated with increased use of tanning beds [6]. O’Riordan *et al.* [23] concluded that girls with friends who used tanning beds and who held positive beliefs about tanning are most likely to use tanning beds. Furthermore, Branstrom *et al.* [24] found that having tanned people around oneself and positive attitudes toward being tanned were related to intentional tanning. Therefore, through social interaction with friends (or family members) who tan regularly, the high sensation-seeking individual acquires attitudes favorable toward tanning bed use. This further leads to adoption of and increased likelihood of tanning bed use.

Summary of proposed relationships

To summarize, this study was based on testing the relationships between sensation seeking and tanning bed use. The model in Fig. 1 presents a hypothesized set of relationships linking sensation seeking with association with peers who use tanning beds and attitudes related to tanning bed use intentions.

We suggest that sensation seeking may be associated with tanning bed use intentions in one of four ways. First, sensation seeking may contribute to tanning bed use intentions directly (Path 1). Second, sensation seeking may lead to association with friends who use tanning beds, which then leads to tanning bed use intentions (Path 2). Third, sensation seeking may affect an individual’s attitudes toward tanning bed use, which then leads to tanning bed use intentions (Path 3). However, sensation seeking may also indirectly affect attitudes toward tanning bed use to the extent that sensation-

seeking tendencies motivate association with friends who use tanning beds and this association, in turn, leads to formation of positive attitudes about tanning bed use and tanning bed use intentions (Path 4). Therefore, this study tested the proposition that the association between sensation seeking and tanning bed use intentions occurs in both direct and indirect contexts, by inclusion of association with peers who use tanning beds and attitudes toward tanning.

Methods

Participants and procedure

After receiving approval from University Institutional Review Board, undergraduate students enrolled in communication courses were recruited at a large northeastern university in the United States. The initial sample included 898 students; however, students >25 years old and naturally dark skinned were excluded from this analysis to maintain homogeneity in the sample. Additionally, people with darker skin color are less likely to get tanned and are at lower risk of skin cancer [25]. (Self-reported skin color was utilized in the present study rather than race or ethnicity to capture more variation in the relevant construct. Instructions stated ‘Think about a part of your body that is not normally exposed to the sun’. The item asked, ‘How would you describe your skin?’ (0–10 point scale with 0 very pale or fair and 10 very dark skin) [Mean = 4.21; standard deviation (SD) = 2.16]. Because this portion of the study focused on intentions to use tanning beds, self-reported skin color was utilized as a filter and 130 participants were eliminated (darkest skin color reported)). This resulted in 745 participants with 65% women ($n = 475$), ranging in age from 19 to 25 (Mean = 21.04, SD = 1.16). Students participated in the study outside of class time and received extra credit for participation. The sample reported ethnicity as predominantly Caucasian (64%), and 16% Asian/Pacific Islander, 3% African American, 6% Hispanic/Latino, 4% Bi/multiracial, with other groups <2% each. After providing written consent, participants entered a room with up to

10 other participants and given a survey to complete individually (~20 min) as part of a larger project on tanning bed use. Upon completion, all participants were thanked and debriefed.

Measures

The dependent variables in this study are association with friends who use tanning beds, attitudes about tanning bed use and tanning bed use intentions. The primary independent variable in this study is sensation seeking. Sensation seeking and attitudes about tanning bed use were multi-item scales. After confirming the unidimensionality of the scales, we created the composite scores by summing and averaging responses to the individual items.

Association with friends who use tanning beds

One item 'How many of your friends use tanning beds regularly?' measured association with friends who use tanning beds. Participants were instructed to write number of friends using tanning beds (Mean = 2.87, SD = 3.01, range = 0–10).

Attitudes about tanning bed use

The measure of attitudes about tanning bed use was created by the authors and consisted of five Likert type items with five-point responses ranging from 1 (strongly disagree) to 5 (strongly agree) such as, 'I think I look healthier when tan'. A higher score on the composite variable (after deleting one item, 'People with a tan look healthier' to maintain unidimensionality) indicated more favorable attitude supporting tanning bed use ($\alpha = 0.81$, Mean = 3.22, SD = 0.78).

Tanning bed use intention

Tanning bed use intention was measured by one item, 'I am likely to use a tanning bed next semester' with responses on a five-point Likert type scale ranging from 1 (strongly disagree) to 5 (strongly agree). A higher score indicated a greater intention

to use a tanning bed next semester (Mean = 2.16, SD = 1.34).

Sensation seeking

The eight-item sensation-seeking scale was created by Hoyle *et al.* [19] based on Form V of Zuckerman's [10] sensation-seeking scale. It is a Likert type scale with five-point responses ranging from 1 (strongly disagree) to 5 (strongly agree). For instance, 'I prefer friends who are excitingly unpredictable'. A higher score on the composite variable (after deleting one item, 'I get restless when I spend too much time at home' to maintain unidimensionality) indicated higher levels of sensation seeking ($\alpha = 0.77$, Mean = 3.46, SD = 0.70).

Results

Analyses

In order to test these cross-sectional data, we employed bivariate correlations and structural equation modeling (SEM). The SEM models tested comparative utility of sensation seeking for understanding tanning bed use intentions, along with the mediating roles of association with peers who use tanning beds, and attitudes toward tanning bed use.

Preliminary analyses

Before testing our hypotheses, we conducted preliminary analyses. We evaluated sex, age and race differences on all the variables in the study by conducting appropriate *t*-tests (for sex and race) or one way analysis of variances (ANOVAs) (for age). This technique has been utilized in prior research to identify any demographic differences in the variables of interest [26]. Results of *t*-tests (please see Table I) document two significant findings: (i) females report more positive attitudes toward tanning and tanning bed use intentions while males are higher in sensation seeking than females and (ii) Whites report greater associations with friends who use tanning beds and more positive attitudes toward tanning and tanning bed use intentions.

Results of ANOVAs indicate no significant findings across age.

Main analyses

We conducted two sets of analyses to evaluate hypotheses. First, we computed zero-order correlations for all the variables in the study (see Table II). Results of bivariate correlations demonstrated that as expected, intention to use tanning beds is positively associated with sensation seeking, association with friends who use tanning beds, attitudes toward tanning bed use and participant sex (female). Results also revealed that sensation seeking is positively related to association with peers who use tanning beds and attitudes toward tanning bed use. Furthermore, the results indicate that association with peers who use tanning beds is positively related to attitudes toward tanning bed use.

Next, we employed maximum likelihood SEM to further evaluate our hypotheses. The first step re-

quired calculation of the error variance $(1 - \alpha)(\sigma^2)$ of each multiple-item variable to account for unreliability within our measures [27]. Because our preliminary analyses identified several sex and race differences in our measures, we first partialled the variance due to respondent's sex and race from study variables.

We created our structural model by constructing the paths predicted by our hypotheses (see Fig. 1). Results of the SEM indicated that our original model was untestable because it had zero degrees of freedom. Also, the regression estimates indicated that the path from sensation seeking to intention to use tanning beds was not significant. Given that we were interested in testing the mediated pathways of influence between sensation seeking and tanning bed use intentions, we deleted the direct path from sensation seeking to tanning bed use intentions and reran the analyses. The results of SEM indicated that the model adequately fit the data, $\chi^2(1) = 1.98$, $P = 0.16$, Comparative

Table I. Sex and race differences in study variables

Variables	Sex differences			Race differences		
	Males, Mean (SD)	Females, Mean (SD)	<i>t</i> (712)	White, Mean (SD)	Other, Mean (SD)	<i>t</i> (712)
Sensation seeking	3.67 (0.70)	3.38 (0.68)	5.39**	3.52 (0.69)	3.43 (0.71)	1.60
Association with peers who use tanning beds	4.22 (6.30)	4.53 (6.59)	-0.61	5.42 (7.01)	2.69 (5.05)	5.53**
Attitudes toward tanning	3.15 (0.70)	3.31 (0.82)	-2.68*	3.44 (0.73)	2.93 (0.76)	8.93**
Tanning bed use intentions	1.77 (1.14)	2.50 (1.44)	-6.88**	2.50 (1.46)	1.80 (1.12)	6.75**

* $P \leq 0.01$, ** $P \leq 0.001$.

Table II. Zero-order correlation matrix for all variables

	1	2	3	4	5	6
1. Sensation seeking	1.00					
2. Association with peers	0.16**	1.00				
3. Attitudes about tanning	0.14**	0.28**	1.00			
4. Tanning bed use intentions	0.14**	0.33**	0.49**	1.00		
5. Age	-0.01	-0.00	0.03	-0.02	1.00	
6. Sex ^a	-0.20**	0.02	0.10**	0.25**	-0.07	1.00

* $P < 0.01$, ** $P < 0.001$.

^aSex 1 = female, 0 = male.

Fit Index = 0.99, Root Mean Squared Error of Approximation = 0.04.

The final model is presented in Fig. 1. The SEM results are overall consistent with our hypotheses regarding the factors shaping the relationship between sensation seeking and tanning bed use intentions. To summarize, the results of the SEM model demonstrate that: (i) For Path 1 (not supported): sensation seeking is not directly associated with tanning bed use intentions; (ii) For Path 2 (supported): sensation seeking is positively related to association with peers who use tanning beds, which is further related to tanning bed use intentions; (iii) For Path 3 (supported): sensation seeking is positively related to attitudes toward tanning, which are further related to tanning bed use intentions; and (iv) For Path 4 (supported): sensation seeking is positively related to association with peers who use tanning beds, which is further related to attitudes toward tanning bed use, leading to tanning bed use intentions.

In combination with the zero-order correlation matrix, the results of our SEM demonstrate that the positive zero-order correlation between sensation seeking and tanning bed use intentions is mediated by association with peers who use tanning beds and attitudes toward tanning bed use.

Discussion

This study examined how sensation seeking contributes to the likelihood of tanning bed use intentions both directly and indirectly by shaping interaction with peers and attitudes toward tanning bed use. Results revealed that sensation seeking both directly and indirectly contributes to tanning bed use intentions. These results will be further discussed.

Sensation seeking and tanning bed use intentions

Sensation-seeking tendencies motivate frequency of association with friends who use tanning beds and instill positive attitudes about tanning bed use, and these factors further contribute to tanning

bed use intentions. This study provides an explication of the process through which sensation seeking leads to tanning bed use. The results of this study are not surprising, given that prior studies have shown a relation between sensation seeking and association with deviant peers [11, 15] and positive attitudes toward health risk behavior [28].

Prior research has shown that perceived attractiveness is one of the strongest predictors of behaviors associated with getting a tan, such as spending more time sunbathing and using tanning beds [9, 29, 30]. Moreover, because tanning bed use has also been associated with weight concerns [23, 31], it would be interesting to examine the peer group beliefs and norms (particularly, peer groups that have high sensation seekers) that motivate individuals to visit tanning beds, individually and/or with friends. Finally, because little research has investigated the relationship between sensation seeking and tanning bed use, this study calls for further inquiry into sensation seeking and different tanning behaviors that may be considered risky from a skin cancer perspective.

Gender, race and tanning bed use intentions

In the present study, gender directly contributed to tanning bed use intentions, with effects emerging strongest for women. These findings are not surprising because prior research has shown that women tend to be more frequent users of tanning beds [4, 6, 21, 32]. Due to a heightened desire in women to appear attractive and to engage in behaviors that will help them achieve the 'thin look' [33], women are more avid users of tanning beds. Although some of the prior studies have examined tanning bed use among females only [29], this study used both males and females to explore their tanning bed use. Thus, one of the present study's strength is in studying tanning bed use for both genders, as tanning bed use is not restricted to women.

In the present study, race indirectly contributed to tanning bed use intentions, with this effect being strongest for Whites/Caucasians as compared with Non-Whites. Hill *et al.* [34] report that tanning bed use is high among Caucasian men and women.

However, for Caucasians, tanning bed use is mediated by association with friends who use tanning beds, an area relatively unexamined to date. This suggests that some friends may be engaging in tanning bed use together. Whether friends go to tanning beds together or alone is also something that needs to be further explored, along with cultural differences in skin color change/enhancement.

Implications of the study

This study has both theoretical and practical implications. Theoretically, it demonstrates the importance of studying both direct and indirect effects of variables that may contribute to tanning bed use intentions. The focus of sensation-seeking literature on substance use may have underestimated the influence of sensation seeking on tanning bed use and, possibly, other sun risk behaviors. Further research is necessary to delineate contexts or circumstances under which sensation seeking or other personality factors affect intentions to use tanning beds.

In terms of practical implications, this study demonstrates that design and evaluation of campaigns to reduce tanning bed use must be targeted to low and high sensation seekers differently because sensation seeking is a strong predictor of tanning bed use. Sensation seeking targeting (designing different messages for low and high sensation seekers) has been successfully used in campaigns to reduce drug use [35, 36]. The present study demonstrated that the influence of sensation seeking on tanning bed use is mediated by association with friends who use tanning beds. Thus, interventions designed to initiate high sensation seekers to engage in other high sensation activities with peers such as adventure sports may reduce tanning bed use. Alternatively, campaigns aimed at changing the youth norm and social expectancies associated with the advantages of using tanning beds (such as, tanning makes one look more attractive or healthy) could change tanning bed use.

Limitations of the study

There are a number of potential limitations in the present study that should be noted. First, there were

a number of demographic limitations. These data were collected from one large northeastern university in the United States, and it is not known if these results would generalize to other areas of the country or other populations. Second, as noted by Yanovitzky [15], utilization of survey data to examine pathways of effects limits the clarification of temporal precedence (for instance, survey data does clarify if in fact association with peers who use tanning beds precedes attitudes or attitudes about tanning act as precursors for association with peers who use tanning beds). Also, this study utilized cross-sectional survey data to examine pathways of association, which limits the causal interpretation of results. Future research should identify increased proneness of sensation seeking on different sun-related behaviors such as tanning, tanning bed use and use of sunscreen. Third, we utilized multi-item measures for only two variables in the study (sensation seeking and attitudes toward tanning bed use), and only single-item measures for association with friends who use tanning beds and intention to use tanning beds. Future studies that utilize SEM should try to include multi-item measures for most of its variables. Finally, this study relied on self-reports. Future research should try and use experimental designs or observational methods to examine tanning bed use.

Future research

Future research should identify other factors that may be contributing or reducing tanning bed use and intentions. A more expansive study may look at how different racial groups engage in skin color management strategies. Singer [37] reports that although many Caucasians tan to achieve a bronzed look, some Africans and Asians use bleaching products to lighten skin (an opposite effect with different associated health risks). Thus, cross-cultural comparisons on how different racial groups engage in various kinds of skin altering techniques merits further attention.

Additionally, research should examine if sensation seeking leads to other risk behaviors related to skin cancer such as deliberate sun exposure and use

of certain sunless tanning products. This study has provided insights into one set of pathways through which sensation seeking contributes to tanning bed use. Future studies should delineate pathways that link other unidentified factors that may be important in understanding tanning bed use.

Conflict of interest statement

None declared.

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