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Evaluating a Measure of Tanning Abuse and Dependence

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Abstract

Objective—To evaluate the Structured Interview for Tanning Abuse and Dependence (SITAD).

Design—Longitudinal survey.

Setting—College campus.

Participants—A total of 296 adults.

Main Outcome Measures—The SITAD modified items from the *Structured Clinical Interview for* DSM-IV *Axis I Disorders* that focus on opiate abuse and dependence. Indoor tanning (IT) behavioral patterns and opiate-like reactions to tanning were measured, and IT behavior was measured 6 months later.

Results—Of 296 participants, 32 (10.8%) met the SITAD criteria for tanning abuse (maladaptive pattern of tanning as manifested by failure to fulfill role obligations, physically hazardous tanning, legal problems, or persistent social or interpersonal problems) and 16 (5.4%) for tanning dependence as defined by 3 or more of the following: loss of control, cut down, time, social problems, physical or psychological problems, tolerance, and withdrawal. The IT frequency in dependent tanners was more than 10 times the rate in participants who do not meet the SITAD criteria for tanning abuse or dependence. Tanning-dependent participants were more likely to report being regular tanners (75%; odds ratio, 7.0). Dependent tanners scored higher on the opiate-like reactions to tanning scale than did abuse tanners, who scored higher than those with no diagnosis.

Conclusions—The SITAD demonstrated some evidence of validity, with tanning-dependent participants reporting regular IT, higher IT frequency, and higher scores on an opiate-like reactions to tanning scale. A valid tanning dependence screening tool is essential for researchers

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and physicians as a tanning-dependent diagnosis may facilitate a better understanding of tanning motivations and aid in the development of efficacious intervention programs.

Recent research has explored the idea that some patterns of tanning behavior may be dependent[1–7] by using a common alcohol screening questionnaire, the CAGE,[8] or, alternatively, by adapting criteria for substance-related disorders from the *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition, Text Revision) (*DSM-IV-TR*)[9] modified to reflect UV light tanning (ie, sunbathing or indoor tanning [IT]).[1,4,6,7] Whereas data from the National Household Survey on Drug Abuse[10] report prevalence rates for alcohol and any illicit drug combined as 2.6% to 9.3%, the modified CAGE and modified *DSM* report tanning dependence rates ranging from 12% to 55%.[1,4,6,7,11] Prevalence rates for dependence on alcohol and various drugs do differ. However, even in settings enriched for dependent behavior, such as bars,[12] prevalence rates are not nearly as high as the tanning dependence rates reported. The high prevalence rates reported suggest that the current assessments tend to overidentify tanning dependence.

Feldman and others suggest that the mechanism for tanning dependence is most likely the release of endogenous opioids when the skin is exposed to UV radiation (see Nolan and Feldman[5] for a review). It is probable that exploring tanning behavior by following the approach used in the *DSM-IV-TR* to categorize opioid use behaviors will lead to improved accuracy in the categorization of tanning dependence.

The Structured Interview for Tanning Abuse and Dependence (SITAD) is a tanning dependence assessment based on opioid use items adapted from the *Structured Clinical Interview for* DSM-IV *Axis I Disorders* (*SCID*).[13] The use of modified opioid *SCID* items was chosen specifically for good content and face validity in the measure. The self-administered structured interview format was chosen because this format has been demonstrated to achieve valid psychiatric categorization for opioid dependence in a previous study.[14]

Evaluation of the SITAD involved exploring differences in variables (ie, IT frequency, IT behavioral patterns, and scores on a scale measuring opiate-like reactions to tanning) that would theoretically be expected to differ among individuals exhibiting tanning abuse, those with tanning dependence, and those who do not meet the SITAD criteria for tanning abuse or dependence. We also expect that use of the SITAD will result in lower prevalence rates for tanning dependence than have been reported in previous studies.[1,6,7]

METHODS

RECRUITMENT AND SAMPLE

This study was conducted at East Tennessee State University between October 1, 2008, and May 31, 2009, and received approval from the university's institutional review board human subjects committee before initiation. The participants were 325 college students (mean [SD] age, 21.8 [5.85] years). The sample was 64.5% female (35.5% male) and 88.9% single (11.1% married). Skin type was distributed as follows: I = 10.5%, II = 23.3%, III = 32.8%, IV = 24.3%, V = 8.1%, and VI = 1.0%.

PROCEDURES

Of 360 randomly selected students contacted by e-mail, 325 agreed to participate (90% participation rate). Twenty-nine individuals who completed the baseline measure did not complete the 6-month behavioral assessment follow-up, leaving 296 participants with complete data. Alter signing informed consent documents, participants completed the SITAD in the fall (ie, October and November). They also completed items assessing their

age, sex, and skin type. Whether participants have ever engaged in IT, the age of their first IT experience, their IT pattern,[15] and whether they experience opiate-like responses to tanning were also assessed in the fall. Six months later, at the end of spring (ie, April and May), participants were reassessed for their IT use in the previous 6 months, thus assessing the period of highest IT frequency.[16]

MEASURES

The SITAD—The SITAD (Figure) used the *SCID*[13] as a model for self-administered interview items designed to determine whether individuals met the criteria for tanning abuse or dependence. Specifically, it focused on criteria related to opiate abuse and dependence. Interview questions were modified to reflect tanning abuse and dependence features and were presented as a computer-assisted self-administered interview with conditional logic (skip patterns, etc). Modification of the *SCID* criteria and *SCID* items into criteria and items appropriate to tanning was accomplished through consultation with substance abuse experts, focus groups with tanners, and pretesting that included cognitive interviewing.[2,17] Initially, the *SCID* items for opiate abuse and dependence were modified using a panel of substance abuse and skin cancer prevention experts. These items were then evaluated using focus groups of tanners to ensure that the items were directly relevant to the unique experiences of individuals who tan. Last, the items were tested using in-person cognitive interviewing to assess for clarity, specificity, recall, and appropriateness of wording. The SITAD can be used with sunbathing, IT, or both behaviors combined by using wording specific to the behavior(s). Participants respond yes or no to the items, with a yes answer indicating that they endorse the criterion.

To be categorized as tanning dependent, participants had to meet 3 or more of the following criteria: (1) loss of control, tanning is engaged in more often or for longer periods than intended; (2) cut down, a persistent desire or unsuccessful efforts to cut down or control tanning; (3) time, a great deal of time is spent obtaining, using, or recovering from tanning; (4) social problems, important social, occupational, or recreational activities are given up or reduced due to tanning use; (5) physical or psychological problems, tanning use despite knowledge of physical or psychological problems caused or exacerbated by tanning; (6) tolerance, the need for increased amounts of tanning to achieve an opiate-like effect or diminished effects with continued use of the same amount of IT; and (7) withdrawal, maladaptive behavioral, physiologic, and cognitive changes specific to opiate withdrawal that occur with decreased tanning use; alternatively, withdrawal can manifest as continued use of tanning to avoid or relieve the physical and cognitive symptoms associated with decreased use.

A tanning abuse diagnosis was determined if the participants did not meet at least 3 of the criteria for tanning dependence as described previously herein but manifested 1 (or more) of the following criteria: (1) recurrent tanning resulting in failure to fulfill major role obligations at work, school, or home; (2) recurrent tanning that is physically hazardous; (3) recurrent tanning-related legal problems; and (4) continued tanning despite persistent or recurrent social or interpersonal problems caused or exacerbated by the behavior.

IT Behavioral Patterns—Patterns of IT were assessed by giving respondents descriptions of various patterns (ie, event/episodic, regular seasonal, regular year-round, and mixed) and asking them to rate whether their behavior matches these descriptions on 5-point Likert-type scales. Individuals are classified into 1 of 3 general patterns (ie, event, mixed, or regular) using an algorithm.[17] Regular tanners report tanning consistently across the year and going to the tanning salon weekly. Event tanners report using IT to prepare for specific events (eg, prom, the beach, or a wedding). Those with a mixed pattern typically report regular tanning

in 1 or 2 seasons (eg, winter and spring) with occasional tanning for events outside those seasons. These patterns differ in terms of IT frequency, IT history, and IT psychosocial predictors.

IT Behavior—Frequency of IT was measured 6 months after the presentation of the other survey items by asking participants to estimate the number of times they used IT in the previous 6 months. The 6-month time frame used (December to May) coincides with the period of heaviest IT behavior.[16] This open-ended measure of IT use has demonstrated strong correlations with diary measures of IT behavior over the same time frame in other studies (r = 0.77–0.87, $P < .001$).[18]

Opiatelike Reactions to Tanning—Opiatelike reactions were measured using a 4-item scale from an earlier study.[19] The items were based on the typical physical reactions reported with endogenous opiate release (ie, relaxation, pain relief, stress relief, and sense of well-being or euphoria). This scale evidenced excellent internal reliability estimates (Cronbach α = .90).

RESULTS

Test-retest reliability for the SITAD was evaluated in a group distinct from the main study group (n = 91) by administering the measure 2 times separated by 3 weeks. Test-retest reliability was good for the IT dependence diagnosis, with 97% agreement between the 2 administrations (phi coefficient = 0.84). Although the agreement for the IT abuse diagnosis was reasonably high (84%), the reliability estimate was relatively low (phi coefficient = 0.43).

PREVALENCE RATES

Thirty-two participants (10.8%) met the SITAD criteria for tanning abuse and 16 (5.4%) met the criteria for tanning dependence. These rates of substance-related dependence are similar to past-year prevalence rates for other forms of substance abuse and dependence found in national surveys (eg, 5.8% for alcohol dependence and 7.7% for alcohol or any illicit drug dependence in young adults) and lower than previously reported rates using other measures.

CONSTRUCT VALIDITY

We used analysis of variance to test for differences in IT frequency and opiatelike reactions to tanning. Statistically significant differences were found for IT frequency in the past 6 months (Table 1). Dependent tanners reported a significantly higher IT frequency than did abuse tanners, who reported a higher frequency than those not categorized as either dependent or abuse tanners ($F_{2,293}$ = 72.6, $P < .001$). The IT frequency in dependent tanners was more than 10 times the rate in participants not categorized as dependent or abuse tanners and more than 3 times the rate in abuse tanners. Significant differences were also found for scores on the opiatelike reactions scale, with dependent tanners reporting higher scores than abuse tanners, who scored higher than those not categorized as dependent or abuse tanners ($F_{2,293}$ = 34.1, $P < .001$) (Table 1).

We also examined the relationship of tanning dependence diagnosis with IT behavioral pattern. Participants who were categorized as tanning dependent were more likely to report being regular tanners ($\chi^2_6 = 99.6$, $P < .001$) (Table 2). As seen in Table 2, 75% of participants categorized as tanning dependent reported being regular tanners (odds ratio, 7.0), with 94% reporting being either mixed or regular tanners.

COMMENT

This study adds to the increasing evidence that some forms of tanning behavior reflect dependence. The measure evaluated herein, the SITAD, demonstrates reasonable tanning dependence prevalence rates. It also exhibits evidence of construct validity, with relationships to tanning frequency, tanning patterns, and a measure of opiate-like reactions to tanning in the expected directions. The test-retest reliability of the tanning dependence classification was good. However, the reliability of the tanning abuse classification was not strong, indicating the need to further study and refine it. Although there is as yet no gold standard for categorizing tanning dependence, and a valid diagnosis will require sets of criteria symptoms that can be assessed through face-to-face clinical interview and medical record review, the SITAD constitutes a further advance in clarifying and confirming this classification.

Earlier approaches to categorizing tanning dependence relied on modified screening measures with no clear underlying conceptual model. The SITAD was adapted from a standard format used to make valid *DSM* diagnoses and was based on Feldman's conceptualization of tanning dependence as it related to endogenous opioid release from UV radiation exposure. Furthermore, the SITAD development used an empirical screening and evaluation process to ensure that the items were directly relevant to the unique experiences of individuals who tan. This careful, empirical approach resulted in a measure with good face and content validity that seems to also perform well in identifying individuals likely experiencing dependence to the effects of tanning behavior. This measure could provide a reasonable quasi-gold standard for tanning dependence, at least until the construct is more fully conceptualized and defined.

This study evaluated a limited sample, that is, college-aged participants. However, college students represent one of the highest risk groups for skin cancer, reporting high frequencies of intentional tanning, particularly IT.[20] There has also been no evidence of differential skin cancer risk behaviors between college and noncollege populations.[21–23] There is no current gold standard of tanning dependence diagnosis against which to validate this or other measures in the literature. Future work needs to develop an accepted conceptual model of pathologic tanning and criteria sets of symptoms that can be assessed through clinical interview and medical record review. These results need to be replicated in a larger, broader, and more representative sample. They should also be replicated examining outdoor tanning behavior and with younger and older populations. An important limitation is that this measure should be compared with the existing modified CAGE and modified *DSM* screening measures to more clearly understand how they relate conceptually and empirically.

Understanding influences on tanning decisions will be important in reducing and eliminating risky tanning behavior. Recent evidence suggests that dependence motivations may be important factors in tanning behaviors, particularly for individuals with frequent and persistent tanning habits.[4,5,9,11,12] A measure, such as the SITAD, that more accurately identifies tanners who are experiencing tanning dependence will be important for physicians to better understand the influences on their patients' tanning behaviors. For example, a patient experiencing tanning dependence will have his or her tanning decisions strongly affected by aspects of the dependency in addition to the effects of appearance or health motivations that may be present. Such an individual may be less influenced by health or appearance-based messages designed to reduce his or her tanning motivations. Other intervention strategies that affect the dependency aspects of his or her behavior may need to be explored and developed. Use of the SITAD to validate simple, short screening measures will also be important.

If some tanners do, in fact, become addicted to tanning, there may be policy implications as well. The IT industry uses unlimited tanning packages and attractive models to hook tanners into tanning.[24] Many of these strategies are directed at minors. Given the association of tanning bed use with melanoma morbidity, stronger policy on the marketing of and access to tanning beds for minors should be considered if addiction can be substantiated. The SITAD will prove to be a useful tool in further exploring tanning dependence in this context.

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The interview is set up for **indoor tanning**. If the focus is on **outdoor tanning**, insert terms **outdoor tanning** or **outdoor tanner** as appropriate. Use the terms **tanning** or **tanner** when focused on both indoor and outdoor tanning.

1. Do you consider yourself a heavy **indoor tanner**? Y N E17.1
   a. Would other **indoor tanners** consider your use heavy? Y N E17.2
2. Have you ever **indoor tanned** to reduce stress, feel better or improve your mood? Y N E17.3
3. Have you ever considered **indoor tanning** to be a problem for you? Y N E17.4
   a. Have you ever felt **indoor tanning** rules or controls your life? Y N E17.5
   b. Has your **indoor tanning** ever felt out of control? Y N E17.6
   c. Have friends or family ever suggested you should reduce or stop your **indoor tanning**? Y N E17.7
      i) Did you continue to **indoor tan** anyway? Y N E17.8

IF YES TO ANY ITEM E17.1 TO E17.8, SKIP TO E23

Recurrent use resulting in failure to fulfill major role obligations at work, school, or home. (Indicate yes on one or more of 18.1 - 18.5) + - **E18**

4. Are there times your **indoor tanning** is more important to you than most other things in your life such as friends, family, school or job? Y N E18.1
   a. Have you ever missed work or school because of **indoor tanning**? Y N E18.2
   b. Would you be willing to miss work or school in order to **indoor tan**? Y N E18.3
   c. Has your work or school suffered (for example, doing a bad job at work or failing courses at school) because of your **indoor tanning**? Y N E18.4
      i) IF NO: Have you neglected your family or household jobs due to **indoor tanning**? Y N E18.5

Recurrent use that is physically hazardous. (Indicate yes on one or more of 19.1, 19.3, 19.4, 19.6) + - **E19**

5. Do you think you would continue to **indoor tan** even if you were diagnosed with cancer? Y N E19.1
   a. Have you ever been diagnosed with a non-cancer skin condition that requires you to avoid or minimize exposure to the sun? Y N E19.2
      i) IF YES: Have you continued to **indoor tan** after this diagnosis? Y N E19.3
   b. Do you think your current **indoor tanning** is unhealthy? Y N E19.4
   c. Have you ever been diagnosed with skin cancer? Y N E19.5
   d. IF YES: Have you continued to **indoor tan** after this diagnosis? Y N E19.6

Recurrent use-related legal problems. (Indicate yes on one or more of E20.1 - E20.8) + - **E20**

6. Have you ever stolen money to pay for an **indoor tanning** session? Y N E20.1
   a. Do you think you might steal money to pay for an **indoor tanning** session if you didn't have enough? Y N E20.2
   b. Have you ever used money that doesn't belong to you in order to **indoor tan**? Y N E20.3
   c. Have you ever lied or otherwise concealed your identity to **indoor tan** more than you were allowed to by the rules? Y N E20.4
   d. Have you ever done anything illegal in order to indoor tan? Y N E20.5
      i) If you did not have enough money to **indoor tan**, do you think you might do something illegal to **indoor tan**? Y N E20.6
   e. Have you ever used money intended for something else such as bills, food, or school fees to pay for an **indoor tanning** session? Y N E20.7
   f. Have you ever sold a possession to get money to indoor tan? Y N E20.8

Continued use despite social or interpersonal problems caused or exacerbated by use. (Indicate yes on one or more of E21.1, E21.2) + - **E21**

7. Has your *indoor tanning* caused you any problems with other people such as family members, friends, romantic partners or people at work or school? Y N E21.1
   b. Would you rather lose a close relationship (romantic, friend, family) than give **up indoor tanning**? Y N E21.2

At least one abuse item is positive (E18, E19, E20, E21) + - **E22**

The use is for longer time periods or more often than intended (Indicate yes on one or more of E23.1 - E23.4) + - **E23**

8. Did you find that when you started using **indoor tanning** you ended up using it much more than you were planning too? Y N E23.1
   a. IF NO: What about **indoor tanning** for a much longer period of time than you were planning to? Y N E23.2
   b. Have you ever **indoor tanned** when you thought more sessions might make you less rather than more attractive? Y N E23.3
   c. Have you ever **indoor tanned** so much you thought it hurt your appearance? Y N E23.4

There is a persistent desire or unsuccessful efforts to cut down or control use. (Indicate yes on one or more of E24.1 or E24.2) + - **E24**

9. Have you tried to cut down or stop **indoor tanning** but been unsuccessful? Y N E24.1
   c. Are there times you feel you would have trouble stopping **indoor tanning** even if you wanted to? Y N E24.2

A great deal of time is spent in activities necessary to use the substance (Indicate yes to E25.1) + - **E23**

10. Did you spend an excessive amount of time **indoor tanning** or doing whatever you had to do in order to be able to **indoor tan**? Y N E25.1

Important social, occupational or recreational activities are given up or reduced because of use (Indicate yes on one or more of E26.1 - E26.4) + - **E26**

11. Have you given up or reduced time with friends, family, work or engaging in other important activities such as sports, hobbies or other interests due to **indoor tanning**? Y N E26.1
    a. Is **indoor tanning** more important to you than your relationship with:
       i) A romantic partner (for example you would rather break up than stop **indoor tanning**)? Y N E26.2
       ii) Other friends? Y N E26.3
       iii) Family members? Y N E26.4

Use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by use. (Indicate yes on one or more of E27.1 - E27.2 + - **E27**

12. Has your **indoor tanning** caused any psychological problems such as making you depressed or anxious, making it difficult to sleep? Y N E27.1
    a. Has your **indoor tanning** caused you any physical problems or made physical problems worse? Y N E27.2

Tolerance, as defined by: a) a need for markedly increased amounts of the substance to achieved the desired (physiological or psychological) effect, or markedly diminished (physiological or psychological) effect with continued use of the same amount of the substance. (Indicate yes on one or more of E28.1 or E28.2) + - **E28**

13. Have you found that you needed a lot more **indoor tanning** sessions in order to get the feeling you wanted (for example, feel good, reduce stress, feel relaxed, etc) than when you first started **indoor tanning**? Y N E28.1
    b. IF NO: What about finding that when you **indoor tanned** the same amount, it had much less effect than before? Y N E28.2

Withdrawal, as manifested by either: a) the characteristic withdrawal syndrome for the substance (see E29.3 to E29.13 below for opiates), or b) the substance is used to relieve or avoid withdrawal symptoms. (Indicate yes on two or more withdrawal symptoms of E29.3 - E29.13) + - **E29**

14. Did you ever have withdrawal symptoms, that is, feel sick when you cut down or stopped **indoor tanning**? Y N E29.1
    a. When you are unable to **indoor tan** on your regular schedule, or you miss a session do you feel physically uncomfortable? Y N E29.2
    b. IF YES: Which of the following symptoms did you have? Y N E29.3
       i) Feeling down or depressed Y N E29.4
       ii) Feeling nauseous or actually vomiting (throwing up)? Y N E29.5
       iii) Feeling achy or sore? Y N E29.6
       iv) Having a runny nose or watery eyes? Y N E29.7
       v) Sweating? Y N E29.8
       vi) Diarrhea? Y N E29.9
       vii) Yawning a lot? Y N E29.10
       viii) Fever? Y N E29.11
       ix) Trouble sleeping? Y N E29.12
       x) Irritability? Y N E29.13
       xi) Anxiousness or restlessness?
    c. IF THEY REPORT WITHDRAWAL SYMPTOMS: After not **indoor tanning** for awhile, did you use **indoor tanning** to keep yourself from feeling bad with [INSERT WITHDRAWAL SYMPTOMS]? Y N E29.14
    d. Have you ever used **indoor tanning** when you were feeling bad with [INSERT WITHDRAWAL SYMPTOMS] so that you would feel better? Y N E29.15

IF LESS THAN THREE DEPENDENCE ITEMS (E23-E29) ARE + AND E18-E21 WERE PREVIOUSLY SKIPPED, RETURN TO E18 AND CHECK FOR TANNING ABUSE.
IF AT LEAST THREE DEPENDENCE ITEMS (E23-E29) ARE + CATEGORIZE AS TANNING DEPENDENT.
IF LESS THAN THREE DEPENDENCE ITEMS (E23-E29) ARE + AND AT LEAST ONE ABUSE ITEM (E18-E21) IS + CATEGORIZE AS TANNING ABUSE
IF LESS THAN THREE DEPENDENCE ITEMS (E23-E29) ARE + AND NO ABUSE ITEM (E18-E21) IS + CATEGORIZE NOT TANNING ABUSE OR DEPENDENT

Figure.
The Structured Interview for Tanning Abuse and Dependence.

Table 1

Indoor Tanning Frequency and Opiatelike Reactions Scale Scores by Tanning Dependence Diagnosis[a]

Variable	No Diagnosis (n=248)	Tanning Abuse (n=32)	Tanning Dependence (n=16)	$F_{2,293}$
Indoor tanning uses in past 6 mo, mean (SD), No.	4.6 (10.8)	15.9 (10.8)	50.6 (48.7)	72.6
Opiatelike reactions scale score, mean (SD)	8.7 (4.3)	12.9 (4.0)	16.3 (2.7)	34.1

[a] $P < .001$ for both variables.

Table 2

Indoor Tanning Patterns by Tanning Dependence Diagnosis[a]

	Participants, No. (%)				
Diagnosis	**Nontanners**	**Event Tanners**	**Mixed Tanners**	**Regular Tanners**	**Total**
No diagnosis	137 (55)	63 (25)	31 (13)	17 (7)	**248**
Tanning abuse	0	13 (41)	6 (19)	13 (41)	**32**
Tanning dependence	0	1 (6)	3 (19)	12 (75)	**16**
Total	**137**	**77**	**40**	**42**	**296**

[a] $\chi^2_6 = 99.6$, $P < .001$.