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Characteristics of sunless tanning product users among sorority and fraternity students

Desire Kay Christensen
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CHARACTERISTICS OF SUNLESS TANNING PRODUCT USERS
AMONG SORORITY AND FRATERNITY STUDENTS

by

Desiré Kay Christensen

A thesis submitted in partial fulfillment of the requirements for the Master of Science
degree in Epidemiology in the Graduate College of The University of Iowa

May 2011

Thesis Supervisor: Associate Professor Leslie K. Dennis

Graduate College
The University of Iowa
Iowa City, Iowa

CERTIFICATE OF APPROVAL

MASTER'S THESIS

This is to certify that the Master's thesis of

Desiré Kay Christensen

has been approved by the Examining Committee for the thesis requirement for the Master of Science degree in Epidemiology at the May 2011 graduation.

Thesis Committee: _____

Leslie Dennis, Thesis Supervisor

Charles Lynch

Linda Snetselaar

ABSTRACT

As skin cancer rates increase, it has become more important for at risk individuals to reduce ultraviolet radiation (UVR) exposure. Limited information is available on characteristics and behaviors of sunless tanning product users in populations with high sun-seeking behaviors. This information is important because use of sunless tanning products could reduce tanning through UVR exposure thereby leading to a reduction in skin cancer. Sorority and fraternity students (n=163) completed a self-administered questionnaire examining sun exposure and tanning attitudes, behaviors and beliefs. Characteristics of sunless tanning product users were compared to non-users using logistic regression accounting for potential clustering effects within sororities and fraternities.

Among students surveyed, 34% reported ever using sunless tanning products. Ever users of sunless tanning products were significantly more likely to be female (OR=7.5), have fair skin (OR=1.4), have used tanning beds greater than 50 times (OR=2.5), and reapply sunscreen when outside on a sunny day (OR=1.3). Ever users of sunless tanning products and those with a preference for these products because they are safer than tanning beds or sunbathing were more likely to reapply sunscreen on a sunny day in the summer. However, other sun protection behaviors (i.e. sunscreen use, amount of sunscreen used, and avoidance of midday sun while on spring break) were not more likely to be adopted by these students.

Prevention efforts could target these fair-skinned females to increase their use of sunless tanning products in combination with sunscreen use and reapplication along with avoidance of midday sun.

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LIST OF ABBREVIATIONS

CI	Confidence Interval
NA	Not applicable
NC	Not calculable
OR	Odds Ratio
REF	Reference group
UVR	Ultraviolet Radiation

CHAPTER I

INTRODUCTION

Skin cancer is the most common cancer in the United States.¹ More than 3.5 million cases are diagnosed annually; one in five Americans will receive a diagnosis during their lifetimes.² While the rates of many cancers are on the decline, skin cancer has been rising within the United States and many parts of the world.^{1,2}

Ultraviolet radiation (UVR) is considered the most important risk factor for the development of skin cancer.³ Sunless tanning products are promoted as a safe method to darken the appearance of skin. Sunless tanning products can be used instead of UVR to generate a tanned appearance, but some evidence suggests users may increase their UVR exposure with the use of sunless tanning products.^{4,5} Information on the characteristics and behaviors of sunless tanning cream users is limited. This information is important for understanding the use of sunless tanning products.

Few studies have reported findings on sunless tanning product use in populations engaged in high sun-seeking behaviors. This study used available information from a cross-sectional survey to characterize differences between users and non-users of sunless tanning products in a population of college students with a high rate of tanning bed use and sun-seeking behaviors.

CHAPTER II

METHODS

Participants

University students in the Midwest were recruited from randomly selected sororities and fraternities with 10 or more members and asked to complete a self-administered questionnaire. Survey information was collected on 165 students. Two students were excluded prior to analysis: one due to random responses; the other an African-American to eliminate the potential for identification and their lowered risk for skin cancer. The remaining 163 participants were included in analyses.⁶ Two participants did not respond to the question used to assess preference for sunless tanning products because they are safer accounting for the missing data.

Measures

The survey assessed tanning attitudes, behaviors and beliefs providing information on sun habits, tanning bed use, sun sensitivity and sunless tanning product use. Participants who responded 'yes' to the question 'have you ever used self-tanning creams in order to get a tan?' were classified as ever users. Ever users of sunless tanning products who responded 'I prefer to use sunless tanning creams because I think using tanning creams is safer than lying in the sun or under a tanning lamp' were classified as having a preference for sunless tanning products because they are safer.

Statistical analysis

SAS 9.2 was used for statistical analyses. Frequency distributions were computed across all response categories to compare responses of ever users of sunless tanning products versus never users and those who prefer sunless tanning products because they

are safer than other methods of tanning versus those who do not prefer them. Frequency of lifetime use of sunless tanning product was examined using three categories (none, 1 to 5 times, and greater than 6 times) based on the distribution of responders. Responses with similar meanings were grouped (e.g. very important and somewhat important were combined for responses to importance of tanning) and dichotomized based on frequency distribution cell sizes and the relationship under examination. Categories were excluded if no participants selected it as a response. Associations were also analyzed separately in males and females and there was no evidence for effect modification. Results are reported for both males and females.

Logistic regression (PROC SURVEYLOGISTIC) was used to calculate weighted ORs using cluster analysis in both univariate and multivariate models. Cluster analysis was conducted to control for immeasurable factors that aggregate by sorority or fraternity house since members of Greek houses are selected based on unknown factors that could act as confounders. Factors significantly associated with the outcome ($p\text{-value} \leq 0.20$) were analyzed for confounding. Tanning bed use, importance of tanning, and reapplication of sunscreen were associated with the outcomes of interest, however, tanning bed use was the only confounder and was adjusted for in multivariate models. Weighted ORs are reported for host factors including age, sex, and measure of sun sensitivity since host factors often lead to behaviors and beliefs. However, these host factors are in the causal pathway and consequently are not appropriate for evaluation as confounders. Tanning bed use confounded many associations but weighted odds ratios may be important, thus both weighted and adjusted ORs are presented.

CHAPTER III

RESULTS

The age range of participants was 18 to 23 years with a median age of 20 years (**Table 1**). Most participants were female (72%), white (98%) and freshman or sophomores (78%). Most users of sunless tanning creams were female and white. All participants who reported preferring sunless tanning products because they are safer than tanning beds or sunbathing were female and white. Two participants who reported preferring these products for other reasons were also female and white (data not reported).

Ever users of sunless tanning products were significantly more likely to be female, have fair skin, and have used tanning beds greater than 50 times (**Table 2**). Ever users were also more likely to view tanning as important but the association diminished after adjusting for tanning bed use. Sunscreen use did not differ between ever versus never users of sunless tanning products. However, they were significantly more likely to reapply sunscreen when outside on a sunny day even after adjusting for tanning bed use. Those who preferred sunless tanning products because they are safer were also significantly more likely to reapply sunscreen when outside on a sunny day (**Table 3**).

More frequent use of sunless tanning products was associated with a higher frequency of tanning bed use (**Table 4**). A higher frequency of sunless tanning product use was observed in those who reported using these products because they feel better with a tan as well as those who wanted to visit tanning salons or sunbathe less often. Reporting a preference for sunless tanning products because they are safer than other tanning methods was also associated with more frequent use of these products.

Table 1. Descriptive statistics of survey participants.

Variable		Overall (%)	Ever users ^a (%)	Safer ^b (%)
# of responders*		163 (100)	55 (33.7)	26 (16.0)
Gender	Females	117 (71.8)	52 (94.6)	26 (100)
	Males	46 (28.2)	3 (5.5)	0 (0)
Race	White	162 (98.2)	53 (100)	26 (100)
Education	Freshman	47 (29.0)	13 (24.1)	4 (15.4)
	Sophomore	80 (49.4)	31 (57.4)	16 (61.5)
	Junior	16 (9.9)	6 (11.1)	5 (19.2)
	Senior+	19 (11.7)	4 (7.4)	1 (3.8)
Age	mean	19.7	19.6	19.8
	median	20.0	19.0	20.0
	std	1.1	0.9	0.9

^a Responded 'yes' to the question 'have you ever used self-tanning creams in order to get a tan?'

^b Ever users of sunless tanning products who responded 'I prefer to use sunless tanning creams because I think using tanning creams is safer than lying in the sun or under a tanning lamp'

* Columns do not always sum to the same total due to missing data.

Table 2. Characteristics of ever users relative to never users of sunless tanning creams (n=163).

CHARACTERISTICS		EVER USERS (N=55) ^a	NEVER USERS (N=108) ^a	OR ^b (95% CI)	ADJUSTED OR ^c (95% CI)
Gender	Male	3	43	1.0 ref	NA ^d
	Female	52	65	7.5 (2.4, 23.4)	
Age	18-19	29	46	1.0 ref	NA
	20	16	39	0.6 (0.4, 1.1)	
	21-23	9	20	0.8 (0.3, 2.0)	
Year of College	Freshman-Sophomore	44	83	1.0 ref	NA
	Junior+	10	25	0.8 (0.4, 1.8)	
Tendency to burn^e	Never burns	16	39	1.0 ref	NA
	Burner	39	69	1.2 (0.6, 2.3)	
Inability to tan	Deep-moderate tan	47	95	1.0 ref	NA
	Mild tan	8	13	1.3 (0.7, 2.5)	
Untanned Skin Color	Medium	24	54	1.0 ref	NA
	Fair	31	54	1.4 (1.1, 1.8)	
Tanning bed use	0-50 times	23	72	1.0 ref	NA
	>50 times	32	36	2.5 (1.6, 4.0)	
Importance of tanning	Not important	6	20	1.0 ref	1.0 ref
	Very-Somewhat important	48	88	1.5 (1.0, 2.4)	1.1 (0.7, 1.6)
Sunscreen Use	Never	9	17	1.0 ref	1.0 ref
	Use	46	91	0.9 (0.4, 2.1)	1.0 (0.4, 2.4)
Amount of sunscreen used	Small	39	81	1.0 ref	1.0 ref
	Large (golfball +)	14	21	1.3 (0.6, 2.5)	1.4 (0.8, 2.6)
Reapplication of sunscreen	Never	17	44	1.0 ref	1.0 ref
	Reapply	37	64	1.2 (1.1, 1.4)	1.3 (1.0, 1.8)
Avoid midday sun on spring break	Disagree	47	83	1.0 ref	1.0 ref
	Agree/Neutral	8	24	0.8 (0.4, 1.6)	1.2 (0.6, 2.3)
I like to sunbathe when on spring break	Agree	51	87	1.0 ref	1.0 ref
	Disagree/Neutral	4	20	0.5 (0.1, 3.1)	1.9 (0.3, 12.0)

^a Columns do not always sum to the same total due to missing data

^b Weighted OR based on cluster analysis accounting for Greek house and gender

^c Weighted OR adjusted for tanning bed use ^d Host factors are not adjusted for tanning bed use

^e After first sun exposure in the summer, skin gets a mild, moderate or severe sunburn compared to no sunburns or burn then tan

Table 3. Characteristics of those who prefer sunless tanning creams because they are safer relative to who do not prefer them (n=161).

CHARACTERISTICS		PREFER SAFER (N=26) ^a	DO NOT PREFER (N=135) ^a	OR ^b (95% CI)	ADJUSTED OR ^c (95% CI)
Gender	Male	0	46	NC ^d	NA ^e
	Female	26	89		
Age	18-19	11	63	1.0 ref	NA
	20	9	46	1.0 (0.5, 2.1)	
	21-23	5	23	1.4 (0.6, 3.5)	
Year of College	Freshman-Sophomore	20	106	1.0 ref	NA
	Junior+	6	28	1.3 (0.6, 3.1)	
Tendency to burn^f	Never burns	9	46	1.0 ref	NA
	Burner	17	89	0.8 (0.4, 1.9)	
Inability to tan	Deep-moderate Tan	25	117	1.0 ref	NA
	Mild tan	1	18	0.2 (0.0, 1.4)	
Untanned Skin Color	Medium	10	68	1.0 ref	NA
	Fair	16	67	1.4 (0.7, 2.9)	
Tanning bed use	0-50 times	12	82	1.0 ref	NA
	>50 times	14	53	1.9 (0.6, 6.0)	
Importance of tanning	Not Important	3	23	1.0 ref	1.0 ref
	Very- Somewhat Important	23	111	1.5 (0.3, 8.2)	1.1 (0.3, 4.7)
Sunscreen Use	Never	6	20	1.0 ref	1.0 ref
	Use	20	115	0.5 (0.2, 1.4)	0.6 (0.2, 1.6)
Amount of sunscreen used	Small	19	100	1.0 ref	1.0 ref
	Large (golfball +)	6	28	1.2 (0.3, 4.0)	1.2 (0.4, 4.0)
Reapplication of sunscreen	Never	5	56	1.0 ref	1.0 ref
	Reapply	20	79	1.4 (1.0, 2.5)	1.6 (1.2, 2.3)
Avoid midday sun on spring break	Disagree	22	106	1.0 ref	1.0 ref
	Agree/Neutral	4	28	0.8 (0.2, 3.7)	1.1 (0.3, 4.6)
I like to sunbathe when on spring break	Agree	25	111	1.0 ref	1.0 ref
	Disagree/Neutral	1	23	0.2 (0.0, 1.3)	0.4 (0.0, 4.6)

^a Columns do not always sum to the same total due to missing data

^b Weighted OR based on cluster analysis accounting for Greek house and gender

^c Weighted OR adjusted for tanning bed use ^d Not calculable ^e Host factors are not adjusted for tanning bed use

^f After first sun exposure in the summer, skin gets a mild, moderate, or severe sunburn compared to no sunburns or burn then tan

Table 4. Frequency of sunless tanning product use (n=161).

		Sunless tanning product use			
		None	1-5 times	6+ times	p-value
Tanning bed use	None	24	1	0	0.0004
	6-50 times	48	12	9	
	50+ times	35	10	22	
Use sunless tanning products					
Feel better with a tan	Yes	3	4	19	<0.0001
	No	104	19	12	
Reduce tanning salons or sunbathing	Yes	0	3	14	<0.0001
	No	107	20	17	
Prefer sunless tanning products					
Safer than tanning salons or sunbathing	Yes	3	5	22	<0.0001
	No	104	18	9	

* Columns do not always sum to the same total due to missing data.

CHAPTER IV

DISCUSSION

Sunless tanning product users in this population exhibited an important sun protection behavior by being more likely to reapply sunscreen on a sunny day in the summer. Despite this behavior, these students did not practice other important behaviors that could protect them from UVR exposure. These students were not more likely to use sunscreen, increase the amount of sunscreen used, or avoid midday sun while on spring break. Preference for these products did not appear to significantly alter protection behaviors.

Students who reported ever using sunless tanning products were significantly more likely to be female, have used tanning beds greater than 50 times, have fair skin and reapply sunscreen when outside on a sunny day. Some of these findings are consistent with a study by Brooks *et al.*⁴ that reported that sunless tanning users were more likely to be female and that users and potential users of sunless tanning products were more likely to have used tanning beds than non-users or never intended users. Cokkinides *et al.*⁵ also reported that use of sunless tanning products was associated with a higher frequency of indoor tanning but not with use of sunscreen. Although we did not find a difference in sunscreen use, ever users were more likely to reapply sunscreen when outside on a sunny day. Our findings indicate that those who have tried sunless tanning products view tanning as important and are more likely to be frequent tanning bed users. It is reported that users of sunless tanning products are likely to view a tanned appearance as desirable.⁸ Relative to non-tanners, sunless tanners may use sunscreen to avoid sunburns but practice other sun protection behaviors less frequently to achieve further tanning

through UVR exposure.⁴ Having fair skin may lead students to try sunless tanning products as an addition to other tanning methods. Ever users in our study engaged in an important sun protection behavior by reapplying sunscreen on a sunny day, with a suggestion that they applied more sunscreen than non-users.

In contrast to our findings, Sheehan and Leshner⁷ reported that sunless tanning was associated with a decrease in tanning bed use. Their study surveyed individuals ranging in age from 14 to 58 years at indoor tanning salons in Georgia. The difference in findings could be attributed to population demographics such as age and regional differences likely due to the importance of tanning among 18 to 23 year olds.

Other studies have not examined sunless tanning product users who report a preference for these products because they are safer. Students who reported a preference for these products because they are safer than tanning beds or sunbathing accounted for 47% of ever users, and they were more likely to reapply sunscreen when outside on a sunny day in the summer. A cross-sectional survey by Stryker *et al.*⁹ that compared exclusive sunless tanners (users of sunless tanning products who do not tan indoors) to non-tanners (neither users of sunless tanning products or indoor tanning) found that exclusive sunless tanners were more likely to use sunscreen but were less likely to seek shade. Compared to exclusive indoor tanners, exclusive sunless tanners were more likely to practice sun protection behaviors.⁹ In our population, only one ever user of sunless tanning products did not use tanning beds. Although there were no exclusive sunless tanners in our population, those who preferred these products because they are safer exhibited some of the same behaviors as the exclusive sunless tanners reported by Stryker *et al.*⁹

Sunless tanning creams have been marketed as a safe alternative for those who want to tan. The use of sunless tanning creams as an alternative is not well established. It is not known if the use of sunless tanning products is associated with reduced UVR exposure. In contrast, there has been concern that users of these products may have increased UVR exposure. Most sunless tanning products do not contain sun protection factor (SPF). By creating a tanned appearance, sunless tanning products could result in a false sense of protection from UVR leading to a reduction in UVR prevention behaviors.

The most frequent users of sunless tanning products in this study were also frequent tanning bed users. Prevention efforts targeting sunless tanning products users should focus on reducing tanning bed use while also promoting the safety of sunless tanning products. Those who preferred sunless tanning products because they are safer than other methods of tanning were more likely to be frequent users of these products. Frequent users may be more inclined to reduce tanning salon visits or sunbathing based on responses of study participants.

There are a few limitations in this study. It is a cross-sectional survey and cannot assess changes in behavior over time. It is also susceptible to reporting bias. The survey did not ask specific questions about frequency of sunbathing or changes in sunbathing behavior, but instead focused more on tanning bed and sunless tanning cream use. Since the majority of this population prefers sunbathing, some information is lacking by not including questions on sunbathing. It is also based on students and findings may not be generalizable.

Despite its limitations, this study provides important information on the characteristics and behaviors of sunless tanning cream users in a population where

tanning is important. The study is strengthened by the range of questions answered on a sun exposure and tanning attitudes, behaviors and beliefs. The study also makes significant contributions to knowledge of sunless tanning product use among those with high sun-seeking behaviors.

Behaviors of sun-seeking young adults are important to consider because of the potential for increased risk of sun damage and skin cancer in these populations. Sunless tanning product users among these young adults exhibited limited sun protection behaviors. Among sunless tanning product users, 47% preferred these products because they are safer than other methods of tanning. Sunless tanning products have the potential to appeal to individuals who view tanning as important. Prevention interventions could focus on fair-skinned females to combine sunless tanning product use with increased use and reapplication of sunscreen. More prevention efforts are needed to reduce tanning bed use in frequent sunless tanning product users for these products to serve as an alternative tanning method.

REFERENCES

1. Wolfe, Jonathan. Rising Skin Cancer Rates are a Global Reality. *Practical Dermatology*, Oct 2009.
2. Ries LAG, Eisner MP, Kosary CL, Hankey BF, Miller BA, Clegg L, Mariotto A, Feuer EJ, and Edwards BK. SEER Cancer Statistics Review, 1975-2002. Bethesda (MD): National Cancer Institute [based on November 2004 SEER data submission]. Available at: http://seer.cancer.gov/csr/1975_2002/.
3. Narayanan DL, Saladi RN, and Fox JL. Ultraviolet radiation and skin cancer. *Int J Dermatol* 2010; 49(9):978-986.
4. Brooks K, Brooks D, Dajani Z, Swetter SM, Powers E, Pagoto S, and Geller AC. Use of artificial tanning products among young adults. *J Am Acad Dermatol* 2006; 54(6):1060-1066
5. Cokkinides VE, Bandi P, Weinstock MA, and Ward E. Use of sunless tanning products among US adolescents aged 11 to 18 years. *Arch Dermatol* 2010; 146(9):987-992.
6. Dennis LK, Lowe JB, and Snetselaar LG. Tanning behaviors among young frequent tanners is related to attitudes and not lack of knowledge about the dangers. *Health education Journal* 2009; 68(3):232-243.
7. Sheehan DJ and Leshner JL. The Effect of Sunless Tanning on Behavior in the Sun: A Pilot Study. *Southern Medical Journal* 2005; 98(12): 1192-1195.
8. Pagoto SL, Schneider KL, Oleski J, Bodenios JS, and Ma Y. The Sunless Study: A beach randomized trial of a skin cancer prevention intervention promoting sunless tanning. *Arch Dermatol* 2010; 146(9):979-984.
9. Stryker JE, Yaroch AL, Moser RP, Atienza A, and Glanz K. Prevalence of sunless tanning product use and related behaviors among adults in the United States: Results from a national survey. *J Am Acad Dermatol* 2007; 56:387-390.