

THE PENNSYLVANIA STATE UNIVERSITY

SCHREYER HONORS COLLEGE

DEPARTMENT OF BIOBEHAVIORAL HEALTH

RANDOMIZED CONTROLLED TRIAL OF AN APPEARANCE-FOCUSED
INTERVENTION TO PREVENT SKIN CANCER IN COLLEGE FEMALES: THE “SKIN”
CAMPAIGN

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ABSTRACT

Indoor tanning, which is common among young females, is a risk factor for several different forms of skin cancer. College-aged women have been found to change their indoor tanning attitudes and behavior after receiving an appearance-focused intervention. The present study attempted to create a culturally-relevant, “youthful” appearance-focused booklet intervention with the goal of changing indoor tanning attitudes and behavior among college-aged females. Forty-eight freshmen females at the Pennsylvania State University were randomized into three groups: a control, an intervention group receiving the newly-designed booklet, and an intervention group receiving an already proven-successful appearance-focused indoor tanning booklet and tested at baseline, at a 3-month follow-up, and at a 6-month follow-up for changes in indoor tanning attitudes and behavior. They were also asked to rate the booklet on comprehension and several “youthfulness” measures. It was expected that the newer, more “youthful” intervention would be more successful at changing indoor tanning attitudes and behavior when compared to the group assigned to the older booklet and the control group. No significant differences were found among the three groups, presumably because of the small n due to the scope of the study. A reduction trend in indoor tanning intentions was observable for the experimental group who received the newer, “youthful” booklet. Future research is needed to single out which aspect of these appearance-focused interventions seems to work best on the target population (young females who use indoor tanning to improve their appearance).

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Introduction

Skin cancer is a serious health concern and numbers are growing in the United States. Despite other types of common cancers' rates decreasing, nonmelanoma skin cancer accounted for over one million of the new cases of cancer in 2009; more than all other types of cancers combined (NCI 2009). Additionally, in the United States alone in 2009, there were 68,720 new cases of melanoma (a deadly form of skin cancer) and 8,650 deaths – numbers that have doubled in the past 30 years (US National Institutes of Health, 2009). Nonmelanoma skin cancers rank among the five most expensive cancers to Medicare, costing \$17,000 on average per person to treat (Housman et al., 2003). Melanoma direct costs in the United States were estimated at \$291 million in 2004 (American Academy of Dermatology, 2010).

UV exposure in all its forms can damage DNA and the magnitude of these effects can be increased by skin type (fair, freckled, or light eyes and hair), severity of erythema (sunburn), and amount of time spent in the sun (World Health Organization, 2010). The International Agency for Research on Cancer has recently listed sunlamps used in indoor tanning booths as “carcinogenic to humans,” indicating an association between their use and the risk of skin cancer, among these, the deadly melanoma (US National Institutes of Health, 2009). Young women are commonly influenced by the media and “peer pressure” to look or act a certain way, often sacrificing aspects of their health in the process (Silverstein, Perdue, Peterson, & Kelly, 1986; Santor, Messervey, & Kusumakar, 2000). Research suggests that young females are concerned with their physical appearance. Many use strategies such as the gym, healthy eating, clothing style, or make-up in an attempt to increase their physical appearance. A tanned appearance is preferred among females and indoor tanning is popular in this population (Hillhouse et al., 2008; Geller et al., 2002).

Heckman, Coups, and Manne (2008) studied a large, nationally representative sample and found that tanning was most common among “young, white females.” Interestingly, youth who were more physically active were most likely to tan, as well as those who smoke or engage in risky drinking. It could be argued that these are people most concerned with their *appearance* (engaging in physical activity to maintain their weight) and *social reputation* (following the social expectations to smoke or drink). Thus, interventions may be most efficacious when designed to address appearance and normative influences on indoor tanning behavior.

One promising intervention approach was co-written by Drs. Joel Hillhouse (School of Public Health, East Tennessee State University) and Rob Turrisi (Biobehavioral Health and Prevention Research, Penn State University). It is a booklet that emphasizes UV damage, healthy alternatives, and a general concept of ‘health and beauty’ (Hillhouse & Turrisi, 2002). This was a low-cost booklet that was mass distributed to college-aged women containing useful information on indoor tanning and skin health.

The booklet was able to “achieve clinically significant reductions in UV exposure behavior.” The authors also examined several mediating factors: attitude toward tanning alternatives (sunless tanning, fashion, etc.) and cognitive mediators (subjective norms, image norms of the media, etc.). Hillhouse and Turrisi showed that intervention material in the form of a short handbook could change the attitudes and intent of college-aged females toward indoor tanning. After reading about the appearance-damaging effects of indoor tanning, treatment participants reported tanning about one-half as much as the control group.

Hillhouse, Turrisi, Stapleton, and Robinson (2008) conducted a randomized controlled trial of an appearance-focused intervention (a booklet) to prevent skin cancer among a female college-aged population. The booklet contained decision-theoretical information attempting to

change behavior. Springtime indoor tanning rates were significantly lower in the experimental group than were in the control group and reductions in future intentions were evident in the experimental group (Hillhouse, Turrisi, Stapleton, & Robinson, 2008).

While these indoor tanning interventions are promising, there remain gaps in the work that has been done. To our knowledge, there is nothing in the body of literature indicating that a culturally relevant, “youthful” intervention in the form of a booklet was utilized on a college-aged population. Hillhouse and Turrisi (2002) piloted the intervention they tested to obtain reactions from the target population (college-aged females who reported tanning in the past year or intent to tan). While they were successful in changing behavior, there could be room to improve upon this intervention by making the content of the booklet more youthful and engaging. The possibility exists that by modifying this existing intervention, more young females can identify with its content and appearance. The present study conducted two focus groups of five college freshmen to ask for their thoughts and opinions on the intervention material. Because nearly ten years have passed since the implementation of the booklet designed by Hillhouse and Turrisi (2002), we understood that sunless tanning “technologies” were likely to have improved. In addition, our culture in general has been undertaken by the “going green” movement, an emphasis on being natural, and a general focus on health. With changing ‘trends’ and writing styles as well as the idea that intervention materials should be current and relevant to the population, a new booklet was designed which was “modernized” and catered to the specific audience of college-aged females.

Several message formats have been tested in regards to indoor tanning *appearance-focused* interventions. “Statistical” messages, focusing on presenting numerical figures and facts, have been shown to decrease intention to tan and tanning behavior as well as increase

perceived susceptibility in a college-aged female population. “Narrative” messages, which present information in a “personal” manner, have been shown to increase perceptions of realism and decrease intention to tan (Greene & Brinn, 2003). The approach used in the present study utilizes a mixture of both, hoping to affect a multitude of individuals (some of which may want strict “evidence” and some of which may want information presented in an interesting, fresh manner).

If indeed our booklet is found to be efficacious, it will be an extremely low-cost intervention that can be easily distributed (perhaps to all incoming freshman at a university, for instance) and have an impact. In this study, a control group receiving no booklet, an experimental group receiving Hillhouse and Turrisi’s booklet (2002), and an experimental group receiving the new booklet titled “*Skin*” were used to compare the efficacy of both interventions.

It is hypothesized that the indoor tanning intervention material (10-page booklet) in this study will reduce actual indoor tanning occurrences and the intent to indoor tan in the treatment group as compared to the control group. In comparison to the “Keep the skin you’re in!” booklet (developed by Hillhouse & Turrisi, 2002), it is hypothesized that the present intervention will be more successful at reducing indoor tanning and the intent to indoor tan.

The present study utilized a focus group to design and revise a “modernized” educational booklet on the dangers of indoor tanning and skin cancer. A three-group design tested the ability to change attitudes and behavior in a control group, a group reading the older booklet published by Hillhouse and Turrisi, and a group reading the newly designed booklet. They were tested at baseline, immediately after analyzing the book (“short-term”), and at a “long-term” follow-up after six months, during the heaviest tanning season in late February. It was hypothesized that the “Skin” intervention will have a stronger effect in changing knowledge, understanding,

attitudes, beliefs, and intentions at the short-term follow-up. It was expected the reductions in indoor tanning will be the highest in the "Skin" condition, compared to the control condition and the "gold standard" ("Keep the skin you were born in!") condition at the long-term follow-up.

Methods

Sample and Recruitment

In the first phase of the project, five freshman females who had reported tanning in the past year (members of the target population for the intervention) were recruited from an introductory-level course at Penn State University. The focus groups met once after the development of the first draft of the intervention and once after several minor revisions were made. These participants were awarded one point of extra credit for the course in which they were enrolled each time they participated in a focus group session.

The second phase of the study used a 3-group design (a similar design was used in a recent study funded by the American Cancer Society, Coups, Manne, & Heckman, 2008). A total of 150 female undergraduates were recruited to account for lack of response to the initial invitation e-mails (based on our previous intervention studies where we had received approximately a 50% response rate). Samples were drawn from the Penn State community using Data Warehouse. Of the 150 students that responded to the survey, 58 screened positively for tanning in the last 12 months or intent to tan in the next year. Of the 58 females eligible to participate in the study, 48 agreed and were randomized into three groups. Further details on the groups appear in the "Procedures" section below. The participants were compensated \$10 each time they completed an online survey throughout the semester, for the possibility of earning \$30 total.

Materials

A new, “modern” booklet was designed in the spring of 2008. This was done researching and observing “trends” relating to slang relevant to the population at hand as well as the most current information on tanning as it relates to skin cancer. During the first phase of the project, the aforementioned focus groups met twice to edit the newly-developed “Skin” booklet’s style of writing, image and word choice, content, other factors related to presentation and content of the booklet. After focus group review, a new booklet that was believed to capture a youthful perspective and clearly presented information, called the "Skin" intervention (and herein referred to as “Skin”) was published for the purposes of the study. Members of the focus groups expressed an interest in the writing style used in the new booklet as well as the thorough information on sunless tanning (as compared to the older booklet). The booklet contains sufficient information and advice on sunless tanning to encourage self-efficacy in tanning alternatives if a tanned look is desired. The booklet also includes information on realistic peer norms and how following trends can actually be dangerous to your health. It focused on increasing awareness of susceptibility for young women of the same peer group and age as the readers and emphasizing that not all young females use tanning; other appearance-changing methods are safer and more practical and healthy options.

Measures

Baseline. At baseline, we asked study participants to report their natural skin type (fair, medium, or dark), their natural hair color (brown, blonde, black, or red), and the mean age at which they began indoor tanning (open-ended). *Booklet evaluations.* Booklet evaluation measures included rating the intervention on comprehension using a 10-point Likert scale (see Table 2) and

“youthfulness” using a 5-point Likert scale (see Table 3). *Indoor tanning frequency.* The variables related to behavior included an open-ended question regarding indoor tanning frequencies for the past one, three, and six months, measured at baseline, at the short term follow up, and the long term follow up. *Indoor tanning intentions.* Self-reported intention to tan in the upcoming year was measured at all three time periods using a 10-point Likert scale.

Procedures

The three groups consisted of a control condition (n=13), an intervention condition in which participants received the indoor tanning "gold standard" intervention entitled “Keep the skin you were born in” (Hillhouse & Turrisi, 2002, n=15, herein referred to as “KEEP”), and a intervention condition that received the "Skin" intervention (n=13). Implied consent was obtained through the use of an online survey. Groups 1 and 2 received the booklets after the baseline survey that was conducted in October 2009. We found no significant differences between groups on background characteristic (Table 1), with the following exception: the “mean age of beginning indoor tanning” was significantly lower in the “Skin” group ($F=4.04$, $p<0.10$). Because of the small sample size, $p<0.10$ was considered significant for the purposes of this study.

Table 1: Demographic Variables by Group (n=48 freshmen female tanners)

“SKIN” refers to the booklet designed and utilized in the present study, while “Keep” refers to the “Keep the Skin You Were Born In!” booklet designed by Hillhouse and Turrisi (2002). “SD” refers to *standard deviation*.

Background Characteristics	Control	SKIN	Keep
Self-reported skin type			
Fair	9	11	9
Medium	4	9	6
Natural hair color			
Brown	5	14	9
Blonde	8	3	3
Black	0	1	1
Red	0	2	2
Mean age began indoor tanning (SD)	16.31(1.11)	15.38(1.78)	16.92(1.382)

In October 2009, a sample of students (n=48) was tested at baseline for knowledge, understanding, attitudes, beliefs, and intent to change before reading the booklets, using a web survey. Handbooks were distributed to the appropriate intervention conditions in early November. In December, a second short-term assessment was given to assess any changes in knowledge, understanding, attitudes, beliefs, and intentions that may have occurred after reading the intervention material (n=48). At this time, participants in the experimental groups also rated their assigned booklets for interest, readability, usefulness, and comprehension.

In March 2010, a long-term follow-up survey was administered (n=44) following the winter months, when indoor tanning is most prevalent (Hillhouse & Turrisi, 2008). The follow-up tested whether the program had sustainable results and actually worked to change attitudes or behavior.

Analysis

A series of six one-way three-group ANOVAS were used to examine previous tanning behavior (at the one-month, three-month, and six-month intervals). Four one-way two-group ANOVAs were used to examine the evaluations of the booklets based on comprehension (see Table 2) and “youthfulness” (see Table 3).

Results

Evaluation of Materials

No significant differences were noted between the two booklets, “Skin” and “Keep the skin you were born in,” as relating to measures of comprehension (see Table 2) and the extent to which they captured a “youthful” perspective (see Table 3).

Table 2: Means and Standard Deviations (SD) for Evaluation of the Intervention Booklet

The scale for all of the evaluation items are anchored by 0 (not at all) and 10 (extremely). “SKIN” refers to the booklet designed and utilized in the present study, while “Keep” refers to the “Keep the Skin You Were Born In!” booklet designed by Hillhouse and Turrissi (2002).

Intervention Condition		Mean	Std. Deviation	Std. Error Mean	t-value	Significance (2-tailed)
Interesting	Skin	6.45	2.114	.473	-.024	.981
	KEEP	6.47	1.959	.506	-.024	.981
Readable	Skin	8.00	1.522	.340	.446	.658
	KEEP	7.73	2.017	.521	.429	.672
Useful	Skin	7.30	1.720	.385	-.272	.787
	KEEP	7.47	1.885	.487	-.269	.790
Easy to Understand	Skin	8.65	1.531	.342	.982	.333
	KEEP	8.13	1.552	.401	.980	.335

Table 3: Means and Standard Deviations (SD) for Evaluation of the Intervention Booklets – Additional Measures

The scale for all of the evaluation items are anchored by -2 (not at all) and 2 (extremely). “SKIN” refers to the booklet designed and utilized in the present study, while “Keep” refers to the “Keep the Skin You Were Born In!” booklet designed by Hillhouse and Turrisi (2002).

		Mean	Std. Deviation	Std. Error	F	p-value
was well designed.	Skin	1.10	.718	.161	.533	.470
	KEEP	1.27	.594	.153		
	Total	1.17	.664	.112		
appealed to my age group.	Skin	1.15	.587	.131	.985	.328
	KEEP	.93	.704	.182		
	Total	1.06	.639	.108		
was too wordy.	Skin	-.55	1.099	.246	1.339	.256
	KEEP	-.13	.990	.256		
	Total	-.37	1.060	.179		
included facts and information that were new to my knowledge.	Skin	1.10	.788	.176	.143	.708
	KEEP	1.00	.756	.195		
	Total	1.06	.765	.129		
included pictures and images that grabbed my attention.	Skin	1.00	.795	.178	.615	.439
	KEEP	.80	.676	.175		
	Total	.91	.742	.126		
was written by someone who understands me.	Skin	.70	.865	.193	.012	.912
	KEEP	.67	.900	.232		
	Total	.69	.867	.147		
captured a youthful perspective.	Skin	1.00	.725	.162	.231	.634
	KEEP	.87	.915	.236		
	Total	.94	.802	.136		

Effects of Intervention

We ran a series of analyses of variance models to examine indoor tanning behavioral outcomes for participants in the Skin, KEEP, and control conditions. Because the long-term (March 2010) follow-up covered the winter months with the highest rates of indoor tanning (Hillhouse & Turrisi, 2008), we expected overall indoor tanning to increase from baseline through the long-term follow-up for all three groups. At baseline, the groups were equivalent on all self-reported previous indoor tanning frequencies ($p < 0.10$).

Table 4: Comparisons of means (standard errors) between intervention groups across indoor tanning tendencies

*“SKIN” refers to the booklet designed and utilized in the present study, while “Keep” refers to the “Keep the Skin You Were Born In!” booklet designed by Hillhouse and Turrisi (2002). “SE” refers to “standard error.”

		Control (SE)	Skin (SE)	KEEP(SE)	F-value	p-value
Baseline	Tanning in past month	.54 (.39)	.65 (.37)	.00 (.00)	1.19	.32
	Intent to tan in next year	4.70 (.64)	5.40 (.41)	3.80 (.62)	2.36	.11
3-month follow up	Tanning in past month	.62 (.46)	1.85 (1.20)	.07 (.07)	1.11	.34
	Intent to tan in next year	4.31 (.63)	4.70 (4.43)	3.33 (.57)	1.84	.17
6-month follow up	Tanning in past month	1.33 (.82)	3.81 (1.54)	1.20 (1.01)	1.51	.23
	Intent to tan in next year	4.50 (.54)	4.38 (.57)	3.53 (.71)	.71	.50

Based on the findings reported in Table 4, intent to tan in the next year and mean number of tanning sessions in the past month decreased in all three groups at the short-term follow up ($p < 0.10$). “SKIN” was the only intervention showing a decrease in intent to tan in the next year from baseline through the long-term follow up, but the differences were not significant. As predicted, all three groups showed an increase in mean number of tanning sessions in the past month from baseline through the long-term follow up. There were no significant differences

between intervention groups in tanning behavior or intention.

Discussion

This study examined and compared the effects of two appearance-focused interventions on reducing indoor tanning use among college-aged females. While participants rated both booklets similarly, the efficacy of the “Skin” booklet designed for the present study in changing attitudes and behavior was less than expected. While comments made during the focus group sessions indicated that the “Skin” booklet was less wordy, more interesting, and more “youthful” than was the older intervention, data showed that *both* interventions were well-received by the target population (both booklets were rated similarly on “youthfulness” factors, when it was expected for the “Skin” booklet to be rated significantly higher).

As previously mentioned, the “Skin” intervention condition was the only intervention showing a decrease in intent to tan in the next year from baseline through the long term follow up. Based on the Likert scale measure, it is indicated that on average the participants went from rating tanning in the next year as “somewhat likely” at baseline (5.40) to more neutral feelings at the long term follow up (4.38). Because of the scope of this study, these differences were not significant, but a definite trend can be observed. Also of importance to note is the fact that the “Skin” intervention condition had a slightly more positive intent to tan in the next year to start with at baseline, although again, these differences were not significant.

One underlying theme that was examined was whether it is better for interventions to be focused on alternatives to the behavior (in this case, alternatives to indoor tanning) or to simply make them appealing to the target population, whether aesthetically or through how the information was presented. Because our preliminary data revealed no significant differences

between the two interventions being tested, the answer seems to be that neither intervention was inherently more efficacious in reducing indoor tanning behavior and intentions.

To our knowledge, this was the first attempt of designing an appearance-focused indoor tanning intervention that was specifically more appealing to the target population (college-aged females) than previous interventions. Because of previous literature indicating that young women respond to messages that target their appearance, it seems that appearance is the motivating factor in changing behavior. In the future, more research could be conducted regarding how to capture the “youthfulness” of the target population and design interventions appropriately tailored to the cultural cohort whose behavior is troubling. More participants in the focus groups would be one way to increase exposure to the preferences of the target population. Additionally, it would be easier to single out what exactly about each separate intervention is efficacious by systematically changing a few things in each one and pilot testing the new booklets repeatedly to identify their strengths. If it comes out that there is some core piece of both booklets that are inherently the same and found to be successful at changing behavior, it should be extended and developed further.

Limitations of this study include a “long-term” evaluation that was only four months after baseline measures. Outdoor tanning was not measured, so it is uncertain whether the sole source of UV exposure was indoor UV tanning or if tanning outdoors was viewed as better or more beneficial to participants. However, the “Skin” booklet focused on skin health as a whole and explained the effects of UV radiation as a general health threat. Additionally, because of the scope of this project, we were unable to recruit and compensate as many participants as we had originally hoped, so the sample size was smaller and any and all effects were less powerful than expected. Lastly, there was a considerable lack of indoor tanning at baseline given the fact that it

was conducted in late October, just after the summer months when tanning would be less common (Hillhouse and Turrisi, 2008). Thus, it could be observed that the interventions fell victim to seasonal variations in the behavior.

Despite the limitations, this study supports the literature that has shown success of appearance-focused indoor tanning and skin cancer prevention strategies, particularly among the specific population of young females. Both of the booklets were low-cost interventions that achieved change through a relatively simple means of administration. Although sunless tanning attitudes and tendencies were not significantly affected by either booklet, as technologies improve over time, we feel that this alternative to indoor tanning should be emphasized and framed by future interventions.

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ACADEMIC VITA: Alyssa D. Todaro**EDUCATION****Pennsylvania State University** – Expected Graduation: May 2010

- Major: Bachelor of Science in Biobehavioral Health
- Minors: Psychology, French & Francophone Studies
- Relevant Coursework: Biology, Microbiology, Psychology, Neuropsychology, Technical Writing, Genetics, Epidemiology, Medical Ethics, Global Health, French

Greensburg-Salem High School – June 2007

- Valedictorian, Class President

WORK & RESEARCH EXPERIENCE**Penn State Alcohol and Skin Cancer Prevention Research Lab** (*Summer 2008 to Present*)

- Leading “Stand Out” project as senior thesis: designed appearance-focused intervention (pilot testing begins in December 2009)
- Involved in multiple projects concerning skin cancer prevention and treatment
- Assisted with prevention research examining etiology, and efficacy trials of individual and familial interventions, as well as implementing practices at Penn State University and nationally. Trials funded by NIH, NCI, American Cancer Society, and NIAAA
- Responsible for performing literature searches, data collection and entry, analysis (using SPSS program), aiding in proofing and publications, development of group based intervention materials

NIH / NIAAA (*Summer 2009*)

- Selected as a summer intern in Dr. Andrew Holmes’ lab: alcohol research examining effects of D-Serine on ethanol intoxication in mice
- Presented research at NIH-wide poster session and at the NIAAA monthly lab meeting
- Trained in StatView program, data analysis, handling animals
- Assisted with publications and training new employees

Mutual Aid Ambulance Company (*Seasonal*)

- Conducted insurance verification, collection calls
- Led event planning and fundraising
- Trained in Medicare and Medicaid policies

AWARDS/ ACHIEVEMENTS

- Graduating one year early from Biobehavioral Health program with no prior AP credits
- Schreyer Honors College Academic Excellence Scholarship Recipient – 2007-2010
- Schreyer Honors College Summer Travel Grant Recipient – Summer of 2009
- Dean’s List – since freshman year

- Penn State Competition Ballroom Dance Team

COMMUNITY SERVICE

- Vice President of Alabaster Ambassadors (traveling teen missionary team)
 - Mission trips to Appalachia, Colorado, Alabama, and Jamaica
 - Utilized motivational concerts/workshops to promote health and self-awareness to low-income populations
- Secretary of the South Greensburg Recreation Board
 - Special Events Coordinator
- Penn State Dance Marathon for Pediatric Cancer
 - THON – Springfield committee member
- Ballroom Dance Teaching Assistant – Introduction to Ballroom Dance class & freshman seminar
- Ballroom dance instructor to elderly - Wild Pines Golf Club (Pocono Pines, PA)
- Red Cross Blood Drive Volunteer (Fall of 2009)
- Penn State Diabetes & Obesity Research Forum Liaison and Volunteer (Fall of 2009)
- Women's Leadership Initiative Participant (2009/2010 academic year)

PUBLICATIONS AND PRESENTATIONS

Stapleton, J., Todaro, A., Turrisi, R., Hillhouse, J., Abar, B., & Robinson, J.K. (2009). A comparison of the efficacy of an appearance focused skin cancer intervention within tanner subgroups identified by latent profile analysis. Poster presented at the 2009 Society of Prevention Research Meeting, Washington, DC.

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