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Using UV Photography to Reduce Use of Tanning Booths: A Test of Cognitive Mediation

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Two laboratory studies were conducted in which a new type of intervention was used to reduce ultraviolet radiation (UV) exposure from tanning booth use among college students (Time 1 *N*s = 70 and 134). The intervention uses UV photography to highlight the damage to facial skin caused by previous UV exposure. When the authors controlled for baseline measures of booth use, students in both studies who viewed their UV photographs reported less booth use at a follow-up session 3–4 weeks later than did students not shown a copy of their photograph. Also, in both studies, the decline in use was significantly mediated by a Tanning Cognition Index composed of variables suggested by the prototype–willingness (prototype) model of health risk: tanning attitudes, tanner prototypes, and willingness to engage in risky UV exposure.

Keywords: health cognitions, tanning booth use

In spite of increasing attention in the media, schools, and the public health sector to the risks associated with ultraviolet radiation (UV) exposure, self-reports of time spent tanning have continued to rise, as has the incidence of skin cancer (Geller et al., 2002; Hoegh, Davis, & Manthe, 1999). In fact, young people appear to be aware of the risks, but many are willing to accept them presumably because of the universal appeal of having a tan (Knight, Kirincich, Farmer, & Hood, 2002). An example of this trend can be seen in the tanning booth industry, which has seen unprecedented growth over the last decade. Booth use tripled from 1986 to 1996 (Robinson, Rigel, & Amonette, 1997). More recently, Gerrard et al. (2005) found that more than half of female college students and more than 15% of male students at a Midwestern university reported recent use. This is consistent with tanning industry estimates that more than 29,000,000 people used booths in 2002 (*Looking fit: Tanning fact book*, 2003–2004). Rates are highest in the Midwest, where some young people report more than 50 booth visits per year (Demko, Borawski, Debanne, Cooper, & Stange, 2003).

Although there is some disagreement as to whether a direct link between booth use and cancer has been established (Karagas et al., 2002), sunlamps are listed in the current *Report of Carcinogens* (U.S. Department of Health and Human Services, 2002), which states "Exposure to sunbeds is known to be a human carcinogen, based on sufficient evidence of carcinogenicity from studies in humans, which indicate a cause-and-effect relationship" (p. 250). Veierod et al. (2003) recently reported a prospective link between booth use (especially from age 20 to 30) and melanoma. This carcinogenic possibility, together with other associated risks (e.g., immunosuppression, eye problems) and the fact that booth use often promotes subsequent sun exposure, has led virtually every major health organization in the United States (American Medical Association, American Cancer Society, Centers for Disease Control and Prevention, National Institutes of Health) to issue policy statements recommending against the use of tanning booths.

This increase in UV exposure suggests a need for effective interventions to reduce the behavior. Such programs do exist, but they have not been very successful (Weinstock & Rossi, 1998). Most of these programs have involved some form of risk education, assuming that concerns about risk will outweigh the appeal of tanning. Risk perceptions do not always inhibit risk behavior, however (Gerrard, Gibbons, & Bushman, 1996), and young people, in particular, often do things that they know are risky (Gerrard, Gibbons, Benthin, & Hessling, 1996). For this reason, many health psychologists have recommended that UV reduction programs target tanning motives (i.e., appearance; Hoegh et al., 1999) rather than risk (McClendon, Prentice-Dunn, Blake, & McMath, 2002; Robinson et al., 1997). Although rare, appearance-based UV reduction programs do exist and they appear to have promise. Jones and Leary (1994), for example, found that messages outlining the negative effects of sun exposure on appearance had more impact on intentions to engage in protective behavior than did messages outlining the health consequences (cf. Rossi, Blais, & Weinstock, 1994).

UV Photography

An appearance-based intervention has been developed recently that uses a camera with a UV filter (Fulton, 1997). The camera produces a photo that reveals the normally invisible damage

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caused by UV exposure. Chronic exposure accelerates photoaging and produces nonuniform epidermal pigmentation, which appears in the photo as dark blotches that are quite prominent and impactful. The intervention was used recently by Mahler, Kulik, Gibbons, Gerrard, and Harrell (2003). In the first study, college students who saw their UV photos reported more intentions to use sunscreen than did those who did not see their photos. Study 2 found similar results among people who were surveyed on area beaches. In addition, in a telephone follow-up a month later, beachgoers who had seen their photos reported less sunbathing and more sunscreen use to protect from incidental exposure. Several attitude measures were taken—for example, perceived rewards of tanning and perceived vulnerability (PV) to photoaging—but there was no evidence that these variables mediated the observed effects. Consequently, the authors recommended that a broader range of mediating cognitions be assessed.

The Prototype–Willingness Model

Mahler et al. (2003) referred to the prototype model and suggested that the image that young people have of the type of person who tans may mediate the effect of the photo on tanning behavior. The prototype model presents a social–psychological approach to the study of health behavior (see Gibbons & Gerrard, 1997; Gibbons, Gerrard, & Lane, 2003, for reviews). Two aspects of the model are directly relevant to tanning. First, the model suggests that much adolescent health risk behavior is neither intentional nor planned; instead, it is a reaction to social circumstances. This reaction is captured in a construct in the model called *behavioral willingness*. Willingness is defined as an openness to risk opportunity—an inclination to engage in a risky behavior if given the chance. Willingness has been shown to add significantly to the variance in risk behavior that can be accounted for by more traditional constructs, primarily intentions and attitudes toward the behavior (Ajzen, 1985; Fishbein & Ajzen, 1975).

The second relevant aspect of the model is social images or prototypes. The model argues that adolescents' perceptions of the type of person who engages in a particular risky behavior (e.g., the typical smoker) have a strong influence on their own willingness to engage: The less favorable the image, the less willing they are to engage in the behavior. Theoretically, altering the tanner image should alter (reduce) tanning behavior (cf. Gerrard et al., in press). The prototype model was the theoretical basis for the current study, which used the UV photo intervention in an effort to reduce tanning booth usage among college students.

Overview

Two studies were conducted as follow-ups and extensions to the study by Mahler et al. (2003), using a different set of mediators and a different type of UV exposure. After receiving or not receiving a copy of their UV photograph, students responded to a questionnaire that contained measures of tanning attitudes and cognitions suggested by the prototype model. They returned approximately 4 weeks later and again responded to the questionnaire and reported on their booth use since the first session. It was hypothesized that the intervention would reduce self-reported booth use and that this intervention effect would be mediated by the Tanning Cognition Index. The second study was conducted as a replication of the first, with some minor changes intended to minimize procedural differences between the experimental and control groups.

Study 1

Method

Participants

Thirty-four male and 36 female undergraduates randomly selected from a list of students enrolled in introductory psychology classes were contacted by phone in late March and asked if they would like to participate in a lab study of recreation attitudes for extra credit. Most were freshmen. Approximately 10% of those contacted declined to participate and another 10% to 12% were unable to schedule a time.

Measures

Baseline booth use. Previous booth use was assessed at the first session (T1) by asking, "How many times have you gone to a tanning booth since the beginning of spring break?" (which was about 3 weeks earlier), followed by a 10-point scale, ranging from 1 (*None*) to 10 (*9 or more times*).

Tanning cognitions. Four tanning cognitions were assessed: attitudes, prototypes, willingness, and PV. Attitudes were assessed with the following five statements: "Having a tan . . . is unhealthy . . . makes me look healthy . . . improves the way I look . . . improves the way most people look" and then "People who work at getting a tan (sit out in the sun, go to tanning booths, do not use sunscreen) are pretty dumb." Each item was followed by a 5-point scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Items were reversed when necessary, standardized, and then combined ($\alpha = .72$). Prototypes were assessed by asking students to think about and then evaluate two types of people: "Those who work on their tan by: visiting tanning booths [and by] . . . purposely exposing themselves to the sun." Evaluations were provided using four adjectives: *immature*, *attractive*, *careless*, and *cool*, each accompanied by 7-point scales, ranging from 1 (*not at all*) to 7 (*very*), which were standardized and summed to form a combined UV prototype index ($\alpha = .77$). Two willingness scenarios were described. First, students were asked to imagine that they had an unexpected opportunity to go out on a boat with no sunscreen available. They then indicated their willingness to do each of the following: (a) go boating unprotected, (b) go boating wearing protective clothing (hat, long-sleeved shirt, pants), and (c) not go boating followed by 7-point scales, ranging from 1 (*not at all willing*) to 7 (*very willing*). The second scenario asked participants to imagine it was the first sunny spring day and their friends were going outside. They then indicated their willingness to do three things: go out . . . (d) without sunscreen or protective clothing, (e) with sunscreen, and (f) wearing a long-sleeved shirt and pants. The six items were reversed where necessary (e.g., Question c) and then summed to form a willingness index ($\alpha = .77$). PV to photoaging was assessed with two questions about the likelihood of wrinkling prematurely due to regular sun tanning and booth use. These were conditional PV measures (Gibbons, Lane, Gerrard, Pomery, & Lautrup, 2002), which assess perceived personal risk contingent on performance of the behavior. They were as follows: "If you *were* to get tanned on a regular basis from using tanning booths [being in the sun], what are the chances that your skin would wrinkle prematurely?" followed by a 7-point scale, ranging from 1 (*no chance*) to 7 (*definitely would happen*; $\alpha = .76$).

A factor analysis of the four cognitions extracted one factor that explained 41% of the variance. Because of its low loading (.30), PV was not included in the aggregate Tanning Cognition Index, which was formed by standardizing and summing the remaining items ($\alpha = .82$).

T2 (follow-up). The same questions were asked at the second session (T2), and the same indices were computed (all αs $> .69$). Booth use "in the past 4 weeks" was measured using the same scale as in T1.

Procedure

T1. Upon arrival at the lab, participants were randomly assigned to either a UV photo or no-UV-photo (NUV) condition. UV condition participants had two pictures of their faces taken with a 35-mm single-lens reflex camera (Polaroid CU5, Faraghan Medical Camera Systems, Philadelphia, PA) equipped with a UV filter. One picture was a natural-light black-and-white, and the other was taken with the filter. Experimenters showed UV students both pictures, pointing out the dark-splotch areas of excessive exposure (damage) in the UV photo and stating that the splotches indicated damage from UV exposure that had already been incurred. More than 90% of students had some visible damage. UV students also received a 2-min oral presentation about UV exposure in which it was explained that (a) UV exposure leads to premature skin wrinkling (photoaging) and increases risk for skin cancer, (b) skin cancer and photoaging have increased in the United States recently, and (c) most skin damage occurs before adulthood, so the college years are crucial for sun protection. NUV condition participants waited for the 2-min period. All participants then completed the primary questionnaire. Finally, there was an extensive debriefing for all students, which included information from the 2-min oral presentation. Also, all participants were given three brochures that described photoaging and melanoma and listed common sun protection methods (e.g., using sunscreen with a sun protection factor greater than 15). Thus, by the end of the study, risk information provided to the two groups was almost identical. UV students did not keep their photos.

T2. Four weeks later, students were called and asked to return; 27 males and 31 females did return. Return rate did not differ by condition (UV = 90%, NUV = 75%; $p > .10$), and returnees did not differ from attriters in previous booth use or on any of the T1 measures (all ps $> .15$).

Results

To assess the impact of the intervention on participants' cognitions, we conducted 2 (gender) × 2 (UV condition) analyses of variance (ANOVAs) in both studies on the individual cognitions and the aggregate index. Gender was included in the analyses because studies of tanning booth use consistently find gender differences (i.e., females report much more use; Demko et al., 2003; Gerrard et al., 2005). This was followed by a logistic regression on number of participants reporting booth use (yes–no) as well as a hierarchical regression on reports of amount of use (number of visits). Finally, to examine the hypothesized mediation of use by the cognition index, we calculated a series of regression equations (Baron & Kenny, 1986) in which the impact of UV condition on booth use was assessed with and then without the presumed mediator (cognition index) included.

Tanning Cognitions

T1. The ANOVAs indicated that the UV photo affected all four cognitions (see Table 1). Relative to NUV students, UV students reported less favorable tanning attitudes and greater PV to photoaging (ps $< .001$), less favorable tanner prototypes ($p = .02$), and marginally less willingness for UV exposure ($p < .06$). UV participants also had lower scores on the Tanning Cognition Index, $F(1, 66) = 15.29$, $p < .001$. There were also gender differences, as females reported more negative prototypes and greater PV (both ps $< .05$).

Table 1
Means for Cognitive and Behavior Measures by Condition and Time (Study 1)

Measure	Pretest	Postphoto	Follow-up
Tan attitudes			
UV		3.2**	3.4
NUV		3.6	3.7
Prototype			
UV		3.9*	3.9
NUV		4.4	4.2
Willingness			
UV		4.9†	4.9*
NUV		5.3	5.5
Perceived vulnerability			
UV		3.9**	4.0*
NUV		3.2	3.5
Tanning Cognition Index[a]			
UV		−3.7**	−2.4*
NUV		4.1	2.9
Booth use[b]			
UV	0.9 (31.2)		0.3** (16.0)
NUV	0.9 (28.1)		1.8 (46.9)

Note. UV = ultraviolet photo condition; NUV = no-ultraviolet-photo condition.
[a] Standardized index. [b] Adjusted means for booth use, controlling for experimental session, are reported at the follow-up. Values in parentheses are percentage of students reporting booth use. Differences between UV and NUV conditions are as follows: † $p < .10$. * $p < .05$. ** $p < .01$.

T2. At T2, the UV effect was still significant on PV ($p = .02$), marginal on attitudes ($p < .11$), and nonsignificant on prototype ($p = .24$). It had become significant on willingness ($p < .05$) and remained significant on the Tanning Cognition Index ($p < .04$).

Booth Use

Percentage using and amount of use. Baseline booth use (assessed at T1) did not differ between conditions in terms of either percentages reporting use (UV = 31%, NUV = 28%, $p > .50$) or amount of use ($p > .80$). At T2, the percentages were very different (UV = 16%, NUV = 47%). A logistic regression on T2 use, controlling for previous use, revealed effects of previous use and UV condition (Walds = 5.48 and 8.41, $ps < .02$ and .004, respectively; odds ratio for UV = 8.03; see Table 1). The hierarchical regression conducted on amount of T2 use, controlling for previous use, revealed the same two effects: Previous use was associated with more T2 use ($\beta = .28$), $t(55) = 2.39$, $p = .02$, and UV condition was associated with less T2 use ($\beta = -.42$), $t(55) = -3.54$, $p < .001$.[1]

Mediation. The regression analyses intended to assess the mediation hypothesis indicated, first of all, that condition did predict the Tanning Cognition Index: UV condition students reported more negative cognitions ($\beta = -.35$), $t(54) = -2.83$, $p <$

[1] There were also three measures of vulnerability to UV damage that were somewhat more objective: eye color, skin tone (i.e., ease of tanning), and sunburn history. None of these measures related to booth use either directly (pre- or postphoto) or in combination with the (UV) condition, however.

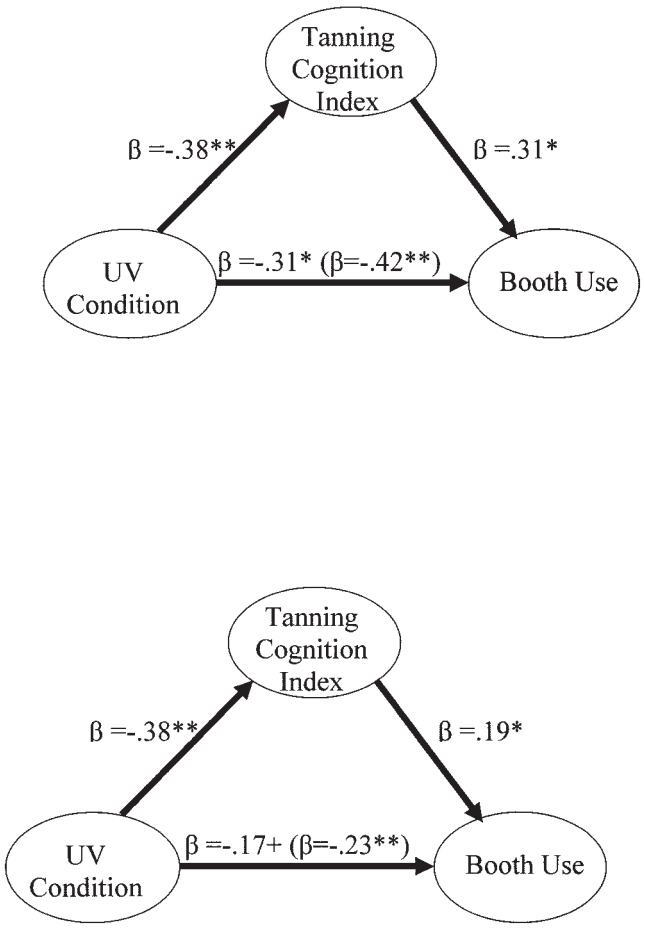

Figure 1. The three-item Tanning Cognition Index as a mediator of the relation between the ultraviolet radiation (UV) photo and amount of tanning booth use for Study 1 (top) and Study 2 (bottom). Values in parentheses represent the effect of UV condition on booth use before the mediator was entered. $^{+}\ p < .10$. $^{*}\ p < .05$. $^{**}\ p < .01$.

.007. Next, the cognition index predicted amount of booth use, controlling for previous behavior and condition ($\beta = .31$), $t(54) = 2.48$, $p < .02$. Finally, condition predicted behavior less strongly with the cognition index included than without it ($\beta = -.31$), $t(55) = -2.58$, $p < .02$. The indirect effect of condition on use, through the cognition index, was significant ($z = -2.05$, $p < .05$; see Figure 1), indicating there was significant mediation.

Discussion

In spite of receiving a fair amount of information about the dangers of UV exposure, the percentage of students in the NUV condition reporting booth use increased noticeably after the experimental session (from 28% to 47%). An increase this time of year (April) is not surprising. In the UV condition, however, reported use declined (from 31% to 16%), suggesting that the photo cut use by more than two thirds. This change in behavior was partially (but significantly) mediated by the cognitions that were assessed, all of which were affected by the camera. Thus, the results did provide evidence of the type of cognitive mediation that was anticipated. As stated above, however, there were some small differences between the UV and NUV conditions (in terms of the information presented). For this reason and in an effort to increase confidence in the findings of Study 1, a second study was conducted.

Study 2

The design of Study 2 was similar to that of Study 1 except that the differences between the UV and NUV conditions were minimized—that is, the same information about UV risk was presented in both conditions and all students (not just those in the UV condition) received a natural-light photo of their faces. Also, the wording of some of the questions was changed slightly.

Method

Participants

College students who participated in mass pretesting sessions at the beginning of the semester were randomly chosen to be called and asked to participate in a lab study on recreation attitudes. A total of 72 female and 62 male college students agreed; this time about 10% to 15% of those called either refused or could not find a convenient time to come to the lab. Previous booth use for this group in the last 6 months, which was assessed in the pretesting, was similar to that in Study 1 (males = 18%, females = 74%).

Measures

Cognitions. The T1 dependent measures were similar to those in Study 1, with the following differences. A single tanning prototype was assessed by asking students to rate the type of person who "works on their tan by sunbathing and/or by visiting booths" followed by four adjectives: *careless* and *cool* (as in Study 1) plus *popular* and *unattractive* (instead of *attractive*). The conditional PV item was replaced with an absolute PV item: "What do you think the chances are that you will get skin cancer in your lifetime from exposure to the sun and/or tanning booths?" which was answered with a percentage. There were three attitude items: "I look better with a tan," "Most people look better with a tan," and "Having a tan is healthy." Finally, only the second willingness index from Study 1 (go outside with friends on the first sunny day) was used. This time, all items, except the PV item, were followed by a 150-mm line on which respondents placed a slash (with anchors *not at all likely* to *very likely*). Factor analyses conducted on the four cognitions produced results very similar to those of the same analyses in Study 1. One factor was extracted that explained 43% of the variance. PV again had a low loading (.14) and so it was dropped, leaving the same three-item Tanning Cognition Index as in Study 1: prototypes, attitudes, and willingness ($\alpha = .73$). All of the cognitions were assessed again at T2 (for the tan index, $\alpha = .85$). For all items except the PV item, 7-point scales were used at T2 (instead of the 150-mm line) but with the same anchors used at T1. The PV item remained as a percentage.

Booth use. In the mass testing sessions, students were asked "How many times have you gone to a tanning booth in the last 6 months?" followed by a 10-point scale, ranging from 1 (*None*) to 10 (*9 or more times*). At T2, students were asked how often they had gone to a tanning booth "in the last 3 weeks," again followed by the 10-point scale, ranging from 1 (*zero*) to 10 (*9 or more times*).

Procedure

T1. Participants in both the UV and NUV conditions were given the same oral presentation, used in Study 1, about increases in skin cancer and

the role of UV exposure in cancer and photoaging. At this point, UV students had regular (black-and-white) and UV pictures taken, whereas NUV students had just their regular photo taken. Thus, both groups had a (regular) photo of themselves this time. The same photo explanation as in Study 1 was provided to the UV group. The NUV group was just told their (regular) photos would be used later in the study. After presenting the photos, the experimenter asked the student to complete the questionnaire with the various dependent measures. All students then received the same debriefing as in Study 1, and they were given the same brochures.

T2. Of the original group, 55 females and 54 males returned for the follow-up. Once again, rate of return did not differ by condition (UV = 78%, NUV = 85%; $p > .30$), and those who returned were not significantly different from those who did not on previous booth use and on the dependent measures, assessed during the postphoto experimental session (all ps $> .22$).

Results

Tanning Cognitions

Gender × Condition ANOVAs conducted on the individual cognitions and the index indicated that students in the UV condition reported less favorable cognitions (i.e., more negative attitudes, higher PV) on all four measures (all ps $< .03$) as well as the cognition index, $F(1, 129) = 14.49$, $p < .001$ (see Table 2). At T2, the pattern of results on each measure was almost identical to that in Study 1: The UV effect was not significant on prototypes and attitudes (ps = .12 and .17), but it was significant on willingness, PV, and the index (all ps $< .03$).

Booth Use

Again, baseline reports of prior booth use did not differ across conditions in terms of percentage using (UV = 47%, NUV = 44%) or amount of reported use ($p = .20$). At T2, the percentage figures were as follows: UV = 27%, NUV = 39%. A logistic regression of T2 use reports, controlling for T1 use, revealed a strong effect of previous use (Wald = 20.75, $p < .001$) and a marginal effect of condition (Wald = 3.06, $p < .08$, odds ratio = 2.36; see Table 2). Hierarchical regressions on amount of use at T2 indicated that previous use ($\beta = .45$), $t(106) = 5.31$, and UV condition ($\beta = -.23$), $t(106) = -2.72$, were both significant predictors (both $ps < .008$); thus, viewing the photos was again associated with significantly less T2 booth use.

Table 2
Means for Cognitive and Behavior Measures by Condition and Time (Study 2)

Measure	Pretest	Postphoto	Follow-up
Tan attitudes			
UV		−.26**	−.15
NUV		.32	.16
Prototype			
UV		−.16*	−.13
NUV		.22	.14
Willingness			
UV		−.21*	−.20*
NUV		.22	.21
Perceived vulnerability			
UV		.19*	.22*
NUV		−.24	−.22
Tanning Cognition Index[a]			
UV		−1.70**	−1.16*
NUV		1.72	1.25
Booth use[b]			
UV	2.4 (47.0)		0.9** (27.1)
NUV	2.1 (44.3)		2.0 (38.5)

Note. The three risk cognitions had different scales at the two time periods, so they were standardized for comparison purposes. Booth use at pretest is for the last 6 months; use at follow-up is for the last 3 weeks. UV = ultraviolet photo condition; NUV = no-ultraviolet-photo condition. [a] Standardized index. [b] Adjusted means for booth use, controlling for experimental session, are reported at the follow-up. Values in parentheses are percentage of students reporting booth use. Differences between UV and NUV conditions are as follows: * $p < .05$. ** $p < .01$.

Mediation. The same mediation analyses from Study 1 were used again and they produced similar results. Being in the UV condition predicted more negative cognitions ($\beta = -.32$), $t(105) = -3.47$, $p = .001$. The cognition index predicted behavior, controlling for condition ($\beta = .19$), $t(104) = 2.10$, $p < .05$. Finally, with the index included, UV condition dropped from a significant ($p < .01$) to a marginal ($p > .06$) predictor of behavior. Once again, the indirect effect of condition through the index was significant ($z = -1.92$, $p = .05$; see Figure 1), indicating significant mediation.

Combining studies. Because of their similar procedures, the two studies were combined and regressions were conducted on the overall data set ($N = 167$). Reports of T2 booth use were as follows: UV = 23%, NUV = 42%. A logistic regression on use revealed main effects of past behavior and UV condition (Walds = 24.20 and 9.96, respectively, $ps < .002$. The same was true for the linear regression for previous use ($\beta = .39$), $t(164) = 5.59$, $p < .001$, and UV condition ($\beta = -.29$), $t(164) = -4.12$, $p < .001$. Thus, across both studies, viewing the photo was associated with less T2 use, controlling for T1 use.

General Discussion

In both studies, the UV photo altered students' cognitions about tanning, and this effect, in turn, mediated the significant impact (reduction) that the photos had on their booth use. Thus, the study provides some information about why the intervention is effective at altering behavior. In particular, it changes tanners' attitudes about tanning (e.g., they are less likely to state that they believe a tan improves appearance) as well as their images of the type of person who tans. Combined with the study by Mahler et al. (2003), these results suggest the photos will reduce UV exposure among groups of individuals that are at (relatively) high risk: beachgoers and tanning booth patrons.

One limitation of the study that should be kept in mind is that self-report measures of behavior were used, which raises some questions about validity and reliability. In both the UV and NUV conditions, students received considerable information and advice about avoiding UV exposure; and, in fact, in Study 2, procedures in the two conditions were identical except for the UV photo. Thus, it seems unlikely that there would have been differential pressure in the two conditions to not report accurately about behavior at the follow-up. Nonetheless, we would suggest that future studies of UV exposure use more objective measures of exposure, for example, spectrophotometers to measure skin color (Mahler, Fitzpatrick, Parker, & Lapin, 1997).

Conclusion

The UV photo provides an effective means of reducing harmful UV exposure from tanning booth use. It does so apparently by altering cognitions about the behavior and about those who engage in it. Thus, it takes the primary motive for tanning and turns it around 180^{0}—making people realize that the behavior in which they were engaging in order to improve their appearance will actually have the opposite effect, eventually. Because of its cost effectiveness, the technique has considerable appeal as a large-scale, community-based intervention with proven results (Mahler et al., 2003). Future examinations of the social–psychological processes that underlie the photo's effects including its impact on perceptions of UV risk should provide additional evidence as to how and why it is effective.

References

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), *Action control from cognition to behavior* (pp. 11–39). New York: Springer-Verlag.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173–1182.

Demko, C. A., Borawski, E. A., Debanne, S. M., Cooper, K. D., & Stange, K. C. (2003). Use of indoor tanning facilities by white adolescents in the United States. *Archives of Pediatric and Adolescent Medicine, 157,* 854–860.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research.* Reading, MA: Addison Wesley.

Fulton, J. E. (1997). Utilizing the ultraviolet (UV) detect camera to enhance the appearance of photo damage and other skin conditions. *Dermatologic Surgery, 23,* 163–169.

Geller, A. C., Colditz, G., Oliveria, S., Emmons, K., Jorgensen, C., Aweh, G. N., & Frazier, A. L. (2002). Use of sunscreen, sunburning rates, and tanning bed use among more than 10,000 U.S. children and adolescents. *American Academy of Pediatrics, 109,* 1009–1014.

Gerrard, M., Gibbons, F. X., Benthin, A. C., & Hessling, R. M. (1996). A longitudinal study of the reciprocal nature of risk behaviors and cognitions in adolescents: What you do shapes what you think and vice versa. *Health Psychology, 15,* 344–354.

Gerrard, M., Gibbons, F. X., Brody, G. H., Murry, V. M., Cleveland, M. J., & Wills, T. A. (in press). A theory-based dual focus alcohol intervention for pre-adolescents: Social cognitions in The Strong African American Families Program. *Psychology of Addictive Behaviors*.

Gerrard, M., Gibbons, F. X., & Bushman, B. J. (1996). Relation between perceived vulnerability to HIV and precautionary sexual behavior. *Psychological Bulletin, 119,* 390–409.

Gerrard, M., Gibbons, F. X., Lane, D. J., Stock, M., Dykstra, J. L., & Pomery, E. A. (2005). [Trends in UV exposure on six college campuses]. Unpublished raw data.

Gibbons, F. X., & Gerrard, M. (1997). Health images and their effects on health behavior. In A. P. Buunk & F. X. Gibbons (Eds.), *Health, coping and well-being: Perspectives from social comparison theory* (pp. 63–94). Mahwah, NJ: Erlbaum.

Gibbons, F. X., Gerrard, M., & Lane, D. J. (2003). A social reaction model of adolescent health risk. In J. M. Suls & K. Wallston (Eds.), *Social psychological foundations of health and illness* (pp. 107–136). Oxford, England: Blackwell.

Gibbons, F. X., Lane, D. J., Gerrard, M., Pomery, E. A., & Lautrup, C. L. (2002). Drinking and driving: A prospective assessment of the relation between risk cognitions and risk behavior. *Risk Decision and Policy, 7,* 267–283.

Hoegh, H. J., Davis, B. D., & Manthe, A. F. (1999). Sun avoidance practices among non-Hispanic White Californians. *Health Education and Behavior, 26,* 360–368.

Jones, J. L., & Leary, M. R. (1994). Effects of appearance-based admonitions against sun exposure on tanning intentions in young adults. *Health Psychology, 13,* 86–90.

Karagas, M. R., Stannared, V. A., Mott, L. A., Slattery, M. J., Spencer, S. K., & Weinstock, M. A. (2002). Use of tanning devices and risk of basal cell and squamous cell skin cancers. *Journal of the National Cancer Institute, 6,* 224–226.

Knight, J. M., Kirincich, A. N., Farmer, E. R., & Hood, A. F. (2002). Awareness of the risks of tanning lamps does not influence behavior among college students. *Archives of Dermatology, 138,* 1311–1315.

Looking fit: Tanning fact book. (2003–2004). Phoenix, AZ: Virgo.

Mahler, H. I. M., Fitzpatrick, B., Parker, P., & Lapin, A. (1997). The relative effects of a health-based versus an appearance-based intervention designed to increase sunscreen use. *American Journal of Health Promotion, 11,* 426–429.

Mahler, H. I. M., Kulik, J. A., Gibbons, F. X., Gerrard, M., & Harrell, J. (2003). Effects of appearance-based intervention on sun protection intentions and self-reported behaviors. *Health Psychology, 22,* 199–209.

McClendon, B. T., Prentice-Dunn, S., Blake, R., & McMath, B. (2002). The role of appearance concern in responses to intervention to reduce skin cancer risk. *Health Education, 102,* 76–83.

Robinson, J. K., Rigel, D. S., & Amonette, R. A. (1997). Trends in sun exposure knowledge, attitudes, and behaviors: 1986 to 1996. *Journal of the American Academy of Dermatology, 37,* 179–186.

Rossi, J. S., Blais, L., & Weinstock, M. A. (1994). The Rhode Island Sun Smart Project: Skin cancer prevention reaches the beaches. *American Journal of Public Health, 84,* 672–674.

U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program. (2002, December). *Report on carcinogens* (10th ed.). Rockville, MD: Author.

Veierod, M. B., Weiderpass, E., Thorn, M., Hansson, J., Lund, E., Armstrong, B., & Adami, H. (2003). A prospective study of pigmentation, sun exposure, and risk of cutaneous malignant melanoma in women. *Journal of the National Cancer Institute, 95,* 1530–1538.

Weinstock, M. A., & Rossi, J. S. (1998). The Rhode Island Sun Smart Project: A scientific approach to skin cancer prevention. *Clinics in Dermatology, 16,* 411–413.