

# Randomized Controlled Trial of a Web-Based Indoor Tanning Intervention: Acceptability and Preliminary Outcomes

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**Objective:** This article describes the acceptability and preliminary behavioral outcomes of a pilot randomized control trial of a web-based indoor tanning intervention for young adult women. The intervention targets indoor tanning users' perceptions of the benefits and value of tanning and addresses the role of body image-related constructs in indoor tanning. **Method:** Participants were 186 young adult women who reported indoor tanning at least once in the past 12 months. The study design was a 2-arm randomized controlled trial with pre- and postintervention assessments and random assignment to an intervention or control condition. Intervention acceptability was assessed by obtaining participants' evaluation of the intervention. Regression analyses were used to test for intervention condition differences in preliminary behavioral outcomes measured at 6 weeks postintervention. **Results:** Participants provided favorable evaluations of the intervention on several dimensions and a highly positive overall rating. Intervention participants were more likely to report abstaining from indoor tanning and indicated a lower likelihood of using indoor tanning in the future compared with control participants on the postintervention assessment. No differences were found for sunburns. **Conclusions:** The results of this pilot randomized controlled trial provide evidence that the indoor tanning intervention is acceptable to participants and may encourage cessation of indoor tanning behavior. The findings provide preliminary support for an indoor tanning intervention that engages tanners to challenge their beliefs about the benefits of indoor tanning. The use of a web-based indoor tanning intervention is unique and provides strong potential for dissemination.

**Keywords:** behavioral intervention, indoor tanning, melanoma prevention, skin cancer prevention

Indoor tanning (IT) beds that emit artificial ultraviolet (UV) radiation are implicated in an estimated 450,000 cases of nonmelanoma skin cancer and 11,300 cases of melanoma each year in the United States, northern and western Europe, and Australia (Wehner et al., 2012). In the United States, the increasing popularity of IT over the past 2 decades among young adult women (Robinson, Kim, Rosenbaum, & Ortiz, 2008) has been accompanied by increasing melanoma incidence in this group (Coelho & Hearing, 2010). Nearly one in three young adult Caucasian women report using IT beds in the past year (Guy, Berkowitz, Watson, Holman,

& Richardson, 2013), making this an important group for melanoma prevention efforts.

The 2014 *Surgeon General's Call to Action to Prevent Skin Cancer* highlighted the need for innovative IT behavioral interventions that address underlying motives for tanning, including "the desire to look attractive and healthy and to conform to societal beauty standards" (U.S. Department of Health and Human Services, 2014, p. 27). Body image theory may provide insights into developing such interventions. Body image theories posit that one's thoughts and actions related to one's appearance are largely

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socially determined by perceptions of societal beauty standards, or *beauty ideals* (Stice, 2001; Thompson & Stice, 2001). These beauty ideals are further reinforced by interpersonal experiences. A young woman who internalizes beauty ideals as her own appearance goals will feel pressured to match her appearance to them. Perceived discrepancies between the internalized ideal and one's appearance lead to body image dissatisfaction. Appearance-altering behaviors, like IT, become powerfully reinforcing because they help to alleviate body dissatisfaction by aligning one's appearance more closely with the ideal.

The application of body image theory to IT would suggest that a young woman's societal experiences can lead her to form a *tan beauty ideal*, defined as the belief that being tan is a defining aspect of being an attractive woman. A young woman who internalizes a tan ideal will value being tan as important to her own attractiveness, be motivated to use IT, and experience appearance dissatisfaction when she is not tan. Evidence is beginning to emerge that supports an association between body image constructs and IT attitudes and behavior (see the review by Thompson, Ata, Roehrig, & Chait, 2012). The desire to possess the same tan as favored celebrities, a marker of tan ideal internalization, is linked to IT among young adults (Cafri et al., 2008). Also consistent with internalization, IT users monitor, evaluate, and compare their tan with their desired or ideal tan level (Cafri et al., 2008; Gillen & Markey, 2012; Prichard, Kneebone, Hutchinson, & Wilson, 2014). Appearance monitoring influences IT intentions by increasing body dissatisfaction (Stapleton, Turrisi, Todaro, & Robinson, 2009). *Skin tone dissatisfaction*, defined as a perceived discrepancy between one's current and ideal tan, is associated with tan ideal internalization and tanning behavior among adolescent girls (Prichard et al., 2014). Body image investment in IT may explain why some users think the short-term appearance benefits and self-confidence gained with IT are more important than or are worth the risks (Banerjee, Hay, & Greene, 2013; Cafri, Thompson, Jacobsen, & Hillhouse, 2009).

This article describes the pilot test of a web-based IT intervention informed by body image theory-guided interventions designed to prevent disordered eating among young women. The intervention targets an IT user's perceptions of the benefits and value of tanning and addresses the role of body image in IT. The intervention was targeted to young women, because they report the highest rates of IT. The intervention included persuasive techniques informed by nonclinical cognitive-behavioral interventions that engage participants in reflection and cognitive restructuring of beliefs (Heinicke, Paxton, McLean, & Wertheim, 2007; Stewart, Carter, Drinkwater, Hainsworth, & Fairburn, 2001; Stice, Rohde, Durant, & Shaw, 2012). Psychoeducational content was designed to engage participants in reflection on how their IT behavior may be influenced by their societal experiences related to tanning, the internalization of the value that a tanned appearance is an ideal body image, and resulting dissatisfaction. Restructuring IT-related beliefs involved thought exercises that presented tan ideal counterperspectives including evidence against a tan beauty ideal and alternative viewpoints related to the personal and social benefits of tanning. Participants were also encouraged to consider strategies for counteracting body dissatisfaction and plans for reducing their IT.

Several IT interventions with evidence of efficacy target perceptions of the short-term appearance benefits of IT through rais-

ing awareness of the negative appearance effects of IT (e.g., premature skin aging, wrinkling; Gibbons, Gerrard, Lane, Mahler, & Kulik, 2005; Greene & Brinn, 2003; Hillhouse, Turrisi, Stapleton, & Robinson, 2008). The present intervention shares important key features with these and other skin cancer intervention approaches (Jackson & Aiken, 2006; Lazovich et al., 2013; Mahler, Kulik, Butler, Gerrard, & Gibbons, 2008; Pagoto, Schneider, Oleski, Bodenlos, & Ma, 2010), including reframing perceptions of tanning benefits, targeting normative perceptions regarding the attractiveness of tanning, and promoting healthy alternatives to tanning. Innovative aspects of this intervention include the web-based format and the use of thought exercises to target central body image constructs, including perceptions of a tan ideal, tan ideal internalization, and perceptions of the role of dissatisfaction in IT.

The first study aim was to describe the acceptability of the intervention as determined by participants' evaluations. The second aim was to report the preliminary behavioral outcomes measured at a 6-week intervention follow-up assessment. The study hypothesis was that intervention participants would report less IT and a lower likelihood of using IT in the future at follow-up compared with control participants. We also examined whether rates of sunburns, a marker of IT use and other risky UV exposure, were lower among intervention participants.

## Method

### Participants

Participants were women between the ages of 18 and 25 years who had used IT in the past 12 months. Participants were recruited from a large northeastern U.S. university with posted study flyers or via in-class announcements in six courses. Study procedures were described as reviewing and providing feedback about an interactive website about tanning beds. A study coordinator screened and enrolled participants via phone. The 186 participants who completed a baseline assessment reported a mean age of 19.78 years ( $SD = 1.35$ ), and their racial makeup was as follows: White (147 participants; 79.0%), Asian (20; 11.1%), Black (2; 1.1%), other (11; 5.9%), and refused to answer (6; 3.2%). Twenty-five participants identified as Hispanic (13.4%).

### Study Design and Procedure

In this two-arm randomized controlled trial, participants were randomized to an intervention condition or a wait-list control condition. Intervention participants completed a baseline assessment, viewed and evaluated the intervention approximately 2 weeks later, and then completed a follow-up assessment approximately 6 weeks after the intervention. Participants in the wait-list control condition completed the baseline and follow-up assessments and were invited to access the intervention after the follow-up. Deviations in this study timing occurred with some participants because of either (a) a 2-week delay in the intervention and subsequent follow-up caused by issues related to intervention programming ( $n = 6$ ) or (b) a follow-up assessment period that was shortened by 1–2 weeks to accommodate assigning extra course credit prior to the end of the semester ( $n = 6$  intervention participants [8% of the intervention condition]). All participants

provided online informed consent prior to the baseline, and the university's institutional review board approved all procedures.

Participants received a unique identification number to securely complete each assessment and the intervention. An introduction e-mail provided study details and a link to the baseline assessment. As many as two e-mail reminders were sent to noncompleters. Participants who did not complete an assessment within 1 week of receiving the second e-mail reminder were considered to be study dropouts. Baseline assessments were completed between December 2013 and March 2014, and follow-up assessments were completed between April and May of 2014. The study timing was planned so that the intervention would be administered prior to the winter months between February and April, which are considered to be the peak time for IT (Hillhouse et al., 2008). Flyer participants received a gift card for each completed assessment (\$25) and the intervention evaluation (\$20). Classroom participants received extra course credit for completing assessments and a gift card for the intervention evaluation (\$20). Incentives were paid immediately following participants' accessing the assessments, regardless of level of completion. Classroom participants were enrolled in a \$100 gift card raffle at the end of the study, contingent on completion of all study procedures.

## Intervention

The intervention was programmed with SNAP survey software (SNAP Surveys Ltd, 2012). The intervention was accessed as a website, but participants were guided through pages in a predetermined order rather than having links that allowed them free exploration. Each page contained psychoeducational content or

thought exercises with corresponding closed- or open-ended questions for providing brief, typed responses. Responses were securely saved and stored by the software program.

The intervention adapted a cognitive-behavioral approach through engaging IT users to reflect on and restructure their beliefs related to their personal and social valuation of tanning. An intervention map with an overview of the intervention techniques and targeted constructs and brief descriptions of associated content is provided in Table 1. Psychoeducational content engaged participants in reflection on their IT-related beliefs and behaviors. Content discussed how media and peer experiences shape and reinforce tanning beliefs (tan ideal) and how these beliefs can lead to an overemphasis on being tan (internalization) and body dissatisfaction. Restructuring IT-related beliefs involved thought exercises in which participants were provided with persuasive information that included presentations of evidence against a tan beauty ideal and alternative viewpoints about the personal and social benefits of IT. The intervention provided counterperspectives to beliefs about a tan ideal in the media (i.e., the belief that tanning is common in attractive media figures) and in peers (i.e., the belief that peers greatly value being tan and IT) and reasons to not internalize the tan ideal. Participants were asked to consider these counterperspectives and to provide their thoughts and reactions to the information in the form of typed responses. Content related to media influences on body image was primarily adapted from and informed by disordered eating interventions (Heinicke et al., 2007; Stewart et al., 2001; Stice et al., 2012). Counterperspectives from IT-using peers were derived from a focus group study with IT users (unpublished data). Specifically, focus group quotes were

Table 1  
*Intervention Map of Techniques, Targeted Beliefs, and Brief Descriptions of Intervention Content*

Technique	Targeted construct	Description of content
Reflection	Societal influences that create and reinforce a tan ideal	Information is provided about how young women's body image is influenced by media portrayals of attractive women that create beauty ideals and peer experiences that reinforce these ideals. Participants answer questions related to how media figures or peers influence their own indoor tanning (IT).
	The process of internalization and resulting body dissatisfaction	Descriptions are provided of how endorsing the tan ideal can lead to feeling pressured to look tan and engender body dissatisfaction when one is not tan. Participants consider the role of negative mood resulting from body dissatisfaction in their own IT.
Restructuring	Beliefs about tan ideal in media	Participants are encouraged to consider examples of the many attractive celebrities who do not tan. Thought exercises are performed related to a shifting societal view that is becoming more positive toward celebrities with natural, untanned appearances.
	Beliefs about internalization and resulting body dissatisfaction	Information is provided about the prevalent use of digital image enhancement to create "perfect" images along with examples of images with digitally enhanced tans. The use of enhanced images by IT salons to induce negative affect in IT users is covered. Participants are encouraged to rethink the value of internalizing a tan ideal given the unrealistic nature of altered media portrayals and the risks of IT. Thought exercises are performed related to participants' reaction to a task of comparing an unaltered image with an altered image of a popular celebrity. The top 10 best personal attributes to counteract body dissatisfaction are listed.
	Beliefs about tan ideal in peers	Thought exercises developed from a preintervention qualitative study with IT users are performed. Examples include the following: considering the negative peer stereotypes associated with tanning; example of how being tan or using IT is not viewed positively by peers; the necessity of IT use because many peers do not pay attention to how tan their peers are; and the view among peers and the college community that the perception of what is attractive is shifting away from tanning toward natural, untanned skin.
Strategies	Planning change and change goals	An IT change goal is described and steps listed for implementing a plan to achieve the change goal. Obstacles to changing IT and strategies for dealing with obstacles are considered. Alternative behaviors to IT that have appearance-enhancing qualities are evaluated.

identified from instances of IT users talking about negative personal and social aspects of being a tanner.

Intervention participants who indicated an interest in changing their IT identified a tanning change goal and a change plan that included consideration of obstacles to changing, including internalization thinking, and strategies for dealing with these obstacles. Participants completed a top 10 list of their best personal attributes and were told to remind themselves of these attributes when experiencing body dissatisfaction in the future. Finally, participants were asked to consider alternative appearance behaviors that could be substituted for IT.

### Acceptability Evaluation

Participants evaluated the intervention by rating it on four aspects: interesting, understandable, useful, and positive (Hillhouse et al., 2008). Item response options were arrayed on an 11-point scale ranging from 0 (*not at all*) to 10 (*extremely*). Participants provided an overall rating of the intervention on a scale ranging from 1 (*I did not like this program at all*) to 10 (*This is a wonderful program*) and indicated whether they would recommend the intervention to a friend if it were publicly available. Participants also provided open-ended feedback related to the aspects of the intervention they liked best and least. For both questions, two authors (masked) independently read and coded each response to identify the referenced best and least liked intervention aspects. The authors compiled the codes into like responses and worked together to develop a consensus related to central themes that described the various types of comments.

### Efficacy Evaluation Measures

**IT.** IT was assessed following guidelines developed by a National Cancer Institute panel of IT researchers (Lazovich et al., 2008). In the baseline assessment, participants estimated the number of times they had used a tanning bed or booth with tanning lamps in their lifetime and in the past 12 months with an open-ended response. In the follow-up assessment, this item stem was used with a past-6-week recall to reflect the period between intervention administration and the follow-up. Global measures of IT are highly correlated with biweekly diary measures of behavior collected within the same time frame (Hillhouse et al., 2008).

**Likelihood of IT.** On the follow-up assessment, participants indicated how likely they were to use IT in the next year on a 5-point response scale ranging from 0 (*not at all likely*) to 4 (*very likely*; Hillhouse et al., 2008).

**Sunburns.** On the follow-up assessment, participants indicated the number of sunburns they had received in the past 6 weeks with an open-ended response option. The sunburn measure was considered a general marker of UV risky behavior because the item did not specify whether the sunburn was a result of IT use.

### Efficacy Evaluation Analytic Plan

A per protocol (PP) data analysis approach was used analyzing data only from participants who completed all study procedures. PP is appropriate in assessments of pilot trials and preliminary intervention outcomes studies designed to determine the efficacy of an intervention delivered in ideal conditions with study-

compliant participants (Armijo-Olivo, Warren, & Magee, 2009). Participants included in the PP analysis were compared with noncompleters on important baseline variables to assess for evidence of bias related to study dropout. There was little evidence that noncompleters differed from study completers on mean levels of baseline lifetime number of tanning sessions,  $t(183) = 0.216$ ,  $p = .83$ ; number of past-12-month IT sessions,  $t(179) = 0.040$ ,  $p = .97$ ; or likelihood of IT,  $t(184) = -1.71$ ,  $p = .09$ .

Intervention efficacy was assessed by comparing intervention and control participants on IT use, likelihood of using IT in the future, and sunburns reported at follow-up. The IT and sunburns outcomes were count variables and were analyzed using zero-inflated negative binomial (ZINB) regression models. Zero-inflated analyses were appropriate because of the high number of zero responses to both variables at follow-up (63% zero values for IT and 91% zero values for sunburns). In addition, the count outcomes had standard deviations that were larger than the means (IT sessions:  $M = 3.33$ ,  $SD = 6.65$ ; sunburns:  $M = 0.23$ ,  $SD = 1.02$ ), which is indicative of overdispersion and the need for negative binomial modeling. Mean differences between conditions in likelihood of using IT in the future were examined with a linear regression model. All analyses were conducted with Mplus Version 7.3 using maximum likelihood parameter estimates with robust standard errors (Muthén & Muthén, 2012).

## Results

### Participants

A screening phone call was conducted for 215 of the 272 individuals who contacted the research team about the study. Twenty-two individuals were screened as ineligible, and the remaining 193 individuals agreed to participate and were enrolled. Six enrolled participants reported no past-12-month IT on the baseline despite indicating IT during the screening call. These ineligible participants were allowed to finish the study procedures but were excluded from data analysis. A total of 187 eligible participants were randomized to the intervention ( $n = 94$ ) or the control ( $n = 93$ ) condition (see Figure 1). The majority of participants were recruited from classrooms (66%;  $n = 123$ ). The mean numbers of baseline past-12-month IT sessions were similar for intervention ( $M = 19.90$ ,  $SD = 18.91$ ) and control participants ( $M = 17.07$ ,  $SD = 20.79$ ),  $t(179) = -0.96$ ,  $p = .34$ , as were mean levels of IT likelihood (intervention:  $M = 2.33$ ,  $SD = 1.43$ ; control:  $M = 2.14$ ,  $SD = 1.42$ ),  $t(184) = -0.93$ ,  $p = .36$ .

### Acceptability

**Intervention evaluation.** The means for the intervention evaluation items, measured on an 11-point scale ranging from 0 (*not at all*) to 10 (*extremely*) were as follows: interesting: 7.70 ( $SD = 1.71$ ; range: 2–10; mode = 8); understandable: 8.94 ( $SD = 1.31$ ; range: 4–10; mode = 10); useful: 7.89 ( $SD = 1.66$ ; range: 3–10; mode = 9); and positive: 8.49 ( $SD = 1.49$ ; range: 5–10; mode = 10). The overall mean rating of the intervention was 8.50 ( $SD = 1.48$ ; range: 3–10; mode = 10) which was highly positive as 10 was the most favorable response option. Sixty-seven participants (81%) indicated they would recommend the intervention to a friend if it were publicly available.

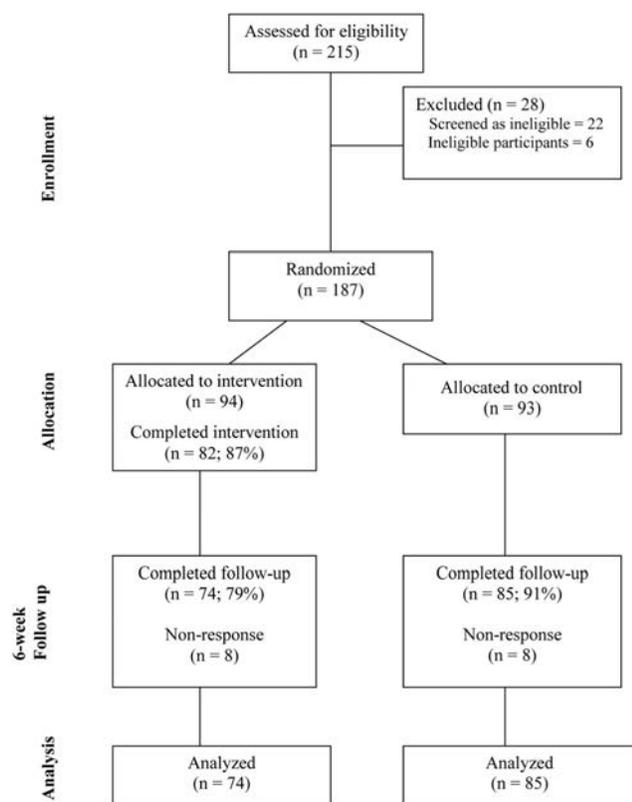


Figure 1. Participant flowchart.

**Participant feedback.** Participants' open-ended responses to questions related to the best and least liked intervention aspects were coded and sorted into representative themes (see Table 2). The best liked aspects of the intervention included the informative content (mentioned in 34% of comments), the focus on media influences (28%), being encouraged to reflect on their positive attributes (19%), being encouraged to think about their tanning behavior (18%), and the quotes about tanning from other young women (9%). Participants also commented on aspects of the intervention approach (13%) that included the use of open-ended questions, the use of images, and length. The most common response to the least liked aspect question was that participants did not have a least liked aspect to note (19%). Other least liked aspects included that the intervention contained inaccurate assumptions (9%), made participants feel pressured to change or plan change (8%), made participants think about the risks of tanning (5%), and involved too much reading (5%). Finally, some participants did not like the repetitive nature of questions (19%), the length (13%), and the question response options (9%). Many of these criticisms appeared to pertain to the baseline survey assessment rather than the intervention.

### Efficacy

Intervention participants reported an average of 2.54 IT sessions ( $SD = 6.39$ ) during the 6-week follow-up period compared with 4.02 IT sessions ( $SD = 4.20$ ) for control participants. We tested for intervention effects on the IT outcome

using a ZINB model because of the large portion of zero responses. Excessive zeros are referred to as *structural zeros* and, in this context, represent a subgroup of participants not at risk for IT (i.e., they abstained from tanning; Cheung, 2002). The two-component ZINB model used logistic regression to model the occurrence of structural zeros, or the nontanning subgroup, and negative binomial regression to model the expected count or frequency of IT across the entire sample using all the responses (including zeros). The conditional means and variances of the negative binomial model component are altered to account for the probability of excessive zeros, as obtained in the logistic model (Long, 1997). Both the logistic and binomial ZINB model components included intervention condition as a predictor and baseline number of past-12-month IT sessions as a covariate in an attempt to reduce variable overdispersion by accounting for individual differences in IT not accounted for by the intervention condition variable.

Results of the ZINB logistic model component (see Table 3) showed that intervention participants were more likely to be in the nontanning subgroup at follow-up compared with control participants ( $\beta = 0.83, p < .05$ ). This beta estimate can be interpreted as the odds of reporting no IT at follow-up (i.e., abstaining from IT) were 2.29 times higher for intervention participants compared with the odds for control participants. For the ZINB count model component, there was a nonsignificant association between intervention condition and the frequency of IT sessions reported at the follow-up after accounting for the excessive zeros. This shows that the intervention did not reduce the frequency of IT sessions compared with the control condition after model adjustments for the excessive zeros found in the sample. The baseline IT covariate was negatively associated with the structural zeros ( $p < .001$ ) and positively associated with the frequency of follow-up IT sessions ( $p < .001$ ).

With respect to the likelihood of future use of IT, intervention participants reported a significantly lower mean likelihood ( $M = 2.15, SD = 1.47$ ) compared with control participants ( $M = 1.50, SD = 1.30; \beta = 0.65, p = .004$ ). For the sunburn ZINB model, neither the logistic nor count component showed significant differences on the basis of intervention condition.

### Discussion

The purpose of this study was to evaluate the acceptability and preliminary impact of a web-based IT intervention. Findings showed high acceptability and preliminary evidence of intervention efficacy. In terms of acceptability, participants provided favorable evaluations of the intervention on several dimensions and a highly positive overall rating. The evaluations were comparable to those reported for an IT handbook intervention delivered to a similar population (Hillhouse et al., 2008). Many participants felt that the best part of the intervention was the content related to media influences and felt positively about reflecting on their IT. The high acceptability is an encouraging sign that IT users may be receptive to interventions that engage them to reflect on their IT behavior.

With regard to behavioral outcomes, the odds of not using IT at the follow-up were more than two times greater among intervention participants compared with the odds of abstaining among control participants. There were, however, no differences between

Table 2  
*Thematic Categories of Participants' Best and Least Liked Intervention Aspects*

Question	Theme	Illustrative quote
Aspects of intervention liked best	Informative (34% of participants)	It really made me think about the harmful effects of tanning and brought to light that there are alternatives. The [intervention] was very informative and realistic about the consequences of tanning.
	Media influence focus (28%)	I especially like the photoshop portion. Girls don't realize that girls in magazines do not even look like that! It is an unachievable and unrealistic image. It reinforced the idea of why people go tanning, to gain a sense of attractiveness that the media instills. The media doesn't necessarily say, 'tan is attractive,' but rather if you do not try to be perfect and do not try to change the imperfections about yourself, you aren't beautiful. I liked how you can think critically about how the media actually affects you. I always knew that it was influencing me, but I never actually took the time to reflect on it consciously.
	Reflecting on positive attributes (19%)	It looked at the bigger picture, which was our self-esteem, confidence, how we feel about ourselves . . . a good reminder that each of us have a lot to be proud of and shouldn't worry solely about our appearance. [The intervention] made you come back to reality and show yourself how good of a person you truly are.
	Reflecting on tanning behavior (18%)	I enjoyed that it really made you think hard about the reasons why I felt I needed to be tan. It made me think a lot about myself and how I compare myself to people.
	Quotes (9%)	I liked the quotes that were incorporated from real people in the program. [The quotes] really put things into perspective for me about what people think about tanning.
Aspects of intervention liked least	Incorrect assumptions (9%)	I didn't like that the program assumes that young girls go tanning because they are feeling down. I think your "theories" might be a little too focused on the superficiality of tanning as opposed to other reasons people go tanning. The impression of thinking you just want to tan to impress people.
	Forced to consider changing behavior (8%)	They are trying to persuade me to change my tanning habits, but maybe I don't want to. What I liked the least was being forced to make goals. I don't really like people telling me what to do, especially because the program only knows so much about me.
	Raised risk awareness (5%)	I didn't like that this made me realize more about how bad tanning is for you. . . .

intervention and control participants on the frequency of IT sessions during the follow-up period after accounting for the large number of abstainers. Thus, it appears that the primary benefit of the intervention was in encouraging some intervention participants to abstain from IT. It is difficult to compare these outcomes with those of other trials that have demonstrated intervention efficacy using linear regression-based techniques (e.g., Hillhouse et al., 2008). Intervention participants also reported a low likelihood of using IT in the future compared with controls. Likelihood of future IT is an important measure of efficacy in this trial given the short follow-up period and the possibility that users may be hesitant to immediately give up their IT if they recently purchased monthly tanning packages. Future evaluation studies should use longer term follow-up assessments to determine whether reductions in IT use carry over to the following IT season. Sunburns are commonly reported with IT use (Stapleton et al., 2013), but our intervention did not lower sunburn rates. The lack of association may be attributable to the low number of reported sunburns or to the fact

that the sunburn measure was not worded to specifically assess sunburns caused by IT.

Existing IT interventions target perceptions of the appearance benefits of tanning by raising awareness of the appearance damage caused by tanning. The current intervention shares important features with other approaches, including providing contextual information about sociocultural influences and peer norms related to tanning, countering the perspective that tanned skin is healthy, providing examples of attractive women who are not tan, and promoting healthy appearance alternatives (Hillhouse et al., 2008; Lazovich et al., 2013; Pagoto et al., 2010). In the broader context of sun protection programs not targeted to IT users, other interventions have provided normative information (Mahler, Kulik, Butler, Gerrard, & Gibbons, 2008; Reid & Aiken, 2013) or addressed media pressures to be tan (Chait, Thompson, & Jacobsen, 2015). However, these non-IT-targeted approaches have either not been evaluated for changes in IT or did not produce changes in IT. This intervention trial provides unique evidence of the efficacy of targeting central body image constructs,

Table 3  
*Comparison of Intervention Conditions on Behavioral Outcomes*

Intervention follow-up outcome	Intervention condition as predictor variable <sup>a</sup>			
	$\beta$	<i>SE</i>	<i>Z</i>	<i>p</i>
IT sessions: Logistic model <sup>b,c</sup>	0.83	0.41	2.03	.042
IT: Count model <sup>b,c</sup>	-0.11	0.01	-0.37	.712
Likelihood of IT in the next year <sup>d</sup>	-0.65	0.22	-2.97	.003
Sunburns: Logistic model <sup>b</sup>	5.38	7.15	0.75	.452
Sunburns: Count model <sup>b</sup>	-0.14	0.84	-0.16	.871

Note. IT = indoor tanning;  $\beta$  = model beta estimate; *SE* = standard error for beta estimate; *Z* = *Z* test of ratio of estimate to standard error.

<sup>a</sup>The control condition was coded as the referent group for each model. <sup>b</sup>Zero-inflated negative binomial model. <sup>c</sup>Model component included number of past-12-month IT sessions reported at baseline as a covariate. <sup>d</sup>Linear regression model.

including IT users' perceptions of a tan ideal, internalization of tanning as a critical component of their personal attractiveness, and the role of dissatisfaction in IT. The use of thought exercises, change plans and goals, and exercises to counteract body dissatisfaction are also unique intervention aspects that may have contributed to the intervention effects.

The intervention targeted IT users' beliefs about the tan ideal and tan ideal internalization. The finding that the intervention reduced IT behaviors supports a future trial designed to examine mediator variables corresponding to these attitudinal mechanisms of change. It is interesting that some participants' comments on the best aspects of the intervention included that the intervention led them to think more deeply about their tanning, their reasons for tanning, and the role of the media in tanning as well as the intervention's focus on promoting positive body image. Many of the least favorable aspect comments were related to feeling that the assumptions of the intervention were "off" or that individuals did not want to consider changing their IT. These comments may be evidence of participants' engaging in the type of self-reflection and challenging of body image beliefs that the intervention was designed to produce. Evidence for the feasibility of this approach would also be strengthened if a future study could demonstrate beneficial intervention effects among tanners with a high degree of baseline tan internalization or tanning body image investment.

This study extends the literature in important ways. The use of a web-based IT approach is novel and has strong potential for sustainable dissemination. In addition, web-based interventions are likely to appeal to the target audience of young adult women and could be extended to integrate social media, mobile technology, and other online content. This is the first intervention to demonstrate that targeting body image constructs and using related thought exercises can reduce IT. Future research should test whether the current approach improves on existing efficacious interventions for subgroups of tanners. For example, there is some evidence that existing appearance-focused interventions may be less efficacious among subgroups of tanners with high levels of preintervention knowledge about appearance damage from IT (Stapleton, Turrisi, Hillhouse, Robinson, & Abar, 2010). It is possible that these subgroups hold the perspective that the appearance and confidence benefits of IT are more important than or are worth the risks (Banerjee et al., 2013; Cafri et al., 2009). The

current intervention may be a more efficacious strategy for these tanners by virtue of attempting to reduce the perceived sociocultural, interpersonal, and personal benefits of tanning that seem to override the risks. It will be important to test in future work whether intervention efficacy differs on the basis of participants' preintervention risk knowledge or tan ideal internalization. It is possible that intervention effects may be bolstered by tailoring content to participants' baseline risk knowledge to provide a greater focus on perceived appearance benefits for participants with low risk knowledge.

This study has several limitations. First, participants recruited to the study may have been more likely to have motivation to change their IT practices compared with women who did not volunteer for the study. Future studies could use different recruitment methods to enroll less motivated tanners. Second, assessments were self-reports. It is possible that the reporting of lower rates of IT by intervention participants were a result of socially desirable responding to appease researchers. Third, participants were provided with strong incentives for participation. Future research is needed to determine the effectiveness of the intervention when delivered in a less controlled manner and with reduced incentives for participation. Finally, the study sample of young adult women was recruited from a single campus and was limited to past-12-month IT users. The extent to which the findings can be extrapolated to other populations and settings remains to be determined. A future intervention trial using IT nonusers who intend to use IT would be valuable to test the effects of the intervention in preventing uptake of IT.

In conclusion, this study provides initial evidence that a web-based IT intervention that targets IT users' body image-related beliefs is well-received and can produce reductions in IT. The preliminary behavioral outcomes are encouraging, but there is a need to replicate findings and evaluate mediating mechanisms of intervention efficacy in additional studies. In addition, the adaptation of the intervention to a more traditional web format would provide greater functionality and interactive components as well as flexibility in engaging participants through social media and other public formats. The present findings provide initial evidence for a promising IT intervention approach with strong potential for dissemination and positive public health impact.

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