

# Messages Influencing College Women's Tanning Bed Use: Statistical versus Narrative Evidence Format and a Self-Assessment to Increase Perceived Susceptibility

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*Understanding the effect of messages and other influences on health decision-making has the potential to decrease risky behavior such as tanning bed use. This study explores the effect of type of evidence, self-assessments of risk for skin cancer, and personality factors on intention to use and use of tanning beds among Caucasian female college students. Specifically, it targeted the perceived susceptibility component of the Health Belief Model and its impact on intention to tan as well as changes in actual tanning behavior. College students (N = 141) in the southeast United States read randomly assigned messages and self-assessments, filled out surveys, and were later contacted for a follow-up telephone survey. The statistical message was rated higher on information value and also resulted in decreased intention to tan, decreased tanning behavior, and increased perceived susceptibility to skin cancer. The narrative message, in contrast, increased perceptions of realism and also worked to decrease intentions to tan. Additionally, the self-assessment manipulation resulted in increased susceptibility and decreased intention to tan and post tanning behavior. Personality factors explained small portions of variance. Key limitations and directions for future research are also addressed.*

## Introduction

Health decision-making is a complex yet crucial process. Understanding this process should assist in better targeting messages advocating preventive behaviors. Researchers continue to explore ways to persuade people to adopt preventive health behaviors, often focusing on the role of variables such as perceived susceptibility. Embedded in many investigations is the yet unresolved question of what forms of evidence are most

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persuasive, often compared as statistical or informational messages versus narratives or case study approaches. The present investigation contributes to and expands this debate in the context of tanning and skin cancer as a specific case of health decision-making. This study explores messages which may be effective in reducing the use of tanning beds among Caucasian college females, specifically by increasing perceived susceptibility to skin cancer and sun damage.

### **The Case of Skin Cancer and Tanning Beds**

Approximately one million cases of basal and squamous cell skin cancers and 21,000 cases of melanoma carcinoma in situ were diagnosed in the United States in 1998 (Landis, Murray, Bolden, & Wingo, 1998). Risk factors associated with the development of skin cancer include: excessive exposure to ultraviolet radiation, fair skin color, blue eyes, and family or personal history of skin cancer (American Cancer Society, 1998). Although some of these factors are hereditary or uncontrollable, exposure to natural sunlight is largely controllable through sunscreen use and limiting sun exposure. Another highly controllable risk factor is exposure to UV rays in the form of tanning bed use (or sunlamps). This is a voluntary behavior, a service for which people generally pay.

Tanning bed use can lead to severe negative health consequences in young adults (e.g., Dinehart, Dodge, Stanley, Franks, & Pollack, 1992; Westerdahl et al., 1994), because the use of tanning beds can lead to cancer (e.g., Spencer & Amonette, 1995; Westerdahl, Ingvar, Måsbäck, Jonsson, & Olsson, 2000) and other health problems such as skin/eye burns and photoaging. Tanning beds are a major risk factor in both melanoma and non-melanoma skin cancer (see Cokkinides, O'Connell, Thun, & Weinstock, 2002; Geller et al., 2002).

Despite increased media attention regarding the dangers of tanning and the decreasing popularity of tanned skin (e.g., George, Kuskowski, & Schmidt, 1996; Morton & Duck, 2001), having a tan is very important in some American subcultures. Each year an estimated 28 million Americans visit one of 25,000 tanning salons or 20,000 beauty parlors and health clubs with tanning facilities (Clark, 1997). The American Academy of Dermatology reported an increase in tanning bed use from 2% in 1986 to 12% in 1996. Women are three times more likely than men to use a tanning bed (Robinson, Rigel, & Amonette, 1997). Tanning bed use is also more prevalent among younger people and decreases with age among those above eighteen, especially young women (see Cokkinides et al., 2002; Geller et al., 2002). Additionally, white Americans are 4.3 times more likely than non-whites to use tanning lamps (Robinson et al., 1997).

### **Message Evidence Format**

Given increased tanning behavior, it is necessary to understand what features of messages such as evidence format are most effective for message designers contemplating campaigns. Evidence, information used as proof, constitutes the argumentative support in a message. A message presents a position, and the receiver assesses it, based, in part, on the evidence used to support the conclusions. Evidence generally increases the persuasiveness of a message (Reinard, 1988; Stiff, 1986). Two dominant types of evidence are statistical and narrative.

#### ***Statistical or Informational Evidence***

Statistical or informational messages summarize across a number of cases, often presenting summary statistics for a population such as number of deaths per year from some

health threat. Because this type of evidence purports to represent a number of cases, there may be an implicit perceived objectivity not apparent with a single case (where representativeness can be questioned).

### ***Narrative or Case Study Evidence***

A narrative or case study is a message that presents information in a personal as opposed to statistical format (see Arneson & Query, 2001; Ellingson & Buzzanell, 1999; Vanderford, Smith, & Harris, 1992). These narratives or case studies are a well-used form, one demonstrated to be both persuasive and memorable (see Reinard, 1988). Instead of simply providing facts and statistics about a health problem, a case study gives the history and experience of a particular person with the problem. Narratives focus on elaborating one example of an event, and they provide appealing detail, characters, and some plot. Taylor and Thompson (1982) suggest case studies may be more effective because readers underuse information presented in a statistical or strictly informational format.

### ***Comparing Statistical and Narrative Evidence***

At present researchers are not completely certain which is the better type of evidence, though they may function differently. Baesler and Burgoon labeled this question “unresolved” (1994, p. 583). Kopfman, Smith, Yun, and Hodges (1998) found that statistical evidence messages produced greater cognitive reactions while narratives produced greater affective reactions. Allen and Preiss’ (1997) meta-analysis argued statistical evidence was slightly more effective than narrative evidence, yet Taylor and Thompson (1982) argue, based on their review, case studies have greater persuasive effect. Reinard (1988) concludes, “all other things being equal, anecdotal reports may have more persuasive impact than statistics” (p. 24). Some of these differences in conclusions are a result of operational issues, as researchers have used the term “evidence” to describe widely different phenomena. Evidence studies have included, for example: credibility of evidence sources, evidence quality, evidence quantity (amount), and sidedness. Specifically for tanning, Cody and Lee (1990) found emotional and informational videos were equally effective in the short-term, however, the emotional video was more effective in influencing long-term skin protection intentions. Clearly both statistical and narrative evidence has been shown to produce persuasive effects, thus examination of the message evidence variable may shed further light on the issue.

### **Health Belief Model**

One theoretical perspective that may address evidence format and perceived susceptibility differences is the Health Belief Model (Becker, 1974). The Health Belief Model (HBM) is based on four components of health-related attitudes: (1) perceived susceptibility to a health threat—how likely people feel they are to develop a certain condition; (2) perceived severity of the health threat—how serious the condition would be; (3) perceived self-efficacy—people’s confidence in their ability to successfully perform behaviors to prevent the threat; and (4) perceived barriers—factors that would prevent them from taking the preventive action. The HBM has been used to explain a number of preventive health behaviors, however, the effectiveness of the HBM and the importance of the four components of the model in predicting behavior vary depending on the specific health threat. For example, Steers, Elliott, Nemiro, Ditman, and Oskamp (1996) found perceived susceptibility predicted increased condom use and decreased risky sexual behaviors. Perceived susceptibility is a crucial component of many health studies

and models of persuasion and is crucial for tanning behavior because receivers must view themselves at risk. Self-efficacy is not an issue with tanning because they need only stop the behavior, a simple solution with few barriers.

### ***Perceived Susceptibility***

The absence of perceived susceptibility may prevent college women from taking action to prevent skin cancer and sun damage. Perceived susceptibility to a threat is important in motivating positive health behavior (Janz & Becker, 1984; Klohn & Rogers, 1991; Mermelstein & Riesenber, 1992; Robinson et al., 1997). Cody and Lee (1990) found that people with sensitive skin types (an important risk factor) reported spending and intending to spend less time at the beach than those with less sensitive skin.

One problem with tanning is that many individuals do not personalize the risk being taken and consequently underestimate their risk (Jones & Leary, 1994). Robinson et al. found that “persons knew that others harm themselves by sun exposure, but did not fully recognize the potential harm of sun exposure to themselves” (1997, p. 182), leading them to suggest that “improved prevention knowledge, in itself, may not be enough to change behavior effectively. Rather, the establishment of personal relevance to the learned information may be necessary to effect behavioral change” (1997, p. 185). Thus, it appears that not only knowledge, but also a significant level of perceived susceptibility to skin cancer must be present in order for preventive health action to be taken. Mermelstein and Riesenber (1992) found perceived susceptibility to skin cancer to be the greatest predictor of intentions to take precautions against skin cancer. Similarly, Robinson et al. (1997) found higher perceived risk to be significantly correlated with a greater likelihood of using sunscreen and staying in the shade. Thus, for interventions to be effective they must increase perceived susceptibility to skin cancer. Increased levels of perceived susceptibility should result in less positive attitudes toward and reduced intentions to use tanning beds, but there is a question of how best to increase perceived susceptibility.

### ***Self-assessment of Risk***

One problem with perceived susceptibility is that it is subjective by definition. That is, people must assess their own risk for a health threat based on their level of knowledge, which is not always based on medical knowledge and may even be based on myth or misinformation. College students may not perceive themselves as susceptible to skin cancer because it generally develops later in life and they may not suffer immediate negative consequences (e.g., long-term skin damage). This misperception may be similar to an explanation of tobacco use among adolescents, specifically “tobacco may undermine the ‘perception of susceptibility’ portion of the HBM. Youthful users of tobacco who fail to see any immediate lethal consequences from their use likely conclude the purported dangers of tobacco as greatly exaggerated” (Lindsay & Rainey, 1997, p. 124).

One possible way to increase perceived susceptibility is through the use of a risk self-assessment. A person fills out a short survey and then uses it to calculate personal risk for skin cancer; this self-assessment should affect levels of perceived susceptibility to skin cancer. Mermelstein and Riesenber (1992) reported that students who received an intervention involving attending a class about skin cancer and calculated her/his own risk for skin damage caused by sun exposure reported significantly higher perceived susceptibility to skin cancer than those who did not. According to Weinstein’s (1980) Theory of Unrealistic Optimism, people are likely to underestimate their own risk for a certain

threat. By providing subjects with a standardized formula for calculating risk for skin cancer, their estimates of risk may become more objective and realistic.

### **Personality Predictors of Tanning Bed Use**

Potential barriers to health behavior adoption are also important in a HBM framework, and previous research has linked appearance-based and other personality traits to sun-related behavior. People choose to tan because they are motivated to make good impressions on others or be seen as physically attractive (Leary & Jones, 1993; also see Keesling & Friedman, 1987). Women who are especially willing to please others or insecure about their appearance may be more prone to tan. Thus, this study includes personality indicators related to body image, eating disorders, self-esteem, and imaginary audience (focus on what others are thinking about you).

### **Hypotheses and Research Questions**

This study will explore the effect of two message formats and a self-assessment of tanning risk on perceived susceptibility to skin cancer and sun damage, intentions and behavior regarding the use of tanning beds among Caucasian female college students. A case study format (telling the history of a young woman who used tanning beds and developed skin cancer) will be compared with an informative format (providing facts only about tanning bed use and skin cancer). The effect of the presence or absence of a self-assessment of risk on perceived susceptibility and tanning behavior will also be measured. Finally, personality factors will be considered in explaining tanning behavior and intentions.

H1a: A narrative evidence format will produce more positive message ratings than a statistical evidence format.

H1b-c: A narrative evidence format, compared to a statistical evidence format, will produce greater: b) actual use of tanning beds; c) intention to tan.

H2a-c: Compared to those participants who do not complete a self-assessment, those participants who do will report: a) increased perceived susceptibility to sun damage and skin cancer; b) reduced intention to tan; and c) decreased actual tanning bed use.

H3a-c: It is expected as self-assessed risk increases, those completing the self-assessment will report: a) increased perceived susceptibility to sun damage and skin cancer; b) reduced intention to tan; and c) decreased actual tanning bed use.

RQ1: What personality factors predict tanning bed use and intentions?

RQ2: Do personality factors or components of HBM explain more variance in tanning intentions and behaviors?

## **Method**

### ***Participants***

Participants in this study consisted of 141 Caucasian female college students<sup>1</sup> ranging in age from 19 to 26 ( $M = 21.4$ ;  $SD = 1.41$ ). Participants were recruited from undergraduate courses at a midsized southeastern University in the United States, participated in the study outside of class time, and received extra credit for participation. Descriptively, participants were raised primarily in the southeast (72%), and most had previously visited a dermatologist (60%).

### **Procedures**

After providing written consent, participants were placed in a room with up to seven other people and given a survey to complete (approximately twenty minutes). They were also asked to provide their first name, last initial and telephone number on a detachable form returned separately from the survey (an alternate contact number of a friend was also requested to increase follow up contact potential). Upon completion of the survey all participants were given a modified debriefing form (to not contaminate the post-test). A follow-up telephone survey contacted 98.6% of the initial participants 3-4 weeks later. The university review board approved the procedures.

### **Message Manipulations**

Surveys were identical with the exception of the presence or absence of one of two types of evidence format (statistical, narrative, or no message), and the presence or absence of a self-assessment to calculate personal risk for skin cancer ( $3 \times 2$  design).<sup>ii</sup>

**Evidence Type.** There were three message evidence conditions focusing on problems associated with tanning, tanning beds, and sun exposure.<sup>iii</sup> One message was statistical in format, providing statistical proof or evidence about the risk of use of tanning beds and information about skin cancer. For example, the statistical message stated: "The myth regarding tanning bed use is that the UVA rays they emit are safer than the sun, but this is not true." The second message used a narrative format that told the history of a young woman who used tanning beds and later developed facial skin cancer. For example, the narrative message stated: "Alicia liked the convenience, and she thought that the UVA rays emitted by the tanning bed were safer than UVB rays from the sun." The statistical and narrative messages contained identical arguments (quality and number) and sources, but they were presented in different evidence formats. Participants in the control condition ( $n = 45$ ) received no message (and no message perception ratings).

**Risk Self-assessment.** The second message feature was the presence or absence of a self-assessment of risk. This manipulation consisted of a nine item self-rating scale which participants filled out and self-scored to rate their risk for skin cancer (see Appendix A). Some items included were skin tone, number of freckles, hair and eye color, and use of tanning beds. The self-assessment was adapted from a scale developed by the American Academy of Dermatology ("AAD Wants to Convert," 1997). Each participant totaled her score and wrote this number at the bottom of the page to reinforce the self-assessment. Self-assessed risk for skin cancer was measured using the total score of those participants who completed the self-assessment. Scores ranged from 1 to 36 ( $M = 24.3$ ;  $SD = 5.41$ ), with a higher score indicating higher risk for skin cancer.

### **Measurement Instruments**

The initial survey consisted of scales to measure various demographics and personality traits, message perceptions, and use of and attitudes toward tanning beds. The present study measured message perceptions and five additional dependent variables: intention to tan, intention to protect skin, perceived susceptibility to skin cancer, tanning behavior change, and tanning bed use. Other psychological and behavioral variables included: self-efficacy, threat, prior tanning behavior, self-esteem, public body consciousness, eating disorders, and imaginary audience.

**Message Perceptions.** Perceptions of the message (narrative or statistical) were measured by a series of ten Likert-type items with five-point responses ranging from “*Strongly Agree*” to “*Strongly Disagree*.” The factor analysis (varimax rotation), reliabilities and scree plot indicated the presence of three factors (primary loadings all above .5 with no secondary loading above .3). The first factor (eigenvalue = 3.83, 32.4% var.) was labeled message *realism* ( $M = 3.74$ ;  $SD = .54$ ) and consisted of four items such as “This message was realistic.” The second factor (eigenvalue = 1.95, 17.2% var.) was labeled message *reflectiveness* ( $M = 3.48$ ;  $SD = .74$ ) and consisted of three items such as “This message made me think about my own risk for skin cancer.” The third factor (eigenvalue = 1.62, 13.8% var.) was labeled *information value* ( $M = 2.89$ ;  $SD = .80$ ) and consisted of three items such as “I learned a lot from this message.” The scores were summed and averaged for the three subscales, with higher scores indicating more positive perceptions of the message. The reliabilities were good (alphas = .87, .83, .84 respectively).

One additional measure of message was a shortened form of the amount of invested mental effort (AIME). It consisted of three Likert-type items, for example “How hard did you try to understand the message you read?” Scores on the AIME were summed and averaged (alpha = .71), with a higher score indicating more effort ( $M = 2.67$ ;  $SD = .73$ ).

**Intention to Tan.** Intention to tan was measured at the pretest using six Likert-type items with five-point responses ranging from “*Strongly Agree*” to “*Strongly Disagree*.” Factor analysis and reliabilities indicated the presence of two subscales, labeled *intention to tan* (eigenvalue = 3.23; 46% var.) and *intention to protect skin* (eigenvalue = 2.10, 27% var.) with items loading on the primary factor above .9 with no secondary loadings above .2. Intention to tan ( $M = 2.93$ ;  $SD = 1.49$ ) was composed of three items such as: “I am likely to use a tanning bed in the next month.” Intention to protect skin ( $M = 2.43$ ;  $SD = .90$ ) was composed of three items such as: “I am likely to wear sunscreen while I am in the sun.” Items were summed and averaged to form two intention scales. A higher score for intention to tan reflected greater intention to use a tanning bed. A higher score on intention to protect skin reflected greater intention to protect skin from sun damage. Reliabilities were very good (alphas = .96 for intention to tan, .93 for intention to protect skin).

**Tanning Bed Use and Change.** Tanning bed use ( $M = 3.06$ ;  $SD = 6.32$ ) was measured at the pretest with the question “How many times have you used a tanning bed in the past month?” Tanning bed change ( $M = -1.67$ ;  $SD = 5.11$ ) between the pretest and posttest was measured by telephone callback 3-4 weeks after the survey. Subjects were asked to answer the question “Would you please estimate how many times you have used a tanning bed in the past month?” Behavior change was measured by subtracting each subject’s use of tanning beds in the month following the pretest from their use in the month prior to the pretest. A positive score for behavior change indicated a reduction of tanning bed use, and a negative score indicated an increase in tanning bed use between the pre- and posttests. Prior tanning behavior ( $M = 10.96$ ;  $SD = 18.35$ ) was measured with a single item, “How many times have you used a tanning bed in the past year?”

**Perceived Susceptibility.** Perceived susceptibility to skin cancer and sun damage was measured at the pretest using eight Likert-type items with five-point responses ranging from “*Strongly Agree*” to “*Strongly Disagree*.” Examples of the items included “I am worried about developing skin cancer because of too much sun exposure” and “Compared with other female [University name] students, I have a high chance of developing

skin cancer.” Reliability was moderate ( $\alpha = .74$ ), and the factor analysis indicated a single factor solution (eigenvalue = 2.85; 38% var.) with all items loading above .5 on the single factor. Scores were summed and averaged ( $M = 3.55$ ;  $SD = .58$ ) with a higher score indicating greater perceived susceptibility.

**Efficacy.** Perceived self-efficacy in preventing skin cancer and sun damage was measured at the pretest using four Likert-type items with five-point responses ranging from “*Strongly Agree*” to “*Strongly Disagree*.” Examples of the items included “Avoiding tanning beds is a good way to protect my skin” and “Using sunscreen won’t prevent my skin from being damaged.” Reliability was satisfactory ( $\alpha = .71$ ), and the factor analysis indicated a single factor solution (eigenvalue = 2.19; 55% var.) with all items loading above .5 on the single factor. Scores were summed and averaged ( $M = 4.16$ ;  $SD = .53$ ) with a higher score indicating greater efficacy.

**Perceived Threat.** Perceived threat of skin cancer and sun damage was measured at the pretest using five Likert-type items with five-point responses ranging from “*Strongly Agree*” to “*Strongly Disagree*.” Examples of the items included “Many people die of skin cancer” and “Skin cancer is almost always curable.” Reliability was moderate ( $\alpha = .76$ ), and the factor analysis indicated a single factor solution (eigenvalue = 2.35; 47% var.) with all items loading above .55 on the single factor. Scores were summed and averaged ( $M = 3.75$ ;  $SD = .55$ ) with a higher score indicating greater perceived threat.

**Personality Factors.** Four personality factors were identified for use in the present study: self-esteem, eating disorders, public body consciousness, and imaginary audience.

Ten five-point Likert items selected from Hudson (1982) measured self-esteem. Sample items include: “I feel I am a likable person” and “I feel that I am a competent person.” Responses ranged from “*Never*” to “*Always*,” with a higher score indicating more positive self-esteem ( $M = 3.82$ ;  $SD = .45$ ). The reliability was good ( $\alpha = .81$ ) with a single factor structure (eigenvalue = 3.83; 43% var.) and all items loading above .5 on the factor.

Eating disorder was measured with twelve Likert-type items selected from the EDI (Garner, Olmstead, & Polivy, 1983) with five-point responses ranging from “*Never*” to “*Always*” ( $M = 2.80$ ;  $SD = .78$ ). For example, items included “I eat when I am upset” and “I feel satisfied with the shape of my body.” The reliability was very good ( $\alpha = .92$ ) with a single factor structure (eigenvalue = 5.88; 49% var.) and all items loading above .5 on the factor. Items were summed and averaged to form one scale, with a higher score indicating more indications of an eating disorder.

Public body consciousness was measured with six Likert-type items selected from Miller, Murphy, and Buss (1981) with five-point responses ranging from “*Never*” to “*Always*” ( $M = 3.98$ ;  $SD = .63$ ). For example, one item stated, “I like to make sure my hair looks right.” The reliability was moderate ( $\alpha = .73$ ) with a single factor structure (eigenvalue = 2.49; 49.5% var.) and all items loading above .55 on the factor. Items were summed and averaged to form one scale, with a higher score indicating more consciousness about body.

The imaginary audience scale (IAS) used in the present study (Walters et al., 1991) utilized four-point Likert-type responses ranging from “*Always*” to “*Never*.” One item, for example, stated, “feel nervous because you worry about whether people like you.” For the present study, a six-item version was used based on previous factor structure and reliabilities (Walters et al., 1991). Reliability was good ( $\alpha = .79$ ), with a single factor

structure (eigenvalue = 3.68; 45.8% var.) and all items loading above .55 on the factor. Items were summed and averaged ( $M = 2.02$ ;  $SD = .53$ ) to form a composite scale, with a higher score indicating more concern about others' thoughts.

## Results

### Analyses

Hypotheses 1 and 2 were analyzed by a series of  $3 \times 2$  analyses of variance (ANOVAs) with independent variables message format (narrative/statistical/none) and self-assessment (present/absent) and dependent variables intention to tan, intention to protect skin, perceived susceptibility to skin cancer, tanning behavior change, and tanning bed use. Perceptions of the message evidence format (statistical or narrative) were tested via a series of  $t$ -tests. Hypothesis 3 (risk self-assessment score) was analyzed by Pearson product-moment correlations. Research questions were addressed through a series of regressions (stepwise or enter). The level of significance was set at  $p < .05$  for all tests except for correlations, where .01 was utilized to protect against Type I error. The zero order correlation matrix for all variables is presented in Table 1.

### Message Perceptions

To address Hypothesis 1a, perceptions of the message evidence format were assessed using four  $t$ -tests.  $T$ -tests were utilized because there were no data collected on message perceptions available for the self-assessment message or from the control group. There were no significant differences between the statistical or narrative messages in mental effort ( $t(98) = -.47$ ,  $d = .05$ ) or message reflectiveness ( $t(98) = .14$ ,  $d = .01$ ). The narrative message ( $M = 3.89$ ;  $SD = .56$ ) produced greater ratings of realism ( $t(98) = 2.29$ ,  $p < .05$ ,  $d = .23$ ) than the statistical message ( $M = 3.57$ ;  $SD = .52$ ). The statistical message ( $M = 3.10$ ;  $SD = .76$ ), however, produced greater ratings on information value ( $t(98) = 2.85$ ,  $p < .01$ ,  $d = .31$ ) than the narrative message ( $M = 2.69$ ;  $SD = .79$ ). Thus, there were some differences in message perceptions based on evidence format, providing some support for Hypothesis 1a.

### Message Effects (Evidence and Self-assessment)

Hypotheses 1 and 2 were explored through a series of  $3 \times 2$  ANOVAs with factors message evidence (narrative, statistical, no message) and self-assessment (present, absent) on tanning behavior change, intentions, and susceptibility. There were no significant interaction effects between evidence format and self-assessment (and none were predicted), thus results are summarized by main effect. Table 2 presents group means and standard deviations.

**Message Evidence Format Main Effects.** The message evidence format revealed several significant main effects (post hoc tested via SNK). Participants who read the statistical message reported decreased tanning behavior (or change) ( $F(2, 136) = 2.87$ ,  $p < .05$ ,  $\eta^2 = .05$ ) compared with those who did not read any message (the effect of the narrative message was not significantly different). For the tanning bed one month post message, the statistical message was significantly better ( $F(2, 136) = 3.02$ ,  $p < .05$ ,  $\eta^2 = .04$ ) than either the narrative or no message. For intention to use tanning beds, both messages ( $F(2, 136) = 3.93$ ,  $p < .05$ ,  $\eta^2 = .05$ ) were significantly better than the no message condition. For susceptibility, all three messages differed significantly from each other ( $F(2, 136) =$

TABLE 1 Zero Order Correlation Matrix for Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Tan change	—													
2. Tan past mo.	-.72**	—												
3. Intent to tan	-.35**	.54**	—											
4. Intent protect	.16	.15	.16	—										
5. Tan year	.52**	.52**	.45**	.10	—									
6. Self assess	.12	.12	.32*	-.19	.20	—								
7. Suscept.	.10	.10	.18	-.22*	.15	.27*	—							
8. Threat	-.08	-.05	-.13	-.16	-.13	.11	.32**	—						
9. Efficacy	-.4	-.01	-.07	-.06	-.07	.07	.16	.24*	—					
10. Eating dis.	-.19*	.16	.22*	.09	.15	.20	.14	.10	.01	—				
11. Body image	-.12	.19	.16	.02	.21*	.14	.12	-.08	-.03	.39**	—			
12. S-esteem	.05	-.01	-.05	-.03	-.09	-.13	-.18	.07	.08	-.30**	-.14	—		
13. Imag. aud.	-.16	.09	.21*	-.10	.03	.15	.24*	.01	.13	.31**	.29**	-.39**	—	
14. Age	.05	-.04	.10	.02	.05	-.05	.08	.06	.02	.11	.07	-.06	-.03	—

$N = 141$  for all correlations except self assessment where  $n = 72$ .

\* $p \leq .01$ ; \*\* $p \leq .001$ .

**TABLE 2** Summary of Means for Message Evidence and Self Assessment Groups

		Tan Chg.	Past Mo.	Intent Tan	Intent Protect	Suscept.
<b>Evidence Format</b>						
Statistical	<i>M</i>	-.85 <sup>a</sup>	1.31 <sup>a</sup>	2.67 <sup>a</sup>	2.31 <sup>a</sup>	3.70 <sup>a</sup>
( <i>n</i> = 50)	<i>SD</i>	2.97	5.03	1.42	.87	.55
Narrative	<i>M</i>	-1.18 <sup>ab</sup>	3.78 <sup>b</sup>	2.73 <sup>a</sup>	2.51 <sup>a</sup>	3.54 <sup>b</sup>
( <i>n</i> = 50)	<i>SD</i>	5.58	7.22	1.59	.76	.52
No Message	<i>M</i>	-3.22 <sup>b</sup>	3.57 <sup>b</sup>	3.10 <sup>b</sup>	2.49 <sup>a</sup>	3.43 <sup>c</sup>
( <i>n</i> = 45)	<i>SD</i>	6.16	6.42	1.44	1.06	.65
<b>Self Assessment</b>						
Present	<i>M</i>	-1.25 <sup>a</sup>	2.18 <sup>a</sup>	2.68 <sup>a</sup>	2.38 <sup>a</sup>	3.66 <sup>a</sup>
( <i>n</i> = 70)	<i>SD</i>	4.60	5.30	1.50	.81	.62
Absent	<i>M</i>	-2.08 <sup>a</sup>	3.76 <sup>b</sup>	3.19 <sup>b</sup>	2.49 <sup>a</sup>	3.04 <sup>b</sup>
( <i>n</i> = 71)	<i>SD</i>	5.57	7.16	1.46	.98	.53

Means that do not share superscripts are significantly different.

3.17,  $p < .05$ ,  $\eta^2 = .06$ ), with the statistical message resulting in the most susceptibility and the no message condition the least. There were no significant differences by message evidence format in intentions to protect skin ( $F(2, 136) = .96$ ,  $\eta^2 = .02$ ).

**Self-assessment Main Effects.** The self-assessment showed several significant main effects. Participants who filled out the self-assessment reported increased perceived susceptibility ( $F(1, 136) = 3.82$ ,  $p < .05$ ,  $\eta^2 = .07$ ) compared with those who did not fill out the self-assessment. Additionally, participants who filled out the self-assessment reported lower intentions to use tanning beds ( $F(1, 136) = 3.93$ ,  $p < .05$ ,  $\eta^2 = .05$ ) compared with those who did not fill out the self-assessment. Finally, participants who filled out the self-assessment reported decreased tanning bed use one month after ( $F(1, 136) = 3.02$ ,  $p < .05$ ,  $\eta^2 = .04$ ) compared with those who did not fill out the self-assessment. There were no significant differences by self-assessment in intentions to protect skin ( $F(1, 136) = .52$ ,  $\eta^2 = .01$ ) and tanning behavior change ( $F(1, 136) = 1.06$ ,  $\eta^2 = .01$ ).

### Regressions

Two sets of regressions were run to test RQ1 and 2, the first set exploring the contributions of personality factors, the second set comparing the contribution of HBM and personality factors.

**Research Question 1.** RQ1 addressed the contribution of personality factors to tanning behavior and intentions. A series of stepwise regressions was performed to explore this question. Predictor variables for each regression were: self-esteem, public body consciousness, eating disorder, and imaginary audience.

The model predicting tanning behavior change ( $F(1, 136) = 5.17$ ,  $p < .05$ ) contained one variable: eating disorders ( $\beta = -.19$ ,  $p < .05$ , Adj. R-sq. = .03). Specifically, women with eating disorder issues reported less reduction in tanning bed use.

The model predicting tanning bed use ( $F(1, 136) = 5.46$ ,  $p < .05$ ) contained one variable: body consciousness ( $\beta = .19$ ,  $p < .05$ , Adj. R-sq. = .03). Specifically, women with more body consciousness reported more tanning bed use.

The model predicting intention to tan ( $F(1, 136) = 7.13, p < .01$ ) contained one variable: eating disorders ( $\beta = .22, p < .01, \text{Adj. R-sq.} = .06$ ). Specifically, women with eating disorder issues reported more intent to use tanning beds. None of the personality variables significantly predicted intention to protect skin.

The model predicting susceptibility ( $F(1, 136) = 8.37, p < .01$ ) contained one variable: imaginary audience ( $\beta = .24, p < .01, \text{Adj. R-sq.} = .05$ ). Specifically, women with higher imaginary audience reported more perceived susceptibility.

**Research Question 2.** For RQ2, regressions were run to test whether personality or HBM variables were better predictors of behavioral and intention variables. Perceived susceptibility, threat, and efficacy were entered on the first step, the personality variables (self-esteem, imaginary audience, body image, and eating disorders) on the second step; this regression was run three times, first predicting intention to use tanning beds and intention to avoid sun and then the tanning behavior change variable.

For intention to use tanning beds, the first step was significant ( $F(3, 140) = 3.88; p < .01; \text{Adj. R-Sq.} = .07$ ). The change for the second step was also significant ( $F(7, 136) = 3.12; p < .01; \text{R-Sq. Cg.} = .04$ ). The final model predicting intention to use tanning beds contained three significant variables: susceptibility ( $\beta = .25, p < .01$ ), threat ( $\beta = -.19, p < .05$ ) and eating disorders ( $\beta = -.21, p < .05$ ).

For intention to protect skin, the first step was significant ( $F(3, 140) = 2.77; p < .05; \text{Adj. R-Sq.} = .04$ ). The change for the second step was not significant ( $F(7, 136) = 1.79; \text{R-Sq. Cg.} = .01$ ). The final model predicting intention to protect skin contained one variable: susceptibility ( $\beta = -.19, p < .05$ ).

For tanning behavior change, the first step was not significant ( $F(3, 140) = 1.64; \text{Adj. R-Sq.} = .01$ ). The change for the second step was not significant ( $F(7, 136) = 1.51; \text{R-Sq. Cg.} = .01$ ).

## Discussion

Health decision-making is a complex phenomenon, as the present examination of tanning illustrated. This study explored the effects of message evidence format (statistical and narrative), a self-assessment for skin cancer risk, and personality factors in predicting intentions and use of tanning beds. Hypotheses were generally supported and are discussed next.

### **Message Evidence Format**

Results from this study indicate statistical and narrative messages function differently, yet both have some effect on tanning intentions and behaviors (see Hypothesis 1). Statistical messages may be more effective in reducing use of tanning beds than are narrative messages, but both statistical and narrative messages are better than no message in decreasing intention to tan and increasing perceived susceptibility. Similar to research by Kopfman et al. (1998), the two messages produced different effects, but both had some effect. In the present study, these were also revealed in differential message ratings, where narrative messages rated higher on realism but statistical messages were rated higher on information value. This complex pattern of effects was only discernable when message ratings, intention, and behavioral outcome data were collected. Few studies have included a no message condition with multiple manipulations, and this is an important control to assist in understanding how message evidence functions. For example, with both types of evidence working better than no message, one can conclude that

any message is better than no message (e.g., giving a person a pamphlet—statistical or narrative—to read while waiting to see a dermatologist is better than no message at all, but this study does show message evidence differences).

The present findings are generally consistent with Allen and Preiss (1997) who found overall slightly more effects for statistical messages. These results do not support research by Taylor and Thompson (1982) or Reinard (1988) who suggested narratives were more effective than statistical information. This finding (and lack of concurrence) is not surprising considering the differences in studies included in reviews by Allen and Preiss (1997) and Reinard (1988). The operationalization is a critical issue, particularly for the statistical message. These contrasts should lead researchers and message designers to carefully consider in detail what type of evidence is used in their message (e.g., evidence quality, source credibility, quantity, base rate fallacy, etc.). Interestingly, there is little evidence available to ascertain the potential combinatorial effectiveness of narrative and statistical messages, that is, including both approaches in one message. Thus far, they have been studied as mutually exclusive, but in conjunction they may produce a broader range of effects than either alone.

The results suggest that messages with primarily factual content may be more effective than those personalizing the information. Those participants who read the narrative may have found it easy to disassociate themselves from the woman in the message, assuming skin cancer was her problem but that it would not happen to them. Perhaps the statistical message had to be processed in such a manner that the reader was made to consider her own use of tanning beds.

### ***Risk Self-assessment***

The self-assessment of risk manipulation was effective in reducing intention to tan, tanning bed use, and in increasing perceived susceptibility, providing support for Hypothesis 2. This finding is consistent with previous research by Mermelstein and Riesenber (1992) who found that high school students who completed an assessment of risk scored higher on perceived susceptibility. There was, however, no effect of the self-assessment on intention to protect skin, differing from the Robinson et al. (1997) finding that higher than average perceived risk correlated with intention to take precautionary measures. Perceived level of risk may be largely influenced by past behavior. Therefore, it is possible that those people who have failed to protect their skin in the past (and thus have a higher risk for skin cancer) do not intend to increase their future skin protection behavior. Interestingly, there was no interaction between self-assessment and evidence format (and none was specifically predicted, though it would be plausible they would work together).

Hypothesis 3 explored the role of the total self assessment risk score (the summed score), and these data were available only for participants in the self assessment condition. A higher self assessment score (not the manipulation itself) was related to more intention to tan and decreased intention to protect skin, opposite of hypothesis. There is also a slight artifact of scoring to note (see Appendix A), where prior tanning bed users score 3 points higher (prior behavior is a part of the self assessment instrument). The self assessment score, however, also correlated with prior tanning behavior (over the past year). The findings for prior behavior are some of the strongest in the study, .52 with tanning in past month, .45 with intention to tan. This finding lends credence to theory of reasoned action (Fishbein & Ajzen, 1975) arguments concerning the relation between prior behavior, intention, and behavior and also points to the importance of issue involvement in message processing (cf. Real & Rimal, 2001; Reinard, 1988). It is worth

noting that Real and Rimal (2001) even operationalized perceived risk as affective involvement in their skin cancer study. Additionally, central and peripheral cues from the elaboration likelihood model (Petty & Cacioppo, 1986) may assist in understanding when message evidence cues are more or less influential. According to this reasoning, statistical evidence would be especially persuasive among those highly involved with the topic. Prior familiarity with the topic, however, may also inhibit message processing. Thus, it may be especially difficult to target prior tanning bed users, even with statistical messages. Based on that reasoning, it would be easier to delay first tanning bed use (initiation) than stop current tanning bed use (cf. smoking or sexual activity campaigns), perhaps messages should be targeted to younger females in junior and high school.

The present study provided support for the relationship between perceived susceptibility, intention to tan, and tanning bed use. The strongest correlation was with the self-assessment manipulation designed specifically to increase perceived susceptibility (a type of validation). Other correlations were moderate and not always in the expected direction, thus, the role of susceptibility in tanning behavior decisions is complex. This is consistent with risk-taking research reporting perceived susceptibility to function opposite of the hypothesized direction. That is, those persons who feel that they are more susceptible to contracting HIV/AIDS or a STD are less likely to practice safe sex behaviors (e.g., DeHart & Birkimer, 1997; Vanlandingham, Suprasert, Grandjean, & Sittitrai, 1995; cf. Aspinwall, Kemeny, Taylor, Schneider, & Dudley, 1991; Joseph et al., 1987). Some people are well aware of risks and continue to perform risky behaviors, often mindfully (cf. knowledge-gap hypothesis). This finding may suggest that participants who tan are aware of their susceptibility to skin cancer and sun damage but continue to tan regardless. Thus, women who know their risk for skin cancer may continue to tan because they do not want to deal with the issue and perhaps choose to avoid it. If they see no other easy and convenient way to achieve a socially desirable tan, then they are willing to take the risk. As Lindsay and Rainey (1997) suggested with young tobacco users, women who tan may place a greater emphasis on the rewards of being tan (looking thin, attracting a mate, etc.) than on the threat of possible future health risks. These women may, consciously or not, decide to focus on now rather than an uncertain future.

Severity or threat may be another crucial component of the HBM to target in order to effect attitude and behavior change. Perceived threat was strongly related to susceptibility, and other relations were all negative, indicating increasing perceived threat reduces tanning risk taking. In order to target severity, messages would need to emphasize the serious nature of skin cancer, scarring which can occur from removal of malignancies, and the costs (social and monetary) involved with the treatment of skin cancer. Klohn and Rogers (1991) found emphasizing the highly visible effects and sudden onset of osteoporosis was effective in increasing perceived severity and intentions to prevent osteoporosis among college women. For tanning, it may be necessary to emphasize the visibility of permanent skin damage that can result from tanning bed use (this is current practice in some before/after tanning posters and the "Fry Now, Pay Later" campaign).

### ***Personality Factors***

Personality factors related to appearance and focus on others' views explained some additional variance in tanning intentions and behaviors. Of the variables used in the present study, body image and eating disorders were most strongly related to central variables (more than self-esteem or imaginary audience). This is consistent with prior research (e.g., Leary & Jones, 1993; Keesling & Freidman, 1987). Body image focuses on

how a person wants to appear physically to others, but eating disorder focuses on satisfaction with one's own body. Tanning behavior clearly has roots in appearance and views of self. Focus group data indicate motivations for tanning center on appearance, looking better, and views of others (perhaps also feeling good about looking better, hinting at self-esteem links), a complex relation important to consider in future tanning research. There is a difference, then, in tanning bed use or laying out at the beach (choosing to darken skin) and tanning from, for example, working outdoors or through sporting activities. Tanning bed users actively seek sun exposure, yet others fail to use sun protection (one is a behavior, the other failure to perform a behavior). This personality-based information regarding tanning can assist in audience segmentation and targeting campaigns. Specifically, women with low self image, body and eating issues will be especially vulnerable to tanning bed use and possible skin cancer problems.

The personality variables in the present study are interrelated in complex ways. One underlying aspect of these data is indication that women may be especially susceptible to the influence of others (cf. imaginary audience). Many of the factors tapped in the study (body image, eating disorder, tanning) focus on appearance or views of others. If women are locating some sense of self in either their appearance or the opinions of others, this opens new areas for potential interventions. The tanning data presented here indicates some women value appearance even at the cost of their own health.

### ***Limitations***

A primary limitation of this study is that it was conducted during the six weeks prior to spring break. This is a popular time for students to use tanning beds; they often spend the weeks just prior to spring break trying to develop a "base tan" before they leave for vacation. Participants who reported tanning prior to spring break may have considered a base tan a preventive behavior to decrease likelihood of burning on spring break; this possibility was not explored in the present data. This trend of tanning bed use before spring break was reflected in the call back surveys, which reported an increase in tanning during the month following the survey compared to the month before the survey. It should be noted, however, that the design specifically considered these issues. Several measures were only moderate in reliability, and this should be considered. Additionally, a sample composed strictly of women who were users of tanning beds may have provided a different kind of data. Differences in demographics or life experience may somehow separate those women who use tanning beds from those who do not. The self-report nature of the data, due to ethical and pragmatic constraints, contain those inherent limitations. Finally, the sample size and geographic location prevent broad generalization.

### ***Future Research***

It will be important to continue to explore different effects (perhaps even combinations) for statistical and narrative messages. In the present study, statistical evidence was superior to narrative evidence, but the narrative message was better than no message. The findings of this study also suggest a relationship between perceived susceptibility and intention to protect skin against sun damage and intention to tan. Future research should further investigate factors that may increase protective behavior such as: knowledge of alternative behaviors, reduction of social pressure to tan, and the effect of interpersonal and normative influence on tanning behavior.

The self assessment tested here shows promise and should be explored further. Besides perceived susceptibility, messages could also target other aspects of the HBM,

such as perceived severity, in order to cause change. High or moderate fear messages (perhaps in combination with statistical evidence, or graphic video or picture presentations) may be effective in communicating the severity of skin cancer. Perhaps a photo of a young, tanned person beside a photo of that same person twenty years later with facial scars from skin cancer removal would be effective in communicating the severity of skin cancer. A PSA showing a young person with clear skin getting into a tanning bed, followed by a young but wrinkled person with scars getting out of the tanning bed would be effective in increasing both perceived susceptibility and severity.

Further investigation of the message evidence format variable is also warranted. A combination of case study and informational messages may also be effective in changing tanning behavior. Evidence source may also play a role in the success of messages about tanning. Perhaps the normative influence exerted by celebrities who refuse to tan in order to protect their skin would be more effective than a message from a healthcare professional about the danger of tanning. Finally, as a result of the nature of the present sample (Caucasian women), it was not possible to explore gender or cultural differences in perceptions of evidence, effectiveness of self assessment, or other variables. Future research should continue to attend to these possibilities in considering message design and processing.

## Endnotes

i. Focus group data obtained prior to the survey was utilized to both develop survey items and narrow the sample. The present study focused on college students because data indicates high use (and initiation) at this lifestage. Reports indicated tanning bed use was perceived very differently for (and by) women and men and Caucasian and non-Caucasian participants. For example, men who tanned were seen (by women and men) as far too concerned about their appearance (and perhaps non-masculine). For African Americans, tanning was not popular, although explanations of why varied from “it’s too damn hot” to “historically lighter skin was more valued among Negroes, so why would anyone want to darken?” Thus, for the purposes of the present study, participants were limited to Caucasian women of traditional college age. 145 students completed the initial survey, however two could not be reached for the follow-up survey and two were excluded because they were out of target age range.

ii. Copies of all messages (both evidence formats and the self-assessment) are available from the first author.

iii. Klohn and Rogers (1991) found motivation to prevent a health threat to be highest when subjects were presented with a message emphasizing the high visibility of the threat. As well, Leary and Jones (1993) suggested that interventions should focus on the negative effects of sun exposure on appearance. Both of these were incorporated in messages.

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## Appendix A

### *The Sun Protection Quiz*

The following activity will help you calculate your own personal risk for skin cancer. Please answer the questions and then add up the scores to determine your risk.

#### **\_\_Hair Color**

blond/red = 4; brown = 3; black = 1

#### **\_\_Eye Color**

blue/green = 4; hazel = 3; brown = 2

#### **\_\_Where is your job?**

outdoors = 4; mixed = 3; indoors = 2

\_\_\_ **Do you have any freckles?**

many = 5; some = 3; none = 1

\_\_\_ **Has anyone in your family had skin cancer?**

yes = 5; no = 1

\_\_\_ **Where in the U.S. did you live most before the age of 18?**

South = 4; Midwest = 3; North = 2

\_\_\_ **Have you ever used a tanning bed?**

Yes = 3; no = 0

\_\_\_ **How many times in the past two years have you used a tanning bed?**

Never = 0; 1-5 = 1; 5-20 = 3; more than 20 = 5

\_\_\_ **Total** (please circle your risk level category below)

**RISK LEVELS – please circle your category**

10–16: below average risk

17–23: average risk

24–26: high risk

26–30: very high risk

YOUR RISK = \_\_\_\_\_

(adapted from: American Academy of Dermatology, 1997)



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