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Predicting Avoidance of Skin Damage Feedback among College Students

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Abstract

Background—Showing people a personal ultraviolet (UV) photograph depicting skin damage can be an effective method for changing sun protection cognitions and behaviors.

Purpose—We examined whether people opt not to see their UV photograph if given a choice. We also examined predictors of avoidance of skin damage feedback.

Methods—College students ($N = 257$) completed questionnaires, viewed example UV photographs, and received the opportunity to see a UV photograph of their face.

Results—Over one-third of participants opted not to see their UV photograph. Greater perceived risk of sun damage and having fewer coping resources corresponded with greater avoidance, particularly among participants who reported infrequent sun protection behavior.

Conclusion—The health benefits of UV photography are realized only if people are willing to view the photograph. Our findings suggest the need for interventions that increase receptivity to viewing one's UV photograph.

Key terms

information avoidance; information aversion; UV photography; skin damage; coping resources

Skin cancer is the most frequently diagnosed cancer in the United States, and rates of melanoma (the most dangerous form of skin cancer) are increasing (1). Interventions that motivate people to protect their skin are thus increasingly important and urgent. Young adults engage in greater sun exposure behavior and lower levels of sun protection behavior compared with older adults (2), making sun protection interventions crucial among young adult populations. One approach to motivating people to protect their skin is to show them

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an ultraviolet (UV) photograph of themselves, which depicts UV skin damage that cannot be seen by the naked eye (3). Viewing a personal UV photograph, however, can be threatening for many reasons. In the present study, we explored whether young adults are willing to view a UV photograph of their face and whether coping resources, high perceived risk and prior skin protection behavior predicted avoidance of viewing one's UV photograph.

Promoting Sun Protection with UV Photography Interventions

Effective approaches to promoting sun protection behaviors that can help prevent skin cancer and damage (1) often make salient the appearance consequences of UV exposure. One appearance-based intervention involves providing people with a personal UV photograph in addition to information about the consequences of UV exposure. Because the UV photograph is personalized and image-based, it can be a useful and engaging tool for increasing awareness of the consequences of UV exposure.

Several studies support the utility of UV photographs in raising sun protection cognitions and behaviors. Compared with control groups, people who receive interventions containing UV photography report higher willingness and intentions to engage in sun protection behaviors, more positive images (prototypes) of the typical person who protects his or her skin, higher perceived vulnerability to skin cancer and photoaging, and more favorable attitudes toward sun protection, all of which can prompt changes in sun protection behaviors (4–7).

UV Photography and Avoidance of Risk Feedback

The evidence that UV photography can increase sun protection cognitions and behaviors suggests that it is an effective intervention tool. However, translating this research into a broader context assumes that people are willing to view their UV photograph if provided the opportunity. This assumption remains untested because researchers typically assign participants to view or not view their photograph rather than letting them decide for themselves. Recent theorizing and research suggest that, when given the choice, people sometimes opt to avoid health-related information, particularly if they believe the information may threaten how they wish to think, feel or behave (8, 9).

Seeing a personal UV photograph is potentially threatening for several reasons, making people unwilling to view their UV photograph if given a choice. First, a UV photograph often portrays unattractive dark spots and other skin damage that people are unaware of because the damage is not easily seen by the naked eye (3). People may be understandably reluctant to see an unattractive portrayal of their appearance. Second, the UV photograph can provide evidence of harmful choices in the past, such as engaging in risky skin exposure. Third, the UV photograph may reveal forthcoming negative appearance consequences (e.g., freckles, wrinkles and age spots that may develop with age) and health consequences (e.g., skin cancer) of one's past behavior. Regardless of the reason, a reluctance to view one's UV photograph can undermine the potential educational and health benefits of viewing one's UV photograph.

Predicting Avoidance: Perceived Risk and Coping Resources

Theories of uncertainty management propose that people are motivated to reduce uncertainty when uncertainty is a source of distress (e.g., when one does not know what treatments are effective for treating one's disease), but are motivated to maintain uncertainty when certainty is a source of distress (e.g., when information could undermine positive emotions such as hope and optimism) (10–12). One way to reduce uncertainty is to seek information, whereas one way to maintain uncertainty is to avoid information. The theories of uncertainty management propose various factors that influence when people regard certainty versus uncertainty as distressing. We focus on two: expectations of an unfavorable outcome (perceived risk) and coping resources (9).

A common theme in several theories is that people prefer uncertainty if it fosters positive emotions such as optimism and hope (11, 12). An expectation or perceived risk of unfavorable news undermines these positive emotions. Several recent findings suggest that people are inclined to avoid information when they believe there is a high likelihood that the news might be bad. In one study, older participants who both believed they had a high likelihood of developing cancer and reported cancer-related worry were more likely to avoid visiting their physician (13). A second study, examining racial bias, manipulated perceived risk of being prejudice and found that participants were more likely to avoid receiving their results from a test of implicit racial bias if they believed it was highly likely that the results would indicate that they were prejudiced (14). People who view themselves at high risk for developing skin damage or skin cancer likely expect that their UV photograph will reveal evidence of damage. In light of these findings, we predicted that people would be more likely to avoid seeing a UV photograph of themselves if they perceived themselves at high risk for negative skin outcomes in the future.

A second theme common in theories of uncertainty management is that people are inclined to avoid information if they lack coping resources. According to the Theory of Motivated Information Management (10), people's perceived ability to cope with the information affects their efficacy assessment. If efficacy is low, people are inclined to avoid the information. Other theoretical models of uncertainty management also suggest that lacking coping resources such as social support can eventuate in avoidance of information (11, 12). Beyond theory, several empirical studies demonstrate that having fewer resources to cope with unwanted health information corresponds with greater information avoidance. For example, one study found that women who reported fewer coping resources were more likely to avoid learning feedback about their personal breast cancer risk (15). A second series of studies replicated this effect for avoidance of general health information as well as one's risk for specific diseases (16). Finally, a third study demonstrated that bolstering people's perceived coping resources by affirming their overall integrity substantially reduced avoidance of threatening health information (17). In line with these findings, we predicted that people who lack resources for coping with information about their skin damage would be more likely to avoid viewing their UV photograph.

Information Avoidance and Risk Behavior

We also examined whether past sun protection behavior moderates the predicted effects of perceived risk and coping resources on avoidance. People whose behaviors (e.g., not wearing sunscreen or sun-protective clothing) increase the likelihood of skin damage may be particularly likely to avoid seeing their UV photograph. People are especially defensive about health risk information that is behaviorally relevant (18–20). In addition, several studies find that people who engage in a risky behavior are less receptive to information documenting the link between their behavior and health risks and will discount or derogate information that suggests their behavior has elevated their risk for unwanted health outcomes (19, 21–23).

Of course, it is hard to discount or derogate visual evidence provided by a UV photograph. However, people who engage in low sun protective behavior can avoid the threat altogether by opting not to see their UV photograph. Thus, we propose that, if given the opportunity, people who engaged in low sun protective behavior in the past will avoid viewing their UV photograph. The role of past behavior is distinct from our other predictors in that it is grounded in dissonance theory (24). People experience dissonance when they behave in ways inconsistent with their attitudes. The dissonance is most evident, however, when people learn that their behaviors produced negative consequences (25). Although people who engaged in low sun protective behavior cannot undo their behavior, they can avoid the dissonance that comes from learning about the negative consequences of their behavior by opting not to see their UV photograph.

We further propose that level of past sun protective behavior will moderate the effects of perceived risk and coping resources on avoidance of one's UV photograph. Regarding perceived risk, we propose that a personal UV photograph is particularly threatening to people who perceive that they are at high risk for future negative skin outcomes (high perceived risk) *and* that the negative outcomes stems from their behavior. Thus, we predicted that a combination of high perceived risk and low past sun protective behavior will correspond with the decision not to see one's UV photograph. We similarly predicted that people are more likely to avoid viewing their UV photograph if they engaged in low sun protective behavior in the past *and* they lack resources to cope if the UV photograph reveals bad news. The lack of resources places these people in a poor position to deal with the dissonance arising from learning that their past sun behavior produced negative consequences.

Overview and Hypotheses

We examined the extent to which young adults avoid feedback regarding skin damage from UV exposure. We also examined whether two established predictors of information avoidance—high perceived risk and a lack of coping resources—correspond with avoiding one's UV photograph. In addition, we examined whether a personal history of low levels of sun protective behavior corresponds with avoidance and moderates the influence of perceived risk and coping resources on the decision to see one's personal UV photograph. We tested three predictions:

1. We hypothesized main effects of perceived risk and coping resources on two indicators of information avoidance: the actual decision to avoid (or see) one's UV photograph and a self-report (scale) measure of avoidance of skin damage information. We predicted that participants who reported greater perceived risk and fewer coping resources would display greater avoidance.
2. We hypothesized that participants who reported lower levels of past sun protection behavior would display greater avoidance.
3. We hypothesized that sun protection behavior would moderate the effects of perceived risk and coping on avoidance. Specifically, we hypothesized that high perceived risk would correspond with the greatest avoidance among participants who reported infrequent sun protection behavior. Likewise, we hypothesized that low coping resources would correspond with the greatest avoidance among participants who reported infrequent sun protection behavior.

We also examined several mechanisms potentially responsible for our predicted effects. Researchers have suggested that people avoid information when they believe the information may: (a) produce undesired emotions, such as regret, sadness, or guilt, (b) challenge a cherished belief such that one is attractive or healthy, or (c) force them to engage in unwanted action such as avoiding sun exposure in the future (9). Based on this theorizing, we expected that the influence of perceived risk and coping, particularly among individuals with low sun protection behavior, might be mediated by these specific motives, as well as other threats specific to the experience of seeing one's UV photograph (e.g., that it may show skin damage, an ugly image, evidence of past foolish behavior, or an image of oneself as old). This secondary research question was exploratory, because our study is the first we are aware of that examines the motivations associated with avoidance of skin damage feedback.

Method

Participants

We recruited participants by posting and distributing flyers around a university campus and through a study description on the psychology department's subject pool website. We advertised the study as focusing on UV exposure among young adults. Young adults have higher rates of sunburn and lower rates of sun protection behavior than older age groups (26) and are thus often targeted in sun protection interventions.

All participants received \$10 if they participated in response to the flyers, or research credit for a psychology course if they participated through the subject pool. Of the 270 students who participated, we omitted data from 13 who reported previously seeing their UV photo, leaving a final sample of 257 participants (77 males) age 18–26 ($M = 19.4$, $SD = 1.45$). The sample was 64.2% White, 16.7% Asian, 6.6% Black/African American, 6.2% Hispanic/Latino, and 6.2% other.

Procedure

After providing informed consent, participants completed the first part of a computer-based survey, which included all demographic and past behavior measures. Next, participants read a description of the UV camera, including that it displays underlying skin damage due to UV exposure and that any dark, freckled, or pitted areas in the UV photo are signs of existing, underlying sun damage to the skin. Participants then saw six example UV photographs of same-age, same-gender peers with varying levels of damage. After viewing the example photographs, participants chose between having or not having their UV photograph taken later in the study.

Following their decision, participants completed the second part of the survey, which included measures of coping resources, perceived risk, and motives for seeing one's UV photograph, as well as the information avoidance scale. After completing these measures, participants who opted to see their UV photograph were seated in front of a Polaroid camera that uses a UV filter to reveal underlying skin damage (3). The camera simultaneously takes a normal black and white photograph and a photograph showing UV damage. The experimenter explained that differences between the two photographs show evidence of existing skin damage due to UV exposure (4, 6). The experimenter then debriefed participants and told them that they could take sunscreen packets from the bowl by the door as they left. The university's institutional review board approved all procedures.

Measures

Skin damage proneness—We included two indicators of skin damage proneness, which in addition to gender, were included as control variables in analyses: (a) Fitzpatrick's classification of sun-reactive skin types, which represents the propensity to sunburn and tendency to tan (27), and (b) eye color (1 = *blue*, 2 = *green*, 3 = *hazel*, 4 = *brown* 5 = *dark brown*, 6 = *black*). Prior UV photography research has controlled for self-reported skin sensitivity (6, 7), and other studies have linked skin type to sun protection behaviors (28, 29).

Perceived risk—Prior studies examining the effect of expectations on avoidance typically manipulate expectations (14). The one published study we know of that specifically measured expectations of an unfavorable outcome (i.e., perceived risk) as related to avoidance used data from a nationally representative sample that included an item in which participants estimated the likelihood that they would develop cancer on a five step scale (13). Given the scant research measuring perceived risk, we opted to create our own two-item measure. Participants estimated from 0% to 100% the likelihood that they would develop (a) serious skin damage and (b) skin cancer in their lifetime. Responses to the two items were averaged ($r = .76$). These items are typical of studies examining personal perceived risk (30).

Coping resources—We assessed coping resources with four items modeled after items used previously (15, 16). The items were: (a) "I personally have what it takes to deal with the news should the UV photo reveal serious skin damage", (b) "I have the emotional help and support I need to deal with the news should the UV photo reveal serious skin damage,"

(c) “I can remain calm in the face of the news should the UV photo reveal serious skin damage,” and (d) “I would cope poorly if the UV photo revealed serious skin damage” (recoded) (1 = *strongly disagree*; 7 = *strongly agree*). These items were averaged ($\alpha = .79$).

Sun protection behavior—Participants answered three questions about their sunscreen use (e.g., “In general, when spending time in the sun, how often have you used sunscreen with SPF 15 or greater on your face?” 1 = *never*; 7 = *always*). They also reported their hat use, protective clothing use, and shade seeking when in the sun (e.g., “When spending time in the sun, how often do you wear long sleeves and pants to protect your skin from the sun?” 1 = *never*; 7 = *always*). These items were adapted from items used in prior UV photography research (6, 7). Factor analyses showed that hat use did not load with the other items and was thus dropped from the measure. Responses to all other items were standardized before creating the five-item scale of sun protection behavior ($\alpha = .72$).

Information avoidance—We measured avoidance of information about skin damage in two ways. The *avoidance decision* was a behavioral measure capturing whether participants chose to see their UV photograph during the study (0 = *yes*; 1 = *no*). Participants reported aloud to the experimenter the decision that they made during the survey. The second indicator of avoidance, the *avoidance scale*, assessed avoidance using six items adapted from prior research (31) and that generally correlates highly with behavioral measures of avoidance. We modified the items to assess a desire to avoid personal feedback about skin damage (e.g., “I would rather not know the extent of sun damage to my skin;” 1 = *strongly disagree*; 7 = *strongly agree*). We reverse-coded items when appropriate and averaged them to form an avoidance index ($\alpha = .82$).

Sunscreen packets—We placed six sample packets of sunscreen in a bowl by the door exiting the lab and instructed participants to take as many packets as they wanted. The experimenter recorded the number of sunscreen packets taken. Researchers have used this approach as a measure of sun protection tendencies in other studies (32, 33).

Avoidance motives—We included seven motives for avoidance as correlates of avoidance and potential mediators of the impact of coping resources, perceived risk, and behavior on avoidance. These ad hoc items were designed specifically for this study and all had the same basic structure: “The possibility that the picture/photo would ____ influenced my decision to see/not see my UV photo.” However, each offered a different explanation for participants’ decision to have or not have their UV photograph taken. The explanations that appeared in the blank were: (a) make me feel bad, (b) challenge my view of myself as healthy, (c) push me to change my sun exposure behavior, (d) show me as ugly, (e) show what I will look like when I’m old, (f) reveal that I engaged in foolish behavior in the past, and (g) reveal that I have skin damage. Participants responded to each item using a scale from 1 = *strongly disagree* to 7 = *strongly agree*.

Results

Descriptive Analyses

We computed descriptive statistics and correlations to describe the sample and relationships among all study variables. We also explored gender differences in avoidance using analysis of covariance (ANCOVAs) and chi-square analysis. Table 1 presents means, standard deviations, and correlations (including statistical significance) for our main study variables. Overall, 88 participants (34.2%) avoided seeing their UV photograph. Responses to the avoidance scale ($M = 2.8$, $SD = 1.17$) correlated with the decision to avoid seeing one's UV photograph ($r = .60$). Women, as well as people with lighter eyes and more sun reactive skin, reported statistically greater sun protection behaviors and greater perceived risk. The only covariate independently related to avoidance was gender; women scored higher than did men on our avoidance scale. Perceiving greater risk and having fewer coping resources also correlated with the avoidance scale. Having fewer coping resources correlated with the UV photograph avoidance decision.

To further explore the gender differences in avoidance, we ran an ANCOVA using gender to predict responses to the avoidance scale after controlling for skin type, eye color, and sun protection. Women reported greater avoidance on the *scale* ($M = 2.9$, $SE = 0.13$) than did men ($M = 2.6$, $SE = 0.09$), $F(1, 252) = 5.21$, $p = .02$. However, a logistic regression with the same control variables but using gender to predict the dichotomous avoidance *decision* revealed that women (35.6%) and men (31.2%) did not differ in their likelihood of actually avoiding their UV photograph ($OR = 1.26$, $p = .44$). A chi-square analysis confirmed that there was no statistically significant relationship between gender and the avoidance decision, $\chi^2(1, N = 257) = 0.46$, $p = .50$.

Predicting Avoidance

We tested our three hypotheses using hierarchical linear and logistic regressions. To simplify analyses, we analyzed the effects of perceived risk and coping resources separately and conducted our analyses in three steps. For perceived risk, we entered our covariates (skin type, eye color, and gender) in step one, our main effect terms of sun protection behavior and perceived risk in step two, and the behavior $\times$ perceived risk interaction term in step three. We then repeated this process but substituted coping resources for perceived risk in the analyses. Finally, we conducted two logistic regressions on participants' dichotomous avoidance decision that paralleled these linear regression analyses.

We standardized all continuous variables and computed the interaction term by multiplying the standardized variables (34). We standardized the items for our index of sun protection behavior prior to combining them because the individual items used slightly different response scales. Standardizing all continuous variables therefore made their metrics comparable. We probed statistically significant and marginal interactions (35) by examining the effects of perceived risk and coping at low and high levels of sun protection behavior (points ± 1 SD from the mean sun protection behavior score). Within the text, main effects for perceived risk, coping, and behavior are reported from the step on which they were entered (step two). However, statistics from each step of the models appear in Table 2 (for

logistic regressions) and in Electronic Supplementary Material Table 1 (for linear regressions). In all regressions, none of the covariates were significantly related to avoidance when entered in the first step.

We calculated achieved power for these regression analyses using G*Power 3.1.9.2 and selecting the option of an F -test for a linear multiple regression (Fixed Model, R^2 increase) (36). With $N = 257$, $\alpha = .05$, one tested predictor (the interaction effect), and six total predictors (the interaction, two main effects, and our three covariates), we achieved adequate power (.99) to detect a medium effect ($f^2 = .15$), but lower power (.62) to detect a small effect ($f^2 = .02$) (36).

Perceived risk

Consistent with Hypotheses 1 and 2, a linear regression analysis revealed that perceived risk and sun protection explained significant variance in our scale measure of avoidance beyond our covariates ($R^2 = .05$, $p < .01$). Greater perceived risk ($\beta = .16$, $t = 2.43$, $p = .02$) and less frequent sun protection behavior ($\beta = -.15$, $t = -2.31$, $p = .02$) separately predicted greater avoidance. Consistent with Hypothesis 3, the perceived risk $\times$ sun protection interaction term was also statistically significant ($R^2 = .05$, $\beta = -.23$, $t = -3.81$, $p < .001$). As evident in Figure 1 and consistent with predictions, among participants who reported low levels of sun protection behavior, greater perceived risk corresponded with greater avoidance ($\beta = .52$, $t = 4.54$, $p < .001$). Among participants who engaged in high levels of sun protection, perceived risk was unrelated to avoidance ($\beta = -.15$, $t = -1.43$, $p = .15$).

We next conducted a logistic regression to analyze responses to the avoidance decision. Table 2 summarizes the results of the logistic regression and includes regression coefficients, odds ratios (OR), and confidence intervals. When we added perceived risk and sun protection behavior, the overall model was not statistically significant ($\chi^2 = 5.76$, $p = .33$), and neither perceived risk ($OR = 1.22$, $p = .16$) nor sun protection behavior ($OR = .81$, $p = .30$) independently predicted avoidance. However, consistent with Hypothesis 3, we again observed a significant sun protection behavior $\times$ perceived risk interaction in the third step of our analyses ($p = .01$). The plot of the interaction was virtually identical to the interaction in Figure 1 predicting the avoidance scale and thus is not shown. As predicted, among participants who reported low levels of sun protection behavior, greater perceived risk corresponded with greater avoidance ($OR = 2.10$, $p = .01$), such that a 1 SD increase in perceived risk makes the odds of avoidance 2.10 times greater. Among participants who reported high levels of sun protection behavior, perceived risk was unrelated to avoidance ($OR = .74$, $p = .23$).

Coping resources

In our second set of analyses, we examined the role of coping resources, sun protection behavior, and their interaction on avoidance. We predicted that fewer coping resources would correspond with greater avoidance, particularly among participants who reported engaging in fewer sun protective behaviors. Consistent with Hypothesis 1 and 2, the linear regression on the avoidance scale revealed that coping resources and sun protection explained additional variance in avoidance beyond our covariates ($R^2 = .17$, $p < .001$), such

that reporting fewer coping resources predicted greater avoidance ($\beta = -.39, t = -6.76, p < .001$), and reporting less frequent sun protection behavior predicted marginally greater avoidance ($\beta = -.11, t = -1.86, p = .06$); an effect that was significant in the final step of the model ($p < .05$). The sun protection $\times$ coping resources interaction was not significant ($R^2 = .01, \beta = .09, t = 1.57, p = .12$). However, to be consistent with our analyses on perceived risk, we examined the influence of coping resources separately at low versus high levels of sun protection behavior. As evident in Figure 2 and consistent with Hypothesis 3, among participants who reported low levels of sun protection behavior, greater coping resources predicted less avoidance, $\beta = -.52, t = -5.18, p < .001$. Among participants who reported high levels of sun protection behavior, the association between greater coping resources and less avoidance was marginally statistically significant ($\beta = -.23, t = -1.91, p = .06$).

We next used logistic regression to analyze responses to the avoidance decision (see Table 2). Adding coping resources and sun protection resulted in a statistically significant model ($\chi^2 = 22.43, p < .001$). Within this model, and consistent with Hypothesis 1, greater coping resources predicted a lower odds of avoidance ($OR = .55, p < .001$). However, sun protection behavior did not predict avoidance ($OR = .90, p = .60$). The sun protection $\times$ coping resources interaction was marginally significant in step 3 of the model ($p = .06$). Similar to our logistic regression with perceived risk, the plot of the interaction was virtually identical to the interaction predicting the avoidance scale (see Figure 2) and thus is not shown. As predicted in Hypothesis 3, among participants reporting less sun protection behavior, fewer coping resources predicted greater avoidance of the UV photograph ($OR = .35, p < .001$). Among participants reporting more sun protection behavior, level of coping resources was unrelated to avoidance ($OR = .90, p = .73$).

Finally, we conducted one last analysis. Our goal was to examine whether sun protection behavior moderated the influence of two predictors of avoidance demonstrated in prior literature. However, to be thorough we also examined the three-way interaction between sun protection, coping resources and perceived risk to examine whether the combination of these variables predicted avoidance. The three-way interaction was not significant for either the avoidance decision ($OR = .80, p = .38$) or the avoidance scale ($\beta = .10, t = 1.62, p = .11$).

Mediation by Avoidance Motives

A secondary aim of our research was to examine the role of several reasons why people might opt to avoid viewing their UV photograph. First, we examined the bivariate correlations between perceived risk, coping, behavior, avoidance, and these motives. As seen in Table 3, the more participants believed that viewing their UV photograph would make them feel bad or show them as ugly, the more inclined they were to avoid viewing their UV photograph. Conversely, the more participants believed that viewing their UV photograph would push them to change their behavior, the less inclined they were to avoid viewing their UV photograph. Perceived risk also correlated positively, and coping resources correlated negatively, with several individual motives for not wanting to see one's photograph. Sun protection behavior was not correlated with any of the individual motives. Although the analysis of avoidance motives was exploratory, these correlations suggest that concerns with emotions and appearance corresponded with avoiding skin damage risk

feedback, whereas motivations to improve one's behavior corresponded to decisions to seek this feedback.

We next conducted analyses to determine whether the motives we examined mediated the influence of our two main predictors (perceived risk and coping resources) on avoidance, and whether any mediation was conditional on values of our moderator (sun protection behavior). We used the PROCESS macro by Hayes (35) and tested model 8 with 5,000 bootstrapped samples for evidence of conditional mediation through the seven avoidance motives entered simultaneously. We found no evidence of any indirect effects that were conditional on either low or high ($\pm 1 SD$) sun protection behavior. Specifically, all bias-corrected bootstrap confidence intervals included zero, indicating that the interactions between sun protection behavior and perceived risk/coping did not predict any of our mediators. There was an indirect effect of coping resources on avoidance through a single motive: the possibility that the UV photo would make one feel bad. However, this effect occurred at both low levels of sun protection behavior (for the avoidance scale, 95% CI $[-.22, -.03]$; for the avoidance decision, 95% CI $[-1.16, -.13]$) and high levels of sun protection behavior (for the avoidance scale, 95% CI $[-.20, -.05]$; for the avoidance decision, 95% CI $[-1.03, -.07]$). Finally, all confidence intervals for mediation of the highest order interaction included zero, indicating no evidence for moderated mediation.

Predicting Sunscreen Packets

In our final analyses, we examined whether each indicator of avoidance and our primary predictors influenced whether participants took sunscreen packets at the end of the study. Roughly half of participants ($n = 130$, 50.6%) did not take any packets. We thus used logistic regression to examine the relationship between avoidance and taking versus not taking sunscreen packets. Greater avoidance predicted a lower likelihood of taking sunscreen packets ($ORs = .77$ for the avoidance scale, and $.28$ for the avoidance decision, $ps < .02$). Logistic regressions examining the effect of our predictors and moderator revealed that greater perceived risk corresponded with a lower likelihood of taking packets ($OR = .74$, $p = .03$), and that greater past sun protection behavior corresponded with a greater likelihood of taking sunscreen packets ($ORs = 1.52$, $ps = .03$). Level of coping resources did not predict taking sunscreen packets ($p = .75$). The two-way interactions (perceived risk $\times$ sun protection behavior, coping resources $\times$ sun protection behavior) were not significant in either analysis ($ps = .45$ and $.33$).

Discussion

Greater perceived risk and having fewer coping resources generally corresponded with greater avoidance, particularly among participants who engaged in lower levels of sun protective behavior. Our effects were largely consistent across measures of avoidance (the dichotomous measure and a scale measure) and held after controlling for gender, eye color and skin type. These findings build on prior research examining the effects of coping resources and perceived risk on avoidance, showing that past protective behavior can moderate the effect of these established predictors. Our findings are also consistent with core predictors of uncertainty management and information seeking, including coping

efficacy, social support, and perceived threat (10–12), and they suggest that past behavior should be considered in future models of information-related behaviors as a possible moderator of more established predictors.

Importantly, our effects were stronger when we operationalized avoidance as a scale response than when we operationalized it as a dichotomous choice. Indeed, past sun protective behavior predicted responses to our scale measure of avoidance but not the dichotomous choice to avoid or not. Women also reported greater avoidance than did men on the scale measure of avoidance, but did not differ from men on the avoidance decision. The stronger effects likely arise from the greater sensitivity of continuous measures to participant sentiments. However, more important than whether past sun protective behavior influenced avoidance by itself was how past sun protective behavior moderated the effect of established predictors in predicting avoidance. The findings suggest that, when facing the decision to see one's UV photograph, prior behavior acts in conjunction with psychosocial influences to determine avoidance.

We were unable to pinpoint the mechanisms that explained why perceived risk, coping resources and past protective behavior predicted avoidance. However, an important finding emerged from our correlational and mediational analyses involving the avoidance motives. Regardless of past sun protective behavior, how participants thought the results would make them feel mediated the effect of coping resources on avoidance. Specifically, participants with more coping resources were less influenced by the prospect that their UV photograph might make them feel bad, and thus were less inclined to avoid viewing their UV photograph. This finding is consistent with other evidence and theory suggesting that affect influences information avoidance and seeking (13, 37). Indeed, having greater coping resources may reduce information avoidance because it provides people the means to deal with possible negative emotional consequences. Other recent work has found that emotional reactions to one's UV photograph and past sun-related risk behavior can either undermine or encourage sun protection cognitions and behaviors (33, 38). Collectively our findings suggest that bolstering people's coping resources may mitigate emotional concerns, thereby increasing receptivity to threatening health feedback.

Implications for UV Photography Interventions

This study is the first investigation of whether people will opt to view a personalized UV photograph depicting skin damage if given a choice. One-third of our participants opted not to see their UV photograph, suggesting a need for interventions to expand the reach of skin damage risk feedback to people inclined to avoid this information. One potential intervention directly addresses lack of coping resources as the reason for avoidance. Studies show that affirming people's overall integrity, typically by having them reflect on personally important values, can reduce information avoidance. Moreover, evidence suggests that it does so by bolstering personal resources so that the threatening information is regarded as less menacing (17). Other research finds that prompting people to contemplate their reasons for avoiding versus seeking threatening information can reduce avoidance by derailing the automatic fear reaction that often accompanies the prospects potential bad news and that leads to defensive responding (39).

Interestingly, we found that participants who reported that their UV photograph might push them to change their behavior were *less* likely to avoid viewing the UV photograph (see Table 3). This latter finding is consistent with the notion that people sometimes view health feedback, such as the results of a genetic test, as potential source of motivation to change behavior (40). More importantly, the findings suggest a point of intervention for health professionals that harnesses some people's openness to change their behavior. Specifically, some people may be willing to change their sun behavior and merely need a motivation, such as viewing their UV photograph, to prompt action.

Limitations and Future Directions

Our study has limitations that suggest additional directions for future research. First, we sampled college students, and it is unknown how well our findings generalize to other populations. People who are at high risk for skin problems due to chronic occupational sun exposure may have limited ability to change the circumstances that place them at risk. Moreover, research documents greater information avoidance when people perceive that they cannot control the negative outcomes linked to the information (9). The implication is that people who cannot control their sun exposure may display even greater avoidance than we observed in this study. It is also possible that students who have stronger tendencies to avoid opted not to participate in this study on UV exposure information, providing another reason why avoidance in the general population might be higher than we observed in this study.

Second, all of the constructs in the current study were measured rather than manipulated, which limits our ability to assert causal relationships. Experimental procedures that manipulate perceived risk and immediate coping resources would allow us to determine whether these variables caused the differences we observed in participants decisions to avoid viewing their UV photograph. Third, we were unable to pinpoint the mechanisms responsible for the interaction effects we observed. Several of the motives we assessed tapped appearance concerns whereas others tapped concerns with behavior and health. Other research finds that the motivations driving sun protection cognitions and behavior are individual specific, with some people influenced more strongly by appearance concerns and other people influence more strongly by health concerns (6, 41). This research suggests the need for a more nuanced approach investigating why people avoid the UV photograph. It also suggests the need to tailor interventions to match the motivations responsible for avoidance.

Our findings suggest that sun protection behavior may interact with other core theoretical predictors of information avoidance. However, it remains unknown whether and how the current findings extend to other information-related behaviors (including seeking information actively or passively from the internet, physicians, or other people, or reappraising the personal relevance or anxiety of the uncertainty) (10, 37). Moreover, decision making is a complex process, and we lack a clear understanding of how coping resources, perceived risk, and prior behavior might interact with other risk-relevant information to influence decision making.

Finally, it remains to be seen whether the decision to avoid seeing one's UV photograph corresponds with less sun protective behavior in the future. We observed that participants who avoided viewing the UV photograph were less inclined to take the sunscreen packets we offered. However, this one time measure of behavior merits replication. Also needed is research that examines sun protective and sun risk behavior over time after people have made the decision to view or not view their UV photograph. Related, although people may be unwilling to view their personal UV photograph, they may be willing to view the UV photographs of other people. In our study, all participants saw UV photographs of other similar-aged, gender matched people. Information about others' skin damage can be influential. One study found that the behavioral benefit of viewing one's own UV photograph was less among participants who also saw a photograph of another person with *more* damage (5). Other work shows that presenting information about the skin cancer experience of similar others can increase perceived skin cancer risk (42). However, it remains unknown whether seeing the UV photographs of others, perhaps with various levels of damage, is an effective substitute to seeing a personal UV photograph.

Conclusion

We found that avoidance of appearance-based skin damage feedback was common in our sample of college students. Moreover, avoidance was particularly high among participants who infrequently engaged in sun protection and either reported high perceived risk of negative skin outcomes or lacked resources to cope with unfavorable news. Our findings suggest that researchers and interventionists should be mindful of these avoiders for ethical and practical reasons. Ethically, it seems problematic for researchers to confront people with information that they do not want to see. Practically, health professionals who implement UV photograph sun protection campaigns may fail to reach a sizable minority of the population—people who do not wish to see their UV photograph. Addressing these ethical and practical concerns requires the development of interventions that increase receptivity to potentially threatening feedback. We look forward to seeing the implementation of such interventions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Reported avoidance as a function of perceived risk and sun protection behavior.

Figure 2.
Reported avoidance as a function of coping resources and sun protection behavior.

Table 1

Correlations, Means, Standard Deviations, and Ranges for Main Study Variables

	Sex	Eye Color	Skin Type	Sun Protective Behavior	Perceived Risk ^a	Coping Resources	Avoidance Scale	Avoidance Decision
Sex	--							
Eye color	-.13*	--						
Skin type	-.13*	.47***	--					
Sun protective behavior	.18**	-.13*	-.26***	--				
Perceived risk ^a	.25***	-.31***	-.24***	.04	--			
Coping resources	-.11	-.06	.03	.09	-.06	--		
Avoidance scale	.13*	-.10	-.04	-.12	.20***	-.40***	--	
Avoidance decision	.04	-.07	.01	-.06	.11	-.27***	.60***	--
Sunscreens packets	.04	.10	.04	.13*	-.09	-.00	-.15*	-.29***
<i>M</i>	--	3.3	3.1	0.00	33.8	5.4	2.8	--
<i>SD</i>	--	1.62	1.35	0.69	22.48	1.25	1.17	--
Range	--	1-6	1-6	-1.4-2.1	0-99.5	1-7	1-7	--

Note. Sex (0 = male; 1 = female); avoidance decision (0 = no avoidance; 1 = avoidance); sunscreen packets (0 = none taken; 1 = one or more taken). We coded eye color and skin type so that higher values correspond to darker eyes and less sun-reactive skin. We coded all other variables so that higher values indicate more of the construct.

^a *n* = 225 (We excluded responses from two participants who provided responses outside the 0% – 100%.)

* *p* .05

** *p* .01

*** *p* .001

Table 2

Results from Logistic Regression Models Predicting Avoidance of UV Photography

Model 1: Perceived Risk			Model 2: Coping Resources		
Variable (SE)	B	OR [95% CI]	Variable (SE)	B	OR [95% CI]
Step 1 (Model $\chi^2 = 2.46, p = .48$)					
Sex (female)	.17	1.18 [0.66–2.11]	Sex (female)	.18	1.20 [0.67–2.13]
Skin type	.13	1.13 [0.84–1.53]	Skin type	.13	1.14 [0.85–1.54]
Eye color	-.21	0.81 [0.60–1.09]	Eye color	-.21	0.81 [0.60–1.09]
Step 2 (Model $\chi^2 = 5.76, p = .33$)					
Sex (female)	.12	1.13 [0.62–2.07]	Sex (female)	.06	1.06 [0.58–1.96]
Skin type	.11	1.12 [0.82–1.53]	Skin type	.17	1.19 [0.86–1.65]
Eye color	-.17	0.84 [0.62–1.15]	Eye color	-.30	0.74 [0.54–1.01]
Perceived risk	.20	1.22 [0.93–1.61]	Coping resources	-.60***	0.55 [0.41–0.73]
Sun protection	-.21	0.81 [0.54–1.21]	Sun protection	-.11	0.90 [0.59–1.36]
Step 3 (Model $\chi^2 = 12.33, p = .06$)					
Sex (female)	-.02	0.98 [0.53–1.82]	Sex (female)	.05	1.06 [0.57–1.95]
Skin type	.09	1.09 [0.80–1.50]	Skin type	.16	1.17 [0.84–1.63]
Eye color	-.19	0.83 [0.61–1.13]	Eye color	-.32*	0.73 [0.53–1.00]
Perceived risk	.22	1.25 [0.94–1.67]	Coping resources	-.57***	0.56 [0.42–0.76]
Sun protection	-.20	0.82 [0.54–1.24]	Sun protection	-.13	0.88 [0.57–1.35]
Perceived risk $\times$ Sun protection	-.52**	0.59 [0.39–0.90]	Coping resources $\times$ Sun protection	.47	1.60 [0.99–2.60]

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 3
Correlations of Perceived Risk, Coping, Behavior, and Avoidance with Motives for Avoidance

	Perceived risk ^a	Coping resources	Sun protective behavior	Avoidance scale	Avoidance decision
Make me feel bad	.16**	-.29***	-.02	.37***	.36***
Challenge view of self as healthy	.11	-.07	-.04	.08	.07
Push me to change behavior	-.02	.11	.00	-.30***	-.44***
Show me as ugly	.10	-.29***	.00	.27***	.25***
Show what I will look like when old	.18**	-.21***	-.08	.07	.02
Reveal past foolish behavior	.12	-.20***	-.06	.09	.08
Reveal I have skin damage	.21***	.00	-.00	-.04	-.15*

Note.

^a $n = 225$ (Two participants who provided responses outside of the 0% to 100% range were excluded.)

* $p < .05$

** $p < .01$

*** $p < .001$