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Avoiding reactance: the utility of ultraviolet photography, persuasion, and parental protectiveness in improving the effectiveness of a UV exposure intervention

Jennifer Leigh Dykstra
Iowa State University

Avoiding reactance: The utility of ultraviolet photography, persuasion, and parental protectiveness in improving the effectiveness of a UV exposure intervention

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Jennifer Leigh Dykstra

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Program of Study Committee:
Meg Gerrard, Co-major Professor
Frederick X. Gibbons, Co-major Professor
Douglas A. Gentile
Frederick O. Lorenz
Nathaniel G. Wade

Iowa State University

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ABSTRACT

Mothers of young children (*N* = 151) participated in an ultraviolet (UV) intervention designed to change attitudes related to UV-safe behavior. The intervention consisted of a colorful brochure and information card pertaining to photoaging and skin cancer, UV photography, and a persuasive message designed to induce either reactance or hypocrisy, depending on experimental condition. It was expected that inducing reactance would lead to a less effective intervention whereas inducing dissonance would improve intervention effectiveness.

Participants were given information about reducing their UV exposure and increasing UV protection. The information was presented in conjunction with either a forcefully persuasive message, an open-ended dialogue, or without persuasion. The women's willingness and intention to seek UV exposure, their intention to protect themselves, their perceived vulnerability to negative consequences, and their willingness and intention to protect their children and allow their children to obtain UV exposure were assessed. The use of UV photography for half of the intervention recipients provided concrete evidence of UV damage. Negative affect and self-esteem were also assessed to explore the mechanisms underlying intervention effectiveness. Unexpectedly, participants who reported the greatest level of negative affect -- those who received a forceful persuasive message and saw their UV photo -- also reported a greater intention than participants with less negative affect to protect themselves from future UV damage.

There was evidence of a trend that participants who received a forcefully persuasive message responded with psychological reactance in the form of greater willingness in comparison with participants who received a less persuasive message. Overall, results tended to support the importance of using UV photographs in conjunction with a forcefully persuasive message to boost intervention effectiveness. Results also supported the use of invoking parental protectiveness in motivating mothers to change their own UV-risk behavior and to be more vigilant about protecting themselves and their children. The role of dissonance in improving the effectiveness of the intervention was not supported.

Public health campaigns to reduce skin cancer can benefit by incorporating a persuasive UV intervention. To maximize effectiveness, the intervention should utilize UV photographs, parental protectiveness, and an informational yet persuasive message.

INTRODUCTION

In the current "Information Age" people are inundated with information. Sources of information include media outlets such as television, newspapers, magazines, and the internet. Friends and family, neighbors and strangers all provide information. Children receive information from their teachers and books in school while adults obtain information from college instructors and textbooks. As one would expect, a considerable amount of learning results from this barrage of information. However, there are many cases where simply providing people with information is not sufficient to change their behavior. For example, in the field of marketing, corporations know that they cannot just advertise the properties of a product to inform the consumer; they use clever advertising to *persuade* the consumer that they should purchase the advertised product (Tellis, 2004). Similarly, from a health-social psychological perspective, providing health information is often not sufficient for changing health behavior. Rather, a persuasive health message is more effective in producing behavior change than is a strictly informational message (Dolder, Lacro, Leckband, & Jeste, 2003). In addition, the form of persuasion is an important factor in determining the effectiveness of a health message.

Health Behavior Interventions

One primary persuasive technique for inducing behavior change is an intervention -- a program designed to intervene in one course of behavior and create a desire to follow a different course of behavior. For example, safe sex interventions aim to reduce episodes of risky sexual behavior and replace them with consistent condom use and other methods of safer sexual behavior. Interventions are especially prevalent in the domain of health behavior – in addition to safe sex interventions, there are interventions designed for smoking cessation, drug use, exercise, nutrition, and ultraviolet (UV) exposure.

Sometimes an intervention is effective and there are fewer cases of AIDS, cancer, cirrhosis of the liver, obesity, or melanoma as a result (e.g., DiClemente et al., 2004; Gortmaker et al., 1999). Sometimes an intervention is not effective and the smoker smokes his or her way into lung cancer, the overweight person becomes obese, or the marijuana user spirals down into heroin addiction (e.g., Bassett & Perl, 2004). Understanding what makes an intervention effective is therefore of vital importance, and social psychological theory can be used to predict and explain the conditions under which an intervention will be effective.

The current study is a test of a persuasive health intervention intended to reduce harmful UV exposure. Two social psychological theories, reactance theory (Brehm, 1966) and cognitive dissonance theory (Festinger, 1957), provided the framework for administering the intervention; opposite results were predicted, depending on the theory utilized. Inducing cognitive dissonance was expected to improve the effectiveness of the intervention in persuading people to change their behavior. In contrast, inducing reactance was expected to make the intervention less effective and lead to resistance of behavior change. Therefore, the overall purpose of the current study was to compare the efficacy of two different theory-based approaches to altering unhealthy behavior. A secondary purpose was to determine conditions of an intervention that would lead to reactance or dissonance and how to manage these effects in order to maximize intervention effectiveness.

Cognitive Dissonance

The basic premise of cognitive dissonance theory is that a discrepancy between two relevant cognitions produces psychological discomfort, and this discomfort, cognitive dissonance, creates a drive to reduce the dissonance and restore mental equilibrium (Festinger, 1957). The strength of the drive is dependent on two factors: a) how important the dissonant cognitions are and b) the ratio of dissonant to consonant cognitions. Festinger (1957) used the example of a smoker who knows that smoking is unhealthy to illustrate his theory of dissonance.

Subsequent conceptualizations of cognitive dissonance theory included the self-concept or importance to the self as a central factor in determining dissonance strength (i.e., Aronson, 1960, 1968; Thibodeau & Aronson, 1992). Aronson and Carlsmith (1962) argued that dissonance reduction is more likely among people who have a reasonably high self-concept than it is among people with a less strong self-concept. People with low self-esteem or a weak sense of self would not be as concerned with self-discrepancy as would someone with high self-esteem; they are more accepting of such inconsistency within themselves (Aronson, 1968; Aronson, Chase, Helmreich & Ruhnke, 1974). A person with high self-esteem who experiences a reasonably strong magnitude of dissonance resulting from discrepant thoughts about the self will feel psychological pressure to reduce the discrepancy. Generally, people are aware of their discrepant thoughts and act accordingly to reconcile them. However, there are times when a discrepancy is not salient until someone else, such as a public health educator or therapist, reveals it. Regardless, once a

person is cognizant of a discrepancy, they are generally motivated to reduce the associated dissonance.

Festinger (1957, Festinger & Carlsmith, 1959) and subsequent researchers (e.g., Baumeister & Tice, 1984; Gotz-Marchand, Gotz, & Irle, 1974) have proposed and/or tested multiple methods of dissonance reduction as well as the conditions under which each strategy is most likely to occur. Five possible methods of dissonance reduction include: attitude change, addition of consonant cognitions, reducing perceived amount of choice, reducing the importance of one of the discrepant cognitions, or behavior change. Using Festinger's example of a smoker to illustrate each of these five methods, respectively, the smoker could: change his or attitude to decide that smoking is not actually unhealthy; conclude that, while unhealthy, smoking also has beneficial aspects (e.g., it contributes to alertness); attribute smoking to peer pressure rather than a volitional choice; change attitudes about dangerousness of other risk behaviors so that smoking is not as unhealthy as other risk behaviors and therefore not much of a health risk, or the smoker could quit smoking. Of these, changing a habitual or resistant-to-change behavior, as smoking is, tends to be one of the more difficult methods (Festinger, 1957). However, under certain circumstances, people will change their behavior in order to relieve themselves of the unpleasant state of cognitive dissonance.

Hypocrisy as Dissonance

A relatively recent body of literature has focused on a specific type of cognitive discrepancy: a mismatch between a person's beliefs and his or her behavior -- hypocrisy. People who commit a hypocritical act by doing something that is in conflict with something they believe experience cognitive dissonance. As described above, for most people, this dissonance is unpleasant and must somehow be reduced. When hypocrisy is induced in the laboratory, the dissonance reduction strategy chosen by experimental participants can be observed and measured. A set of hypocrisy studies by Elliot Aronson and colleagues have found that behavior change is one of the primary methods hypocritical participants have used to reduce their uncomfortable state of dissonance.

For example, in two similar studies of safe sex, Aronson and colleagues (Aronson, Fried, & Stone, 1991; Stone, Aronson, Crain, Winslow, & Fried, 1994) induced dissonance via hypocrisy, and then observed participant behavioral changes consistent with safer sexual practices. In the studies, half of the participants reviewed their sexual behavior

history (number of partners, condom use, etc.) and half did not. In addition, half of the participants voluntarily made a public statement of the importance of safe sex by recording a Public Service Announcement (PSA) for high school students, and the other half of the participants did not. Contrary to prior work on cognitive dissonance, participants in this study were all in favor of safe sex prior to recording the PSA; none of them was forced to endorse a message they did not agree with. Thus, hypocrisy between their own belief and their actual behavior was induced among the participants who made the public declaration advocating safe sex and reviewed their own unsafe sexual history. Consistent with predictions, the participants in the hypocrisy condition reported more intention to engage in safe sex and were more likely to obtain condoms and AIDS pamphlets than were participants in the other three conditions (Aronson et al., 1991; Stone et al., 1994).

A study of recycling behavior provided a conceptual replication of these results (Fried & Aronson, 1995). In this study, half of participants recalled their own recycling behavior and half wrote a speech about increasing recycling on campus. As expected, participants who had been made aware of their past failures to recycle and made a public statement in support of recycling were more likely to volunteer to help a recycling organization than were other participants. Likewise, a study by Aronson and colleagues (Dickerson, Thibodeau, Aronson, & Miller, 1992) found that participants who were induced to feel hypocritical about wasting water subsequently took shorter showers.

Thus, these hypocrisy studies suggest that people who are made aware that they have not always acted wisely or made healthy decisions are more likely to comply with medical recommendations than are people who have not thought about their prior behavior. Likewise, people who are aware of their discrepant beliefs and behavior are likely to be more adherent than are people who are not as aware of their hypocrisy. By including both of these components, salience of past failures and a pro-attitudinal statement, laboratory-created cognitive dissonance via hypocrisy induction can lead to positive attitudinal and behavioral changes.

Dissonance Induction

In the current study, answering questions about prior tanning behavior/ UV exposure and use of sunscreen or other forms of UV protection served as part of a hypocrisy induction. Having participants answer these questions and recall their failure to use good judgment in receiving UV exposure was expected to increase adherence to a UV

intervention – a behavioral change – as a form of dissonance reduction. Rather than following the typical hypocrisy paradigm and using a PSA or petition as a public statement, the current study incorporated an interviewing style loosely based on aspects of the successful counseling technique "motivational interviewing" (MI), which creates dissonance without a formal public declaration.

The MI technique was developed by Miller and Rollnick (1991, 2002) to assist therapists in helping their clients change unwanted behaviors in a non-confrontational manner. The technique consists of four basic principles: 1) expression of empathy, 2) development of a discrepancy between overall client goals and the client's current behavior, 3) overcoming resistance, and 4) supporting the client's self-efficacy (Miller & Rollnick, 2002). Of these four principles, the second principle was considered the most vital to the current study – guiding participants to become aware of the mismatch between their goals and beliefs about UV safe behavior and their current UV behavior – because this discrepancy was expected to induce dissonance. Because the technique is relatively lengthy even using the brief version (i.e., 30 minutes; McNally, Palfai, & Kahler, 2005), a few key elements of MI were chosen and adapted in the present study. This highly modified and reduced technique involved a very brief (e.g., 5 minutes), non-confrontational, participant-centered, open-ended discussion of UV exposure that focused on the discrepancy between belief and behavior and involved having participants in this condition report their behavior and belief aloud. Prior research on the effectiveness of the MI technique has produced very encouraging results for health behaviors such as reducing heavy drinking and opiate-use relapse (McNally et al., 2005; Saunders, Wilkinson, & Phillips, 1995); therefore it was expected to be effective in producing change in UV- related beliefs and behavior as well.

Information is Insufficient

Inducing cognitive dissonance via hypocrisy is one persuasive technique that has been shown to increase change among a variety of behaviors, e.g., safe sex, recycling, and reducing water consumption (Aronson et al., 1991; Dickerson et al., 1992; Fried & Aronson, 1995; Stone et al., 1994). However, numerous other informational inventions have not been successful because information alone is often not sufficient for inducing behavior change. For example, a recent meta-analysis of interventions designed to improve patient adherence in taking psychotropic medications found distinct differences in intervention efficacy (Dolder et al., 2003). According to Dolder and colleagues (2003), the least successful interventions

were those of a "purely educational nature," that is, only included information. In contrast, interventions that included information and addressed behavioral and affective components were the most successful at increasing adherence. Similarly, a meta-analysis of HIV interventions for women found that the interventions that demonstrated the least success were those that relied only on providing information (Exner, Seal, & Ehrhardt, 1997). HIV interventions that included behavioral practice skills (such as using a condom) were more successful in reducing risky sexual behavior.

In the area of UV exposure, a recent experimental intervention designed to test the effectiveness of multiple intervention components failed to change tanning behavior. In the study, adults at a beach received a complex intervention, including UV protection recommendations, a personal UV damage assessment, inducement of a public commitment to reduce exposure, and free sunscreen (Pagoto, McChargue, & Fuqua, 2003). This intervention was intended to reduce UV exposure (i.e., time spent outdoors) and increase UV protection (i.e., sunscreen use). Participants in the intervention condition did significantly increase sun protection as compared to participants in the control condition; however, neither group decreased their tanning behavior. Although the participants in the intervention condition learned about the dangers of tanning as intended by the intervention, this knowledge did not translate to the fully successful outcome of less tanning behavior.

It appears that interventions can be successful at educating people about the harmful effects of risky behavior, but because the intervention recipients still maintain attitudes and beliefs that counter the factual information and lead to risky behavior, the intervention is not completely effective. A number of different theories have been proposed to account for this inconsistency between participant knowledge and behavior, and several of them are supported by research. For example, research on tanners has suggested that although people acknowledge potential health consequences of tanning in general, they believe that their own risk is comparatively low (Cody & Lee, 1990). This optimistic bias likely accounts for some of the discrepancy between belief and behavior that reduces intervention effectiveness.

Optimistic bias and other related theories often employed in health-behavioral research have accounted for the incompatibility between attitudes, beliefs, and behavior with some success. However, some interventions designed to decrease risky behavior have actually resulted in an *increase* in risky behavior or in willingness to participate in risky activities (e.g., Jones & Leary, 1994; Gibbons, Stock, Gerrard, Dykstra, Mahler, Eggleston,

& Kulik, 2007). Reactance theory (Brehm, 1966) provides a viable explanation for iatrogenic effects of health interventions.

Reactance Theory

Reactance is the psychological motivation to reestablish a freedom that is perceived to be threatened or has been eliminated (Brehm, 1966). In general, any behavior that a person is capable of performing and believes they are free to perform can be considered a freedom. Different freedoms are important to different people, and the importance of a specific freedom to an individual, as well as the strength with which it is held, can change over time. The level of reactance a person experiences varies with the desirability of the freedom, the strength of the threat to that freedom, and the proportion of freedoms that are threatened at the same time (Brehm, 1966).

In the classic reactance experimental situation, participants report their attitude toward a topic, read a persuasive communication that is either in agreement or disagreement with their position on the topic, then report their attitude again (Worchel & Brehm, 1974). Reactance has been demonstrated if a person's attitude changes in a direction undesired by the persuader as a result of a persuasive message that threatens a freedom. Psychological reactance has been operationalized in a variety of research paradigms as attitude or opinion changes, derogation of others, threat denial, and as behavioral changes (Brehm & Brehm, 1981).

Situation-induced reactance is sometimes powerful enough to change the direction of a person's position on a topic. For example, Ashmore, Ramchandra, and Jones (1971) measured participants' attitudes toward the role of police on campus. After this assessment, participants were told that the college dean had censored a speech about campus police that the experimenter had planned to play for them. Participants also were told whether or not the attitudes reflected in the speech that had been censored were consistent with their own attitudes. As an illustration, a participant may have started the study with the opinion that the campus police should not have much authority over students. The participant was either told by the experimenter that the censored speaker agreed with the participant that campus police should not have authority, or the participant was told that the speaker disagreed and thought campus police should have absolute authority. Results indicated that the participants whose attitudes were consistent with the attitudes in the censored speech became more strongly committed to their position. In contrast, participants whose initial

attitudes were inconsistent with those in the speech adopted the attitudes about campus police reflected in the speech, which were opposite to their initial attitudes. Thus, reactance aroused by the censorship polarized attitudes. Similar attitude shifts have been found with a variety of persuasive messages that demanded compliance (Brehm & Brehm, 1981).

Similar to attitudinal changes, reactance against a persuasive health-promoting message designed to reduce a specific risk behavior may lead people to increase the frequency of that behavior (Brehm & Brehm, 1981; Donaldson, Graham, Piccinin, & Hansen, 1995). This phenomenon, known as a "boomerang" or iatrogenic effect, can be harmful to the person experiencing reactance if the threatened behavior was unhealthy to begin with, for example, increased smoking in response to an anti-smoking campaign.

Reactance Theory and Health

Although the phenomenon of reactance has been observed in a number of different contexts, the strongest evidence of its influence on health attitudes and behavior has been provided by a series of studies on alcohol consumption among underage drinkers (Bensley & Wu, 1991; Engs & Hanson, 1989; Gordon & Minor, 1992). For example, a survey of American college students conducted after the legal drinking age was increased to age 21 found that underage drinkers consumed more alcohol than their older peers after the drinking age increased while drug use rates remained stable and comparable for both age groups (Allen, Sprenkel, & Vitale, 1994). The authors explained these findings using reactance theory; that is, the underage drinkers viewed the law as an effort to deny their right to drink, a cherished freedom frequently associated with the college experience. Thus, these younger students responded to the new law, which threatened their freedom, by drinking more alcohol rather than drinking less as the law intended (Allen et al., 1994).

Intervention and prevention efforts are also vulnerable to reactance effects. As Gibbons, Gerrard, and Pomery (2004) pointed out, at-risk populations who are not ready to hear a message of prevention or intervention may react against such a message. In general, a prevention or intervention attempt will be most successful for people who have already made a decision or have attitudes consistent with the message of prevention or intervention (Donaldson et al., 1995). Messages that are forceful in demanding change or compliance are particularly ineffective for people who have not yet decided they want or need to change their behavior (Buller, Borland, & Burgoon, 1998). Unfortunately, many

people have not yet realized or decided that UV exposure is a behavior that needs changing.

UV Exposure as a Health Risk

For the last several decades, cancer has been a major public health concern in the United States. Lung cancer and breast cancer, in particular, have captured American interest and led to anti-smoking campaigns and fundraisers for breast cancer research. Whereas the Surgeon General's warnings have helped to reduce rates of cigarette smoking and the Susan G. Koman Foundation has helped raise awareness of breast cancer, skin cancer has only recently begun to receive national attention as a serious health concern. This concern is both valid and timely, as skin cancer is currently the most common form of cancer in the United States and prevalence rates continue to rise each year (American Cancer Society, 2006).

UV exposure is the leading cause of skin cancer; more than 90% of all skin cancers are caused by UV light (American Cancer Society, 2006). There are three main forms of skin cancer: basal cell carcinoma, squamous cell carcinoma, and malignant melanoma. The first of these types, basal cell, is the most prevalent, but melanoma is the most serious (American Academy of Dermatology, 2005). Compared to more virulent forms of cancer, such as leukemia, skin cancer is relatively benign. If detected early, treatment is often very successful in eliminating the cancer. However, if undetected or untreated, melanoma can be fatal; more than 7,900 Americans die each year from melanoma (American Cancer Society, 2006). Even if skin cancer is successfully treated, removal of cancerous lesions can leave significant scarring. The appearance of these scars may leave survivors feeling less attractive.

Even without the unattractive scarring that can result from skin cancer removal, UV exposure in and of itself has a deleterious effect on the skin's appearance. Over time, exposure to UV light damages the cells of the epidermis layer of the skin, leading to wrinkles, age spots, rough texture, and sagging; collectively these symptoms are termed "photoaging." Experts believe that more than 90% of all changes in the skin's appearance over time are a result of UV exposure rather than the natural aging process (Taylor, Stern, Leyden, & Gilchrest, 1990; Taylor & Sober, 1996).

Given that both skin cancer and photoaging can be considered serious, negative consequences of UV exposure, it would seem that people would be sufficiently motivated to

take adequate precautions to protect themselves from these outcomes. However, multiple research studies and public surveys indicate that people do not consistently protect against UV damage. This failure to protect from UV exposure is not due to a lack of knowledge. Recent efforts by the public health and medical communities have succeeded in increasing awareness of the dangers of tanning among the American public (Arthey & Clarke, 1995), but several studies have shown that this increased knowledge does not necessarily translate into decreases in tanning or increases in UV protective behaviors (Beasley & Kittel, 1997; Robinson, Rigel, & Amonette, 1997). For example, a survey of tanning booth users found large discrepancies between participants' beliefs and their behavior. When asked about possible dangers of using a tanning bed, 91% of current tanning bed users agreed that using tanning booths could potentially lead to skin cancer, and 93% thought tanning might result in premature aging (Knight, Kirincich, Farmer, & Hood, 2002).

Premature aging is considered unattractive, and women of all ages generally report being more concerned about their physical appearance than men do (Pliner, Chaiken, & Flett, 1990). This concern is underscored by the proliferation of anti-aging products offered by the cosmetics industry; 90 million Americans use or have used these products, the majority of whom are women (National Consumers League, 2004). Because premature aging is especially a concern for women, it seems logical that women would be more likely than men to be persuaded by an intervention that focuses on their appearance. UV exposure, however, is damaging to health as well as appearance, and women are at risk for both types of negative consequences. An examination of the UV-intervention literature reveals recommendations for health-focused (i.e., Katz & Jernigan, 1991) or appearance-focused (i.e., Hillhouse & Turrisi, 2002; Jackson & Aiken, 2006) interventions to improve UV-safe behavior. However, a UV intervention that combines appearance and health-related concerns, as in the current study, may be more effective than an intervention that focuses on either concern alone, especially for women.

UV interventions may be successful in changing attitudes, but they must do more than provide information to be completely successful in changing behavior. Previous research suggests that tanners who participate in informational studies, the majority of whom are women, realize that UV exposure is dangerous, but understanding this information is not sufficient motivation for altering behavior (Knight et al., 2002). This disconnect between healthy belief (tanning is harmful) and unhealthy tanning behavior suggests that information alone is not sufficiently persuasive and therefore strictly

informational interventions were not effective. It is also possible that reactance is aroused when people who already understand the dangers of UV exposure and know what is required to protect from UV damage are instructed to protect themselves. This reactance may result in subsequent failure to follow protective recommendations.

Reactance as Non – Adherence

In their review of the medical adherence literature, Fogarty and Youngs (2000) identified four conditions under which adherence is reduced. The first condition, duration, refers to the negative relation between treatment length and adherence, that is, the longer patients must adhere to a doctor's orders, the less likely they are to follow those orders (DiMatteo & Friedman, 1982; Rand, 1993). The second condition is frequency -- patients are more likely to adhere to treatments that occur less frequently than those that occur daily (Kruse, Eggert-Kruse, Rampmaier, Runnebaum, & Weber, 1993; Paes, Bakker, & Soe-Agnie, 1997). Third, treatment plans that are complicated tend to result in less adherence. For example, patients would rather take only one medication than several (DiMatteo & Friedman, 1982; Janis, 1984). Finally, a prevention-focused treatment elicits less compliance than a treatment plan seeking to cure because distant health threats or illnesses that are symptom-free are less salient to patients than are current or debilitating illnesses (Miller, 1997; Trick, 1993).

Unfortunately, effective reduction of UV exposure requires all four of these components, which suggests that this is an arena where non- adherence with a recommendation to reduce exposure is likely. Specifically, UV reduction requires a lifetime avoidance of exposure (duration), daily use of sunscreen with frequent application (frequency), and wearing protective clothing including sunglasses and wide brimmed hats, while avoiding the sun during peak hours (complexity). Moreover, all of these efforts serve to prevent future skin cancer and photoaging rather than treat a current condition (prevention-focus). Given the demanding, long-term preventive nature of UV protection, and the considerable restrictions conscientious adherence imposes, medical communications such as physicians' suggestions or public health messages that are designed to reduce UV exposure by focusing on negative outcomes could very well result in non- adherence.

Brehm and Brehm (1981) argue that evidence of non-compliance is sufficient to assume that reactance has occurred. They also argue, however, that provoking a boomerang effect, whereby any behavior change is in the opposite direction of that

intended, is the clearest evidence of reactance. A suggestion that a person needs to reduce their UV exposure poses a threat to the freedom to tan or even to be outdoors without UV protection. The amount of reactance exhibited in response to such a suggestion may depend on a variety of factors including individual differences in personality.

Self - Esteem and Reactance

As described previously, the role of the self-concept or self-esteem has been explored in conjunction with dissonance magnitude (Aronson, 1968; Aronson & Carlsmith, 1972). This research has suggested that people with high self-esteem are more bothered by discrepancies and are subsequently more motivated to reduce dissonance. Another line of research has explored the relation between reactance and self-esteem. Together, this research suggests that self-esteem may function as a moderator and is worth further exploration. For example, in an early study of the relation between self-esteem and reactance, college women were exposed to information about AIDS and contraception (Gerrard, Kurylo, & Reis, 1991). Self-esteem and discomfort with sexual material (erotophobia) were measured, and as predicted, erotophobic participants with high self-esteem recalled significantly less sexual information than either erotophilics or participants with low self-esteem. The authors suggested that the erotophobic women were threatened by the sexual nature of the information, and those with high self-esteem reacted by ignoring the information rather than learning it as the other participants did.

Another study examined changes in perceived risk of experiencing negative consequences as a form of reactance (Smith, Gerrard, & Gibbons, 1997). To make their risk behavior salient, sexually active college women reviewed their sexual experiences and birth control use before rating how likely they were to experience an unplanned pregnancy. Despite having equal levels of pregnancy risk, women with high self-esteem rated their likelihood as significantly lower than did the women with low self-esteem. This study offers additional support for the demonstration of reactance from high self-esteem people who were forced to face the reality of their unwise behavior rather than enjoying the freedom to ignore their risk level. Taken together, these studies and others demonstrate a consistent finding: people with high self-esteem experience reactance when their freedom to ignore threatening information has been eliminated, perhaps because they are more likely to view the information as an implied criticism that they have been acting unwisely. Some research has shown that people with high self-esteem are more sensitive to criticism than are people

with low self-esteem (Shrauger & Lund, 1975) and that they become defensive when their self-esteem is threatened (Baumeister, Smart, and Boden, 1996).

A recent series of experimental studies provides further evidence that people with high self-esteem exhibit reactance when forced to face the fact that they have acted unwisely (Gibbons et al., 2007). Although the methodology differs across these studies, they reveal the same pattern of reactance. Participants with high self-esteem were the most willing to engage in risky behavior following a persuasive message designed to reduce their risk behavior. In these studies, risk behavior was assessed using three separate but related constructs: actual behavior, behavioral intention, and behavioral willingness. These constructs are associated with different cognitive strategies, and thus have different implications for intervention. More specifically, intention involves more deliberate thought than willingness does and therefore responds differently to attempts at persuasion.

Behavioral Intention versus Behavioral Willingness

Behavioral intention, planning to engage in a behavior, is a construct from expectancy value theories, such as the theory of reasoned action (Fishbein & Ajzen, 1975) and the theory of planned behavior (Ajzen, 1985). Behavior theorists claimed that almost all behavior is planned (Ajzen, 1985; Fishbein & Ajzen, 1975). For example, a college student could plan to have sex with someone he or she meets at a fraternity party, and most of the time, a concrete plan to engage in a behavior does translate into actual behavior.

Behavioral willingness, a key construct in the Gibbons et al. reactance studies and in the prototype/willingness model (Gibbons & Gerrard, 1995; Gibbons, Gerrard, & Lane, 2003), is the notion that, under the right circumstances, people are often open to engaging in a behavior they had not planned to engage in. For example, the college student mentioned in the intention example above may not be intending to have sex with someone he or she just met, but when presented with a scenario about meeting someone attractive who is interested in having sex with them, the student might indicate they would have sex. Willingness to engage in a behavior has been shown to predict a variety of non-habitual behaviors (Gibbons & Gerrard, 1995; Gibbons et al., 2003).

Reminiscent of dual-processing models, behavioral intention is a rational, reasoned construct that reflects deeper cognitive processing whereas behavioral willingness is more heuristically based (Chaiken & Trope, 1999; Gibbons et al., 2007). Reactance is also thought to be heuristic in nature (Sherman, Crawford, and McConnell, 2004; Gibbons et al.,

2007); thus, evidence of reactance is more likely to be found if behavior is measured with the heuristic construct of willingness as opposed to the more reasoned construct of behavioral intention. People who experience reactance in response to an intervention are essentially expressing their resentment in being told what they should or should not do. Thinking logically about an intervention message, as would occur while reporting behavioral intention, would reduce plans to engage in risky behavior. Both reactance and willingness are less rational and rely more on mental shortcuts than what makes sense logically. In three separate studies, Gibbons and colleagues (2007) found evidence that people with high self-esteem respond in an irrational manner consistent with reactance, i.e., they reported more willingness, but reactance was not evident on the women's reports of their (more rational) intentions.

In one of the Gibbons et al. (2007) studies, participants were given accurate information about the prevalence of casual sex on their college campus, a statistic which is typically overestimated. The participants believed that the purpose of the study was to persuade them to decrease risky or unprotected sexual behavior, and most of them responded appropriately by becoming less willing to engage in casual sex in the future. However, participants with high self-esteem who were already engaging in casual sex became more willing to continue their risky behavior in spite of the information about prevalence (Gibbons et al., 2007, Study 4). Similarly, participants in a second study heard about a fictitious fellow student who had been diagnosed with a sexually transmitted disease. In general, hearing about this student led to a reduction in the participants' willingness to have risky casual sex. There was an exception to this pattern, however. Participants with high self-esteem who had had many sexual partners reported *increased* willingness to participate in risky sexual activity (Gibbons et al., 2007, Study 3). In contrast, when thinking rationally about their future plans, all participants, regardless of their own risky behavior or level of self esteem, reported less intention to engage in unprotected sex.

A third study (Gibbons et al., 2007, Study 2) was an experimental intervention designed to reduce UV exposure in outdoor workers – a group at high risk for negative consequences from UV exposure. The intervention has been used successfully in several other populations, and consists of multiple components, including either health-focused or appearance-focused videotapes and photography that reveals UV damage (Gibbons, Gerrard, Lane, Mahler, & Kulik, 2005; Mahler, Kulik, Gibbons, Gerrard, & Harrell, 2003). Use of UV photography first became popular among dermatologists (Fulton, 1997) but it has

spread to public health personnel and social scientists that specialize in health behavior (e.g., Gibbons et al., 2005; Mahler et al., 2003; Weinstock & Rossi, 1998). To create a UV photograph, a digital or traditional Poloroid camera is used to take a photograph of the skin. A filter that transmits UV light while blocking light from the visible spectrum is placed over the camera lens and the resulting photograph reveals uneven distribution of melanin under the skin's surface (Faraghan Studios, 2007). This uneven pigmentation represents areas of the skin that have been damaged by UV light (Faraghan Studios, 2007; Fulton, 1997).

Data in Gibbons et al. study (2007) were collected pre and post-intervention, three months post-intervention, and one year post-intervention for a total of four waves of data collection. Background information collected at pre-test included sunscreen use, UV exposure, self-esteem, and attitudes toward UV exposure. Immediately prior to the intervention manipulation, participants reported their intention and willingness to receive UV exposure and protect themselves and their children from UV exposure. The intervention itself consisted of one of four factorial combinations of UV photographs and videotapes; the fifth condition served as a control for the other four conditions.

As predicted, participants in the intervention conditions reported less willingness and intention to expose themselves to UV rays than did participants in the control condition, and they were more inclined to protect themselves. However, as in Study 2 above, there was one intervention group that increased their willingness to expose their skin to the sun. As before, the workers in the intervention condition who had high self-esteem and worked the most hours outside (and were therefore most at risk) were the exception to the general pattern. Although this reactance response had dissipated by the final follow-up, this intervention for at-risk outdoor workers replicated previous boomerang effects among high self-esteem, high risk participants exposed to persuasive, health promotion messages.

Each of these three studies provides evidence that participants were aware that an attempt was being made to change their behavior, which is a form of freedom threat. In addition, all three studies demonstrated that high-risk participants with high self-esteem experienced reactance, that is, they responded to the intervention by increasing their willingness to engage in the risky behavior (Gibbons et al., 2007).

Reactance was overcome, however, in one particular area of importance: the welfare of one's children. In the study of outdoor workers described above, the participants were asked about protecting themselves from UV exposure, and about protecting their children. The results were striking – when asked how willing they would be to go outside unprotected

and how willing they would be to allow their children to be outside without sunscreen , they reported significantly more willingness to expose themselves than to allow their children to be exposed. Thus, to the extent that these male outdoor workers experienced reactance, it did not affect their willingness to allow their children to be exposed to UV rays. If reactance experienced by fathers can be overcome in regard to their children, then this effect would be expected to be even more pronounced among mothers in the current study, because women are more likely to be the primary caregiver for children (Howes, Hamilton, & Philipsen, 1998; Ridgeway & Correll, 2004), which would include administering UV protection.

Perceived Vulnerability

As explained previously, because reactance and behavioral willingness are both heuristically based constructs, reactance was expected to affect willingness, but not intention, in the current study. Reactance was also expected to affect perceived vulnerability. Basically, perceived vulnerability is a construct incorporated in most health behavioral models that characterizes how at-risk people feel they are for experiencing the negative consequences that are associated with a particular behavior. For example, a heavy smoker may perceive that he or she is vulnerable to lung cancer. In contrast, a non-smoker might feel relatively invulnerable to the same condition by virtue of not smoking. When assessing perceived vulnerability, it is important to ask questions of conditional perceived vulnerability (i.e., "If you were to…how likely is it that you would…") to distinguish between responses based on current behavior versus those on future behavior or behavioral intention (Gerrard, Gibbons, & Reis-Bergan, 1999; van der Velde, van der Plight, & Hooykaas, 1996).

People generally report feeling less vulnerable to consequences than epidemiological data suggest they ought to be, but there is still the expected positive correlation between actual risk level and perceived vulnerability (Gerrard, Gibbons, & Bushman, 1996; Gibbons, Gerrard, Ouellette, & Burzette, 1997). Health interventions often target perceived susceptibility as a step to changing unhealthy behavior; a person who feels more vulnerable to negative consequences is more likely to avoid or decrease the risky behavior than is a person who does not feel they are at risk (Gerrard, Gibbons, Vande Lune, Pexa, & Gano, 2002; Van der plight, 1998). Logically, a persuasive health message to avoid tanning should lead to more concern about the dangers of tanning. Therefore, if some

recipients of these messages fail to increase concern about the negative consequences of UV exposure -- a form of non-compliance to a message instructing behavior change -- (Brehm & Brehm, 1981), then this unhealthy response could be considered reactance.

Rationale for the Current Study

Previous research has shown that some health interventions are effective and some are not. Research has also shown that understanding that a behavior change would be wise is not always sufficient motivation for a person to undertake the behavioral modification; persuasion is needed to induce behavioral change. Persuasive interventions designed to arouse cognitive dissonance (Festinger, 1957) should facilitate desired behavior change, whereas interventions that arouse reactance (Brehm, 1966) should inhibit appropriate change. The current study applied these two theories to a persuasive UV intervention and assessed whether or not they were effective in changing UV attitudes and behavior for women with children.

Surprisingly, there are no published studies that have directly pitted dissonance theory against reactance theory to compare their efficacy in altering UV behavior. In one recent study (Dykstra, 2005), however, an attempt was made to induce reactance in response to experimenter-administered criticism. In the study, male and female college students were told they had extensive UV damage, and then were exposed to one of three persuasive health communications instructing a reduction in UV exposure and regular use of sunscreen. In one condition, the persuasive message was designed to criticize participants for their damage. In the other two conditions, the environment was blamed. Conditions also differed on whether participants believed the health message was specific to them (individual threat) or whether multiple people received the message (general threat). The results of this study somewhat validated the importance that message type has in determining intervention effectiveness: individual freedom threat did lead to reactance, especially among frequent tanners and participants with high self-esteem, which subsequently resulted in greater willingness to receive UV exposure. The role of criticism in producing reactance was less supported, perhaps because the study contained methodological problems that reduced the likelihood of finding significant effects. There were two main weaknesses in the Dykstra (2005) study that were addressed in the current study: 1) all participants received all of the components of the UV intervention, and 2) the persuasive attempt intended to induce reactance was not sufficiently salient.

First, in the Dykstra (2005) study the components of the UV intervention were not manipulated; all of the participants received the same components. One component of the intervention, in particular, has been shown to be very effective in changing attitudes and behavioral intention and willingness (Gibbons et al., 2005; Mahler et al., 2003), the use of UV photography – facial photographs that show underlying UV skin damage. Most people who have been confronted with this evidence that they have sustained UV damage become highly motivated to change the error of their UV-seeking ways. Because everyone received the full intervention in the Dykstra study, reactance effects may have been overcome by the UV photography portion of the intervention. In the current study, only half of the participants saw their UV damage photograph.

Second, participants in the Dykstra (2005) study were equally interested in and were equally likely to retain information about UV damage, i.e., regardless of condition, more than 90% of participants correctly answered two "pop-quiz" questions on UV information. There were no significant differences across conditions in participants' reports that the skin cancer statistics provided to them were helpful, or in the amount of time participants spent reading the statistics.

As Brehm (1966) points out, information and arguments supplied by a respected communicator may lead to positive influence. In other words, a person who receives information about a topic (information pertaining to UV exposure and damage in the current study) may use that information to make an informed choice to follow the suggestions of the communication. Brehm (1966) further notes that reactance will only be triggered if it is obvious that the communicator is trying to persuade the message recipient and is not merely sharing information. The Dykstra (2005) study attempted to provide information as well as make clear the persuasive intent of the experimenter's recommendations. However, it is possible, albeit somewhat unlikely, that the information was received by participants but the persuasive element of the message was not salient enough to arouse reactance, i.e., the participants may not have perceived the message to be an attempt to change their behavior, or may not have felt sufficiently criticized for their prior exposure.

Although manipulation check analyses revealed differences across conditions in participants' experience of being blamed by the experimenter for their damage, perceived criticism was not measured in the study. In addition, the study did not include a direct measure of whether or not participants realized the experimenter was attempting to persuade them to change their attitudes and behavior. In the current study, affect was

assessed to measure participants' responses to the two main components of the intervention: the photograph and the persuasive message. In addition, including this assessment provided an opportunity to explore how negative affect impacted intervention effectiveness.

The current study also explored a relatively uncharted area of intervention effectiveness: invoking parental protectiveness. Although parents are susceptible to "irrational" reactance when provoked with a health intervention, this response can be set aside when the focus of the intervention is on their children (Gibbons et al., 2007). It seems plausible that when mothers think about protecting their children from harm, they would likely be even more adherent than usual to a hypocrisy-inducing intervention and less reactant than normal to an obviously persuasive intervention. If mothers are able to differentiate their own attitudes from how they feel about protecting their kids, then an intervention could be successful at changing mothers' willingness and intentions toward their children even if their own attitudes do not reflect those recommended by the intervention. Thus, the UV intervention in the current study was expected to be effective in inducing participants, who are mothers of young children, to be willing to reduce their children's UV exposure and increase their UV protection.

STUDY OVERVIEW AND HYPOTHESES

The current study involved administering various forms of a UV exposure intervention in order to examine the roles that dissonance (Festinger, 1957) and reactance (Brehm, 1966) play in its efficacy. An effective intervention would result in low willingness and intention to be exposed to UV, high intention to practice UV-protective behavior, and increased perceived vulnerability to UV-related consequences. The multi-component intervention was administered to adult mothers of young children using one of three techniques: information only (no persuasion), forceful persuasion (designed to arouse reactance), and subtle persuasion (designed to induce dissonance). These techniques were expected to have significantly different effects on willingness and intention. More specifically, the forceful persuasion technique was expected to be the least successful in changing health cognitions because it induces reactance in participants receiving an obviously persuasive intervention. The subtle persuasion technique, which involved an open-ended, non-threatening dialogue between participant and experimenter, was expected to be the most effective. Effective attitude change as a result of this condition was expected due to the dissonance aroused as participants reached their own conclusions that they had not always behaved in accordance with their UV-safe beliefs. The information-only technique was expected to perform at a level between the two persuasive techniques.

The use of UV photography has been shown to be an important component of previous UV interventions (Mahler et al., 2003), but its use has not been employed in conjunction with different persuasion techniques as in the current study. In order to further explore the mechanisms underlying the effectiveness of this intervention, half of participants received the intervention with UV photo, and half did not – they only received a black and white photo. The six experimental conditions of the study are outlined in Table 1.

Table 1: Experimental Conditions

	No persuasion	**Subtle persuasion**	**Forceful persuasion**
Full intervention	UV photo	UV photo + dialogue	UV photo + forceful persuasive message
No UV photo	No UV photo	No UV photo + dialogue	No UV photo + forceful persuasive message

An interaction between persuasive technique and UV photo was expected such that participants who received the subtle persuasion manipulation and viewed their UV damage were expected to demonstrate more attitude change consistent with the recommendations of the intervention than were participants in the other experimental conditions. In other words, the combination of the UV photo and hypocrisy induction (via the subtle persuasion technique where participants verbally reported their protection level and how much importance they placed on protection) was anticipated to be effective in changing participant attitudes to be consistent with UV-safe beliefs. In contrast, the forceful persuasion version was expected to be the least effective for participants who did not see their damage. Without the "proof" provided by the UV photo to reduce the reactance produced by the forceful message, this condition was expected to be least effective in producing healthy attitude changes.

Hypotheses

1. A main effect was expected for persuasion condition on intention and willingness to be exposed to UV rays, intention to protect, and perceived vulnerability. Specifically, because hypocrisy was assumed to have been induced in the subtle persuasion condition, participants in this condition were expected to report the lowest willingness and intention to be exposed to UV rays, the highest intention to protect, and the highest perception of vulnerability. Because reactance was assumed to have been induced by the forceful persuasion, participants in this condition were expected to report the highest willingness and intention to be exposed to UV rays, the lowest intention to protect, and the lowest perception of vulnerability. It was anticipated that the no persuasion control participants would fall between these two conditions.

2. Consistent with previous research, a main effect for UV photo was predicted. Specifically, participants who viewed their UV photo were expected to report less willingness and intention to obtain UV exposure, more intention to protect, and greater perceived vulnerability than were participants who saw only a black and white photo.

3. An interaction of UV photo and persuasion was predicted such that participants who received the forcefully persuasive message and did not see their UV photo were expected to experience reactance in response to the persuasion manipulation. This

reactance was expected to manifest as high behavioral willingness to obtain UV exposure, low perceived vulnerability to negative consequences of UV exposure, and low intention to protect from UV exposure.

4. An interaction of UV photo and persuasion condition was also predicted to yield one condition more effective than others. The intervention was expected to be the most effective among participants who received the subtly persuasive message and saw their UV photo due to the induction of hypocrisy compounded by "proof" of damage (and evidence of unwise behavior) via the photo. This was expected to manifest as low behavioral willingness to obtain UV exposure, high perceived vulnerability to negative consequences of UV exposure, and high intention to protect from UV exposure.

5. Consistent with earlier research that suggests that having an intention is part of a rational mode of decision making and is likely to be affected by social desirability, a main effect for the repeated measures factor of intentions vs. willingness to engage in risky UV behavior was predicted. Specifically, all participants were expected to report lower intention to expose themselves to UV than willingness to do so regardless of experimental condition.

6. A main effect of self vs. child was also expected, that is, the women were expected to report less intention and willingness to allow their child(ren) to receive UV exposure than they would allow themselves. This effect, however, was anticipated to interact with the UV photo manipulation such that viewing the UV photo was expected to make the negative consequences of UV exposure more salient and create a stronger desire to prevent these consequences in the participants' children than in oneself.

7. The interaction of UV photo and self/child differences was expected to be qualified by persuasion condition. Thus, a 3-way interaction (UV photo x self-child x persuasion condition) was expected such that participants who saw their UV photo and were in the forceful persuasion condition were expected to show the largest differences between self and child willingness. It was expected that these participants would experience reactance due to the forceful persuasive message,

and therefore have higher willingness to take risks themselves than did participants in other conditions. However, these participants would also be motivated by the physical evidence of damage revealed in their UV photo to take care of their children, and the reactance they experienced for themselves would not decrease this motivation. These two opposing forces were expected to lead to the largest discrepancy between self and child willingness in the forceful persuasion condition.

An additional, secondary-level hypothesis predicted an interaction between self-esteem and persuasion condition such that high self-esteem participants in the forceful persuasion condition were expected to report more reactance, and therefore greater willingness to be exposed to UV rays and less perceived vulnerability than those with low self-esteem. Participants with high self-esteem in the subtle persuasion condition, however, were expected to be more persuaded and report less willingness to expose themselves to UV and have higher perceived vulnerability than those with low self-esteem.

Because previous research in the area of UV exposure has not considered the role of affect in determining intervention effectiveness, no formal hypotheses about affect were made a priori. Affect assessment was included in the study design to allow for exploratory analyses involving affect and the possible interaction combinations of affect, UV photo, persuasion, and self-esteem.

METHOD

Participants

One hundred ninety-four mothers of elementary and middle-school aged children who had previously participated in a study of media effects on aggression were contacted and asked to participate in the current study in exchange for monetary compensation ($15). Twenty-three of the women decided not to participate and another 20 agreed to participate but either did not show up for their research appointments or cancelled and were unable to reschedule, resulting in a participation rate of 78%. The average age of the 151[1] mothers who participated in the current study was 43.1 years old, 93.4% were married, and 96% were Caucasian.

Materials

The multi-component UV intervention (see Mahler et al., 2003) consisted of facial photographs taken with a Polaroid camera, a colorful information card (Appendix A) that included text and photos pertaining to both skin cancer and photoaging, an informative brochure on UV exposure (Appendix B), and single-use sunscreen samples. The intervention components were identical for all participants with the exception of the photographs; half of the participants only saw a black and white photo whereas the other half also saw a photograph that revealed UV damage to their skin that is not visible to the naked eye. The primary purpose of the UV photograph was to make the negative consequences of UV exposure immediate and salient; people tend to think of these consequences as an abstract distal outcome (Mahler, Kulik, Gerrard, & Gibbons, 2006).

Measures

Demographics. A total of four demographic items assessing the participants' age, race, marital status, and whether their job involved knowledge of UV were administered. These items are included in Appendix C.

Self- esteem. Participants completed Rosenberg's 10-item self-esteem scale (1965). Sample items include, "On the whole, I am satisfied with myself" and "I take a positive attitude toward myself." The items were rated on a 7-point scale (1 = strongly disagree; 7 = strongly agree; see Appendix C. Reliability for the scale was adequate**,** α = .75.

Self-consciousness. Sixteen items (Appendix C) assessing private self-consciousness and social anxiety (Feningstein, Scheier, & Buss, 1975) were included to

draw attention from the self-esteem items. As these items were only intended as filler, participant responses to these items were not saved to the data file. The public self-consciousness subscale was not included because these items were deemed too similar to self-esteem to be used as non-relevant filler.

Prior tanning behavior. Four items (Appendix D) were employed to assess tanning behavior prior to participation in the current study; two of these assessed booth use, and the other two assessed outdoor tanning. Examples of these items are: "How many hours did you sunbathe during a typical week last summer?" and "How many times have you used a tanning booth in the past 6 months?" All four items were combined to create an index of previous tanning, $\alpha = .76$.

Prior incidental UV exposure. Because not all UV exposure is obtained deliberately, amount of incidental exposure was also assessed. This scale (Appendix E) consisted of two items, $\alpha = .92$: "How many hours did you spend in the sun doing something other than sunbathing (e.g. work, sports) in a typical week last summer?" and "On average, how many hours per week do you spend outside doing something other than sunbathing during a typical week in the summer?"

Prior sunscreen use. Three items were averaged to create an index of prior sunscreen use, $\alpha = .88$. These items included use of sunscreen on the face, the body, and in general. "When you spend time in the sun, how frequently do you use sunscreen on your face?" is an example of a prior sunscreen use item (See Appendix F).

Behavioral intention – Mothers' exposure*.* Two items (Appendix G) were employed to assess the women's intentions (expectations) to expose themselves to UV rays in the next 6 months: "How likely are you to spend some time in the sun to get some color (sunbathe) in the next 6 months?" and "How likely are you to use a tanning booth or salon in the next 6 months?" The response scales for these items were from 1 (definitely will not do this) to 7 (definitely will do this). The reliability of an index of these two questions was low ($\alpha = .48$) so they were analyzed separately.

Behavioral intention – Mothers' protection. A set of 10 items (Appendix G) was used to measure the women's intentions to protect themselves from UV damage by using sunscreen (e.g.,"I plan to use sunscreen regularly"; 1 = strongly disagree; 5 = strongly agree)[2]. The responses to these items were averaged to create an intention to protect index, $\alpha = .90$.

Behavioral intention – Child exposure. Participants were asked three questions about their intentions to allow exposure in the next 6 months; each of these items was rated on a 7-pt. scale (1 = definitely will not do this, 7 = definitely will do this; see Appendix G). The three items assessed intention to allow one's child sunbathe, use a booth, and use self-tanner, e.g., "How likely are you to: allow my child/children to spend time in the sun to get some color (sunbathe)." When combined, the reliability of these three items was low (α = .63) so they were analyzed separately.

Behavioral intention – Child protection. Two questions (Appendix G) were used to assess intention to protect one's child/children from UV exposure in the next six months. These items were rated on the same 7-point scale as the exposure intention items, 1 = definitely will not do this, 7 = definitely will do this. The items were: "How likely are you to: …insist that my child/children use sunscreen when they are going to be outside for more than 30 minutes";" …insist that my child use sunscreen daily". These items were combined to form a child protection index, α = .77.

Behavioral willingness – Mother. In order to assess the mothers' willingness to expose themselves to UV rays, the women were presented with a description of three hypothetical situations involving UV exposure (e.g., spending time outside, going boating, using a tanning booth; see Appendix H). For each scenario, participants were given a series of behaviors (e.g., put on sunscreen before going outside, tan at the salon several times; nine items total – three for the outside scenario, four for the boating scenario, and two for the booth scenario), and were asked to rate their willingness to engage in each behavior on a 7-point scale (1 = not at all willing; 7 = very willing). The responses were aggregated into separate indices for each of the UV-related scenarios, with non-risky choices reverse coded. Reliability analyses suggested that one item ("Go outside, but stay in the shade to avoid the sun") be dropped from the spending time outside scenario because the reliability was only .56 if all three items were included. The item "Go boating, but put on a hat, long sleeves, and pants to cover as much skin as possible" was dropped from the boating scenario index because with all four boating items included, the reliability was only .61. These deletions resulted in the following scales: spending time outside (two items), α = .82; going boating (three items), α = .87; using a tanning booth (two items), α = .86; all three scenarios combined (seven items), α = .84. In addition, combining the two outdoor scenario items to form an outdoor exposure intention scale (five items) resulted in a separate index, α = .86.

Behavioral willingness – Child. Similar to the scenarios described above, three scenarios involving UV exposure for the participant's child were also included. As can be seen in Appendix H, each scenario was accompanied by three or four options, resulting in a total of 10 willingness items, each rated on a 7-point scale (1 = not at all willing; 7 = very willing). A willingness index was created for each scenario by averaging ratings such that high scores indicated more willingness to let the child receive UV exposure. Reliability analyses suggested dropping two items, one from the booth scenario ("Pay for your child to use a tanning booth several times - enough to build up a tan") and one from the summer camp scenario ("Tell your child to stay out of the sun"). The reliability coefficients of these two scenarios with the less reliable items included were α = .79 and .42, respectively. Reliability coefficients after dropping the two less reliable items were as follows: using a tanning booth (two items), α = .95; going to summer camp (three items), α = .73; spending time outside (three items), α = .78; all three scenarios combined (eight items), α = .74; the two outdoor scenarios combined (six items), α = .68.

Perceived vulnerability. Nine items (Appendix I) assessed vulnerability to negative consequences related to UV exposure. Three of these items (rated on a 7-point scale: no chance to definitely would happen), were used to assess how vulnerable participants felt they were to the negative consequences of obtaining UV exposure outside, e.g., "If you were to get tanned on a regular basis from being in the sun, what are the chances that your skin would wrinkle prematurely?" Three similar items, rated on the same 7-pt. scale, assessed vulnerability as a result of booth use (e.g.,"How serious is the skin damage that results from using a tanning booth?"). Three additional perceived vulnerability items were assessed on 5-point scales (1 = strongly disagree, 5 = strongly agree). An example of these items is, "If I do not protect my skin from the sun and UV rays, I feel that I will develop premature wrinkling and age spots." All perceived vulnerability items were coded such that a high score indicated more vulnerability to negative consequences. Because different scales were used for these items, responses to all nine items were standardized prior to being combined to form an overall index of conditional vulnerability, α = .74.

Negative affect. Twenty-eight adjectives (e.g., "uncomfortable," "guilty," "pessimistic," and "troubled"; see Appendixes J and K), some of which were derived from the Multiple Affect Adjective CheckList (MAACL, Zuckerman & Lubin, 1965), were employed to asses the women's affect at two different points in time during the study. One-half of the adjectives were presented immediately after the photo manipulation, and their polar

opposites were presented immediately after the persuasion manipulation in order to assess affect change. The women were instructed to rate each adjective in terms of how much it represented how they were currently feeling (1 = does not apply at all, 7 = applies very much). Positive-oriented items were reverse coded, then the items from each time point were combined into indices of negative affect (α's = .81 and .91, respectively).

Impressions about the study and PI. Two items, each rated on a 5-pt. scale were used to assess participants' impressions of the study. These items, which are included in Appendix L, were "How much did you like the study," (1 = strongly disagree, 5 = strongly agree) and "How much did you learn from the study?" (1 = not a lot, 5 = a great deal). Four other adjectives (e.g., professional, considerate) were used to obtain participants' impressions of the PI. These adjectives (Appendix L) were all rated on 7-pt. scales (1 = not at all, 7 = very much), and were intended as a persuasion manipulation check.

Procedure

Prior to participation in the intervention, a female research assistant gave participants a brief overview of the procedure and purpose of the study. After signing an informed consent document (Appendix M) and receiving payment, participants were left alone in a private room with a computer. All questionnaires for the study were administered via MediaLab research software (Empirisoft, 2004) on the computer. First, a brief background questionnaire (Appendix C) assessed self-esteem and basic demographic information -- age, ethnicity, and marital status. This questionnaire also included the self-consciousness scale as a filler in order to reduce the salience of the self-esteem questions.

Next, the assistant presented all participants with a colorful, laminated information card that depicted and presented accurate information about skin cancer and photoaging. They were told to study the information card for as long as they desired. This card served as the first step of the intervention, and it's purpose was to make the primary consequences of UV exposure, skin cancer and photoaging, salient to the participants. In order to increase awareness that the women had not always practiced optimal UV protection, all participants next reviewed their previous UV exposure. The review involved answering 20 questions (see Appendixes D, E, and F) about skin type and family history of skin cancer, as well history of UV exposure and sunburns, and prior protective behavior (e.g., types of protection, consistency of use, etc.).

Following this review of their behavior was the UV photography manipulation. Participants were randomly assigned to one of two UV photo conditions: they either had one or two photographs taken of their face with a Polaroid camera. All participants were shown a natural light black and white photograph, and half of the participants also saw a second photograph that had been taken with a UV filter that revealed underlying UV damage to their face. The black and white photograph was described to all participants as a "standard black and white photograph." Participants in the no UV condition were also told that the purpose of the photograph would be explained later. Participants in the UV condition were told that the black and white photograph "shows just what we can see with our eyes." In the UV photo condition, the purpose of the UV filter was explained and the resulting UV photograph was described as revealing "underlying UV damage, some of which we can't see yet with our eyes. Any difference between the photos is a sign of some damage to the skin. Any uneven shaded, speckled, freckled, or pitted areas are signs of existing, underlying UV damage." The assistant briefly pointed out the areas with the greatest amount of damage. Each participant was given a few moments to look at her photograph(s), then she completed a brief questionnaire to asses her affect in response to the photo. Participants were not explicitly told that this affect assessment was related to the photo manipulation. Participants were then instructed to put their photo(s) in an envelope before continuing with the study. The remainder of the procedure was conducted by the principal investigator (PI), who was blind to photo condition. Participants were randomly assigned to one of three persuasion conditions; see Table 2 for the number of participants per cell.

Table 2: Cell Counts by Persuasion Condition and UV Photo Condition

	No persuasion	**Subtle persuasion**	**Forceful persuasion**
No UV	26	24	29
UV	25	24	23

Note: *N* = 151.

In the *forceful persuasion* condition, participants were told that they had sustained considerable UV damage due to their lifetime UV exposure and failure to use adequate UV protection. In this condition, the PI openly attempted to persuade participants that they should be using adequate protection and avoiding intentional UV exposure in the future. In describing how participants should be protecting themselves, several personal freedoms

were jeopardized in an attempt to induce reactance, such as the freedom to be in the sun when they want to and the freedom to wear short sleeves without sunscreen. Specifically, the PI told particpants in this condition:

> I'd like to talk with you for a minute about UV exposure and UV damage. It is important that you realize you have UV damage and that this damage is a result of receiving UV exposure throughout your life without adequate UV protection. This UV damage will continue to get worse and will put you at greater risk for skin cancer and also wrinkles and age spots if you continue to receive UV exposure without using adequate protection. You need to use sunscreen of at least SPF 15, preferably SPF 30, every day. You should also avoid any unnecessary UV exposure and protect yourself every time you will be outside, including on cloudy days and during cold weather.

In the *subtle persuasion* condition, participants were briefly interviewed about their beliefs about UV exposure and the importance of protection in a non-threatening manner. Responses were reflected back to participants when appropriate and the PI took notes on the conversation. The women were asked questions about their current UV protection behavior and were subtly guided to the conclusion that they should protect from additional UV damage:

> What are some positive things you perceive about receiving UV exposure? What are some negative things you perceive about receiving UV exposure? How important is it to you that you protect yourself from UV damage? How consistently do you protect yourself from UV damage? What steps could you take to meet your goal of protecting yourself? What might get in the way of that goal? How can you reduce or overcome these barriers?

These questions were intended to develop a sense of discrepancy between their UV exposure and protection behavior on the one hand, and their beliefs about protecting from UV damage on the other. Their awareness of this discrepancy was expected to increase as a result of the intervention. It was expected that reporting their current level of protection orally to the PI after reporting the level of importance they placed on protection would induce hypocrisy among the participants in this condition. In addition, participants were encouraged to set goals to change their UV behavior – they were asked to list steps they could take to increase protection and ways to overcome barriers they expected to face in changing their behavior (cf., Gollwitzer, 1993). At the end of the discussion, the PI summarized the conversation.

In the *no persuasion* condition, the PI introduced herself to the participant, but did not deliver a persuasive message. All participants completed the second affect questionnaire in

order to assess changes in their affect, and then immediately completed the final questionnaire.

The final questionnaire contained the primary dependent variables: their willingness and intention to obtain UV exposure and protect against UV damage, as well as their perceived likelihood of experiencing harmful consequences from UV exposure. These measures were followed by an assessment of the women's willingness to let their children be exposed to UV rays, and their intention to protect their child(ren) from this exposure.

Next, the PI conducted an oral debriefing emphasizing that the information provided about UV exposure in the study was accurate and should be heeded to avoid skin cancer and photoaging. Participants were thanked for their participation and referred to the American Cancer Society and/or their physician if they had additional questions. All participants were encouraged to have their doctor conduct a skin screening (a thorough examination of the skin for potentially cancerous moles, etc.) at least once per year. Finally, questions about UV or the study were answered, and additional information about reducing UV exposure and increasing UV protective behaviors was provided in the form of a brochure (Appendix B). As a secondary dependent variable, participants were offered samples of sunscreen to take home "if you will use them." The number of samples taken by each participant from a bowl of 15 samples was recorded unobtrusively as an additional behavioral intention measure. Participants were also invited to take their photograph(s) with them.

RESULTS

In general, the current UV-related behavior of the study sample was not very high risk: only 6% had used a tanning booth in the previous six months, 44% did not try to tan, and on average, the participants had spent less than one hour per week sunbathing the previous summer. Their lifetime UV exposure, however, indicated more risk: 38.4% had sunburned several times or more, and 75% had suffered at least one sunburn severe enough to blister. In addition, eight participants had experienced skin cancer, and another 10 had been diagnosed with pre-cancerous spots. Seventy-seven percent of the sample knew at least one person, such as a friend, family member, or coworker, who had been diagnosed with skin cancer.

Randomization Checks

To verify that random assignment had resulted in an equal distribution of UV-related variables across the six experimental conditions, several photo by persuasion analyses of variance (ANOVAs) were conducted on variables related to previous UV exposure. These analyses indicated that there were no differences across conditions in the number of hours that participants had sunbathed ($p > .79$), their sunscreen use ($p > .51$), or their desire to be tan ($p > .58$). There was a significant difference in prior tanning booth use ($F(2, 143) = 3.81$, $p < .03$), such that participants randomly assigned to the subtle persuasion condition had used a booth more than participants in the forceful persuasion condition, $t(98) = 2.10$, $p < .04$. Although significant (means were 1.04 for the no persuasion condition; 1.02 for the forceful persuasion condition; 1.38 for the subtle persuasion condition), these mean differences were relatively trivial considering that the largest (and only statistically significant) difference was .36 on a 7-point scale. There was also a significant difference in mean level of prior incidental exposure to UV by persuasion condition, $F(2, 143) = 3.17$, $p < .05$. A follow-up t-test revealed that participants in the forceful persuasion condition had received more incidental exposure than participants in the no persuasion condition, $t(99) = 2.68$, $p < .01$; standardized Ms = .24 and -.24, respectively. Because these randomization analyses suggest that participants' prior UV exposure was not equally distributed across the persuasion conditions, subsequent analyses were conducted with all prior exposure variables (tanning, incidental exposure, and sunscreen use) treated as covariates.

A second set of ANOVAs was conducted to determine whether participants perceived the experiment and the delivery of the persuasive message differently depending on which

condition they were assigned to. The first of these analyses indicated that, in general, participants liked the study (*M* = 3.91 on a 5-pt. scale), and thought the experimenter was "respectful" (*M* = 6.75 out of 7). There were no between-condition differences on these responses ($F(2, 133)^3 = 1.89$, $p > .16$; $F(2, 133) = 0.31$, $p > .74$, respectively).

Participants who saw their UV photo tended to report learning more from the study than those who did not see their UV photo, $F(1, 133) = 2.99$, $p < .09$; *M*s = 3.67 and 3.30 on a 5-pt. scale. Due to the intended forcefulness of the persuasive message in the forceful persuasion condition, participants in this condition were expected to rate the experimenter as more pushy than participants in the other two persuasion conditions. Although the mean difference in perceived pushiness was not statistically significant between the no persuasion and forceful persuasion conditions, participants in the subtle persuasion condition rated the experimenter as less pushy than did other participants, $t(139) = 2.47$, $p < .02$; *M*s = 1.11 vs. 1.58 on a 7-pt. scale. These participants also rated the experimenter as more considerate than did participants in the no persuasion and forceful persuasion conditions, $t(139) = 2.42$, $p < .02$; *M*s = 6.84 vs. 6.43 on a 7-pt. scale.

Descriptive Statistics

The means and standard deviations for all dependent variables for the overall study sample are presented in Table 3. An examination of these descriptive statistics revealed that participants had reported very little willingness and intention for themselves and their children to use tanning booth (all booth-related means were less than 2.0 on a 1-7 scale). In addition, a 2 X 3 General Linear Model (GLM) was conducted on an index of these four booth-related items. The main effects of UV photo condition and persuasion condition were not significant, nor was the UV photo X persuasion interaction, *p*s > .38. Therefore, due to the potential reduction in statistical power as a result of the floor effect of the booth-related items for analyses predicting tanning booth use, the analyses involving these items are not reported. Thus, all subsequently reported analyses on UV exposure pertain only to sunbathing outside or incidental exposure. The remaining dependent variables were significantly inter-correlated, as shown in Table 4. A full correlation matrix including all variables assessed in the study is included in Appendix N.

Table 3: Means and Standard Deviations of Dependent Variables

Variable	Mean	Standard Deviation
BW sunbathe	4.29	1.60
BW - use a tanning booth	1.97	1.64
BI sunbathe	2.83	1.97
BI - use a tanning booth	1.33	1.12
BI protect	4.00	0.69
PV	Standardized	Standardized
Child BW sunbathe	2.09	0.84
Child BW use booth	1.23	0.78
Child BI sunbathe	1.79	1.37
Child BI use booth	1.14	0.64
Child BI protect	5.34	1.46
Pre-persuasion negative affect	2.74	0.84
Post-persuasion negative affect	2.34	0.92

Note. N = 151. Possible range for all variables = 1 – 7 except BI to protect self (1 – 5). BW = behavioral willingness. BI = behavioral intention. PV = perceived vulnerability.

Table 4: Correlations among Dependent Variables

Variable	1	2	3	4	5	6	7	8	9
1. BW sunbathe	-								
2. BI sunbathe	.38***	-							
3. BI protect	-.51***	-.36***	-						
4. PV	-.25**	-.20*	.36***	-					
5. Child BW sunbathe	.44***	.17*	-.48***	-.34***	-				
6. Child BI sunbathe	.26**	.38***	-.27**	-.31***	.27**	-			
7. Child BI protect	-.37***	-.11	.49***	.27**	-.50***	-.20*	-		
8. Pre-persuasion negative affect	-.01	.12	-.09	-.12	.05	.10	-.09	-	
9. Post-persuasion negative affect	.06	.17*	-.11	-.21**	.05	.10	-.04	.81***	-

Note. N = 151. *p < .05. **p < .01. ***$p \leq .001$. BW = behavioral willingness. BI = behavioral intention. PV = perceived vulnerability.

General Analytic Strategy

Due to the primarily categorical nature of the design and the necessity of including multiple covariates, the GLM was used as the main method of analysis. The study design is best described as a 2 (photo: UV vs. no UV) by 3 (persuasion: none, subtle, forceful) between-subject factorial design. As is described in detail below, the basic 2 X 3 GLM was used to test each of the primary hypotheses of the study. For ease of comparison, the

means and standard errors by condition for each of the dependent variables tested throughout the hypotheses are displayed together in Table 5. In addition, the GLM tables for tests of between-subjects effects are in Appendix P.

Table 5: Adjusted Means[4] by UV Photo and Persuasion Condition

	No Persuasion	Subtle Persuasion	Forceful Persuasion
BW sunbathe			
No UV	3.95 (0.27)	4.08 (0.27)	4.57 (0.25)
UV	4.69 (0.27)	4.18 (0.27)	4.25 (0.28)
BI sunbathe			
No UV	2.77 (0.35)	2.65 (0.35)	2.80 (0.32)
UV	3.14 (0.34)	2.40 (0.35)	3.16 (0.36)
BI protect			
No UV	3.90 (0.11)	4.00 (0.10)	3.86 (0.10)
UV	3.86 (0.10)	4.10 (0.10)	4.35 (0.11)
PV			
No UV	-0.24 (0.11)	0.05 (0.11)	-0.01 (0.10)
UV	-0.06 (0.10)	0.07 (0.11)	0.18 (0.11)
Child BW sunbathe			
No UV	2.11 (0.16)	1.97 (0.16)	2.07 (0.15)
UV	2.49 (0.16)	1.95 (0.16)	1.87 (0.16)
Child BI sunbathe			
No UV	1.94 (0.27)	1.73 (0.26)	1.41 (0.24)
UV	1.85 (0.26)	2.19 (0.27)	1.76 (0.27)
Child BI protect			
No UV	5.68 (0.27)	5.51 (0.26)	4.91 (0.24)
UV	4.80 (0.26)	5.09 (0.27)	6.08 (0.27)

Note. N = 151. Scales are 1 – 7 except BI protect (1 – 5). Standard errors are in parentheses. Perceived vulnerability has been standardized. BW = behavioral willingness. BI = behavioral intention. PV = perceived vulnerability.

Previous research (Gerrard, Stock, Gibbons, Dykstra, Mahler, & Kulik, 2007) suggests that intervention effectiveness can differ as a result of the age of the participant. The age range of the current sample was large (30 to 61), thus, moderation of the intervention effects by age was a possibility to consider during data analysis. Correlation analyses confirmed that age was significantly and negatively correlated with willingness (r (151) = -.25, p < .01) and intention (r (151) = -.29, p < .001) to sunbathe. This tendency for younger participants to be more receptive to receiving UV exposure raises the possibility of theoretically interesting interactions, however, the study was not designed to examine age effects, and consequently the sample size was not large enough to treat age as a predictor variable. Thus, all subsequent analyses treated age, prior UV exposure (booth and sun), and prior sunscreen use (described previously) as covariates.

Hypothesis Testing

Hypothesis 1. The first hypothesis predicted that the effectiveness of the intervention would differ by persuasion condition such that it would be most effective for women in the subtle condition, followed by those in the no persuasion condition, followed by those in the forceful condition. A series of four 2 X 3 GLMs (see Appendix P) was conducted with the women's willingness and intention to sunbathe, their intention to protect themselves, and their perceived vulnerability serving as the dependent variables. Persuasion condition was not a significant predictor of willingness to sunbathe, ($F(2, 139) = 0.56$, $p > .57$) or intention to sunbathe, $F(2, 139) = 1.07$, $p > .35$. However, there was a marginally significant main effect of persuasion condition on intention to protect, $F(2, 139) = 2.55$, $p < .09$. Bonferroni-adjusted pairwise comparisons revealed a marginally significant difference between the mean level of intention to protect among participants in the no persuasion condition (mean adjusted for covariates of age and prior UV-related behavior = 3.88) and those in the forceful persuasion condition (adjusted mean = 4.10), such that intention to protect was greater if participants received a forcefully persuasive message, $p < .10$.

There was also a marginally significant main effect of persuasion condition on perceived vulnerability, $F(2, 139) = 2.66$, $p < .08$. Although none of the Bonferroni-adjusted pairwise comparisons of the adjusted means of the three persuasion conditions were significant ($ps > .12$), the trend in means was such that the mean level of perceived vulnerability was lowest among participants in the no persuasion condition. Overall, these analyses suggest that Hypothesis One was not supported. The effectiveness of the intervention, as assessed by willingness, intention, and perceived vulnerability, did not differ as expected across persuasion conditions.

Hypothesis 2. Hypothesis Two predicted that the intervention would be more effective for participants who saw their UV photo than for those who saw only a black and white photo. As with Hypothesis One, four 2 X 3 GLMs (see Appendix P) were conducted with the mothers' willingness and intention to sunbathe, intention to protect themselves, and their perceived vulnerability serving as the dependent variables. There were no significant differences in willingness to sunbathe as a function of UV photo condition, ($F(1, 139) = .66$, $p > .42$), intention to sunbathe, ($F(1, 139) = .32$, $p > .57$), or perceived vulnerability ($F(1, 139) = 2.13$, $p > .15$). However, there was a significant main effect of UV condition on intention to protect, $F(1, 139) = 4.71$, $p < .04$. As predicted, the mean level of intention to

protect was greater for participants who had seen their UV photograph (4.10) than for those who had not (3.92). Although the intervention was not universally more effective for participants who saw their UV photograph, their greater intention to protect as a function of being in the UV condition provides partial support for this hypothesis.

Hypothesis 3. The third hypothesis predicted an interaction between UV photo condition and persuasion condition such that the intervention would be least effective in changing the women's willingness, intentions, and perceived vulnerability in the forceful persuasion, no UV photo condition due to an induction of reactance. A series of four GLMs were conducted on the four outcome variables with photo and persuasion condition serving as the predictor variables (see Appendix P). The photo x persuasion interaction of was not significant for willingness ($F(2, 139) = 2.04$, $p > .13$), intention to sunbathe ($F(2, 139) = .53$, $p > .59$), or perceived vulnerability, $F(2, 139) = .40$, $p > .67$. There was, however, a significant interaction for intention to protect, $F(2, 139) = 3.63$, $p < .03$. As is shown in Table 6, the mean difference between the UV and no UV photo condition was significantly different among participants who received a forcefully persuasive message, $t(48) = 2.85$, $p < .01$. These means suggest that, in terms of intention to protect, the intervention was more effective for participants who received a forceful message and saw their UV photo than for those who received a forceful message but did not see their UV photo. Pairwise comparisons revealed that the mean level of intention to protect did not differ by persuasion condition among participants in the no UV photo condition, *p*s > .10. Therefore, this hypothesis was not supported; the intervention was not least effective for those who did not see their UV photo and received a forceful message. It is interesting to note, however, that the intervention appeared to be most effective for intention to protect among participants who saw their UV photo and received a forcefully persuasive message.

Table 6: Adjusted Mean Level of Intention to Protect by UV Photo and Persuasion Condition

	No Persuasion	Subtle Persuasion	Forceful Persuasion
No UV	3.90 (0.11)	4.00 (0.10)	3.86 (0.10)
UV	3.86 (0.10)	4.10 (0.10)	4.35 (0.11)**

Note. $N = 151$. $^{**}p < .01$ between No UV and UV conditions. Standard errors are in parentheses.

Hypothesis 4. The fourth hypothesis predicted an interaction between UV photo condition and persuasion condition such that the intervention was predicted to be most effective for participants who saw their UV photo and received the subtle persuasion manipulation. Only one of the four analyses of the dependent variables examined in hypotheses 1-3 yielded a significant interaction of photo and persuasion condition -- the analysis on intention to protect. However, pairwise comparisons revealed that the difference in means among participants who saw their UV photo in the subtle and forceful persuasion conditions was not significant, $p > .49$. Overall, this hypothesis was not supported; the intervention was not most effective for participants who saw their UV photo and received a subtly persuasive message. In other words, contrary to prediction, these participants did not report the lowest willingness or intention to sunbathe, nor the highest perceived vulnerability or intention to protect.

Hypothesis 5. Intention to receive UV exposure was expected to be significantly lower than willingness across all conditions. A repeated measures GLM (UV photo X Persuasion) on intention to sunbathe vs. willingness to sunbathe was used to test this fifth hypothesis. Prior to adding the covariates to the analysis, the main effect of construct (intention vs. willingness) was highly significant, suggesting that participants were more willing to sunbathe than they were intending to sunbathe, $F(1, 143) = 76.04$, $p < .001$. However, when the covariates were included in the analysis, this main effect was no longer significant, $F(1, 139) = 1.26$, $p > .26$. In addition, UV photo condition, persuasion condition, and the interaction of these variables did not interact significantly with construct, all ps > .30. These analyses suggest that although willingness was significantly greater than intention to sunbathe for all participants, these differences were due to differences in the prior UV exposure/protection variables and/or age rather than the intervention.

Hypothesis 6. The sixth hypothesis predicted that the mean level of willingness and intention to sunbathe participants reported for themselves would be greater than the mean level they would report for their children. This difference was expected to be greatest among participants in the UV photo condition. To test this hypothesis, two different repeated measures GLMs were conducted: one for self vs. child willingness and one for self vs. child intention. In both analyses, UV photo condition and persuasion were between-subjects factors and self vs. child was treated as a within-subjects factor. As predicted, participants reported greater willingness to receive UV exposure themselves than to allow UV exposure for their children, $F(1, 139) = 24.69$, $p < .001$. Similarly, participants reported

greater intention to sunbathe than intention to allow their children to sunbathe, $F(1, 139) = 15.08$, $p < .001$. Both of these analyses suggest that participants, all of whom were mothers, were planning to be more protective of their children than they were of themselves. However, the photo condition by target interaction was non-significant for intention and willingness, *p*s > .56. Thus, the self versus child difference did not vary as a function of photo condition, that is, participants were more likely to protect their children than themselves regardless of whether or not they saw their own UV photo (see Table 7). The main effect of photo condition was also non-significant for intention and willingness, *p*s > .32.

Table 7: Adjusted Mean Level of Willingness and Intention by Target and UV Photo Condition

	Self Willingness	Child Willingness	Self Intention	Child Intention
UV	4.38 (0.16)	2.10 (0.09)	2.90 (0.20)	1.93 (0.15)
No UV	4.20 (0.15)	2.05 (0.09)	2.74 (0.19)	1.69 (0.15)

Note. *N* = 151. Standard errors are in parentheses.

Hypothesis 7. Mean differences for willingness between self vs. child as a function of persuasion condition and UV photo condition were also anticipated. More specifically, the largest differences between self/child willingness were expected for participants in the forceful persuasion condition who saw their UV photo. A 2 (UV photo) X 3 (persuasion) GLM was conducted with willingness to sunbathe versus willingness to let one's child sunbathe serving as the paired-sample dependent variable. Contrary to prediction, the three-way interaction of Photo X Persuasion X Target was not significant, $p > .63$. Participants who saw their UV photo and received a forcefully persuasive message did not have the largest mean difference in willingness to sunbathe for themselves versus willingness to allow their child to sunbathe.

Additional Analyses

UV damage. For participants in the UV photo condition, the assistant rated the damage shown in each participants' UV photo on a five-point scale (1 = none, 5 = a lot). The mean level of overall damage was 2.90 (*sd* = .90); 94% of the participants received a rating greater than 1, which indicates that nearly all participants in this condition had visible UV damage. A GLM was conducted to see if the mean level of damage differed by

persuasion condition. As expected due to random assignment, persuasion condition was not a significant predictor of damage level, $p > .81$. Regardless of persuasion condition, participants had an equivalent amount of damage.

Sunscreen samples. The number of sunscreen samples taken by participants was analyzed to see if the number taken differed by experimental condition. A UV photo X Persuasion GLM revealed an interesting pattern, shown in Table 8. Although not statistically significant ($F(2, 137) = 2.29$, $p = .11$), there was a trend for participants who received a forceful message and saw their UV photo to take more samples than participants who received a forceful message but saw only a black and white photo. If number of sunscreen samples is considered a proxy for behavioral intention or behavioral change, then the use of the UV photo was important depending on the level of persuasiveness of the intervention message. Showing the UV photo tended to be more effective when paired with a forcefully persuasive message, but it appeared to be less effective when not paired with a persuasive message. The UV photo had no effect on the number of samples taken by participants who received a subtle persuasive message.

Table 8: Adjusted Mean Number of Sunscreen Samples Taken by Persuasion and UV Photo Condition

	No Persuasion	Subtle Persuasion	Forceful Persuasion
No UV	2.59 (0.29)	2.59 (0.29)	2.11 (0.26)
UV	2.08 (0.29)	2.57 (0.29)	2.80 (0.30)

Note. $N = 151$. Standard errors are in parentheses.

Skin Cancer Patients. As reported previously, eight of the participants in the current study had been diagnosed with skin cancer. Because the effectiveness of the intervention may have differed significantly for the former cancer patients, all of the analyses testing the hypotheses of the study were re-run without including these eight participants. These analyses yielded the same results with two exceptions. First, the 2 (UV photo) by 3 (persuasion) GLM on behavioral willingness revealed a marginally significant UV photo X Persuasion interaction, $F(2, 132) = 2.43$, $p < .10$. Figure 1 depicts this interaction; the pattern for the forceful persuasion condition is as expected – seeing the UV photo is associated with less willingness, but the pattern for the no persuasion condition is unexpected and does not make sense theoretically.

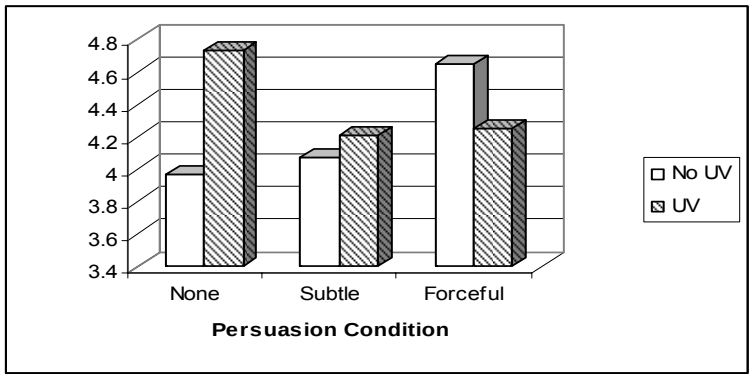

Figure 1: Adjusted Means for Willingness to Sunbathe by UV Photo and Persuasion Condition among Participants without Skin Cancer

The second difference between the analyses that did not include participants who had previously had skin cancer and those that did include them was that the marginally significant main effect of persuasion condition on intention to protect (reported previously) was no longer marginally significant, $F(2, 129) = 2.23$, $p > .11$.

Exploratory Analyses

Because few of the hypotheses were supported using the original 3 X 2 design, exploratory analyses were conducted to see if more significant effects could be detected when the two non-forceful persuasion conditions were combined. Although it made theoretical sense that the no persuasion and subtle persuasion conditions would operate relatively similarly to each other in that neither approach was expected to produce reactance, GLM analyses were conducted on each of the dependent variables comparing the no persuasion condition to the subtle persuasion condition to confirm that they were equivalent. For most of these analyses, there were no significant effects involving persuasion condition, which suggests that the non-forceful conditions were having a similar impact on the outcome variables. Therefore, the no persuasion and subtle persuasion conditions were combined into a "non-forceful" persuasion condition for the subsequent exploratory analyses described below.

Reactance. A response consistent with reactance (high willingness, low perceived vulnerability, and low intention to protect) was predicted for participants who did not see their UV photo and received a forceful persuasive message. To re-test this hypothesis (# 3) using the combined persuasion conditions, the non-forceful persuasion conditions were both

coded as “0” and the forceful persuasion condition was coded as “1”. Each of the three dependent variables was sequentially tested using UV photo X Persuasion GLMs. Consistent with predictions, these analyses revealed a marginally significant interaction of UV photo condition and persuasion condition on willingness, $F(1, 141) = 2.71$, $p = .10$. As shown in Table 9, there was a trend for the mean level of willingness to sunbathe (high score = more willingness to sunbathe) to be higher for participants in the forceful persuasion condition who did not see their UV photo than for those who did see their UV photo, although this pairwise comparison was not significant, $p > .29$. The comparison across UV condition for participants who received a non-forceful persuasive message was also not quite significant, $p > .12$.

Table 9: Adjusted Mean Level of Willingness to Sunbathe by Persuasion and UV Photo Condition

	Non-forceful Persuasion	Forceful Persuasion
No UV	4.01 (0.19)	4.57 (0.25)
UV	4.44 (0.19)	4.25 (0.28)

Note. $N = 151$. Standard errors are in parentheses.

Additionally, there was a significant UV photo X Persuasion interaction for intention to protect, $F(1, 138) = 6.98$, $p < .01$. As with willingness, the mean level of intention to protect was lower for participants in the expected condition -- forceful persuasion, no UV – than for those who received a forceful message but did see their UV photo, $p < .01$ (see Table 10). Together, these analyses suggest a non-significant tendency for participants who received a forceful persuasive message but did not see their UV photo to report cognitions consistent with reactance as compared to those who did see their UV photo – higher willingness to receive UV exposure and lower intention to protect from UV damage, both of which are unhealthy choices.

Table 10: Adjusted Mean Level of Intention to Protect by Persuasion and UV Photo Condition

	Non-forceful Persuasion	Forceful Persuasion
No UV	3.95 (0.07)	3.86 (0.10)
UV	3.98 (0.07)	4.35 (0.11)

Note. *N* = 151. Standard errors are in parentheses.

Parental protectiveness. The largest differences between self/child willingness were expected for participants in the forceful persuasion condition who saw their UV photo – this hypothesis (# 7) was re-tested after combining the two non-forceful persuasion conditions. A 2 (UV photo) X 2 (persuasion) GLM was conducted with willingness to sunbathe versus willingness to let one's child sunbathe serving as the paired-sample dependent variable. As when all three levels of persuasion condition were analyzed, the three-way interaction of UV photo X Persuasion X Target was not significant, $p > .41$. However, the target by persuasion interaction was closer to being significant in this analysis, $F(1, 141) = 2.35$, $p < .13$. Importantly, the means, shown in Table 11, were in the predicted direction such that there was a larger difference in mean willingness to sunbathe for self versus willingness to allow one's child to sunbathe among participants who received a forcefully persuasive message. Although not quite significant, this analysis suggests that participants who received a forceful message expressed an unhealthy willingness to sunbathe in response to the message, but appropriately reported a low level of willingness to allow their child to sunbathe. If a trend toward higher willingness is considered reactance, then this reactance appeared to be overcome by parental protectiveness, as expected.

Table 11: Adjusted Mean Level of Willingness to Sunbathe by Target and Persuasion Condition

	Non-forceful Persuasion	Forceful Persuasion
Self	4.23 (0.14)	4.41 (0.19)
Child	2.13 (0.08)	1.97 (0.11)

Note. *N* = 151. Standard errors are in parentheses.

Negative affect. To explore the role that negative affect played in determining reactions to the intervention, several analyses were conducted linking affect to willingness, intention, and perceived vulnerability. Two main indices of affect were utilized in these analyses: pre-persuasion and post-persuasion. Pre-persuasion affect consisted of 14 affect items assessed immediately after the photo manipulation, but prior to the persuasion manipulation. Post-persuasion affect (also 14 items) was assessed immediately after the persuasion manipulation. The post-persuasion index consisted of items that were polar opposites of those included in the pre-persuasion index.

Correlation analyses (see Table 4) revealed that the two affect indices were highly correlated with each other, r (151) = .81, $p < .001$. For the sample as a whole, pre-persuasion affect was not significantly correlated with any of the other dependent variables (i.e., willingness and intention for child or self, perceived vulnerability). However, post-persuasion affect was significantly correlated with intention to sunbathe and perceived vulnerability. More specifically, participants who reported greater negative affect were also more likely to report intention to sunbathe (r (151) = .17, $p < .05$) and less likely to feel vulnerable to UV-related consequences, r (151) = -.21, $p < .01$. These correlations were driven primarily by participants who received a non-forceful persuasive message, as described below.

In order to see whether the correlations involving negative affect reported above were consistent for all participants or differed by experimental condition, a second set of correlation analyses was conducted separately for each of the four cells within the 2 (UV vs. no UV) X 2 (forceful persuasion vs. non-forceful) matrix (see Appendix O). Interestingly, several differences emerged in comparing the correlations between affect and other dependent variables by experimental condition. Among participants in the forceful persuasion condition, negative affect was not significantly correlated with any of the dependent variables, regardless of UV condition. In contrast, for participants in the non-forceful persuasion conditions, among those who saw their UV photo, negative affect was significantly and negatively correlated with intention to protect, $r(49) = -.33$, $p < .03$. This correlation suggests that participants who reported greater negative affect were likely to report less intention to protect themselves from UV damage. Among the participants in the non-forceful persuasion conditions, several significant correlations emerged among those who did not see their UV photo. Negative affect was correlated with perceived vulnerability ($r(48) = -.36$, $p < .02$), intention to sunbathe ($r(48) = .33$, $p < .02$) and intention to protect

one's child, ($r(48) = -.30$, $p < .04$. These significant correlations suggest that greater negative affect was associated with less healthy cognitions for participants who did not receive a forcefully persuasive message and saw only a black and white photograph of themselves.

To further explore the effects of negative affect, two 2 (UV vs. no UV) X 2 (forceful persuasion vs. non-forceful persuasion) GLMs were conducted. The analysis of pre-persuasion negative affect revealed a significant main effect for UV photo manipulation. As expected, participants who saw their UV photo reported greater negative affect than those who saw only a black and white photo, $F(1, 141) = 11.79$, $p = .001$. Also as expected, there were no differences by persuasion condition ($p > .88$), which implies that participant affect did not differ across a manipulation that had not yet occurred. For the second analysis, post-persuasion negative affect was the outcome variable and pre-persuasion affect was treated as an additional covariate. This analysis yielded a significant main effect of persuasion condition ($F(1, 140) = 6.54$, $p < .02$) such that participants who had received a forceful persuasive message reported more negative affect after the persuasion manipulation than participants who had received a non-forceful message, controlling for their pre-persuasion affect. This main effect was qualified by a marginally significant UV photo X Persuasion interaction, $F(1, 140) = 3.38$, $p < .07$. Pairwise comparisons indicated that participants who received a forceful persuasive message and saw their UV photo had greater negative affect than those who did not see their UV photo ($p < .02$), as shown in Table 12.

Table 12: Adjusted Mean Level of Post-Persuasion Negative Affect by UV Photo and Persuasion Condition Controlling for Pre-Persuasion Negative Affect

	Non-forceful Persuasion	**Forceful Persuasion**
No UV	2.34 (0.08)	2.41 (0.10)
UV	2.21 (0.08)	2.62 (0.11)

Note. $N = 151$. Standard errors are in parentheses.

To see if there were condition differences in change in affect from pre- to post-persuasion, a repeated measures GLM predicting pre-affect and post-affect from UV photo condition and persuasion condition was conducted. This analysis revealed a significant Persuasion by Time interaction ($F(1,139) = 6.34$, $p < .02$); although negative affect

decreased from pre-persuasion to post-persuasion for all participants, the decrease was smaller among participants who received the forceful persuasion manipulation, as shown in Table 13.

Table 13: Adjusted Mean Level of Pre- and Post- Persuasion Manipulation Affect by Persuasion Condition

	Non-forceful Persuasion	Forceful Persuasion
Pre-persuasion	2.76 (0.08)	2.78 (0.11)
Post-persuasion	2.28 (0.09)	2.54 (0.13)

Note. *N* = 151. Standard errors are in parentheses.

Self-esteem. Based on prior research (Dykstra, 2005; Gibbons et al., 2007), self-esteem was expected to moderate the impact of persuasion and photo on the dependent variables. In order to maximize power from the continuous nature of self-esteem, hierarchical multiple regression analyses were conducted to explore the potential moderation. Each of the primary dependent variables (willingness, intention to sunbathe, and intention to protect for self and child; perceived vulnerability) were regressed onto persuasion condition, UV photo condition, self-esteem, and the corresponding two-way interactions of these variables as well as the three-way interaction of UV photo X Persuasion X Self-esteem. For these analyses, the forceful persuasion condition was dummy coded as "1" and the two non-forceful persuasion conditions were coded as "0".

There were no significant main effects of self-esteem or interactions including self-esteem in predicting: willingness, intention to protect, perceived vulnerability, intention to allow one's child to obtain UV exposure, or intention to protect one's child (all *p*s > .15. Therefore, the self-esteem level of the participants did not affect any of these outcome measures.

Self-esteem was a marginally significant predictor of intention to sunbathe (β = -.25, t = -1.83, p = .07) such that participants with high self-esteem reported less intention. In predicting willingness to let one's child obtain UV exposure, there was a marginally significant UV photo condition X Persuasion X Self-esteem interaction, β = .33, t = 1.87, p < .07. A median split was created for self-esteem, then the regression analysis was conducted separately for participants with high and low self-esteem. The UV photo condition X Persuasion interaction was clearly non-significant among participants with high

self-esteem, $p > .97$. The interaction approached marginal significance among participants with low self-esteem, $\beta = -.32$, $t = -1.57$, $p = .12$. As shown in Table 14, willingness to allow one's child to obtain UV exposure tended to be greater among participants with low self-esteem who saw their UV photo than among those who did not see their UV photo if they received a non-forceful persuasive message. The opposite was true of participants who received a forceful message: willingness tended to be less if they saw their UV photo.

Table 14: Adjusted Mean Level of Willingness to Allow Child to Receive UV Exposure for Low Self-Esteem Participants by UV Photo and Persuasion Condition

	Non-forceful Persuasion	**Forceful Persuasion**
No UV	2.11 (0.19)	2.26 (0.22)
UV	2.42 (0.19)	1.94 (0.22)

Note. $N = 151$. Standard errors are in parentheses.

Self-esteem and negative affect. Next, each of the regression analyses (including self-esteem) was repeated including negative affect (pre- and post-persuasion) as additional predictors of each of the dependent variables. Including negative affect into the regression equations did not eliminate or change the significant interactions discussed previously. However, these analyses did yield one additional effect; post-persuasion affect was a significant negative predictor of perceived vulnerability, $\beta = -.20$, $t = -2.31$, $p < .03$. This main effect suggests that participants who were feeling more negative after the persuasion manipulation reported less perceived vulnerability to the consequences of UV damage. Therefore, with the exception of negative affect predicting less perceived vulnerability, the addition of affect did not significantly alter the analyses reported previously and therefore negative affect did not function as a significant moderator or mediator of the relations between the experimental conditions and the dependent variables (e.g., intention, willingness).

DISCUSSION

The primary purpose of this study was to explore whether the induction of cognitive dissonance and reactance would (differentially) impact the effectiveness of a persuasive message in determining attitude change as a result of a UV intervention. It was expected that inducing reactance would lead to a less effective intervention whereas inducing dissonance would improve intervention effectiveness. Information about reducing UV exposure and increasing UV protection was conveyed to intervention participants; their willingness and intention to obtain exposure, their intention to protect themselves, their perceived vulnerability to negative consequences, and their willingness and intention to protect their children and allow their children to obtain UV exposure were assessed as outcome variables. The use of ultraviolet photography for half of the intervention recipients provided evidence of UV damage and an assessment of negative affect and self-esteem allowed for further exploration of the mechanisms underlying intervention effectiveness.

Previous research found evidence of reactance in willingness to engage in a behavior as opposed to actual behavior or intention to engage in the behavior (Gibbons et al., 2007). Based on this previous work, in the current study, the construct of behavioral willingness was expected to be influenced by reactance because both willingness and reactance are heuristic in nature (Gibbons et al., 2007; Sherman et al., 2004). In contrast, reactance effects were not expected for behavioral intention, which is a construct associated with more reasoned processing. Thinking logically about an anti-tanning message would reduce plans to engage in tanning behavior, thus, reactance effects were expected to manifest more for willingness than for intention. There was evidence of a trend that participants who received a forcefully persuasive health message responded with psychological reactance in the form of comparatively greater willingness. A lack of perceived vulnerability was also anticipated as an expression of reactance, but this prediction was not supported. Overall, results tended to support the importance of using UV photographs in conjunction with a forcefully persuasive message to boost intervention effectiveness. The role of dissonance in improving the effectiveness of the intervention was not supported.

Evidence of Reactance

From Brehm's reactance theory (1966), we know that people are motivated to maintain an important freedom that has been threatened. In the current study, the freedom for the study participants in the forceful persuasion condition to receive as much UV

exposure as desired was threatened by the persuasive message. They were told that they were damaging themselves by receiving UV exposure and that they needed to limit their time in the sun and protect themselves when they were in the sun. Moreover, they were told that protection was required daily for the rest of their lives. Reactance to this message was expected in the form of reduced effectiveness of the UV intervention. If participants who received a forceful persuasive message were experiencing reactance, they were expected to report greater willingness to sunbathe, less perceived vulnerability, and less intention to protect from UV damage than were participants who received a less forceful message. There is some evidence to suggest that this reactance occurred, at least for the participants who did not see their UV photo. In this study, all participants received an UV intervention that advocated UV-safe behavior, but those who saw only a black and white photo and were explicitly told they had to limit their UV exposure and protect vigilantly tended to be the least willing to limit their exposure.

Dissipation of Dissonance

It was expected that participants who reflected on their current UV behavior and acknowledged their goals of meeting the recommendations of the UV intervention would discover a discrepancy between behavior and belief. This discrepancy was then predicted to lead to a stronger commitment for future UV-safe behavior among participants who experienced such dissonance than for participants who were not feeling hypocritical. However, there was little evidence in the current study that participants in the subtle persuasion condition experienced dissonance or that they were more motivated to follow the intervention recommendations than were participants who did not report to the PI their behavior and the steps they could take to meet their goal of protecting themselves better from UV damage. In fact, analyses comparing the subtle persuasion and no persuasion conditions revealed that the two conditions had virtually identical influence on participant willingness, intention, and perceived vulnerability.

One potential explanation for the lack of significant effects is that the induction of hypocrisy was not strong enough, that is, perhaps participants did not feel hypocritical as a result of the dialogue with the PI as intended. Because participants were not directly asked about feelings of dissonance or hypocrisy, this explanation can neither be clearly ruled out nor endorsed. However, a post-hoc analysis of participant affect assessed immediately after the persuasion manipulation supports this explanation. A comparison of the means for

participants in the no persuasion and subtle persuasion conditions on several dissonance-related affect adjectives yielded no significant differences. Participants in both of these conditions were equally likely to report feeling: guilty, shameful, uncomfortable, disappointed with themselves, and dissatisfied with themselves. If participants who received the subtle persuasion condition were feeling hypocritical as a result of the persuasion manipulation, it seems likely that they would be more likely to endorse these affect adjectives.

It could also be the case that dissonance was aroused by the conversation participants had with the PI about their beliefs and behavior, but this dissonance was reduced in a manner other than that predicted. Rather than planning to follow the intervention guidelines more so than other participants, participants in the subtle persuasion condition may have changed their beliefs about their current UV behavior, which is another viable dissonance reduction strategy (Festinger, 1957), to dissipate the dissonance they were feeling. Participants were asked by the PI how vigilantly they were currently protecting themselves from UV damage. Because prior research has suggested that most people are far from perfect at following UV protection recommendations (Maddock, Redding, Rossi, & Weinstock, 2005), it was expected that participants would realize they were not protecting themselves very well. However, a post-hoc content analysis[4] of the participant/PI dialogue revealed that 43% of participants who received the subtle persuasion manipulation reported that they were currently protecting at a level equal to or greater than 80% of the time.

These participants may have been reporting their protective behavior accurately. Although such a high level of protection would be inconsistent with protection levels reported by participants in other UV studies, it is not implausible. Yet an analysis of previous UV protection behavior, which was assessed prior to the persuasion manipulation, revealed no significant differences between participants who received the subtle persuasion manipulation and those who did not receive a persuasive message ($p > .99$). If participants in the subtle persuasion condition were protecting at a rate as high as they reported during the persuasion manipulation, it would make sense that their prior protection level would be higher than that reported by other participants. Due to differences in the way the two persuasion conditions were administered, participants who did not receive a persuasive message did not report their level of protection to the PI in addition to reporting it while answering the UV history questionnaire, so a true comparison cannot be made. Nevertheless, over-reporting their protection behavior to the PI after the persuasion

manipulation as a way of reducing dissonance is a viable explanation for the lack of hypocrisy exhibited by participants in the subtle persuasion condition.

A third possibility is a hybrid of both of the above explanations: participants successfully dissipated the dissonance induced by the subtle persuasion manipulation via a change in belief. In other words, as a result of the persuasion manipulation, they convinced themselves that they were already doing very well at protecting themselves from UV damage. Therefore, when reporting their affect immediately after the manipulation, their affect resembled that of participants who did not receive a persuasive message. Any of these explanations are feasible; unfortunately, the current study can neither rule out these or other possibilities, nor provide support for the use of hypocrisy and dissonance in improving intervention efficacy.

Public Health Implications

From a public health standpoint, the intervention-related outcomes of the current study are encouraging, especially considering the relatively low-cost, low effort nature of the intervention. Total cost per participant was less than $20 and the procedure only required one intervention administrator and a single session that lasted less than an hour. As a result of receiving the intervention, participants reported that they intended to protect themselves from future UV damage. Regardless of experimental condition, participants reported relatively high agreement that they intended to have a doctor check their skin in the next year (*M* = 4.64 on a 7-pt. scale) and 96.7% of participants agreed that tanning was harmful or somewhat harmful. As reported previously, participants liked the study and reported that they had learned from the study. In talking with each participant at the end of the experimental sessions, many spontaneously revealed to the PI that they enjoyed being in the study and had plans to change their behavior, or to at least think more about how their UV exposure was affecting their health and appearance. In addition, 97% of participants took at least one sunscreen sample (*M* = 2.44, range = 0 to 8), which may be considered an indication of future intention to protect.

Intervention Effectiveness

Data were collected during the current study to confirm the importance of UV photography as an integral portion of the intervention. Based on affect ratings, seeing the UV photograph was an unpleasant experience; participants in the UV photo condition reported greater levels of negative feelings than did participants who did not see their UV

photo. Despite the negative feelings, 86% of participants who had their UV photo taken elected to keep their photographs as compared to 66% who received only a black and white photograph. Although it did not affect all of the cognitions assessed in the current study as predicted, there is some evidence that the UV photograph was a useful component of the intervention. Participants who saw the damage revealed in their UV photograph reported significantly greater intention to protect themselves from future UV damage relative to participants who saw only a black and white photograph.

The intervention was relatively more effective for participants who received a forceful persuasive message that was backed up by evidence of UV damage – the UV photograph. After being confronted with "proof" of the consequences of their unsafe UV behavior, participants who were given forceful and explicit advice on how to avoid future damage were the most likely of all participants to intend to act on this advice. These participants reported a comparatively higher level of intention to protect themselves and their children from UV damage as compared to other participants. Perhaps the effectiveness of the UV photograph and the effectiveness of the forceful (but informative) persuasive message combined in an additive or multiplicative manner to motivate participants to have UV-safe cognitions. These results suggest that reactance, which tended to be exhibited by participants who received a forcefully persuasive message but only saw their black and white photo, can be minimized or overcome by providing proof that behavioral change is necessary. As previous research has suggested, reactance is detrimental to intervention efficacy - being able to undermine an unhealthy response would be of great benefit to intervention administrators.

Parental Protectiveness

In addition to having an impact on participants' cognitions antecedent to UV-safe behavior changes for themselves, the intervention utilized in the current study also affected how participants planned to protect their children. The mothers who participated in this study reported that they were significantly less likely to allow their children to sunbathe or go outside without UV protection than they were to sunbathe or go outside without protection themselves. Very few prior research studies on UV interventions have attempted to invoke parental protectiveness as a method of improving intervention adherence. The current study suggests that this approach may be very fruitful in increasing behavior that protects the child as well as making parents more aware of their own unsafe behavior. During debriefing, several participants commented that as a result of the study, they became aware

that they generally make more effort to protect their kids than themselves, but they will try to improve their own behavior to serve as a good role model.

Appearance versus Health Concerns

Previous research has suggested that women are more appearance-focused than men (Pliner et al., 1990) and that interventions that appeal to appearance-related concerns can be successful with women (Hillhouse & Turrisi, 2002). An intervention that targets UV behavior, as in the current study, is unique in that it can focus on appearance (photoaging), health (skin cancer), or both. The information provided to participants in the current study pertained to both photoaging and skin cancer to maximize motivation for adherence to the intervention, although appearance-related concerns were expected to outweigh health concerns because the study sample consisted entirely of women. However, a post-hoc analysis on perceived vulnerability to photoaging versus skin cancer yielded no significant difference ($p > .82$) between these two negative outcomes; the women in this study reported feeling equally vulnerable to consequences affecting their health and appearance.

Significant differences may have resulted from focusing the intervention on one type of negative outcome over the other; because both were addressed, participants became (or already were) vulnerable to negative consequences for both their health and their appearance. As both health and appearance are valid concerns that might increase motivation to take the intervention recommendations seriously, it is perhaps an asset of the intervention utilized in the current study that participants felt equally vulnerable to skin cancer and photoaging. The relatively older age of the participants in this study (average age = 43.1) as compared to previous UV-intervention studies that have sampled college-aged women may have also contributed to equal concern for health and appearance-related consequences. The literature suggests that it is primarily younger people who are more concerned with appearance than health (Hillhouse & Turrisi, 2002).

Effective Negative Affect

Unexpectedly, participants who reported the greatest level of negative affect -- those who received a forceful persuasive message and saw their UV photo -- also reported relatively greater cognitions consistent with the recommendations of the intervention (i.e., greater intention to protect). It is unclear from the design of the current study if the negative affect experienced by the participants in this condition resulted in their healthy attitudes as a means of dispelling the negative affectivity, but this is a logical explanation. Perhaps

participants who saw evidence of their UV damage and were told what to do became upset. By planning to take more precautions in the future and by tending to be less willing to do further damage to their skin, these participants could have alleviated their distress. Future intervention research should manipulate negative affect to determine the direction of causation between affect and adherence.

Limitations

The data for this study were collected in the Midwest during the coldest months of the year --early November to mid February. This is a time of year when tanning behavior and intention to tan are necessarily low due to cold weather and the natural tendency to wear less revealing (i.e., warmer) clothing. It is possible that larger differences in willingness and intention to tan as a function of persuasion condition would have emerged if the data had been collected in the late spring or early summer when people typically begin tanning in preparation for warm weather clothing.

Only participants in the subtle persuasion condition were expected to experience hypocrisy. Participants in this condition reported aloud their belief about the importance of protection as well as their current protection behavior. This "public" admission was expected to arouse feelings of hypocrisy consistent with research conducted by Aronson and colleagues (Aronson et al., 1991; Stone et al., 1994). However, because all participants reviewed their UV history, which included questions about current protection behavior as well perceived vulnerability to UV-related consequences (akin to a belief that UV is dangerous), it is possible that participants in the forceful persuasion and no persuasion conditions also experienced some degree of hypocrisy. If all participants experienced some (unintended) hypocrisy, this would dilute the possibility of detecting effects due to the hypocrisy induction.

There were a number of differences between the subtle and forceful persuasion conditions other than just "amount" of persuasion (e.g., length of message, tone of voice). One of these differences may have resulted in an unintentional confound between persuasion amount and information about damage. In the forceful persuasion condition, the PI told participants that they had UV damage as a result of UV exposure. Although this was almost certainly true, given that virtually all adults have UV damage, participants in the subtle persuasion condition were not explicitly told they had UV damage. This potential confounding would be most noticeable in comparing the forceful persuasion, UV photo

condition to the subtle persuasion, no UV photo condition. All participants who saw their UV photo were told they had UV damage in a less-explicit manner when the damage revealed by their photo was pointed out by the assistant. Therefore, those in the forceful persuasion, UV photo condition heard twice from two different people that they had damage. In contrast, participants in the subtle persuasion, no UV photo condition did not hear this message at all. A potential consequence of this confound is that the forceful persuasion, UV photo condition may have been the most effective due to the double message of "you have damage" rather than the combination of UV photo and forceful persuasion, as intended. Unfortunately this confound can not be remedied under the present design; future research should disentangle damage information from strength/type of persuasion.

Analyses revealed significant relations between age and prior tanning behavior and many of the outcome variables: willingness, intention, and perceived vulnerability. However, because the study was not designed to treat these variables as predictor variables, the number of participants in the study sample was not adequately large (e.g., cell sizes less than nine when dividing participants into groups based on persuasion condition, UV condition, and a median split on prior behavior or a three-way split on age) to generate the statistical power necessary to test any effects. In the current study these significant relations were handled by treating age and prior exposure as covariates, but future research is suggested to examine these effects directly by including them as predictor variables. It is possible that the effectiveness of a UV intervention, or the effectiveness of a persuasive message administered within the intervention, may differ significantly as a function of the intervention recipient's age or prior behavior.

Future Research

As indicated previously, there were several shortcomings in the study design that could and should be addressed by future research. First, age and prior UV exposure should be built into the study design as predictor variables. Perhaps persuasion type would interact with age; a forceful persuasive message might be more effective among older rather than younger participants. It may also be the case that a forceful message is less effective for participants who are currently receiving a considerable amount UV exposure because these participants would be expected to be the most defensive about their unhealthy behavior.

Second, future research could improve the hypocrisy manipulation. Although there is some prior research to suggest that motivational interviewing can be effective in changing

health behavior, it is not clear that this success is a result of hypocrisy induction. Rather than using motivational interviewing, hypocrisy might be more easily induced using a more traditional hypocrisy paradigm (Aronson et al., 1991; Dickerson et al., 1992; Fried & Aronson, 1995; Stone et al., 1994). For example, participants could review their UV exposure behavior and then sign a petition to have more beach umbrellas installed on a local beach or to include UV-safe curriculum in the local school district. Alternatively, participants could record a PSA for their community about the need for UV-safe behavior to reduce the growing rate of skin cancer.

Finally, future research should include manipulation checks to assess the underlying mechanisms resulting in attitude differences between the experimental conditions. It was unclear in the current study whether or not hypocrisy had been induced because there were no direct assessments of hypocrisy. It was also uncertain whether or not the participants recognized that the forceful persuasive message administered by the PI was an attempt to limit their freedom.

Conclusion

With all of the information bombarding the American public about their health, UV exposure is not likely to be at the top of anyone's list of health concerns. However, UV exposure is responsible for a significant proportion of negative consequences each year: skin cancer, wrinkles and age spots, even death. Providing information to people about UV exposure is often not enough incentive to lead to behavior change. Rather, administering a persuasive message as part of an intervention can alter UV-related cognitions such as intention to protect from future UV damage. Such a message is particularly effective if it includes evidence that negative consequences are already occurring and if the message is sufficiently informative that people understand how to change their behavior. By combining these elements, reactance can be avoided and the likelihood of intervention effectiveness improves. Invoking parental protectiveness is an additional intervention strategy that shows great potential in producing UV-safe behavior. When suitably persuaded by hard evidence and armed with useful knowledge, people can be motivated to change their unhealthy UV behavior – especially when they remember that they are setting an example for their children.

ENDNOTES

[1] A sample size analysis (Bonett, 2002) was conducted to estimate the number of participants needed for the current study. As shown below, the analysis suggested a sample size of 158. The goal was to recruit 160 participants for the study, however, 20 participants who were recruited failed to keep their appointment. Although a few participants were successfully recruited to replace these 20 no-shows, additional recruitment was limited by the number of names on the recruitment list. The final sample size (151) was slightly smaller than the analysis suggested, but was still deemed adequately large to test the hypothesis of the study.

$n = 4 (\sigma)^2 * (Z/w)^2 + 1$
$n = 4 (1.60)^2 * (1.96/0.5)^2 + 1$
$n = (10.24) * (15.37) + 1$
$n = 158$

[2] The different scale (5-pt instead of 7-pt) used on the intention to protect items was an oversight when the measures for this study were created.

[3] The questions assessing perceptions of the study and PI were not answered by the first 10 participants. Accordingly, the sample size and available degrees of freedom were reduced for analyses involving these items.

[4] The GLM program computes the estimated marginal means of the dependent variables, with covariates held at their mean value, for specified factors (either between- or within-subjects) in the model. These means are predicted means, not observed means, and they are based on the linear model that has been specified (UCLA, 2007). These estimated marginal means are referred to as "adjusted means" in this document to remind the reader that they have been adjusted for the covariates.

[5] For the subtle persuasion condition, the PI took notes as participants answered her questions. These notes included how consistently the participant reported protecting from UV damage as well as the level of importance the participant placed on protection. The number of participants who reported on an open-ended scale that they were currently protecting themselves at least 80% of the time was divided by the number of participants who answered this question in the subtle persuasion condition; this proportion was 43%.

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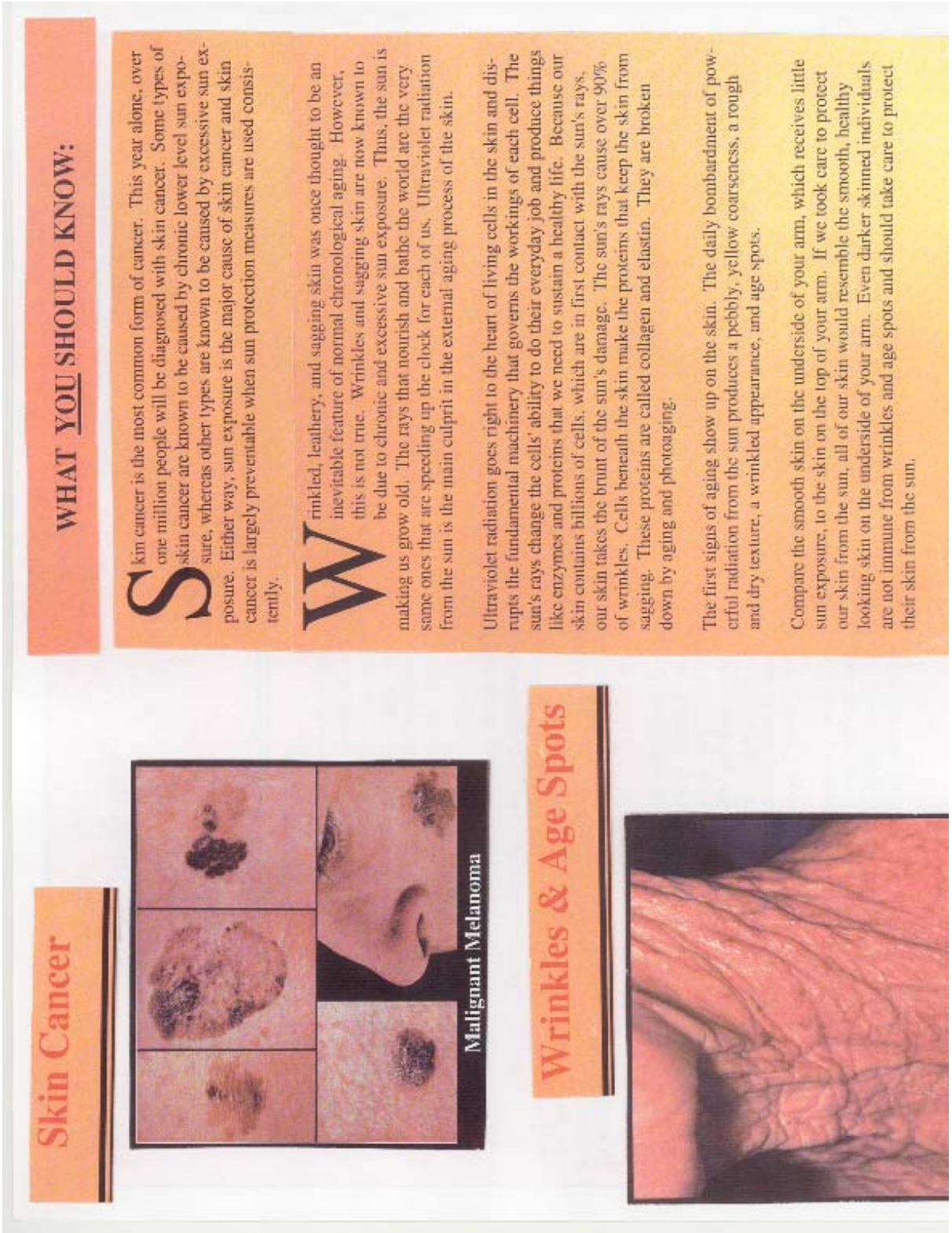
APPENDIX A. INFORMATION CARD



WHAT YOU SHOULD KNOW:

- OVER 90% OF WRINKLES ARE CAUSED BY THE SUNS RAYS, RATHER THAN BY THE NATURAL AGING PROCESS
- WRINKLES & AGE SPOTS CAN BE PREVENTED BY REGULAR USE OF SUNSCREEN WITH SPF OF AT LEAST 15
- IT TAKES ONE PALMFUL OF SUNSCREEN LOTION TO COVER YOUR ENTIRE BODY

- OVER 90% OF SKIN CANCERS ARE CAUSED BY THE SUNS RAYS
- SKIN CANCER CAN BE PREVENTED BY REGULAR USE OF SUNSCREEN WITH SPF OF AT LEAST 15

These two women are the same age, but the one on the right looks much older (due to wrinkles and age spots). The one on the left has taken care to protect her skin from the sun.

Basal Cell Carcinoma

Squamous Cell Carcinoma

APPENDIX B. BROCHURE

When it comes to your skin and the sun, a little knowledge can go a very long way. The more sensible you are about UV exposure, the more you can enjoy outdoor activities and limit the risks of overexposure. By incorporating these simple, sun-safe steps into your daily routine, you can reduce the harmful effects of the sun on your skin.

Apply sunscreen daily. Use a broad spectrum sunscreen (protects against UVA and UVB) with a Sun Protection Factor (SPF) of at least 30. Apply at least 20 minutes before you go outside. Give maximum protection to the parts of your body that get the most exposure: your face, hands, forearms, shoulders, ears, back of the neck, and top of the head – **you need 1 oz. of sunscreen to cover your entire body.** Use a lip balm with a sunscreen for your lips, which can blister if unprotected.

Reapply often. When outdoors for long periods of time, or after toweling off, excessive perspiration, prolonged swimming or vigorous activity, remember to reapply. A rule of thumb is to reapply every 2 hours.

Wear a sunscreen every day, all-year round. This is true even on cloudy or overcast days, since 80% of the sun's rays can penetrate light clouds, mist, and fog. Also, incidental exposure, like the kind received unintentionally while gardening or walking the dog, accounts for 80% of lifetime exposure.

Wear a hat and protective clothing. Hats with wide brims provide additional sun protection as do tightly woven, dark colored shirts and pants that keep the sun out.

Don't forget sunglasses. Whenever outdoors, wear sunglasses that block UVA and UVB rays.

Seek the shade and avoid the midday sun. If your shadow is shorter than you are, you're more likely to sunburn. Plan outdoor activities before 10 a.m. or after 4 p.m., when the sun is less intense.

Protect children. Minimize sun exposure and apply sunscreen to children six months and older. Keep children younger than six months old out of direct sunlight. However, if adequate clothing and shade are not available, sunscreens may be appropriate for use on infants younger than six months; ask your doctor.

Avoid sunburn like the plague—Ditto for tanning booths and lamps.

Sunburn blisters are second degree burns—see a doctor. Remember that sunburns can look mild at first, but over a period of time, they can progress to the blister stage.

Be particularly careful in higher altitudes and tropical climates. Solar radiation is more intense in these areas. If you are vacationing, remember to wear a high SPF and reapply often.

Be extra careful near highly reflective surfaces such as sand, concrete, water or snow. Apply a sunscreen even when you're underneath a beach umbrella; the rays can reflect off the sand and reach you.

If you are taking medication, check with your physician or pharmacist before going into the sun. Some medicines can make your skin more sensitive to the sun.

Moisturize skin after sun exposure. Look for after-sun products that contain moisturizers, such as Vitamin E and aloe to replenish lost moisture after sun exposure.

Learn the signs of skin cancer:

1) a skin growth that increases in size; 2) a mole, birthmark or beauty mark that changes color, increases in size or thickness, changes in texture or is irregular in outline; 3) a spot or growth that continues to itch, hurt, crust, scab, erode or bleed; 4) an open sore or wound on the skin that does not heal or persists for more than four weeks, or one that heals and then reopens.

If you have any of these signs, contact your doctor immediately!

APPENDIX C. BACKGROUND QUESTIONNAIRE

DEMOGRAPHICS

AGE:_____

ETHNICITY (circle all that apply):

Asian African-American Hispanic/Latino Caucasian (Non-Latino) Other_____

MARITAL STATUS (circle one):

Single In a committed relationship Married Divorced/Separated

OCCUPATION (circle one): Does your job involve knowing about UV (ultraviolet light) exposure?
Yes No

SELF- ESTEEM

The following are several statements about how you feel about yourself. Please read each statement carefully and indicate the extent to which you agree with each statement.

1	2	3	4	5	6	7
Strongly Disagree			**Maybe**			**Strongly Agree**

1. I feel that I'm a person of worth, at least on an equal level with (equal to) others.
2. I feel that I have a number of good qualities.
3. All in all, I'm inclined to feel that I'm a failure.
4. I'm able to do things as well as most other people.
5. I feel I do not have much to proud of.
6. I take a positive attitude toward myself.
7. On the whole, I'm satisfied with myself.
8. I wish I could have more respect for myself.
9. I certainly feel useless at times
10. At times, I think I am no good at all.

SELF - CONSCIOUSNESS

The following are several statements about how you feel about yourself. Please read each statement carefully and indicate the extent to which each statement is characteristic of you.

1	2	3	4	5
Extremely Uncharacteristic				Extremely Characteristic

1. I'm always trying to figure myself out.
2. Generally, I'm not aware of myself.
3. I reflect on myself a lot.
4. I'm often the subject of my own fantasies.
5. I never scrutinize myself (think carefully about myself).
6. I'm generally attentive to my inner feelings.
7. I'm constantly examining my motives.
8. I sometimes have a feeling that I'm off somewhere watching myself.
9. I'm alert to changes in my mood.
10. I'm aware of the way my mind works when I work through a problem.
11. It takes me time to overcome my shyness in new situations.
12. I have trouble working when someone is watching me.
13. I get embarrassed very easily.
14. I don't find it hard to talk to strangers.
15. I feel anxious when I speak in front of a group.
16. Large groups make me nervous.

APPENDIX D. UV QUESTIONNAIRES

UV HISTORY

1. How many times have you been sunburned in your life?
   a. Never
   b. Once or twice
   c. A few times
   d. Several times
   e. Many times

2. Have you ever been sunburned badly enough to blister?
   a. I have never been sunburned
   b. I've been sunburned, but not badly enough to blister
   c. One or two of my sunburns blistered
   d. Three or four of my sunburns blistered
   e. I have had at least five sunburns that blistered
   f. I have had more than five sunburns that blistered

3. After not having been in the sun for several months, if you were to go out in the midday sun for one hour without sun protection, which of the following would best describe what would happen to your skin? I would…

   a. Burn easily and not tan at all
   b. Burn easily, then the burn might turn into a light tan
   c. Burn moderately, then tan lightly
   d. Burn minimally, then turn a moderate brown tan
   e. Probably not burn, and develop a dark brown tan
   f. Not burn, I am dark skinned naturally

4. Has anyone that you know well had any type of skin cancer? (check all that apply)

   _____ immediate family member _____ co-worker
   _____ extended family member _____ someone else
   _____ close friend _____ no one I know well

5. Which of your family members had any type of skin cancer? (check all that apply)
   ____ mother ____ sibling
   ____ father ____ aunt
   ____ grandmother ____ uncle
   ____ grandfather ____ cousin

   ____ I'm pretty sure a relative of mine has had skin cancer, but I'm not sure which one
   ____ None of my relatives have had skin cancer

6. Have you ever had any of the following skin problems? (check all that apply)

_____ Pre-cancerous spots

_____ Diagnosed with skin cancer (what type?) _____

_____ Diagnosed with some other skin disease (what is it?) _____

_____ None of the above

7. Do you try to get a tan?
   a. Yes, as dark as I can get
   b. Yes, until I achieve the tan I want
   c. Yes, a little tan
   d. No, I don't try to get a tan
   e. No, I make an effort to avoid being tanned

PRIOR TANNING BEHAVIOR

1. On average, how many hours per week do you spend in the sun sunbathing during a typical week in the summer?

A	B	C	D	E	F	G	H	I	J
< 1 hour	1-2 hours	3-4 hours	5-6 hours	7-8 hours	9-10 hours	11-15 hours	16-29 hours	30-39 hours	40+ hours

2. How many times did you sunbathe (spend time in the sun for the primary purpose of "getting some color") this past summer?

A	B	C	D	E	F	G	H	I
0 times	1 time	2-3 times	4-6 times	7-9 times	10-14 times	15-19 times	20-24 times	25 + times

3. How many hours did you spend in the sun sunbathing in a typical week this past summer?

A	B	C	D	E	F	G	H	I	J
< 1 hour	1-2 hours	3-4 hours	5-6 hours	7-8 hours	9-10 hours	11-15 hours	16-29 hours	30-39 hours	40+ hours

4. Over the entire course of your life, on average, how frequently have you used a tanning booth or lamp?

1	2	3	4	5	6
I have never used a tanning booth	Rarely- once a year or less	Infrequently- a few times a year	Occasionally- once a month or so	Often- a few times per month	Frequently- once a week or more

5. How many times did you use a tanning booth or salon <u>in the last 6 months</u>?

A	B	C	D	E	F	G
0 times	1-2 times	3-5 times	6-10 times	11-15 times	16-20 times	More than 20 times

APPENDIX E. PRIOR INCIDENTAL UV EXPOSURE

1. On average, how many hours per week do you spend outside doing something other than sunbathing (e.g. work, sports) during a typical week in the summer?

A	B	C	D	E	F	G	H	I	J
< 1 hour	1-2 hours	3-4 hours	5-6 hours	7-8 hours	9-10 hours	11-15 hours	16-29 hours	30-39 hours	40+ hours

2. How many hours did you spend in the sun doing something other than sunbathing (e.g. work, sports) in a typical week this past summer?

A	B	C	D	E	F	G	H	I	J
< 1 hour	1-2 hours	3-4 hours	5-6 hours	7-8 hours	9-10 hours	11-15 hours	16-29 hours	30-39 hours	40+ hours

APPENDIX F. PRIOR SUNSCREEN USE

1. When you spend time in the sun for the primary purpose of getting some color, how frequently do you use sunscreen?

A	B	C	D	E	F	G	H
I am never in the sun	I never use sunscreen	Less than 10 % of the time	About 25% of the time	About 50% of the time	About 75% of the time	Over 90% of the time	I always use sunscreen

2. When you spend time in the sun, how frequently do you use sunscreen on your body (arms, legs, neck, etc.)?

1	2	3	4	5	6	7
Never	Occasionally	Some of the time	About half of the time	Most of the time	Almost Always	Always

3. In general, when you spend time in the sun, how often do you use sunscreen on your face?

1	2	3	4	5	6	7
Never	Occasionally	Some of the time	About half of the time	Most of the time	Almost Always	Always

4. How often do you wear sunscreen when you know you will be outdoors for an extended period of time?

1	2	3	4	5	6	7
Never	Occasionally	Some of the time	About half of the time	Most of the time	Almost Always	Always

5. When you spend time in the sun for some reason other than sunbathing, (e.g., working, playing sports, etc.), how frequently do you use sunscreen?

A	B	C	D	E	F	G	H
I am never in the sun	I never use sunscreen	Less than 10 % of the time	About 25% of the time	About 50% of the time	About 75% of the time	Over 90% of the time	I always use sunscreen

6. When you wear sunscreen, what is the SPF you usually wear?

5 or less	6-10	11-14	15-20	21-30	31-45	45+	Don't know

APPENDIX G. BEHAVIORAL INTENTION

BEHAVIORAL INTENTION – MOTHER

1	2	3	4	5	6	7
Definitely will NOT do this						Definitely WILL do this

1. How likely are you to spend time in the sun to get some color (sunbathe) in the next 6 months?
2. How likely are you to use a tanning booth or salon in the next 6 months?
3. How likely are you to use a self-tanning product in the next 6 months?

1	2	3	4	5	6	7
Not at all						Very often

4. How often will you spend time in the sun to get some color (sunbathe) in the next 6 months?
5. How often will you use a tanning booth or salon in the next 6 months?
6. How often will you use a self-tanning product in the next 6 months?

BEHAVIORAL INTENTION – CHILD

Use the scale below to indicate how **likely** you are to do each of the following activities in the next 6 months:

1	2	3	4	5	6	7
Definitely will NOT do this						Definitely WILL do this

1. Allow my child/children to spend time in the sun to get some color (sunbathe)
2. Allow my child/children to use a tanning booth or salon
3. Allow my child/children to use a self-tanning product
4. Insist that my child/children use sunscreen when they will be outside for more than 30 minutes
5. Insist that my child/children use sunscreen daily

BEHAVIORAL INTENTION TO PROTECT – MOTHER

1	2	3	4	5
Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree

1. I plan to use sunscreen regularly.
2. I plan to always use a sunscreen with an SPF of at least 15 on my face.
3. I plan to always use a sunscreen with an SPF of at least 15 on my body.
4. I plan to always use sunscreen on my face if/when I sunbathe.
5. I plan to always use sunscreen on my face when I do any outdoor activity.
6. I plan to use sunscreen on my face on a daily basis.
7. I plan to use sunscreen on all exposed areas of my body if/when I sunbathe.
8. I plan to use sunscreen on all exposed areas of my body when I do any outdoor activity.
9. I plan to use sunscreen on all exposed areas of my body on a daily basis.
10. I plan to reapply my sunscreen often if/when I sunbathe.

APPENDIX H. BEHAVIORAL WILLINGNESS

BEHAVIORAL WILLINGNESS – MOTHER

1	2	3	4	5	6	7
Not at all willing			Moderately Willing			Very willing

1. Suppose that it is the first warm and sunny day that you have not been busy with work or other responsibilities for a long time. You have had a really hard week and are anxious to get outdoors. A group of friends is heading outdoors right now, and you do not have any sunscreen. Under these circumstances how willing would you be to do each of the following:

   A. Go outside and enjoy the sun for a few hours without any form of sun protection.
   B. Go outside unprotected, but only for 30 minutes.
   C. Go outside, but stay in the shade to avoid the sun.

2. Suppose that you were with some friends, and they decide to spend most of the day on their boat. It is the first really hot and sunny day of the year, and you love boating. However, neither you nor your friends have any sunscreen, and there isn't enough time to go to town to buy some sunscreen and go boating. In this situation, how willing would you be to do each of the following:

   A. Go ahead and go boating without using any sun protection.
   B. Go boating, and try to stay out of the sun.
   C. Go boating, but put on a hat, long sleeves, and pants to cover as much skin as possible.
   D. Decline the invitation to go boating.

3. Suppose that you won a certificate for a month of free tanning at a local tanning salon. How willing would you be to do each of the following:

   A. Tan several times a week for the entire free month.
   B. Go tanning just a couple times.

BEHAVIORAL WILLINGNESS – CHILD

1	2	3	4	5	6	7
Not at all willing			Moderately Willing			Very willing

1. Suppose you're on vacation early in the summer and your young son or daughter is eager to play outside. It is a sunny day. How willing would you be to do *each* of the following:

   A. Let your child play outside without any sun protection.
   B. Only let your child play outside without sun protection, but only for an hour.
   C. Insist that your child have sunscreen on before playing outside for any amount of time.

2. Suppose your child is a young teenager and he or she wants to use a tanning booth to look more attractive. How willing would you be to do each of the following:

   A. Buy a tanning package so that your child can use a tanning booth several times a week for several months – enough to build and maintain a tan throughout the semester.
   B. Pay for your child to use a tanning booth several times - enough to build up a tan.
   C. Tell your child you do not want him or her to use a tanning booth.

3. Suppose your young child is going to an outdoor day camp every day for the month of July that includes swimming lessons at the local pool. How willing would you be to do each of the following:

   A. Send your child to camp without sun protection.
   B. Tell your child to stay out of the sun.
   C. Apply sunscreen before you take your child to camp each day.
   D. Apply sunscreen each day and send a bottle of sunscreen with your child with instructions that they reapply it throughout the day.

APPENDIX I. PERCEIVED VULNERABILITY

1	2	3	4	5
Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree

1. If I do not protect my skin from the sun and UV rays, I feel that I will develop premature wrinkling and age spots.
2. If I do not protect my skin from the sun and UV rays, I feel that I will look a lot older than I am in the future.

1	2	3	4	5	6	7
Not at all			Moderately			Very

3. If you were to use a tanning booth, how concerned would you be about damage to your skin?
4. How serious is the skin damage that results from using a tanning booth?

1	2	3	4	5	6	7
No chance						Definitely will

5. If you were to get tanned on a regular basis from using indoor tanning equipment, what are the chances that your skin would wrinkle prematurely?

6. If you were to get tanned on a regular basis from being in the sun, what are the chances that your skin would wrinkle prematurely?

7. If you were to get tanned on a regular basis from using indoor tanning equipment, what are the chances that you would develop skin cancer at some point in the future?

8. If you were to get tanned on a regular basis from being in the sun what are the chances that you would develop skin cancer at some point in the future?

9. Some people think that tanning is not safe while other people do not think there is any harm in tanning. How do you feel about (sun) tanning?

   a. Tanning is very harmful
   b. Tanning is somewhat harmful
   c. Tanning is neither harmful nor healthy
   d. Tanning is not harmful
   e. Tanning is healthy

APPENDIX J. PRE – PERSUASION AFFECT

Please rate each of the following adjectives for how much they describe how you are feeling right now.

1	2	3	4	5	6	7
Does not apply at all						Applies very much

1. uncomfortable
2. unfriendly
3. disgusted with myself
4. pride
5. bad
6. optimistic
7. lethargic
8. satisfied with myself
9. unashamed
10. uneasy
11. calm
12. discouraged
13. proud of myself
14. bothered

APPENDIX K. POST – PERSUASION AFFECT

Please rate each of the following adjectives for how much they describe how you are feeling right now.

1	2	3	4	5	6	7
Does not apply at all						Applies very much

1. energetic
2. good
3. dissatisfied with myself
4. friendly
5. untroubled
6. guilty
7. disappointed with myself
8. encouraged
9. uncomfortable
10. nervous
11. pleased with myself
12. shame
13. pessimistic
14. fine

APPENDIX L. STUDY IMPRESSIONS

1	2	3	4	5
Not a lot				A great deal

1. How much did you like the study?
2. How much did you learn from the study?

1	2	3	4	5	6	7
Not at all						Very much

1. The experimenter acted in a professional manner.
2. The experimenter acted in a respectful manner.
3. The experimenter acted in a pushy manner.
4. The experimenter acted in a considerate manner.

APPENDIX M. INFORMED CONSENT DOCUMENT

Title of Study: Dimensions of a UV Exposure Intervention
Investigators: Jennifer Dykstra, M.S., Meg Gerrard, Ph.D., & Rick Gibbons, Ph.D.

This is a research study. Please take your time in deciding if you would like to participate. Please feel free to ask questions at any time.

INTRODUCTION

The purpose of this study is to evaluate a UV exposure intervention. You are being invited to participate in this study because you are an adult female who resides in or near the Ames community.

DESCRIPTION OF PROCEDURES

If you agree to participate in this study, your participation will last for 50 minutes or less. During the study you may expect the following study procedures to be followed. You will answer questions about your skin type and your attitudes about tanning/UV exposure. You may also answer questions about your current and previous tanning behavior/UV exposure. You will also have your photograph taken. You may skip any questions that you do not wish to answer or that make you feel uncomfortable. You may also receive a phone call or email after the study asking you to answer a few additional questions.

RISKS

While participating in this study, it is possible that you may experience the following risks: psychological distress from learning health information.

BENEFITS

If you decide to participate in this study there may be no direct benefit to you. It is hoped that the information gained in this study will benefit society by providing valuable information about UV exposure interventions.

COSTS AND COMPENSATION

You will not have any costs from participating in this study and you will be compensated for participating in this study. After signing this consent document, you will receive $15 cash in exchange for your participation.

PARTICIPANT RIGHTS

Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time. If you decide to not participate in the study or leave the study early, it will not result in any penalty or loss of benefits to which you are otherwise entitled.

CONFIDENTIALITY

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies such as the National Cancer Institute and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

To ensure confidentiality to the extent permitted by law, the following measures will be taken. Identifying information will be removed from your data when this study is complete. Your data will be kept confidential to the extent permitted by the law. Only the researchers involved in this study will have access to your data, and the data will be kept in a locked filing cabinet in a locked office. Electronic versions of your data will be kept on password protected computers in a locked office. The data will be retained by the study researchers for five years before being destroyed and erased. If the results are published, your identity will remain confidential.

QUESTIONS OR PROBLEMS

You are encouraged to ask questions at any time during this study.

- For further information about the study contact Jennifer Dykstra, M.S. at (515) 294-9681, jldennis@iastate.edu or Meg Gerrard, Ph.D. at (515) 294-2119, mgerrard@iastate.edu.

- If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566 or Diane Ament, Director, Office of Research Assurances (515) 294-3115, dament@iastate.edu.

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PARTICIPANT SIGNATURE

Your signature indicates that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document and that your questions have been satisfactorily answered. You will receive a copy of the written informed consent prior to your participation in the study.

Participant's Name (printed) _____

_____ _____
(Participant's Signature) (Date)

INVESTIGATOR STATEMENT

I certify that the participant has been given adequate time to read and learn about the study and all of their questions have been answered. It is my opinion that the participant understands the purpose, risks, benefits and the procedures that will be followed in this study and has voluntarily agreed to participate.

_____ _____
(Signature of Person Obtaining Informed Consent) (Date)

APPENDIX N. FULL CORRELATION MATRIX – ALL PARTICIPANTS

		BW index: sun exposure (a=.86)	BW index: use booth (a=.86)	BI: sunbathe	BI: tanning booth	BI index: protect (a=.90)	PV index: all (a=.74)	child BW index: sun exposure (a=.68)	child BW index: booth use (a=.95)	BI: allow child to sunbathe	BI: allow child to use booth	child BI index: protect (a=.77)	Affect: pre-persuasion index (a=.81)	Affect: post-persuasion index (a=.91)	age
BW index: sun exposure (a=.86)	Pearson Correlation	1	.366**	.376**	.207*	-.507**	-.253**	.439**	.235**	.257**	.167*	-.369**	-.005	.056	-.252**
	Sig. (2-tailed)		.000	.000	.011	.000	.002	.000	.004	.001	.040	.000	.953	.491	.002
	N	151	151	151	151	148	151	151	151	151	151	151	151	151	151
BW index: use booth (a=.86)	Pearson Correlation	.366**	1	.478**	.455**	-.356**	-.258**	.158	.569**	.275**	.305**	-.105	.037	.080	-.183*
	Sig. (2-tailed)	.000		.000	.000	.000	.001	.053	.000	.001	.000	.200	.653	.326	.024
	N	151	151	151	151	148	151	151	151	151	151	151	151	151	151
BI: sunbathe	Pearson Correlation	.376**	.478**	1	.326**	-.364**	-.198*	.172*	.350**	.375**	.234**	-.109	.116	.165*	-.294**
	Sig. (2-tailed)	.000	.000		.000	.000	.015	.034	.000	.000	.004	.183	.157	.043	.000
	N	151	151	151	151	148	151	151	151	151	151	151	151	151	151
BI: tanning booth	Pearson Correlation	.207*	.455**	.326**	1	-.191*	-.210**	.144	.476**	.263**	.222**	-.121	-.085	-.045	-.126
	Sig. (2-tailed)	.011	.000	.000		.020	.010	.077	.000	.001	.006	.139	.302	.579	.123
	N	151	151	151	151	148	151	151	151	151	151	151	151	151	151
BI index: protect (a=.90)	Pearson Correlation	-.507**	-.356**	-.364**	-.191*	1	.357**	-.476**	-.312**	-.270**	-.275**	.494**	-.094	-.111	-.035
	Sig. (2-tailed)	.000	.000	.000	.020		.000	.000	.000	.001	.001	.000	.256	.180	.676
	N	148	148	148	148	148	148	148	148	148	148	148	148	148	148
PV index: all (a=.74)	Pearson Correlation	-.253**	-.258**	-.198*	-.210**	.357**	1	-.335**	-.371**	-.311**	-.105	.269**	-.119	-.214**	.076
	Sig. (2-tailed)	.002	.001	.015	.010	.000		.000	.000	.000	.200	.001	.147	.008	.351
	N	151	151	151	151	148	151	151	151	151	151	151	151	151	151
child BW index: sun exposure (a=.68)	Pearson Correlation	.439**	.158	.172*	.144	-.476**	-.335**	1	.266**	.274**	.162*	-.497**	.048	.049	-.037
	Sig. (2-tailed)	.000	.053	.034	.077	.000	.000		.001	.001	.047	.000	.561	.546	.651
	N	151	151	151	151	148	151	151	151	151	151	151	151	151	151
child BW index: booth use (a=.95)	Pearson Correlation	.235**	.569**	.350**	.476**	-.312**	-.371**	.266**	1	.424**	.550**	-.213**	.093	.115	-.173*
	Sig. (2-tailed)	.004	.000	.000	.000	.000	.000	.001		.000	.000	.009	.256	.159	.034
	N	151	151	151	151	148	151	151	151	151	151	151	151	151	151
BI: allow child to sunbathe	Pearson Correlation	.257**	.275**	.375**	.263**	-.270**	-.311**	.274**	.424**	1	.533**	-.204*	.101	.096	.056
	Sig. (2-tailed)	.001	.001	.000	.001	.001	.000	.001	.000		.000	.012	.216	.240	.491
	N	151	151	151	151	148	151	151	151	151	151	151	151	151	151
BI: allow child to use booth	Pearson Correlation	.167*	.305**	.234**	.222**	-.275**	-.105	.162*	.550**	.533**	1	-.169*	-.021	-.002	-.002
	Sig. (2-tailed)	.040	.000	.004	.006	.001	.200	.047	.000	.000		.038	.794	.977	.981
	N	151	151	151	151	148	151	151	151	151	151	151	151	151	151
child BI index: protect (a=.77)	Pearson Correlation	-.369**	-.105	-.109	-.121	.494**	.269**	-.497**	-.213**	-.204*	-.169*	1	-.085	-.044	-.067
	Sig. (2-tailed)	.000	.200	.183	.139	.000	.001	.000	.009	.012	.038		.298	.588	.413
	N	151	151	151	151	148	151	151	151	151	151	151	151	151	151
Affect: pre-persuasion index (a=.81)	Pearson Correlation	-.005	.037	.116	-.085	-.094	-.119	.048	.093	.101	-.021	-.085	1	.805**	-.043
	Sig. (2-tailed)	.953	.653	.157	.302	.256	.147	.561	.256	.216	.794	.298		.000	.599
	N	151	151	151	151	148	151	151	151	151	151	151	151	151	151
Affect: post-persuasion index (a=.91)	Pearson Correlation	.056	.080	.165*	-.045	-.111	-.214**	.049	.115	.096	-.002	-.044	.805**	1	-.046
	Sig. (2-tailed)	.491	.326	.043	.579	.180	.008	.546	.159	.240	.977	.588	.000		.578
	N	151	151	151	151	148	151	151	151	151	151	151	151	151	151
age	Pearson Correlation	-.252**	-.183*	-.294**	-.126	-.035	.076	-.037	-.173*	.056	-.002	-.067	-.043	-.046	1
	Sig. (2-tailed)	.002	.024	.000	.123	.676	.351	.651	.034	.491	.981	.413	.599	.578	
	N	151	151	151	151	148	151	151	151	151	151	151	151	151	151

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX O. FULL CORRELATION MATRICES – BY CONDITION

No UV, Non-forceful Persuasion

		BW index: sun exposure (a=.86)	BW index: use booth (a=.86)	BI: sunbathe	BI: tanning booth	BI index: protect (a=.90)	PV index: all (a=.74)	child BW index: sun exposure (a=.68)	child BW index: booth use (a=.95)	BI: allow child to sunbathe	BI: allow child to use booth	child BI index: protect (a=.77)	Affect: pre-persuasion index (a=.81)	Affect: post-persuasion index (a=.91)	age
BW index: sun exposure (a=.86)	Pearson Correlation	1	.321*	.337*	.230	-.472**	-.273	.280	.098	.301*	.146	-.353*	-.032	.080	-.037
	Sig. (2-tailed)		.026	.019	.116	.001	.060	.054	.507	.038	.322	.014	.829	.588	.804
	N	48	48	48	48	47	48	48	48	48	48	48	48	48	48
BW index: use booth (a=.86)	Pearson Correlation	.321*	1	.467**	.486**	-.334*	-.280	.085	.401**	.180	.254	-.159	.287*	.324*	.007
	Sig. (2-tailed)	.026		.001	.000	.022	.054	.567	.005	.222	.082	.282	.048	.025	.964
	N	48	48	48	48	47	48	48	48	48	48	48	48	48	48
BI: sunbathe	Pearson Correlation	.337*	.467**	1	.321*	-.250	-.246	.170	.304*	.353*	-.098	-.269	.314*	.411**	-.315*
	Sig. (2-tailed)	.019	.001		.026	.090	.092	.247	.036	.014	.508	.064	.030	.004	.029
	N	48	48	48	48	47	48	48	48	48	48	48	48	48	48
BI: tanning booth	Pearson Correlation	.230	.486**	.321*	1	-.141	-.133	.089	.292*	.113	-.023	-.045	.048	.198	-.087
	Sig. (2-tailed)	.116	.000	.026		.344	.366	.547	.044	.444	.879	.760	.745	.177	.557
	N	48	48	48	48	47	48	48	48	48	48	48	48	48	48
BI index: protect (a=.90)	Pearson Correlation	-.472**	-.334*	-.250	-.141	1	.353*	-.280	-.097	-.231	-.282	.398**	-.223	-.226	-.073
	Sig. (2-tailed)	.001	.022	.090	.344		.015	.056	.517	.118	.054	.006	.132	.127	.625
	N	47	47	47	47	47	47	47	47	47	47	47	47	47	47
PV index: all (a=.74)	Pearson Correlation	-.273	-.280	-.246	-.133	.353*	1	-.351*	-.431**	-.325*	.028	.412**	-.254	-.337*	-.042
	Sig. (2-tailed)	.060	.054	.092	.366	.015		.015	.002	.024	.850	.004	.081	.019	.779
	N	48	48	48	48	47	48	48	48	48	48	48	48	48	48
child BW index: sun exposure (a=.68)	Pearson Correlation	.280	.085	.170	.089	-.280	-.351*	1	.073	.319*	-.119	-.450**	.212	.210	.089
	Sig. (2-tailed)	.054	.567	.247	.547	.056	.015		.624	.027	.420	.001	.148	.152	.548
	N	48	48	48	48	47	48	48	48	48	48	48	48	48	48
child BW index: booth use (a=.95)	Pearson Correlation	.098	.401**	.304*	.292*	-.097	-.431**	.073	1	.048	.001	-.118	.534**	.613**	-.060
	Sig. (2-tailed)	.507	.005	.036	.044	.517	.002	.624		.745	.996	.423	.000	.000	.685
	N	48	48	48	48	47	48	48	48	48	48	48	48	48	48
BI: allow child to sunbathe	Pearson Correlation	.301*	.180	.353*	.113	-.231	-.325*	.319*	.048	1	.213	-.387**	.117	.196	.245
	Sig. (2-tailed)	.038	.222	.014	.444	.118	.024	.027	.745		.146	.007	.429	.181	.093
	N	48	48	48	48	47	48	48	48	48	48	48	48	48	48
BI: allow child to use booth	Pearson Correlation	.146	.254	-.098	-.023	-.282	.028	-.119	.001	.213	1	-.240	-.149	-.042	.314*
	Sig. (2-tailed)	.322	.082	.508	.879	.054	.850	.420	.996	.146		.100	.312	.777	.030
	N	48	48	48	48	47	48	48	48	48	48	48	48	48	48
child BI index: protect (a=.77)	Pearson Correlation	-.353*	-.159	-.269	-.045	.398**	.412**	-.450**	-.118	-.387**	-.240	1	-.171	-.277	-.148
	Sig. (2-tailed)	.014	.282	.064	.760	.006	.004	.001	.423	.007	.100		.246	.056	.314
	N	48	48	48	48	47	48	48	48	48	48	48	48	48	48
Affect: pre-persuasion index (a=.81)	Pearson Correlation	-.032	.287*	.314*	.048	-.223	-.254	.212	.534**	.117	-.149	-.171	1	.778**	-.032
	Sig. (2-tailed)	.829	.048	.030	.745	.132	.081	.148	.000	.429	.312	.246		.000	.829
	N	48	48	48	48	47	48	48	48	48	48	48	48	48	48
Affect: post-persuasion index (a=.91)	Pearson Correlation	.080	.324*	.411**	.198	-.226	-.337*	.210	.613**	.196	-.042	-.277	.778**	1	-.062
	Sig. (2-tailed)	.588	.025	.004	.177	.127	.019	.152	.000	.181	.777	.056	.000		.678
	N	48	48	48	48	47	48	48	48	48	48	48	48	48	48
age	Pearson Correlation	-.037	.007	-.315*	-.087	-.073	-.042	.089	-.060	.245	.314*	-.148	-.032	-.062	1
	Sig. (2-tailed)	.804	.964	.029	.557	.625	.779	.548	.685	.093	.030	.314	.829	.678	
	N	48	48	48	48	47	48	48	48	48	48	48	48	48	48

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

No UV, Forceful Persuasion

		BW index: sun exposure (a=.86)	BW index: use booth (a=.86)	BI: sunbathe	BI: tanning booth	BI index: protect (a=.90)	PV index: all (a=.74)	child BW index: sun exposure (a=.68)	child BW index: booth use (a=.95)	BI: allow child to sunbathe	BI: allow child to use booth	child BI index: protect (a=.77)	Affect: pre-persuasion index (a=.81)	Affect: post-persuasion index (a=.91)	age
BW index: sun exposure (a=.86)	Pearson Correlation	1	.386*	.323	.162	-.499**	-.159	.456*	.219	.113	.222	-.407*	-.016	.214	-.270
	Sig. (2-tailed)		.038	.087	.401	.007	.411	.013	.254	.560	.248	.028	.935	.265	.156
	N	29	29	29	29	28	29	29	29	29	29	29	29	29	29
BW index: use booth (a=.86)	Pearson Correlation	.386*	1	.445*	.775**	-.360	-.464*	.371*	.815**	.269	.468*	-.184	.007	.186	-.237
	Sig. (2-tailed)	.038		.016	.000	.060	.011	.048	.000	.158	.010	.339	.971	.335	.215
	N	29	29	29	29	28	29	29	29	29	29	29	29	29	29
BI: sunbathe	Pearson Correlation	.323	.445*	1	.205	-.300	-.055	.153	.262	.308	.241	-.126	-.025	.132	-.284
	Sig. (2-tailed)	.087	.016		.285	.121	.776	.429	.170	.104	.207	.516	.900	.496	.136
	N	29	29	29	29	28	29	29	29	29	29	29	29	29	29
BI: tanning booth	Pearson Correlation	.162	.775**	.205	1	-.227	-.601**	.299	.927**	.164	.285	-.186	.144	.291	-.291
	Sig. (2-tailed)	.401	.000	.285		.245	.001	.115	.000	.396	.133	.335	.455	.126	.126
	N	29	29	29	29	28	29	29	29	29	29	29	29	29	29
BI index: protect (a=.90)	Pearson Correlation	-.499**	-.360	-.300	-.227	1	.365	-.470*	-.382*	-.482**	-.502**	.468*	.022	-.130	-.038
	Sig. (2-tailed)	.007	.060	.121	.245		.056	.012	.045	.009	.006	.012	.913	.508	.848
	N	28	28	28	28	28	28	28	28	28	28	28	28	28	28
PV index: all (a=.74)	Pearson Correlation	-.159	-.464*	-.055	-.601**	.365	1	-.253	-.616**	-.308	-.324	.316	-.010	-.129	-.004
	Sig. (2-tailed)	.411	.011	.776	.001	.056		.185	.000	.104	.087	.095	.957	.505	.982
	N	29	29	29	29	28	29	29	29	29	29	29	29	29	29
child BW index: sun exposure (a=.68)	Pearson Correlation	.456*	.371*	.153	.299	-.470*	-.253	1	.358	.180	.292	-.415*	.052	.119	-.161
	Sig. (2-tailed)	.013	.048	.429	.115	.012	.185		.057	.351	.124	.025	.789	.538	.403
	N	29	29	29	29	28	29	29	29	29	29	29	29	29	29
child BW index: booth use (a=.95)	Pearson Correlation	.219	.815**	.262	.927**	-.382*	-.616**	.358	1	.440*	.624**	-.208	.110	.220	-.211
	Sig. (2-tailed)	.254	.000	.170	.000	.045	.000	.057		.017	.000	.279	.570	.252	.271
	N	29	29	29	29	28	29	29	29	29	29	29	29	29	29
BI: allow child to sunbathe	Pearson Correlation	.113	.269	.308	.164	-.482**	-.308	.180	.440*	1	.783**	-.032	.276	.300	.092
	Sig. (2-tailed)	.560	.158	.104	.396	.009	.104	.351	.017		.000	.868	.147	.114	.635
	N	29	29	29	29	28	29	29	29	29	29	29	29	29	29
BI: allow child to use booth	Pearson Correlation	.222	.468*	.241	.285	-.502**	-.324	.292	.624**	.783**	1	-.145	-.020	-.044	.067
	Sig. (2-tailed)	.248	.010	.207	.133	.006	.087	.124	.000	.000		.452	.919	.821	.732
	N	29	29	29	29	28	29	29	29	29	29	29	29	29	29
child BI index: protect (a=.77)	Pearson Correlation	-.407*	-.184	-.126	-.186	.468*	.316	-.415*	-.208	-.032	-.145	1	.083	-.119	.069
	Sig. (2-tailed)	.028	.339	.516	.335	.012	.095	.025	.279	.868	.452		.669	.537	.721
	N	29	29	29	29	28	29	29	29	29	29	29	29	29	29
Affect: pre-persuasion index (a=.81)	Pearson Correlation	-.016	.007	-.025	.144	.022	-.010	.052	.110	.276	-.020	.083	1	.886**	-.130
	Sig. (2-tailed)	.935	.971	.900	.455	.913	.957	.789	.570	.147	.919	.669		.000	.500
	N	29	29	29	29	28	29	29	29	29	29	29	29	29	29
Affect: post-persuasion index (a=.91)	Pearson Correlation	.214	.186	.132	.291	-.130	-.129	.119	.220	.300	-.044	-.119	.886**	1	-.174
	Sig. (2-tailed)	.265	.335	.496	.126	.508	.505	.538	.252	.114	.821	.537	.000		.365
	N	29	29	29	29	28	29	29	29	29	29	29	29	29	29
age	Pearson Correlation	-.270	-.237	-.284	-.291	-.038	-.004	-.161	-.211	.092	.067	.069	-.130	-.174	1
	Sig. (2-tailed)	.156	.215	.136	.126	.848	.982	.403	.271	.635	.732	.721	.500	.365	
	N	29	29	29	29	28	29	29	29	29	29	29	29	29	29

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

UV, Non-forceful Persuasion

		BW index: sun exposure (a=.86)	BW index: use booth (a=.86)	BI: sunbathe	BI: tanning booth	BI index: protect (a=.90)	PV index: all (a=.74)	child BW index: sun exposure (a=.68)	child BW index: booth use (a=.95)	BI: allow child to sunbathe	BI: allow child to use booth	child BI index: protect (a=.77)	Affect: pre-persuasion index (a=.81)	Affect: post-persuasion index (a=.91)	age
BW index: sun exposure (a=.86)	Pearson Correlation	1	.444**	.486**	.272	-.554**	-.324*	.604**	.367**	.443**	.313*	-.414**	.092	.088	-.302*
	Sig. (2-tailed)		.001	.000	.059	.000	.023	.000	.009	.001	.028	.003	.528	.550	.035
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49
BW index: use booth (a=.86)	Pearson Correlation	.444**	1	.619**	.508**	-.364*	-.240	.171	.651**	.487**	.534**	-.129	-.084	.024	-.221
	Sig. (2-tailed)	.001		.000	.000	.010	.097	.240	.000	.000	.000	.377	.566	.870	.127
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49
BI: sunbathe	Pearson Correlation	.486**	.619**	1	.338*	-.475**	-.280	.261	.505**	.433**	.436**	-.067	.082	.130	-.363*
	Sig. (2-tailed)	.000	.000		.018	.001	.052	.070	.000	.002	.002	.645	.577	.373	.010
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49
BI: tanning booth	Pearson Correlation	.272	.508**	.338*	1	-.243	-.233	.153	.577**	.452**	.538**	-.159	-.193	-.184	-.201
	Sig. (2-tailed)	.059	.000	.018		.092	.107	.295	.000	.001	.000	.277	.184	.206	.167
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49
BI index: protect (a=.90)	Pearson Correlation	-.554**	-.364*	-.475**	-.243	1	.345*	-.724**	-.443**	-.392**	-.373**	.600**	-.280	-.330*	-.042
	Sig. (2-tailed)	.000	.010	.001	.092		.015	.000	.001	.005	.008	.000	.051	.021	.774
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49
PV index: all (a=.74)	Pearson Correlation	-.324*	-.240	-.280	-.233	.345*	1	-.352*	-.354*	-.408**	-.271	.188	-.060	-.238	.188
	Sig. (2-tailed)	.023	.097	.052	.107	.015		.013	.012	.004	.059	.196	.681	.100	.196
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49
child BW index: sun exposure (a=.68)	Pearson Correlation	.604**	.171	.261	.153	-.724**	-.352*	1	.353*	.361*	.389**	-.612**	.017	.053	.027
	Sig. (2-tailed)	.000	.240	.070	.295	.000	.013		.013	.011	.006	.000	.907	.717	.856
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49
child BW index: booth use (a=.95)	Pearson Correlation	.367**	.651**	.505**	.577**	-.443**	-.354*	.353*	1	.637**	.954**	-.216	-.063	-.021	-.239
	Sig. (2-tailed)	.009	.000	.000	.000	.001	.012	.013		.000	.000	.136	.666	.887	.098
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49
BI: allow child to sunbathe	Pearson Correlation	.443**	.487**	.433**	.452**	-.392**	-.408**	.361*	.637**	1	.605**	-.204	-.067	-.031	-.065
	Sig. (2-tailed)	.001	.000	.002	.001	.005	.004	.011	.000		.000	.161	.648	.830	.658
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49
BI: allow child to use booth	Pearson Correlation	.313*	.534**	.436**	.538**	-.373**	-.271	.389**	.954**	.605**	1	-.194	-.122	-.103	-.213
	Sig. (2-tailed)	.028	.000	.002	.000	.008	.059	.006	.000	.000		.183	.402	.483	.141
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49
child BI index: protect (a=.77)	Pearson Correlation	-.414**	-.129	-.067	-.159	.600**	.188	-.612**	-.216	-.204	-.194	1	-.221	-.077	-.046
	Sig. (2-tailed)	.003	.377	.645	.277	.000	.196	.000	.136	.161	.183		.127	.600	.754
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49
Affect: pre-persuasion index (a=.81)	Pearson Correlation	.092	-.084	.082	-.193	-.280	-.060	.017	-.063	-.067	-.122	-.221	1	.808**	-.032
	Sig. (2-tailed)	.528	.566	.577	.184	.051	.681	.907	.666	.648	.402	.127		.000	.827
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49
Affect: post-persuasion index (a=.91)	Pearson Correlation	.088	.024	.130	-.184	-.330*	-.238	.053	-.021	-.031	-.103	-.077	.808**	1	-.016
	Sig. (2-tailed)	.550	.870	.373	.206	.021	.100	.717	.887	.830	.483	.600	.000		.915
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49
age	Pearson Correlation	-.302*	-.221	-.363*	-.201	-.042	.188	.027	-.239	-.065	-.213	-.046	-.032	-.016	1
	Sig. (2-tailed)	.035	.127	.010	.167	.774	.196	.856	.098	.658	.141	.754	.827	.915	
	N	49	49	49	49	49	49	49	49	49	49	49	49	49	49

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

UV, Forceful Persuasion

		BW index: sun exposure (a=.86)	BW index: use booth (a=.86)	BI: sunbathe	BI: tanning booth	BI index: protect (a=.90)	PV index: all (a=.74)	child BW index: sun exposure (a=.68)	child BW index: booth use (a=.95)	BI: allow child to sunbathe	BI: allow child to use booth	child BI index: protect (a=.77)	Affect: pre-persuasion index (a=.81)	Affect: post-persuasion index (a=.91)	age
BW index: sun exposure (a=.86)	Pearson Correlation	1	.163	.150	.146	-.456*	-.396	.522*	.155	.033	-.063	-.267	-.210	-.165	-.469*
	Sig. (2-tailed)		.458	.494	.507	.033	.062	.011	.479	.881	.774	.218	.336	.453	.024
	N	23	23	23	23	22	23	23	23	23	23	23	23	23	23
BW index: use booth (a=.86)	Pearson Correlation	.163	1	-.064	.206	-.262	-.348	.002	.402	-.134	-.179	.061	-.010	-.105	-.292
	Sig. (2-tailed)	.458		.771	.345	.238	.104	.992	.057	.542	.413	.783	.964	.634	.176
	N	23	23	23	23	22	23	23	23	23	23	23	23	23	23
BI: sunbathe	Pearson Correlation	.150	-.064	1	.467*	-.326	-.282	.063	.098	.481*	.368	-.075	-.032	-.049	-.019
	Sig. (2-tailed)	.494	.771		.025	.138	.192	.776	.657	.020	.084	.734	.884	.824	.930
	N	23	23	23	23	22	23	23	23	23	23	23	23	23	23
BI: tanning booth	Pearson Correlation	.146	.206	.467*	1	-.222	-.130	.131	-.053	-.063	-.065	-.119	-.324	-.291	.075
	Sig. (2-tailed)	.507	.345	.025		.321	.553	.550	.811	.774	.770	.590	.132	.179	.734
	N	23	23	23	23	22	23	23	23	23	23	23	23	23	23
BI index: protect (a=.90)	Pearson Correlation	-.456*	-.262	-.326	-.222	1	.537*	-.417	-.177	-.136	-.008	.470*	.072	.033	.108
	Sig. (2-tailed)	.033	.238	.138	.321		.010	.054	.431	.545	.970	.027	.751	.885	.631
	N	22	22	22	22	22	22	22	22	22	22	22	22	22	22
PV index: all (a=.74)	Pearson Correlation	-.396	-.348	-.282	-.130	.537*	1	-.383	-.180	-.068	.105	.052	-.250	-.326	.278
	Sig. (2-tailed)	.062	.104	.192	.553	.010		.071	.411	.757	.634	.813	.251	.129	.199
	N	23	23	23	23	22	23	23	23	23	23	23	23	23	23
child BW index: sun exposure (a=.68)	Pearson Correlation	.522*	.002	.063	.131	-.417	-.383	1	-.244	.053	.023	-.356	-.122	-.119	-.325
	Sig. (2-tailed)	.011	.992	.776	.550	.054	.071		.261	.809	.916	.095	.578	.588	.130
	N	23	23	23	23	22	23	23	23	23	23	23	23	23	23
child BW index: booth use (a=.95)	Pearson Correlation	.155	.402	.098	-.053	-.177	-.180	-.244	1	-.097	-.056	-.119	.081	.142	-.087
	Sig. (2-tailed)	.479	.057	.657	.811	.431	.411	.261		.660	.801	.590	.715	.518	.693
	N	23	23	23	23	22	23	23	23	23	23	23	23	23	23
BI: allow child to sunbathe	Pearson Correlation	.033	-.134	.481*	-.063	-.136	-.068	.053	-.097	1	.830**	.054	.234	.132	.012
	Sig. (2-tailed)	.881	.542	.020	.774	.545	.757	.809	.660		.000	.806	.283	.549	.957
	N	23	23	23	23	22	23	23	23	23	23	23	23	23	23
BI: allow child to use booth	Pearson Correlation	-.063	-.179	.368	-.065	-.008	.105	.023	-.056	.830**	1	-.118	.209	.101	-.037
	Sig. (2-tailed)	.774	.413	.084	.770	.970	.634	.916	.801	.000		.593	.338	.646	.869
	N	23	23	23	23	22	23	23	23	23	23	23	23	23	23
child BI index: protect (a=.77)	Pearson Correlation	-.267	.061	-.075	-.119	.470*	.052	-.356	-.119	.054	-.118	1	.355	.258	-.125
	Sig. (2-tailed)	.218	.783	.734	.590	.027	.813	.095	.590	.806	.593		.096	.235	.571
	N	23	23	23	23	22	23	23	23	23	23	23	23	23	23
Affect: pre-persuasion index (a=.81)	Pearson Correlation	-.210	-.010	-.032	-.324	.072	-.250	-.122	.081	.234	.209	.355	1	.790**	.017
	Sig. (2-tailed)	.336	.964	.884	.132	.751	.251	.578	.715	.283	.338	.096		.000	.938
	N	23	23	23	23	22	23	23	23	23	23	23	23	23	23
Affect: post-persuasion index (a=.91)	Pearson Correlation	-.165	-.105	-.049	-.291	.033	-.326	-.119	.142	.132	.101	.258	.790**	1	.118
	Sig. (2-tailed)	.453	.634	.824	.179	.885	.129	.588	.518	.549	.646	.235	.000		.591
	N	23	23	23	23	22	23	23	23	23	23	23	23	23	23
age	Pearson Correlation	-.469*	-.292	-.019	.075	.108	.278	-.325	-.087	.012	-.037	-.125	.017	.118	1
	Sig. (2-tailed)	.024	.176	.930	.734	.631	.199	.130	.693	.957	.869	.571	.938	.591	
	N	23	23	23	23	22	23	23	23	23	23	23	23	23	23

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

APPENDIX P. GLM TABLES

Tests of Between-Subjects Effects

Dependent Variable: bwsun BW index: sun exposure (a=.86)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Corrected Mode	128.285[b]	9	14.254	8.182	.000	.346	73.634	1.000
Intercept	100.931	1	100.931	57.933	.000	.294	57.933	1.000
age	11.858	1	11.858	6.806	.010	.047	6.806	.736
histexp	1.045	1	1.045	.600	.440	.004	.600	.120
histtan	10.000	1	10.000	5.740	.018	.040	5.740	.663
histptct	65.789	1	65.789	37.762	.000	.214	37.762	1.000
pcond	1.941	2	.971	.557	.574	.008	1.114	.141
uvcond	1.155	1	1.155	.663	.417	.005	.663	.128
pcond * uvcond	7.118	2	3.559	2.043	.134	.029	4.086	.415
Error	242.165	139	1.742					
Total	3124.600	149						
Corrected Total	370.450	148						

a. Computed using alpha = .05

b. R Squared = .346 (Adjusted R Squared = .304)

Tests of Between-Subjects Effects

Dependent Variable: tanbi1 BI: sunbathe

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Corrected Mode	164.525[b]	9	18.281	6.391	.000	.293	57.520	1.000
Intercept	61.921	1	61.921	21.648	.000	.135	21.648	.996
age	12.434	1	12.434	4.347	.039	.030	4.347	.544
histexp	.639	1	.639	.223	.637	.002	.223	.076
histtan	95.324	1	95.324	33.327	.000	.193	33.327	1.000
histptct	4.195	1	4.195	1.467	.228	.010	1.467	.225
pcond	6.131	2	3.066	1.072	.345	.015	2.144	.235
uvcond	.927	1	.927	.324	.570	.002	.324	.087
pcond * uvcond	3.056	2	1.528	.534	.587	.008	1.068	.137
Error	397.582	139	2.860					
Total	1746.000	149						
Corrected Total	562.107	148						

a. Computed using alpha = .05

b. R Squared = .293 (Adjusted R Squared = .247)

Tests of Between-Subjects Effects

Dependent Variable: biprtct BI index: protect (a=.90)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Corrected Mode	34.064[b]	9	3.785	15.232	.000	.502	137.085	1.000
Intercept	44.916	1	44.916	180.756	.000	.571	180.756	1.000
age	.311	1	.311	1.252	.265	.009	1.252	.199
histexp	.011	1	.011	.044	.834	.000	.044	.055
histtan	1.654	1	1.654	6.655	.011	.047	6.655	.726
histptct	24.661	1	24.661	99.243	.000	.422	99.243	1.000
pcond	1.269	2	.635	2.553	.082	.036	5.107	.503
uvcond	1.169	1	1.169	4.706	.032	.033	4.706	.577
pcond * uvcond	1.803	2	.901	3.628	.029	.051	7.256	.662
Error	33.795	136	.248					
Total	2407.060	146						
Corrected Total	67.859	145						

a. Computed using alpha = .05

b. R Squared = .502 (Adjusted R Squared = .469)

Tests of Between-Subjects Effects

Dependent Variable: pvall PV index: all (a=.74)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Corrected Mode	8.084[b]	9	.898	3.092	.002	.167	27.826	.970
Intercept	.013	1	.013	.045	.833	.000	.045	.055
age	.012	1	.012	.040	.841	.000	.040	.055
histexp	.084	1	.084	.291	.591	.002	.291	.083
histtan	2.741	1	2.741	9.434	.003	.064	9.434	.862
histptct	1.760	1	1.760	6.058	.015	.042	6.058	.686
pcond	1.544	2	.772	2.658	.074	.037	5.316	.521
uvcond	.619	1	.619	2.130	.147	.015	2.130	.305
pcond * uvcond	.233	2	.117	.401	.670	.006	.803	.114
Error	40.380	139	.291					
Total	48.466	149						
Corrected Total	48.463	148						

a. Computed using alpha = .05

b. R Squared = .167 (Adjusted R Squared = .113)