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Promoting Healthy Behavior Change in Skin Cancer Risk Reduction Using the Transtheoretical Stages of Change Model

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PROMOTING HEALTHY BEHAVIOR CHANGE IN SKIN CANCER RISK REDUCTION USING THE TRANSTHEORETICAL STAGES OF CHANGE MODEL

by

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PROMOTING HEALTHY BEHAVIOR CHANGE IN SKIN CANCER RISK REDUCTION USING THE TRANSTHEORETICAL STAGES OF CHANGE MODEL

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Skin cancer is the most commonly diagnosed cancer in the United States with 20% of people developing some form of skin cancer in their lifetime (American Cancer Society, 1999). In spite of the high incidence of skin cancer, it is highly preventable. Approximately 90% of the cases are caused by exposure to ultraviolet radiation from the sun (Skin Cancer Foundation, 1992). The effect of an intervention aimed at reducing skin cancer risk was compared to a survey only control group in 99 Chicago beach-goers. The intervention was based on the Transtheoretical Stages of Change Model (TTM) and included sun sensitivity assessment, sun damage assessment via UV photography, pamphlet, and commitment contract. The intervention was associated with significant increases in sun protection behaviors ($p < .05$) and consistent sunscreen use ($p < .01$) on all exposed body areas ($p < .01$) at 2-month follow-up. The intervention group participants were more likely than control group participants to cite "preventing skin cancer" as a primary motivating variable for sunscreen use ($p < .05$) at follow-up. The intervention was also associated with significant movement across the stages of change ($p < .01$). The number of intervention participants in the precontemplative stage of change decreased by 9% at follow-up while the number in the action and maintenance stages of change increased by nearly 30%. Although intervention participants increased their use of sunscreen, no differences between

groups were observed in the frequency of sun exposure at follow-up. The present study supports the TTM as a useful framework for developing interventions aimed at reducing skin cancer risk. Future research should target sun exposure as well as sun protection behaviors for skin cancer risk reduction.

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CHAPTER I

INTRODUCTION

Skin cancer is the most common form of cancer diagnosed in the United States each year. In fact, any given person has a 1 in 5 chance of developing some form of skin cancer during their lifetime (Rigel, Friedman, & Kopf, 1996). The most common types of skin cancer carcinoma (about 1 million diagnosed in 1999) are highly curable, including squamous cell and basal cell (American Cancer Society, 1999). The next most common skin cancer is the potentially fatal melanoma, and the American Cancer Society has predicted over 44,000 diagnoses during 1999. Less common forms of skin cancer include Kaposi's sarcoma, which is more prevalent in the HIV/AIDS and other immuno-suppressed populations, and cutaneous T-cell lymphoma. Overall, the American Cancer Society predicted over 9,000 deaths in 1999 from skin cancer, 79% of those resulting from melanoma and 21% from other skin cancers.

While most skin cancers are highly treatable, treatment often involves surgery, radiation therapy, electrodessication (tissue destruction by heat), cryosurgery (tissue destruction by freezing), and laser therapy all of which are expensive and some of which are quite invasive and painful (ACS, 1999). Not only are most skin cancers treatable, but according to the literature, most are highly preventable.

Causes of Skin Cancer

Skin cancer risk can be determined by a number of factors including family history, personal history, excessive exposure to carcinogens such as coal tar, pitch,

creosote, arsenic compounds, and ultraviolet radiation. Individuals with fair complexions and/or multiple or atypical nevi (moles) are at increased risk especially when combined with other risk factors. Some research also indicates a positive relationship between history of severe sunburn during childhood years and incidence of malignant melanoma, the most deadly form of skin cancer (Osterlind, Tucker, Stone, & Jensen, 1988; Zanetti, Franceshi, Rosso, Colonna, & Bidoli, 1992). A more recent study showed that severe sunburn after the age of 19 is associated with increased risk for malignant melanoma (Westerdahl, Olsson, & Ingvar, 1994). This study found that most individuals who suffered severe burn during childhood continued to suffer burns later in life as well. These studies suggest that repeated severe sunburn during the life span can lead to increased risk for malignant melanoma, although burns incurred during the childhood years may lend more heavily to skin cancer risk.

The incidence of skin cancer has increased by 4% per year since 1973, which indicates increased exposure to carcinogens, particularly ultraviolet radiation (Scotto, Fears, Kraemer, & Fraumeni, 1996). The literature indicates that 90% of all skin cancers are caused by exposure to ultraviolet radiation from the sun (Skin Cancer Foundation, 1992; Loescher, 1993). Exposure to sunlight has become more dangerous with time as the stratospheric ozone layer is gradually depleting, providing less protection against ultraviolet radiation from the sun (Kerr & McElroy, 1993).

The Effects of Sun on the Skin

The sun emits high energy rays called ultraviolet radiation (UV) (National Cancer Institute, 1999). Ultraviolet radiation can either be of type A or B

wavelengths, each of which affect the skin differently. When the skin is exposed to ultraviolet radiation it begins to produce a protective substance called melanin, which darkens the skin and blocks ultraviolet radiation (New South Wales Cancer Council, 1987 ; Greeley, 1999). When the skin is exposed to ultraviolet radiation for an extended period of time, skin cells begin to die, connective tissue function becomes altered, and blood vessels begin to dilate causing the skin to appear red and swollen. A few days after the sun exposure, a layer of skin is shed and freckles (i.e., changes in pigmentation) begin to appear. Ultraviolet radiation also affects skin at the molecular level, damaging DNA. Frequent sun exposure can result in an accumulation of genetic mutations, which ultimately can lead to skin cancer (Greeley, 1999). Humans have enzymes that correct ultraviolet damage to DNA, however not all damage can be repaired which increases risk of skin cancer development. Fortunately, sun exposure can be avoided, which should significantly reduce the risk for skin cancer. However, in spite of this seemingly simple solution, skin cancer rates continue to rise.

Sun Protection

The American Cancer Society (ACS) warns that ultraviolet rays of the sun are at highest intensity between the peak hours of 10am and 4pm (American Cancer Society, 1999). The ACS recommends limited or no sun exposure during peak times. This can be accomplished either by remaining indoors or by covering exposed skin with clothing such as hats, long sleeved shirts and pants when outdoors. They also recommend the use of sunscreen lotions with sun protection factor of 15 or higher on all exposed skin with reapplication every 2 hours or after swimming or sweating.

Additionally, the ACS recommends avoiding artificial sources of ultraviolet radiation such as tanning beds. The Food and Drug Administration (FDA) announced in recent years that the minimum standard of protection in a sunscreen is a level 15 SPF. An SPF of 15 means that skin could be exposed to the sun 15 times longer than if not protected to incur the same amount of damage (FDA/Center for Drug Evaluation and Research, 1999). Sunscreen manufacturers are now required to print the SPF on labels of all sunscreen products. Even more recently, the FDA has recognized research suggesting that exposure to UVA rays, in particular, is a crucial factor in developing skin cancer. Surprisingly, there is no evidence that current sunscreens adequately protect the skin from exposure to UVA rays (Koh, Geller, Miller, Grossbart, & Lew, 1996). The FDA is now in the process of identifying standards for UVA protection, so that sunscreen can provide more sun protection. The use of SPF as a sunscreen standard has been widely debated, because it is unclear if sunscreens have been effective at protecting the skin from sun damage (Koh et al., 1996). Furthermore, sunscreens with an SPF of 30 or higher may provide consumers with a false sense of security, because the difference in sun protection between 15 SPF and 30 SPF and higher is negligible. This may lead consumers to expose themselves to harmful UVA for longer periods of time. Ultimately, the best mode of protection from ultraviolet radiation is to cover the skin with clothing or avoid exposure completely.

Prevalence of Sun Protection Behavior

A number of studies in the United States and in countries where ozone layer depletion is most severe (i.e., Australia, New Zealand) have examined the extent to

which sun protection behavior is being practiced in the population. Sun protection behaviors include wearing protective clothing, avoiding sun exposure during midday hours, and using sunscreen with a sun protection factor (SPF) of 15 or more on exposed skin areas (CDC, 1998).

A large-scale population based study of 10,048 Caucasians found that 47% of participants surveyed reported they were "not very likely" to protect themselves from the sun (i.e., use sunscreen, wear protective clothing, or seek shade) when exposed for an hour or more at a time (Hall, May, Lew, Koh, & Nadel, 1998). Another large-scale study found that of 2549 Caucasians sampled by a telephone survey, approximately 25% reported frequent sunbathing and 66% reported engaging in outdoor activities on or near a body of water in the last month (Koh, Bak, Geller, Mangione, Hingson, et al., 1997). Of these sunbathers, 47% reported using some type of sunscreen but only about 25% used sunscreen with an SPF of 15 or more. In a third study, Caucasians who were present at a shopping mall, a large social function, and on a vacation cruise ship were surveyed about their sun exposure behavior (Mawn & Fleischer, 1993). Of the 476 surveyed, 42% reported never or seldom using sunscreen and 33% reported having sunbathed at least once a week. The results of these studies demonstrate that approximately half of the participants surveyed reported not engaging in adequate protective behaviors, in spite of frequent sun exposure. In 1991, the U.S. Department of Health and Human Services (1991) released the National Health Promotion and Disease Prevention Objectives, which included the goal of increasing the percentage of people who limit sun exposure and engage in

appropriate protective behaviors to 60%. Even this goal, which, according to the recent literature has not been achieved, leaves 40% of people engaging in behaviors that contribute to skin cancer risk.

Predictors of Sun Exposure and Use of Sun Protection

In order to develop effective interventions that address sun protection and exposure behaviors, it is important to examine the variables that predict sun protection and intentional sun exposure. Hall et al (1997) found that participants who reported burning after 1 hour of sun exposure were more likely to engage in sun protection behaviors than those who reported no burning after 1 hour of exposure. This suggests that tendency to burn, an immediate consequence of sun exposure, may increase sun protection behaviors more effectively than the delayed and less probable consequence of developing skin cancer. The same group found that participants who were older, female, and with personal histories of skin cancer were also more likely to engage in protective behaviors. Other researchers have discussed how appearance-based concerns may predict unprotected sun exposure (Keesling & Freedman, 1987; Prentice-Dunn, Jones, and Floyd, 1997; Mahler, Fitzpatrick, Parker, & Lapin, 1997). Rossi, Blais, Redding, & Weinstock (1995) cite studies that indicate attractiveness and physical appearance concerns are strong predictors for tan seeking behavior. Keesling & Freedman (1987) discuss how, historically, a suntan has become associated with increased attractiveness and physical health. At the turn of the 20th century, medical treatments often involved sun exposure to improve the pale, sallow skin tone of a diseased person. Also at this time, suntans had become associated with the upper class

because wealthy people typically had more leisure time to spend outdoors. The suntan has been used to sell products and services and desire for a suntan has been perpetuated by the cosmetic industry, tourism, and tanning salons. Miller, Ashton, McHoskey, and Gimbel (1990) found that university students were more likely to judge a person described in a vignette as physically attractive when the vignette mentioned that the individual was suntanned. The suntan is a relatively immediate consequence of sun exposure and appears to have a high reward value that outweighs the risk of painful burns or skin cancer for many people. Therefore, intervention research needs to address the negative effects of sun exposure on the appearance of the skin. For example, overexposure to the sun results in premature aging, wrinkling, and pigmentation blotching. While these consequences are not as immediate as a suntan itself, they are more immediate and probable than skin cancer.

Skin Cancer Prevention Interventions

The discrepancy between the seemingly minimal response effort of sun protection behaviors and the increasing incidence of skin cancer has brought attention to skin cancer prevention efforts. A number of primary and secondary interventions have been developed and examined empirically. Primary prevention strategies involve reducing risk factors for skin cancer (e.g., exposure to the sun, sunscreen use), while secondary prevention strategies involve screening and early detection. For the purposes of this paper, only primary prevention strategies will be discussed at length. Cummings, Tripp, and Herrmann (1997) review a number of areas of primary prevention that have been addressed in the literature, such as sunscreen application,

use of protective clothing and shade, and limiting sun exposure during peak hours. Interventions that have been developed to target areas of primary prevention include educational programs, media campaigns, behavioral interventions, or package interventions.

Educational interventions have been school-based for children and adolescents (Katz & Jernigan, 1991; Hughes, Altman, & Newton, 1993; Loescher, Emerson, Taylor, Christensen, & McKinney, 1995; Crane, Schneider, Yohn, Morelli, & Plomer, 1996) and community-based for adults in locations such as work-sites (Girgis, Sanson-Fisher, & Watson, 1994; Hanrahan, Hersey, Watson, & Callaghan, 1995). These interventions often involve lectures, workshops, or the dissemination of educational materials that promote safe sun behaviors. Rossi, Blais, Redding, & Weinstock (1995) discuss how educational interventions are typically successful at increasing knowledge and awareness but often fail to promote behavior change.

Media campaigns usually sponsored by non-profit cancer organizations have become a popular way to promote sun protection. In Australia, a campaign known as "Slip! Slop! Slap!" (slip on a hat, slop on sunscreen, slap on a hat) was launched to promote sun protection knowledge and behavior change (Rassaby, Larcombe, Hill et al., 1983). This campaign involved a number of public service announcements, as well as school and community-wide campaigns. Research investigators found increases in sunscreen use one year later, however no control groups were used for comparison. A similar campaign, "Sun Smart", also conducted in Australia, found that almost half of participants surveyed reported engaging in more sun protection behaviors one year

after the campaign was launched. In addition, half of the participants who reported behavior change attributed it to campaign messages (Borland, Hill, & Noy, 1990). However, a control group was not used for comparison purposes in this campaign. In the United States, a number of campaigns have been launched, one of which involved the publication of the ultraviolet index (UVI) by the National Weather Service. As described by Geller, Hufford, Miller, Sun, Wyatt et al (1997) the UVI is a prediction of the intensity of ultraviolet light on a given day on a 0-10 scale. They also conducted a study that examined the effects of publicly releasing this information on a daily basis and found that 38% of participants reported sun protection behavior change as a result of their awareness of the UVI. Unfortunately, these results did not indicate which behaviors were changed, how behavior changed, and whether sun exposure was reduced as well. Further, control groups were not employed and follow-up data was not collected in this study. While media campaigns appear to be effective in disseminating educational messages linking skin cancer and sun exposure and the benefits of sun protection, it remains unclear whether this leads to behavior change. Additionally, public campaigns target a wide audience and fail to address differential effects of the intervention on specific subgroups. For example, individuals at varying levels of risk may respond differentially to educational messages. Finally, most studies analyzing the effects of media campaigns have flawed designs such as lack of control groups and follow-up data collection.

A few behavioral interventions have been conducted to promote sun protection behavior and appear promising. One study examined the effects of a multi-component

behavioral intervention on sun protective behavior at a public pool setting (Lombard, Neubauer, Canfield, & Winett, 1991). This multi-component intervention involved the use of peer leader modeling, posted feedback and goals, commitment raffle, and free sunscreen. They found increases of two or more protective behaviors in children (from 6.5% to 26.9%), adults (22% to 37.95%), and lifeguards (16.7% to 63.5%), however a control group was not employed for comparison.

Another larger scale study, called the Rhode Island Sun Smart Project involved a package intervention based on the Transtheoretical Stages of Change Model (TTM) (Weinstock & Rossi, 1998; Weinstock, Rossi, Redding, and Maddock, 1998). This intervention was also performed in the setting at which the behavior of interest occurs, in this case on the beach. These researchers criticize previous efforts in skin cancer prevention because the interventions appear to be designed under the assumption that individuals are ready to make behavior changes, when in fact they may be in more preliminary stages of change (i.e., precontemplation and contemplation). Using an intervention that addresses each stage of change outlined in their model, they demonstrated significant differences between control and intervention groups. The intervention group received personal sun sensitivity assessment and feedback, pamphlet, free sunscreen, an instant polarized light photograph of the participant revealing sun damage, and at 2- and 12- month follow-up individualized feedback regarding their sun exposure and protection behavior. This innovative study underscores the importance of using theoretical models to guide intervention development.

While educational and media campaigns are more numerous in the literature, behavioral interventions are needed to bridge the gap between knowledge and behavior change. Further, promoting behavior change in the setting where the behavior occurs, as opposed to unrelated settings may be more conducive to behavior change. The few studies that use behavioral interventions suggest that "package" interventions may be more effective at promoting behavior change in a community than "single tool" interventions, which only target those individuals who are prepared to make behavior changes. Finally, Weinstock et al (1998) has demonstrated the importance of using theoretical models to guide intervention development, and the TTM appears to provide a reasonable framework for conceptualizing behavior change.

Transtheoretical Stages of Change Model

The TTM has been discussed as one of the most influential models of behavior change in the last two decades (Morera, Johnson, Freels, Parsons, Crittenden et al., 1998). Originally developed to conceptualize interventions to treat addictive behaviors such as smoking, it has been applied to other health behaviors such as eating disorders, exercise, dietary fat reduction, and mammography screening (Prochaska, Velicer, Rossi, Goldstein, Marcus et al., 1994). It has most recently been shown to be a useful way to conceptualize skin cancer prevention interventions (Rossi, Blais, Redding, & Weinstock, 1995). The use of the term "transtheoretical" indicates that the model combines cognitive, motivational, social learning, and relapse prevention theories to explain behavior change. The TTM proposes that behavior change occurs in a series of stages and individuals move through these stages based on their perceptions of the

costs and benefits of change (DiClemente, Prochaska, Fairhurst, Velicer, Velasquez, & Rossi, 1991; Prochaska & DiClemente, 1983). This costs and benefits analysis is what has been termed "decisional balance" (Velicer, DiClemente, Prochaska, & Brandenburg, 1985). Interventions that are developed from this conceptualization of behavior change not only take into account an individual's current readiness to change but also identify processes that will facilitate movement across the stages, ultimately toward behavior change. Prochaska & DiClemente (1992) identified 10 processes of change, each of which can be applied during the different stages of change. The processes of change include consciousness raising, self-liberation, social liberation, self-reevaluation, environmental reevaluation, counterconditioning, stimulus control, reinforcement management, dramatic relief, and helping relationships (see Table 1).

The stages of change in which these processes are utilized are precontemplation, contemplation, preparation, action, and maintenance. In the precontemplation stage, the individual has no realization of the problem or intention to change. Behavior change is least likely to occur and processes of change are least likely to be utilized when an individual is in the precontemplation stage. The contemplation stage is when the individual becomes aware of the problem and begins to consider change. Consciousness raising is the process that is most often used by contemplators as they are more likely to be interested in information pertaining to the problem behavior that they have identified. At this point, the reinforcing value of behavior changes need to be strengthened and the individual must have the repertoire

Table 1

Processes of Change

Process	Description
Consciousness Raising	Awareness of information about the behavior change.
Self-Liberation	Choosing not to engage in unhealthy behavior.
Social Liberation	Awareness of social/policy changes about healthy behavior.
Self-Reevaluation	Perception of self in relation to ones' personal smoking habit.
Environmental Reevaluation	Assessment of harmfulness of unhealthy behavior on environment.
Counterconditioning	Substitution of other activities or thoughts for unhealthy behavior.
Stimulus Control	Removing stimuli related to unhealthy behavior from environment.
Reinforcement Management	Healthy behavior followed by reinforcers from self or others.
Dramatic Relief	Emotional response to warnings about negative consequences of unhealthy behavior.
Helping Relationships	Presence of support people with whom to discuss concerns About unhealthy behavior.

required for the behavior change. Self-reevaluation is often the process that facilitates the movement from the contemplation stage to the preparation and action stages. The preparation stage actually involves the decision and commitment to change and the action stage is where the initiation of change occurs. Individuals in the action stage often use self-liberation, counterconditioning, stimulus control, and reinforcement management to facilitate behavior changes. The maintenance stage involves

maintaining the change over a longer period of time. Movement through the five stages of change is not necessarily linear in that those individuals who relapse during the maintenance stage often fall back into precontemplation and contemplation stages and cycle through the stages again.

Although the TTM has guided intervention development in the health behavior change literature, a number of criticisms have been lodged against the TTM as an explanatory model of change. Davidson (1998) points out that the TTM oversimplifies the process of change assuming that change occurs in discrete stages, when in fact, it most likely occurs along a continuum. Bandura (1998) elaborates on this point by noting that temporal cut-off points for stages are determined rather arbitrarily. For example, in the smoking cessation literature parameters are identified regarding the length of time an individual will spend in each stage of change. The predictive validity of the TTM has also been called into question, as stage membership does not explain how and why future behavior will change (Davidson, 1998). In other words, this model does not address causal questions but rather provides a description of behavior change. Questions have been raised regarding the processes that have been identified as facilitators of movement across stages. Some researchers have found that the strategies identified to facilitate movement across stages are not well defined and have little predictive value (Sutton, 1996; Herzog, Abrams, Emmons, Linnan, and Shadel, 1997). However, DiClemente and Prochaska (1998) disagree and cite a number of studies that demonstrate a reliable relationship between the processes of change and movement across stages of change for a variety of behaviors. In the

same paper they discuss a number of effective strategies for change that have been developed based on the stages of change. For example, motivational interviewing (Miller & Rollnick, 1991) targets individuals in the earlier stages of change, educational materials tailored to stages (American Lung Association, 1987; Glynn, Boyd, & Gruman, 1990; Prochaska, Diclemente, Velicer, & Rossi, 1993), and individualized computer-based interventions are tailored to stage and processes (Prochaska, Velicer, Fava, Ruggiero, LaForge et al, 1997; Velicer, Prochaska, Bellis, DiClemente, Rossi et al, 1993; Velicer, Prochaska, Fava, LaForge, & Rossi, 1997). The TTM continues to be widely accepted and has much promise as a theoretical model of behavior change.

TTM-Based Interventions in Skin Cancer Prevention

The TTM has been used as a model to develop interventions that facilitate behavior changes in sunbathers. Rossi et al (1995) underscore how package stage-based interventions which involve an educational component as well as more personalized problem behavior and risk assessment components may be more effective at not only moving precontemplators to the contemplation stage but also through to the action stage of change. They discuss how individualizing the intervention to each participant more accurately targets their stage of change and which processes might be most helpful in moving them into the next stage of change. Weinstock et al, (1998) demonstrated this by using the package intervention discussed above. The educational component involved the distribution of a pamphlet that describes sun protection strategies and skin cancer risk factors. This component of the intervention was used

to target those participants who may be in the precontemplation stage as it may facilitate awareness. The next component of the intervention, the sun sensitivity assessment and feedback, is composed of three brief questions that when scored can be used to determine an individual's level of skin sensitivity to ultraviolet light. Sun sensitivity is a major risk factor for all types of skin cancer (Weinstock, 1992). The only objective measure of sun sensitivity is the minimal erythema dose of ultraviolet B radiation required to produce visibly reddened skin (MED). MED is a complicated and expensive procedure that requires the use of controlled ultraviolet exposure and skilled phototherapists, therefore most researchers have used self-report questionnaire items to evaluate sun sensitivity. Weinstock (1992) examined 14 questionnaire items that have been used in the literature to determine sun sensitivity in an effort to develop a final prediction rule for an objective measure of sun sensitivity (i.e., MED). He found that skin type ($r = .46$), a 4-point scale based on ease of tanning and susceptibility of burning, color of untanned skin ($r = .41$), and color of hair ($r = .23$) were independent predictors of MED. Rossi et al (1995) use the three indicators determined by Weinstock (1992) and then classify individuals as high, moderate, or low risk for skin damage depending on their responses to the items. This provides a participant with a personalized risk evaluation and was followed by feedback as to which behaviors would be best for that participant to change and how to change those behaviors based on the evaluation. This component of the intervention is targeted towards participants in both the precontemplative and contemplative stages of change

who need to move towards action stage, as it facilitates awareness of personal risk and provides feedback on preventive actions.

The "sun damage assessment," the third component of the intervention, has a similar goal. "Sun damage assessment" is done by taking an instant polarized light photograph of the front of the face. A photograph taken with a camera that is fixed with high-speed film and an ultraviolet light lens will reveal epidermal pigmentation damage on the skin. Viewing this damage allows an individual to become aware of the consequences of their sun exposure to date. This type of assessment has traditionally been performed in dermatological settings with the use of a sun scanner. A sun scanner is a box that has a mirror and a "black light" or a Wood's light inside. Wood's light, often used in dermatologic examinations, is a low intensity source of blue and near-ultraviolet light that is absorbed more heavily by melanin than by other skin components (Asawanonda & Taylor, 1999). The contrast between areas of normal skin and the epidermal layer of the skin that are heaviest laden with melanin is exaggerated when viewed with this apparatus. When skin is exposed to the sun repeatedly, irregular epidermal pigmentation that takes on the appearance of freckle-like spots or smudges appears. When a participant looks into the box, the light allows them to see ultraviolet damage and photoaging on their skin in the mirror (Rossi, Blais, & Weinstock, 1994). As discussed earlier, increased ultraviolet skin damage and photoaging contribute to skin cancer risk. The sun scanner is less portable and practical for use in a beach setting, therefore the polarized light instant camera, which creates the same effect via an instant photograph was selected for use. James Fulton,

M.D., Ph.D. of the American Society of Dermatologic Surgery endorsed the use of UV photography in the detection of sun damage after documenting skin rejuvenation procedures for patients with severely sun damaged skin (Faraghan Medical Systems, 2000).

This component of the intervention is also targeted at individuals in the contemplative stages of change in that it increases the saliency of the consequences of past behavior. Skin photoaging, if severe, becomes visible to the naked eye in the form of wrinkles and blotches. This component of the intervention may target those individuals who have physical appearance concerns by increasing the saliency of skin damage. The smoking cessation literature has shown that increasing the saliency of the effects of smoking behavior has resulted in greater use of the processes of change by smokers (Ockene, Kristeller, Goldberg, Ockene, Merriam, et al, 1992). The negative consequences of the behavior of an individual who is in the contemplative stage of change do not outweigh the positive consequences of their behavior. In order to facilitate movement into the preparation and action stages, the negative consequences of the behavior need to be increased or made more salient than the positive consequences of the behavior.

In a brief report Weinstock et al (1998) discuss how this package intervention delivered to Rhode Island beachgoers resulted in significant differences between intervention and control group in sunscreen use and sun avoidance at 2 and 12-month follow-up. While these results are impressive, the manner in which the intervention was implemented and sun protective and exposure behaviors were measured was not

clearly described and consequently, this study is not replicable. While the intervention appears to be promising on a conceptual level, it is important to assess the reliability of the results via direct and systematic replications by independent researchers. Only after independent replications have assessed the reliability of experimental results, can dissemination research to evaluate the replicability, generality, acceptability, and cost benefits of a promising intervention be justified.

While the skin damage assessment seemed to be a key component in this intervention, the authors do not clarify how the results of these assessments were interpreted. For example, how would a participant know how to gauge the outcome of a polarized light photograph? Comparison photographs graded for different levels of damage might aid participants in more accurately assessing their own level of damage. Additionally, this study does not report specific data pertaining to the participants' stage of change at baseline and the participants' stage at follow-up times. Finally, the intervention based on the stages of change does not appear to address stages of change beyond the action stage. The addition of an intervention component that emphasizes the maintenance stage of change might be helpful for those individuals who may already be engaging in some level of healthy behavior. For example, the commitment strategies that were discussed in Lombard et al (1991) might be a reasonable addition to encourage maintenance of those in the action stage of change.

Purpose

The present study is composed of two phases. The first phase aims to examine the prevalence of sun protection and sun exposure behaviors, and the motivating

variables that control such behavior of 100 beach-goers in Chicago, Illinois. Interventions are often conducted in coastal and tropical areas while neglecting areas that urban and highly populated. The Midwest may be overlooked in skin cancer prevention efforts because of the limited summer months, however the Center for Disease Control reports show that skin cancer deaths are higher in noncoastal regions than coastal regions (CDC, 1995). The same CDC report showed that during 1973-1992 the state of Illinois ranked #7 in the nation for melanoma deaths. From these epidemiological data, it is difficult to isolate the risk behaviors accounting for this high incidence of melanoma and whether those afflicted lived in urban or rural areas of Illinois. Nevertheless, these data suggest that people in Midwest cities such as Chicago may be engaging in high levels of sun exposure behaviors and neglecting sun protection behaviors thereby placing them at elevated risk of developing skin cancer. Therefore, some assessment of risky behaviors and an evaluation of skin cancer prevention efforts is justified in Chicago, a city where residents are often assumed to be at low risk of skin cancer as a result of the geographic and meterological characteristics of the city.

Phase 1 also aims to identify motivating variables that effect the use of sun protection and the frequency of unprotected sun exposure. Any variables identified are to be incorporated into the intervention that is examined in the second phase of the study.

Phase 2 aims to examine the effects of a prevention intervention based on the TTM in a highly populated urban area. The intervention is based on the Rhode Island

Sun Smart package intervention developed by Weinstock et al (1998) and it includes a sun sensitivity assessment, sun damage assessment via UV photography, education via pamphlet, and a commitment card. The commitment procedure was added to address behavior change maintenance. Each intervention component was included to address at least one of the transtheoretical stages of change. The effects of this package intervention on stage of change, sun protection behavior, and sun exposure will be examined.

CHAPTER II

PHASE 1

Hypotheses

We hypothesize that the prevalence of sun protection and sun exposure behavior in Chicago beach-goers will be similar to estimations of prevalence of similar behavior across the U.S. From a sample of 10,048 Caucasian Americans, Hall et al. (1997) documented that almost half of those surveyed reported not using sun protection when exposed to the sun. Only 30% reported that they avoid sun exposure when outdoors. We also hypothesize that the motivating variables for using sun protection identified most often by participants will be those that emphasize short-term consequences, for example, preventing a burn, as opposed to those that emphasize long-term consequences such as preventing skin cancer. While no study has examined the motivating variables for sunscreen use in sunbathers, a number of studies have found that those individuals most likely to use sunscreen were those that were most likely to burn after prolonged sun exposure (Campbell & Birdsell, 1994; Hall et al. 1997).

Methods

Setting

The survey was conducted on the shore of Lake Michigan in Chicago, Illinois which consists of both grass- and sand-covered areas. A pedestrian/bike path travels alongside the shore area carrying with it hundreds of recreationers on any given summer day. Data were collected on three different weekend days during the months of August and September during peak UV hours (2:00 p.m.-6:00 p.m.). Minimal cloud cover or wind was observed during data collection and the average temperature was 80 degrees Fahrenheit with a range from 75 to 85 degrees Fahrenheit.

Participants and Procedures

Four research investigators carried out data collection. Data collectors were trained to approach beach-goers on a random basis with no bias to race, gender, or obvious use or lack of use of sun protection behavior. One hundred beach-goers were approached by a research investigator and asked if they would consent to filling out a 10 minute Sun Behavior Survey regarding their sun exposure and protection behaviors. Approximately 95% of those approached agreed to participate in the study. The mean age of participants was 28.5 years of age with a range from 19 to 60 years of age. Fifty-one percent of participants were female, 88% reported Caucasian as their race, 3% each reported Asian-American and Latino as their race, and 1% each reported African-American and Multiracial as their race. Eighty percent of those

surveyed reported having completed a college degree and another 17% reported having completed some college.

Participants were asked to first read an anonymous survey consent form (Appendix A) that outlined the details of the project. The research investigators encouraged each participant to ask any questions and they collected the Sun Behavior Survey when each participant was completed (see Appendix B).

Measures

The Sun Behavior Survey was compiled by the research investigator as no standard survey has been developed at this time in the skin cancer prevention literature. The survey consisted of 6 sections that collected information on skin type, sun exposure, recent sunscreen use and protection behaviors, current sunscreen use and protection behaviors, risk perception, and motivating variables. As described below, questions within each section were either drawn from or based on other similar surveys.

Skin Type

Skin type is a measure of skin sensitivity to burning and as well as ease of tanning. This measure was developed by Fitzpatrick (1988) and is determined by responses to the standard question: Which of the following best describes your reaction to your first exposure to summer sun without sunscreen for about 1 hour at midday? Skin type I is described as "a painful burn the next day and no tan 1 week later." Skin type II is described as "a painful burn the next day and a light tan a week

later." Skin type III is "a slightly tender burn the next day and a moderate tan 1 week later." Finally, skin type IV is described as "no burn the next day and a moderate tan 1 week later." These skin types have been categorized according to the incidence of skin cancer associated with the skin type (Robinson, 1987; Robinson, Rademaker, Sylvester, & Cook, 1997). Skin types I and II are associated with a high risk for developing skin cancer, while skin type III is associated with a moderate risk for developing skin cancer and skin type IV is associated with a low risk for developing skin cancer.

Sun Exposure

Sun exposure was evaluated with a series of questions aimed at determining the amount of time an individual intentionally sunbathes as well as the amount of time an individual engages in recreational activities in the sun during the summer months. Participants were also asked to what extent they make an effort at getting tanned. This was evaluated by the question, "Which is true of your sun exposure this summer?" Participants had five items to choose from: 1) I try to get as dark as I can get, 2) I tan until I get the color that I want, 3) I like to get a little tan, 4) I avoid being tanned if I can, and 5) I make every effort to avoid being tanned (Clarke, Williams, & Arthey, 1997).

Recent Sunscreen Use and Other Protective Behaviors

Participants were asked to report the frequency of their sun protective behaviors over the previous 3 months (i.e., June, July, and August). Participants rated

how often sunscreen was used when they had been out in the sun this summer on a 5 point likert scale which ranged from very seldom to always. They were also asked to report the sunscreen SPF, the parts of the body they usually protect with sunscreen, the number of sunscreen applications in an 8 hour day in the sun, and the frequency with which they have used other sun protection such as sunglasses, lip protection, hat, umbrella, protective clothing and zinc oxide.

Current Sunscreen Use and Other Protective Behaviors

In addition to having participants recall their sun exposure and protective behaviors over the past summer, participants were asked to record their current behaviors. Current sun protection behaviors were measured by having participants report whether they were using sunscreen, sunglasses, lip balm with sun protection, a hat that covers the face and head, an umbrella, shirt that covers back, chest, and shoulders and zinc oxide right now. They were also asked to report the solar protection factor (SPF) of the sunscreen they are currently using, and to indicate which body parts are currently being protected by sunscreen.

Risk and Risk Perception

As with many physical illnesses, personal and family history both play a strong role in assessing risk for skin cancer (Cummings et al, 1997). A person who has a personal history of either melanoma, basal or squamous cell carcinoma is at increased risk for developing the same condition again as well as for developing a different type of skin cancer (Robinson, 1987). Participants were asked to report their own history

of skin cancer as well as their family history. In addition to history and skin type, the number of sunburns one has had in their lifetime, particularly prior to the age of 12, indicates risk for melanoma type skin cancer (Cummings et al, 1997). Participants were asked to indicate the number of burns they have had this summer as well as over their lifetime. Risk perception was also evaluated by having participants rate the extent to which they feel they are at risk choosing from "no risk," "some risk," "fairly good risk," and "high risk." An indirect measure of perceived risk is the frequency with which an individual examines his/her body for signs of skin cancer development. Participants were asked to report the frequency with which they do such bodily exams.

Motivating Variables for Sun Protection and Sun Exposure

Determining the variables that motivate a behavior is essential when developing interventions to change that behavior. Participants were asked to provide their reasons for using sun protection when they are in the sun. They were given a number of possible reasons including "to prevent a painful burn," "reduce risk for developing skin cancer," "prevent dry skin/acne," "prevent freckling/spots," "prevent a tan," "prevent wrinkling or aging," and "skin condition." Participants were also asked what their reasons were for not using sun protection when in the sun and could chose from the following: 1) want a tan/slows tanning, 2) not at risk for cancer, 3) never get burned, 4) lazy/too much hassle, 5) too expensive, skin condition, embarrassed to put it on, 6) don't like the way it feels (greasy), 7) forget to bring it with me, 8) forget to put it on even when I have it, and 9) sunscreen irritates my skin. Participants were then asked what their reasons are for intentionally sunbathing or exposing themselves

to the sun. They could choose from the following: "I think I look better with a tan," "I think my friends/others think I look better with a tan," "I am/appear healthier when I am tan," "Being out in the sun is a way to spend time with friends," "If I have a good tan, I can avoid getting burned," and "I'm bored/have a lot of free time." Finally, participants were asked to identify variables that they feel would motivate them to use sun protection more often. A number of variables were listed (e.g., having sunscreen available on the beach, being reminded of the benefits of using sunscreen, seeing graphic pictures of skin cancer tumors, etc.) and participants could check as many as they like or list others.

Analyses

Descriptive analyses were conducted using SPSS to examine frequency distributions of skin type, sun exposure, sun protection behaviors, reasons for protection, and reasons for exposure without protection.

Results

Sample Characteristics

One hundred beach-goers in the Chicago Park District agreed to complete the Sun Behavior Survey during the months of August and September in 1999. Participants were 47% male, and they ranged in age from 19 to 41 years old with a mean age of 28.5 years old. Eighty-eight percent of participants classified themselves as Caucasian, 1% African-American, 3% Asian-American, 3% Hispanic/Latino, and

1% Multiracial. Participants were highly educated with 97% reporting to have completed at least some college, 46% reporting to have obtained a 4 year degree, and 34% reporting to have obtained a graduate degree.

Dependent Variables

Skin Type

In this sample, 9% of those surveyed described their skin as Skin Type I, the highest skin cancer risk skin type, while 23% described their skin as Skin Type II. Forty-eight percent described their skin as Skin Type III, and 20% used Skin Type IV to describe their skin sensitivity.

Sun Exposure

Participants were asked to indicate the average number of days in a typical week and average number of hours in a typical day during the summer months that they 1) intentionally spent time sunbathing and 2) engaged in outdoor activities. Only 22% of those surveyed reported that they did not intentionally sunbathe in an average week during the summer, while 15% reported spending an average of 1 hour a week, 20% reported spending an average of 2 hours, 26% reported spending an average of 3-5 hours a week, and 17% of participants reported spending 6 or more hours a week intentionally sunbathing. Males appeared to spend more hours in the sun engaging in outdoor activities, recreational or otherwise. Approximately two-thirds of the males surveyed reported that they spent an average of six hours or more engaging in outdoor

activities in any given week during the summer. About half of females surveyed reported spending six or more hours engaging in outdoor activities, while 13% reported spending one hour or less engaging in outdoor activities in the sun compared to only 2% of males.

Participants were also asked to report how much they aim to get tanned in the summer. Over half of participants endorsed "I like to get a little tan", and 22% aim to tan to a certain color shade, while only 12% indicated that they make efforts to avoid being tanned.

Recent Sunscreen Use and Other Protective Behavior

Only 19% of the sample reported that they used sunscreen "always" when in the sun, while about 21% reported that they used sunscreen "very seldom" when in the sun. This indicates that the majority of participants spend some amount of time in the sun unprotected and at least one-fifth of the participants seldom use sunscreen when exposed to the sun.

Of those participants using sunscreen only 53% reported using a sun protection factor (SPF) of at least 15 which has been identified as the minimum standard for ultraviolet protection. Further, only 37% reported that they actually use sunscreen on all exposed areas of their body when in the sun, the remainder of the sample reported that they only use sunscreen on certain exposed body parts. Over half of the participants who reported using sunscreen did report that they reapply sunscreen at least every 4 hours, however 35% reported only applying sunscreen at the beginning of the day. These results show that not only are a large number of people intentionally

exposing their skin to the sun, but also that most people do not adequately protect their skin by covering all exposed areas with the appropriate SPF.

Current Sun Protection Behaviors

Participants current sun protection behaviors appeared fairly consistent with their reports of their recent sun protection behaviors. Only 33% of participants reported using sunscreen at the time of the assessment. Of those using sunscreen, only 25% reported using a sunscreen with an SPF of at least 15. Further, only 8% of those reporting to be currently using sunscreen reported that they applied it to all exposed areas of the body. However, participants reported the use of sunglasses (58%), lip protection (35%), hats (11%), and shirts (33%).

Risk and Risk Perception

While skin cancer risk can be determined in part by skin damage and sun exposure, heredity is a strong risk factor particularly for malignant melanoma, the most deadly form of skin cancer. Twenty-two percent of participants surveyed reported that they have a family member who has been diagnosed with melanoma. Only 1% of participants reported receiving a melanoma diagnosis. While the vast majority of participants have not been diagnosed with melanoma, very few actually examine their skin for signs of skin cancer development. Forty-five percent of those surveyed reported that they never examine their skin for signs of melanoma and 32% reported examining their skin "once a year or less." Only 10% reported that they do regular (more than once a month) skin checks, and another 13% reported that they

examine their skin "once a month or less." These results would suggest these participants are either unaware of the benefits of skin exams or they do not feel they are at significant risk to warrant a skin examination. Most participants did admit, however that they feel they are at "some risk" for developing skin cancer (i.e., 63%) as opposed to "no risk," "fairly high risk," and "high risk." About 9% reported that they felt they were at "high risk" while 15% reported they felt they were at "no risk" for developing skin cancer. The results indicate that most participants perceive at least some personal skin cancer risk.

Motivating Variables for Sun Protection and Sun Exposure

Over half (55%) of those surveyed identified "preventing a painful burn" as their primary reason for using sunscreen while in the sun. Another 22% reported "preventing a painful burn" as their second reason for using sunscreen. Twenty-six percent of those surveyed reported that "reducing skin cancer risk" was their primary reason for using sunscreen in the sun and 52% named this as their second reason. About 15% of those surveyed reported "preventing wrinkling or aging" was their primary reason for using sunscreen while 14% reported this as their secondary reason for using sunscreen.

Participants were asked to indicate up to three reasons for engaging in each of the following behaviors: 1) intentionally sunbathing and 2) not using sunscreen while in the sun. When participants were asked to indicate the reasons they intentionally sunbathe or expose themselves to the sun over 60% of participants checked the item "I think I look better with a tan" as a reason they intentionally sunbathe. Nearly half

(48%) checked "I am/appear healthier when I am tan" and 39% checked "Being out in the sun is a way to spend time with friends." When participants were asked to indicate their reasons for not using sunscreen while in the sun 53% checked "I forget to bring it with me," 38% checked "I want a tan/sunscreen slows tanning," and 23% checked "I'm too lazy/too much hassle."

Conclusion

The results of this survey are consistent with studies discussed earlier that have examined similar sun exposure habits (Mawn & Fleischer, 1993; Koh et al., 1997; Hall et al, 1998). This survey found that a majority of participants are exposing themselves to the sun on a regular basis during summer months. For example, over half of those surveyed report spending over 6 hours a week during the summer months intentionally sunbathing. Of those exposing themselves to the sun only 1/5 reported using sunscreen on every occasion of sun exposure. Further, of those individuals using sunscreen only about half are using a SPF that is strong enough to provide adequate protection from ultraviolet light, and less than 40% are using sunscreen on all of their exposed skin. The inconsistent and inadequate use of sun protection by participants would seem to suggest that they do not perceive themselves at risk for developing skin cancer. On the contrary, almost two-thirds of those surveyed believed they were at some risk for developing skin cancer. In spite of this perceived personal risk, 45% admitted that they never examine their skin for abnormalities.

This study also examined the motivating variables responsible for sun protection and exposure. For those participants using sun protection, relatively

immediate consequences (i.e., sunburn) appeared to have more control over sunscreen use than the delayed, probabilistic health consequence of developing skin cancer. Further, for those engaging in sun exposure, the relatively immediate consequence, i.e., suntan, appeared to reinforce exposure and punish sunscreen use. The outcome of this phase of the study suggests that the relatively immediate consequences of sun exposure behavior outweigh the delayed and probabilistic consequence of developing skin cancer. Other studies have found that appearance concerns outweigh safety concerns in sunbathers (Wichstrom, 1994; Prentice-Dunn et al, 1997). Overall, Midwestern beach-goers were found to be as likely to engage in sun safety as participants surveyed across the U.S. population (Hall et al, 1997). This study extends the literature by providing more detailed information about the motivating variables behind sunscreen use, sun exposure, and suntanning. Interventions aimed at skin cancer prevention would be most effective if they target and attempt to manipulate these motivating variables in order to increase the use of sun protection and decrease the frequency of sun exposure and tanning. The next phase of this project examines the effects of a skin cancer prevention intervention based on the TTM. The intervention was designed to increase the saliency of a short-term negative and rather hidden consequence of sun exposure, skin damage. It is hypothesized that awareness of this 'hidden' consequence may lead to increases in sun protection behaviors and reductions in sun exposure behavior. The intervention also includes educational and individualized risk awareness components that address issues pertaining to the preliminary stages of behavior change.

CHAPTER III

PHASE 2

Hypotheses

I hypothesized that significant increases in mean reported sun protection behavior at 2-month follow-up will be observed in the intervention group. The intervention group will also be more likely to use the recommended SPF and protect all exposed areas. No changes are hypothesized to occur across time within the control group. I also hypothesized that the mean reported sun exposure duration will decrease significantly in the intervention group, while no change will occur within the control group at 2 month follow-up. The motivating variables with respect to sun protection are hypothesized to change for the intervention group across time. Intervention group participants will be more likely to cite the importance of preventing skin cancer as a motivator for sun protection use at 2 month follow-up while control group participants will continue to cite the importance of short-term consequences such as preventing sunburn. The level of importance placed on a suntan will also decline significantly for intervention group across time, although it will remain unchanged for the control group. The stage hypothesis states that the intervention group will make a significant shift towards the action and maintenance stages of change at 2 month follow-up while the control group will show no stage movement across time.

Methods

Setting

Baseline data collection and the intervention were conducted on the North Avenue Beach section of the Chicago Park District beachfront in Chicago, Illinois. The beachfront area expands several miles and is composed of sand- and grass-covered areas and is outlined by a pedestrian/bike path that carries with it hundreds of people any given summer day. Baseline data was collected and the intervention was conducted on weekend days (Saturdays and Sundays) during July 2000 between the hours of 12:00 p.m. and 5 p.m. Central Standard Time. Data collection occurred on July 1, 2, 8, and 9. The high temperature on each of these days was 85, 82, 85, and 81 degrees Fahrenheit respectively, and cloud cover was minimal. Intervention and control group data were collected simultaneously but in locations separated by 1 mile of beachfront.

Two-month follow-up data were collected two months subsequent to the baseline assessment time by email, mail, and phone during the months of September and October 2000. Participants were asked to complete the questionnaires in their home when convenient and then return to the principal investigator. The two month follow-up period was selected as the appropriate time period as it denotes the latter months of summer in Chicago, while baseline data was collected mid-Summer. Participants had the opportunity to engage in various sun protective behaviors during the 2 months prior to baseline and during the two-month follow-up period. The

weather was such that the participants still had the opportunity to engage in those behaviors at the time of the follow-up data collection.

Sample Characteristics

During data collection no preference was given to age, race, gender or any other salient characteristic. Of the 272 participants recruited, 142 were recruited into the intervention group and 130 were recruited into the control group. A total of 15 surveys (5 from the intervention group and 10 from the control group) were excluded from analysis because the participant failed to give follow-up contact information. Of the 257 participants who provided contact information, 75% provided an email address, 50% provided a phone number, 16% provided a home mailing address, 27% provided both email address and phone number, and 9% provided email address, phone number and home mailing address.

About 13% of the 257, or 33 participants (21 intervention group and 12 control group), provided contact information that was invalid. Invalid contact information includes disconnected phone numbers, return to sender mailing addresses, or discontinued email addresses. The remaining 224 participants provided a valid survey and contact information. During follow-up data collection a total of 125 participants did not respond to contact attempts, while 99 participants did respond and provided valid follow-up data. Characteristics of responders and non-responders are illustrated in Table 2 below.

Table 2

Characteristics of Responders and Non-Responders at Baseline

	Responders		Non Responders			
Variable	N	Mean	N	Mean	F Value	P Value
Age (18+)	98	26.22	120	27.41	1.52	0.217
sunscreen use (1 never- 5 always)	99	2.28	124	2.23	0.121	0.728
safe sun behaviors (0-8)	99	2.38	125	2.37	0.01	0.921
time spent tanning (hrs per week)	99	2.5	125	2.67	0.618	0.432
time spent in sun other (hrs per week)	99	3.12	125	3.55	0.319	0.572
Importance of a tan (1 not at all- 10 very)	99	8.67	125	10.72	3.44	0.065
time spent tanning (hrs per week)	98	4.93	125	5.15	0.53	0.467
sun exposure goal (1 dark tan- 5 avoid tan)	99	2.63	125	2.58	0.307	0.579

No significant differences occurred between those who responded (responders) to follow-up data collection and those who did not (non-responders) on age, sunscreen use, safe sun behaviors, stage of change, time spent tanning, time spent in the sun engaging in activities other than purposeful tanning, importance of being tan, and participant's desired outcome of sun exposure. Those participants who provided valid email addresses with or without phone numbers ($n = 143$) were the most likely to respond (56%), followed by those who provided both email addresses and home mailing addresses ($n = 25$; 52%), while those who provided phone numbers only were least likely to respond ($n = 44$; 7%). The primary difference between responders and non-responders appears to be the method they selected to be contacted for follow-up data collection.

The primary analysis of the effect of the independent variable is based on data from responders, or participants who provided both baseline and follow-up data. The present sample ($N = 99$) is 37% male and 63% female. The majority of participants selected Caucasian as their racial status (84%), while 6% selected Latino, 3% each selected Asian-American and African-American, and 1% selected Multi-Racial. Approximately 83% of those surveyed reported living in the Chicagoland area which includes the city and suburbs of Chicago, while 1% reported living in the state of Illinois but not Chicagoland, 13% reported living out of state, and 3% reported living in a different country.

Procedures

Participants were recruited to participate on Saturday and Sunday afternoons during peak UV hours (12-5 pm) during July 2000. As discussed above, control and intervention group data collection were conducted simultaneously in two locations on the lakefront separated by one mile.

At the intervention location, a project table was set up in a highly trafficked, central location in the sand beach area. The project table was decorated with a large banner that read, "Sun Project: Chicago 2000." A Reflec UV Instant Camera System provided by Canfield Clinical Systems was set up at the project table as well as sample photos displaying varying degrees of photo damage ranging from mild to severe (see Appendix C). Pamphlets provided by the American Cancer Society and a wide selection of sunscreens were also placed on the table. Research assistants wore yellow t-shirts with the project and sponsor's logo. Potential participants on the beach and passing by on the boardwalk were approached by research investigators and offered the opportunity to participate. However, beach-goers often approached the table with inquiries about the project. Potential participants who agreed to participate were asked to have a seat at the project table to read a consent form, complete a survey about their sun protection and exposure behavior, and undergo a brief intervention. Participation rates for the intervention group were not calculated as many participants approached the table without first being asked by a research assistant.

Control group data were collected one mile north of the intervention group location on a sand beach area. Instead of seated at a project table, research assistants

were mobile and approached beach-goers asking them to complete a brief survey about their sun exposure and protection behavior. Those who agreed to participate were first asked to read and sign a consent form (Appendix D). Approximately 95% of those approached agreed to participate. Reasons reported for declining participation include English not first language, individual preparing to leave the beach, or lack of interest.

Participants were asked to provide a first name and either an email address, mailing address and/or telephone number where they can be reached for 2-month follow-up data collection. Participants in each group were informed that if they return the follow-up survey by October 2000 they will be placed in a lottery for $100. The winning lottery number was determined by random numbers (0-9) drawn from a hat. For each group, three numbers were drawn independently, determining the 3 digit participant number ranging from 001-137 for the intervention group and 200-320 for the control group. During the first draw for the intervention and control groups respectively, only the numbers 0, 1 and 2,3 respectively were entered into the hat. For the 2 subsequent draws all ten numbers were entered. The intervention and control participant who won the lottery money were informed by the same method of contact. They were asked to provide a mailing address to which money orders were sent.

Because of the potential for beach-goers to migrate across both locations of data collection, they were asked if they had ever completed this survey or had participated in similar projects recently. No participants indicated that they had done so and examining contact information for duplicates corroborated this. Duplicates

were not discovered so it was concluded that no subject participated in more than one of the conditions.

Measures

Sun Stage of Change.

The Sun Stage of Change survey (Rossi, Blais, & Weinstock, 1995) is made up of two categories of four questions each (Appendix E). The first category of items has been labeled "sun protection items" and the second category has been labeled "sunscreen items." Rossi et al (1995) developed a staging algorithm in which a respondent's stage of change can be determined by their responses. Both control and intervention participants completed this survey at baseline and follow-up points.

Sun Behavior Survey.

This instrument as described in "Phase 1" includes a number of measures including skin type, amount of skin protected from sun, frequency of sun exposure, sunscreen use, use of other sun protection measures (i.e., sunglasses, lip protection, umbrella, protective clothing, zinc oxide, hat), risk perception, tanning importance, personal and family history of skin cancer and motivating variables for sun protection and exposure (Appendix F).

The follow-up survey includes a question that aims to determine the extent to which the participant perceives their participation in this project affected their behavior. The participant is asked to select the statement that best describes the effect

the project has had on their sun protection behavior. The statements include (a) my participation in this project has had no effect at all, my sun protection and sun exposure behaviors have not changed and I don't intend to change; (b) my participation in this project has affected me some, I intend to change my behavior for the better, I just haven't made the changes ;yet, (c) my participation in this project has affected me some, I intend to change my behavior for the better, and I have made some changes; (d) my participation in this project has affected me very much, I intend to change my behavior for the better, I just haven't made the changes yet; and (e) my participation in this project has affected me very much, I have made changes in my behavior and I intend to continue to do so. The 5 responses were coded with the numbers 1-5 with increasing numbers indicating more perceived effect.

Experimental Condition

Sun Sensitivity Assessment and Feedback.

The purpose of the sun sensitivity assessment was to determine how sensitive the skin is to solar radiation (Appendix G). Participants received feedback regarding which sun protection behaviors would best protect them given their skin sensitivity level. Sun sensitivity level was determined for each participant and they received a commitment card that indicated the sun protection behaviors that are recommended for their sensitivity level. Participants received the standard American Cancer Society (2000) recommendations for preventing skin cancer. The recommendations given to

participants with higher sensitivities stressed the importance of avoiding sun exposure during peak UV hours.

Commitment

After receiving the commitment card described above, the participant were be asked to make a commitment by signing the card and having a friend sign the card. The cards read "My signature indicates that I commit to increasing or decreasing the frequency of the indicated behaviors. By signing this card, I am making this commitment to myself and you and I ask you to support me in this commitment." Participants were asked to post the commitment cards along with their UV photos in an obvious location such as on bathroom mirror, refrigerator, or in a medicine cabinet to remind them of their commitment and protection behaviors (see Appendix H).

Sun Damage Assessment: Instant UV Photograph

Facial photographs were taken of participants with the Reflec UV Instant Camera. As discussed above, exposures taken with such a camera reveal skin photo damage that is not visible to the naked eye under normal conditions. This camera filters out all light with the exception of UV light. UV light is selectively absorbed by melanin, therefore the photo reveals any hyperpigmentation on the skin that occurs as a result of photodamage. Participants were asked to remove sunscreens or makeup with a mild soap or isopropyl alcohol provided by the research investigator prior to taking the photo. Sunscreens would bias the photo in that melanin in the skin would not absorb the UV light because it would be blocked or reflected away by the

sunscreen. Each participant posed for a single photo by placing the chin onto the chin rest of the camera and closing their eyes. Each photo required 60 seconds to develop at which point the participant was able to view the photo and compare it to a set of comparison photographs. Comparison photo 1 will show 'mild damage', or damage from a single severe burn. Comparison photo 2 will show 'moderate damage', or damage covering a significant portion of the facial skin. Finally, comparison photo 3 will show 'high damage', or damage covering all of the facial skin (Appendix I). These photos were taken from world wide web sites of Canfield Clinical Systems (2000) and Faraghan Medical Systems (2000), companies which manufacture UV photography equipment. Once participants viewed their photo, compared it to the sample set, they were asked to keep the photo as a reminder of the existing damage in their facial area. With the participant present, the research investigator categorized each photo as in mild, moderate, or high level of photodamage, depending on how well it matched the sample photos. Participants were urged to post the photo in their homes with their commitment cards. Copies of photos were not made or collected by the research investigator.

Pamphlet

Participants were also given an American Cancer Society (2000) pamphlet that outlines recommendations for increasing sun safety including proper use of sunscreen and the importance of sun avoidance at peak UV hours (Appendix J).

Free Sunscreen

Once participants completed the discussed intervention components they were asked to use the sunscreen provided by the research investigator during their stay at the beach on that day.

Control Condition

The control group participants were only asked to complete the aforementioned surveys. They were given no information, materials, or advice regarding sun protection practices and/or skin cancer prevention.

Design

This investigation is a 2 x 2 repeated measures between-groups design. The between-group factor has two levels, which are the intervention and control groups. The intervention group contains 52 participants and the control group contains 47 participants. The within-group factor has two levels as well and these include the baseline and 2-month follow-up assessment times.

Analyses

Repeated measures analysis of variance (ANOVA) or analysis of covariance (ANCOVA) were employed to determine group differences across baseline and 2-month follow-up measures for continuous dependent variables. ANCOVA was used when group means were significantly different at baseline. The baseline measure was entered as the covariate and differences were determined between groups at the

follow-up measurement period. The continuous dependent variables include sun protection behaviors, frequency of sun exposure with intention to tan, frequency of sun exposure engaging in outdoor activities, stage of change, desired outcome of sun exposure, frequency of sunscreen use, amount of exposed skin protected from the sun, and perceived importance of a tan. One-way ANOVAs were employed to examine the direction of differences between intervention and control group at baseline and at 2-month follow-up. Chi square analyses were employed to determine group differences for noncontinuous dependent variables such as "reasons for using sunscreen" at both baseline and 2-month follow-up.

Because the ability of the Stages of Change Survey to predict behavior based on stage of change is unknown, the relationship between stage of change and sun protection behaviors was examined. The stages of change, as identified by this instrument, need to be significantly correlated with the presence of protection behaviors. Pearson r correlations were conducted to determine the relationship between stage of change and behavior change.

Results

Skin Type

Skin type is a measure of skin sensitivity to the sun. As discussed above, there are 4 different skin types (I-IV) and sun sensitivity decreases with increasing skin type. For example, skin type I is highly sensitive to the sun and vulnerable to burns with exposure, while skin type IV has low sensitivity to the sun and requires prolonged

exposure to burn. No differences between groups were observed at baseline on skin type [ϕ =.17, p=.41]. Approximately 10% of those surveyed endorsed skin type I, 21% endorsed skin type II, 43% endorsed skin type III, and 26% endorsed skin type IV. The minority of participants endorsed skin type I, possibly because the likelihood of burning is so high that it prevents these individuals from intentionally sunbathing.

Sunscreen Use

Frequency

Participants rated the frequency of their sunscreen use in the past 2 months as either seldom, fairly often, very often, or always. One way ANOVAs revealed that the frequency of sunscreen use at baseline did not differ between groups [F(1, 97) =1.21, p=.27]. Repeated measures ANOVA revealed differences between groups across time [F (1, 97)=17.33, p=.001]. Intervention participants that endorsed "always" and "very often" using sunscreen when exposed to the sun increased 25% between baseline and follow-up while control group participants decreased 4% during same time period (see Figure 1 & 2). Also, a positive correlation was observed between the sun damage rating of the UV photograph and sunscreen use at follow-up (r = .28, p=.04). As higher levels of sun damage were revealed in photographs, higher levels of sunscreen use were reported by intervention participants at follow-up.

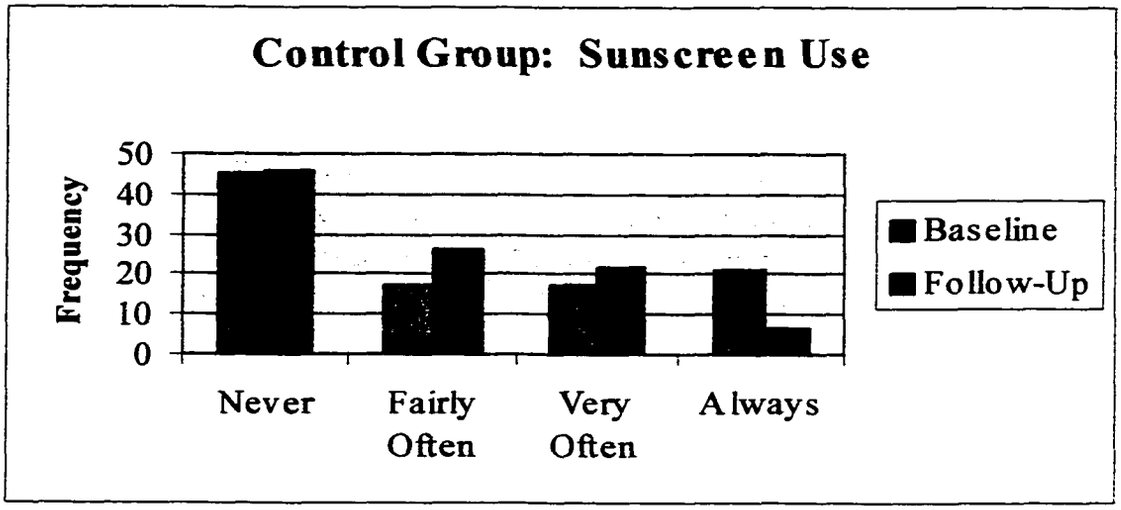


Figure 1. Sunscreen use in the control group.

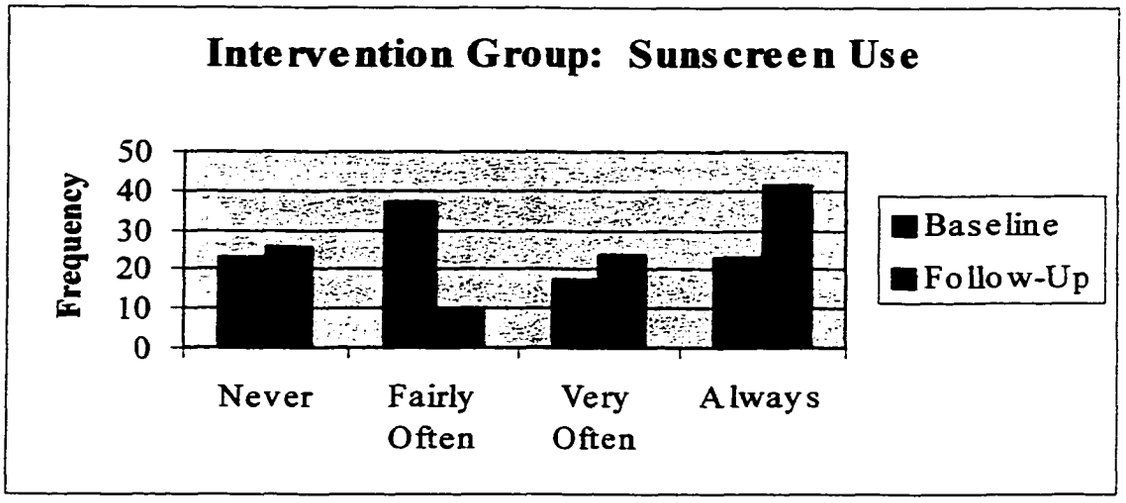


Figure 2. Sunscreen use in the intervention group.

Body Parts Protected

While participant's often reported sunscreen use, not all participants used sunscreen to cover all exposed areas of the body. For example, a participant would respond affirmatively when asked if using sunscreen but then would report that they only applied it to their lips. The body parts listed include face, lips, back, neck, legs, stomach, arms or all exposed areas. The Sun Behavior Survey included an item where participants had to circle which body parts they had protected from the sun. Intervention and control group means did not differ on this variable at baseline [$F(1, 97)=1.21$, $p=.27$] however, repeated measures ANOVA revealed a group effect across time [$F(1, 97)=10.06$, $p=.002$]. Intervention participants who reported protecting "all exposed areas" of their body increased 34.7% from baseline to follow-up while control participants decreased 12% from baseline to follow-up (See Figures 3 & 4). Not only did the intervention participants report using sunscreen more frequently but they also reported using it in such a way as to maximize their protection.

Reasons for Sunscreen Use

Participants were asked to report their primary and secondary reasons for using sunscreen when exposed to the sun. A number of options were available for the participant to select including, (a) prevent a painful burn, (b) reduce my risk of developing skin cancer, (c) prevent dry skin/acne, (d) prevent freckling/spots, (e) prevent a tan, (f) prevent wrinkling or aging, and (g) prevent a skin condition. Chi

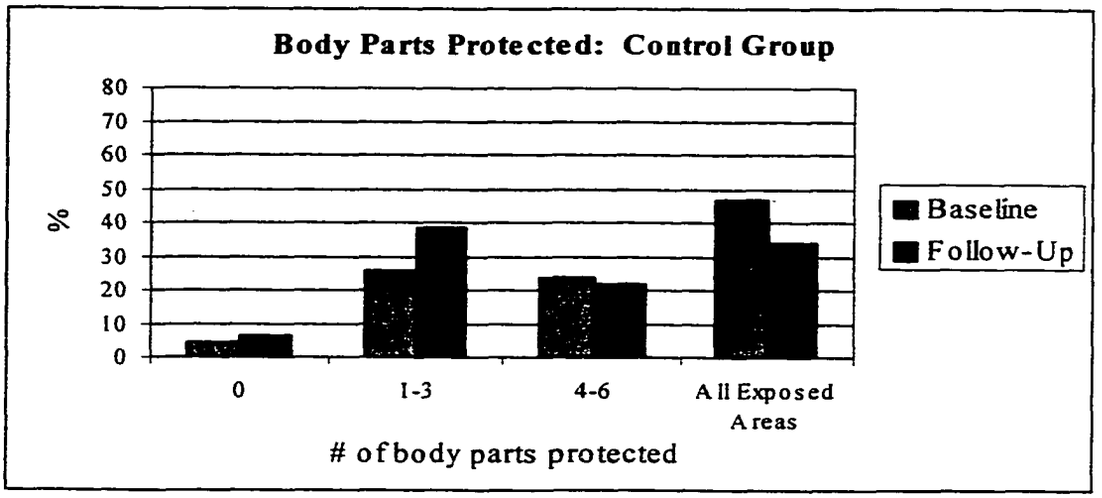


Figure 3. Percentage of body parts protected with sunscreen in the control group.

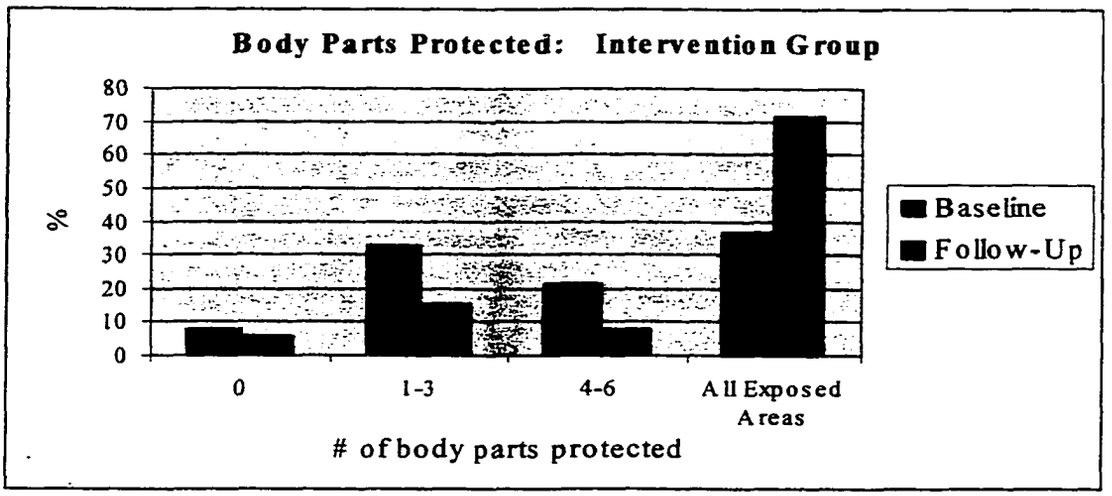


Figure 4. Percentage of body parts protected with sunscreen in intervention group.

square analyses revealed that frequencies of the various selections did not differ significantly between groups at baseline [ϕ =.309, p=.18]. The same analyses revealed significant differences in the frequencies of various selections between groups at follow-up [ϕ =.364, p=.013]. The majority of participants in both groups at baseline (81%) and at follow-up (83%) selected either "prevent a painful burn" or "reduce my risk of developing skin cancer" as their primary reason for wearing sunscreen. The number of intervention participants endorsing "reduce my risk of developing skin cancer" as the primary reason they use sunscreen increased by 23% from baseline to follow-up while the number of control participants increased only 11%. The number of intervention participants citing "prevent a painful burn" as their primary reason for using sunscreen decreased 15% between baseline and intervention while the number of control participants choosing this as their primary reason increased 1% (See Figures 5 & 6). The motivating variables for sunscreen use in intervention participants appears to be changing in that they appear to be more concerned about the long-term negative effects of sun exposure and less concerned about the short-term negative effects. This finding is promising because the intervention appeared to strengthen the effect of the long-term consequence, i.e., skin cancer, on current protective behavior.

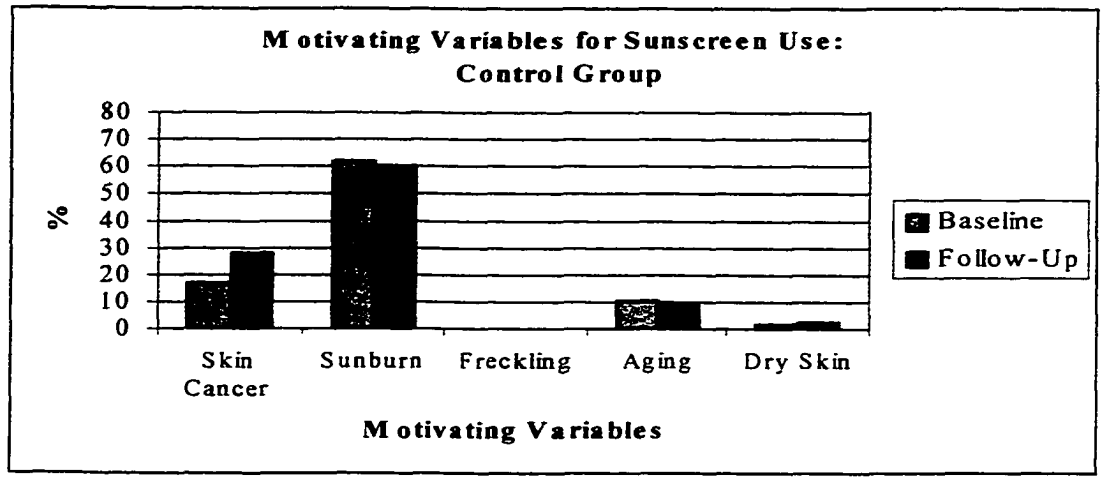


Figure 5. Variables motivating sunscreen use for control group participants.

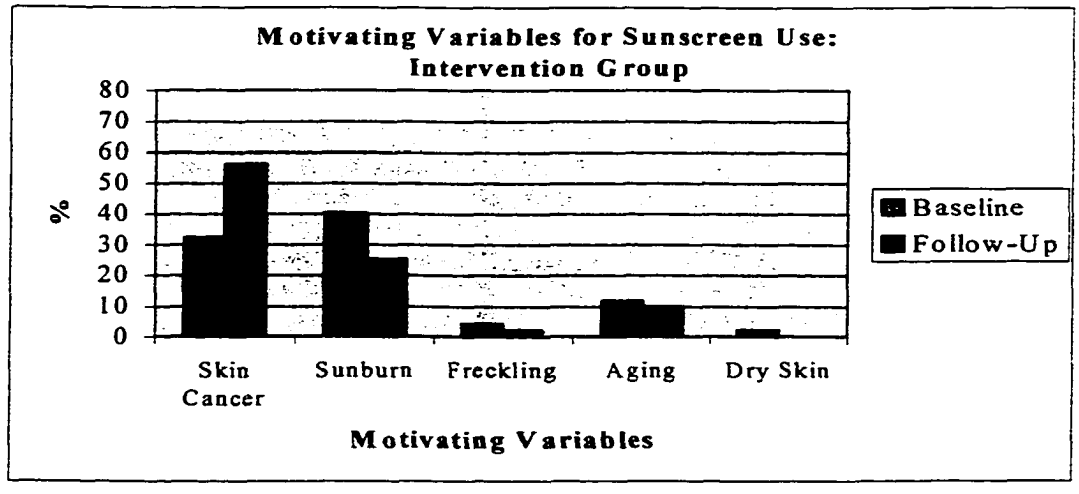


Figure 6. Variables motivating sunscreen use for intervention group participants.

Safe Sun Behaviors

Sunscreen use is only one of many "safe sun" behaviors; there are many other steps one can take to protect the skin from sun exposure. Participants were given a score depending on the frequency with which they engaged in 4 safe sun behaviors. Participants were asked on a 4-point likert scale the frequency they engaged in each behavior. A participant could get a maximum of 12 points which would indicate consistent use of all protection behaviors and a minimum of 0 points which would indicate no use of all protection behaviors. Intervention participants (M = 5.58, SD =2.51) endorsed about the same frequency of safe sun behaviors during baseline as control participants (M = 4.8, SD = 1.92). Repeated measures ANOVA were used to determine group differences across time. The results of this analysis showed that reports of use of protection behavior increased for the intervention group, but remained the same for the control group [F(1, 94)=3.93, p=.05]. It appears as though the intervention participants made modest increases in their use of all sun protection behaviors (See Figure 7)

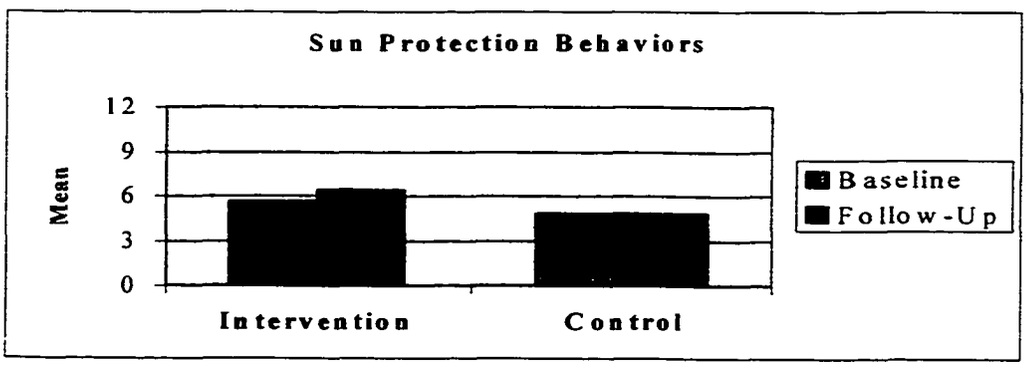


Figure 7. Mean sun protection behaviors for intervention and control groups.

Stage

Motivation can be best assessed using the stages of change, as each stage reflects how likely one is to make behavior changes. No group differences were observed at baseline according to a Chi square analysis [ϕ=.25, p=.17], although differences were observed at follow-up [ϕ=.40, p=.003]. The number of intervention participants meeting criteria for the precontemplative stage decreased by 17%, while the number of control participants decreased by 8% (See figures 8 and 9). Additionally, the number of intervention participants meeting criteria for the action and maintenance stages of change increased almost 30% over time, while the number of control participants meeting criteria for action and maintenance stages of change did not change. The hypothesis that the intervention would move participants across the stages of change is supported by these data. The intervention appears to have had an effect on motivation at all stages of change.

Sun Exposure

Protecting the skin from photodamage during sun exposure is important, however limiting sun exposure is the only way to completely prevent photodamage. Participants reported how many hours per week they spend sunbathing, or with the intent of tanning. Intervention and control participants did not differ significantly at baseline on this variable [F (1, 97)=1.91, p =.17]. Repeated measures ANOVA revealed no significant differences at the .05 level between groups at follow-up [F (1, 97)=3.34, p =. 07]. The means for both groups actually increased over time.

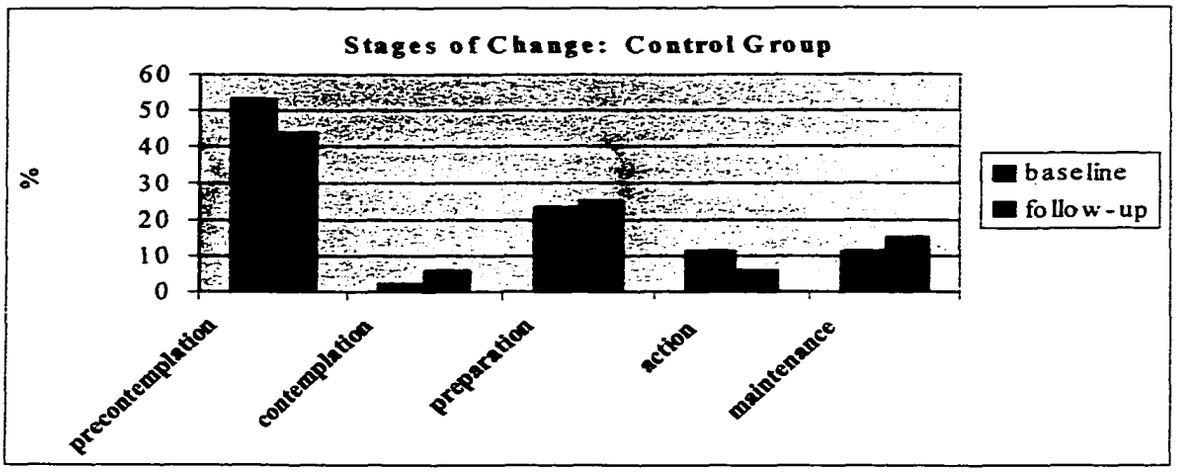


Figure 8. Stages of change for control group from baseline to follow-up.

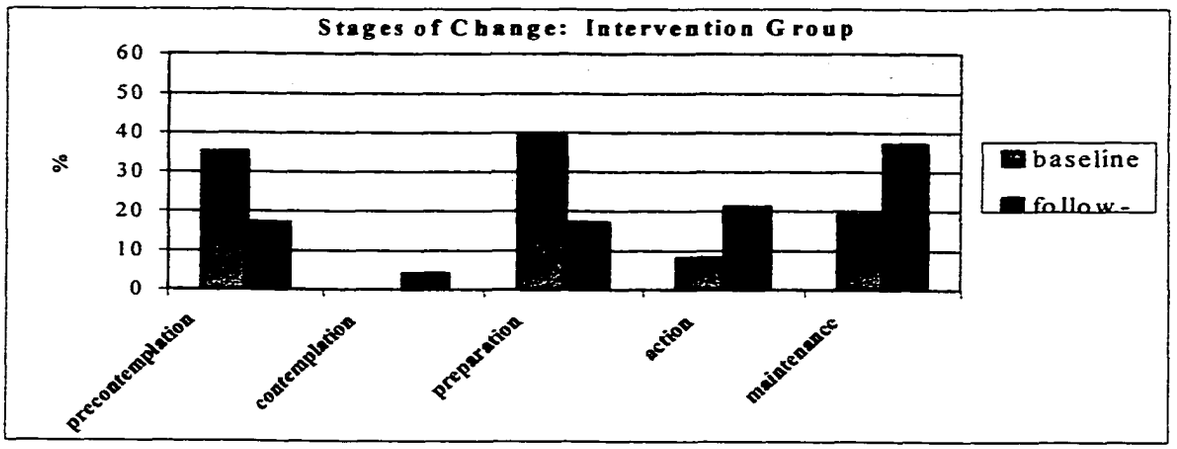


Figure 9. Stages of change for intervention group from baseline to follow-up.

Participants were also asked to report how many hours they spend in the sun engaging in activities other than intentional tanning such as recreation, work, gardening, etc. Intervention participants reported significantly more hours in the sun engaging in activities other than tanning [F (1, 98)=9.67, p = .002]. For this reason, ANCOVA was performed and revealed no differences between groups across time on this type of sun exposure (see Figures 10 & 11). The reason for significant group differences at baseline is unclear. Many intervention group participants approached the table and were therefore more likely than control participants to be walking about the beach and boardwalk area than lying on the beach. This may indicate that these participants are more active outdoors generally. Although intervention participants appeared to increase sun protection behaviors and exhibit more concern regarding skin cancer risk, limiting sun exposure does not appear to be a likely method of protecting oneself or reducing risk for these individuals.

Tanning Goal

Participants were asked to report the goal of their sun exposure with regard to tanning and the importance of being tanned. In terms of tanning goal, significant differences were revealed at baseline [F (1, 97) = 5.88, p = .017]. The intervention group participants were significantly more likely to report that getting a suntan is the objective of their sun exposure. As a result, ANCOVA was used to determine

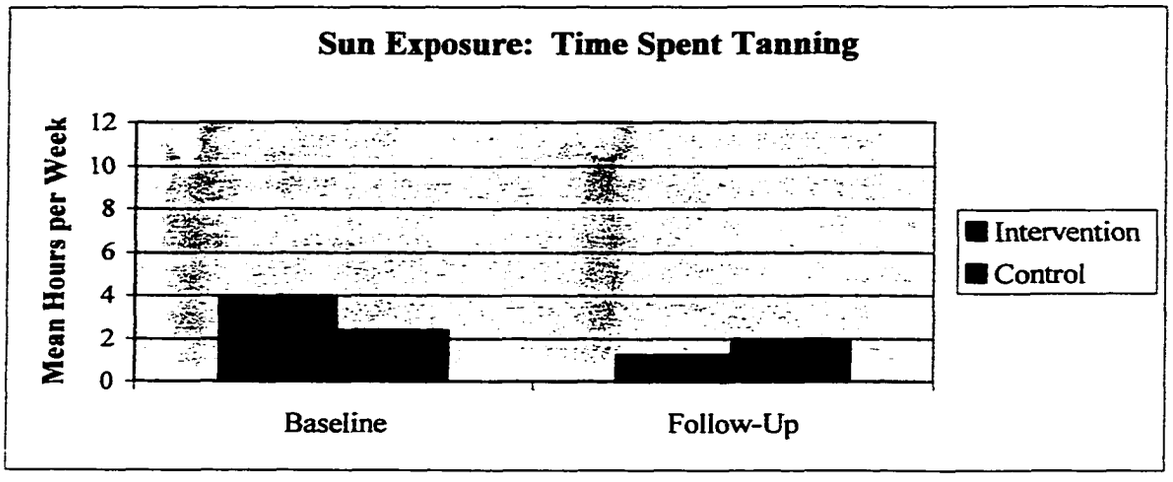


Figure 10. Mean hours per week spent tanning for intervention and control groups.

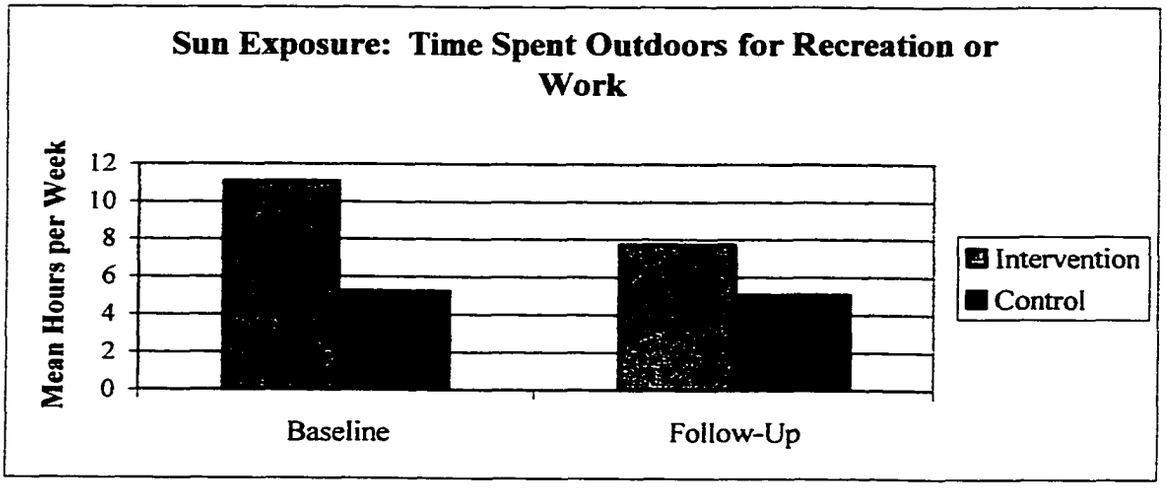


Figure 11. Mean hours per week spent outdoors for intervention and control groups.

differences across time. The baseline measure used as the covariate, the follow-up measure was used as the dependent measure, and group membership was used as the grouping variable. No significant differences were revealed at follow-up [F (1, 96) = .897, p = .346]. While participants have not reduced their sun exposure, they also did not change the goal of their sun exposure with regard to tanning. However, the statement that best described the goal of sun exposure for most participants in both groups was "I like to get a little tan." It may be the case that most people do not perceive having a light tan, especially when developed over time with the use of sunscreens to prevent burning, as contributing to their skin cancer risk.

Importance of Being Tanned

Participants were also asked to rate how much importance they assign to being tanned on a scale from 1-10. Groups did not differ on this variable at baseline and repeated measures ANOVA were used to determine group differences across time. No differences between groups were found [F (1, 93) = .86, p = .355], although significant within group differences were found [F (1, 93) = 12.3, p = 001]. Both groups appeared to assign less importance to being tanned across time. This change could be a result of the time of the year in which participants were asked. The importance of being tanned may decrease as the summer ends.

Perceived Effect of Participation

At follow-up only, all participants were asked to indicate the extent to which their participation affected their intentions to make behavior changes as well their

perceived behavior changes. One-way ANOVA revealed significant differences between groups on this variable in that intervention participants were more likely to believe their participation affected them [F (1, 94) = $p < .01$]. Approximately 25% of intervention participants reported that their participation lead to "much behavior change," while 0% of control group participants reported that their participation lead to " much behavior change." An additional 27% of intervention participants and 15% of control participants reported that their participation lead to "some behavior change." Almost 45% of control participants indicated that their participation had no effect and they have no intention to make behavior changes compared to 12% of intervention participants (See Table 3).

Relationship Between Sun Protection Behavior and Stage of Change

In order to examine the relationship between stage of change and behavior change Pearson r correlations were conducted between all dependent variables and stage of change at baseline and follow-up for all participants (See Table 4). At baseline, no significant relationship was evident between age or education and stage of change. However, at follow-up, a positive correlation between age and stage of change and education and stage of change appeared. This result may suggest that after participating in this investigation, older and more educated individuals were more likely to shift towards the latter stages of change. At both points in time, skin type was negatively associated with stage of change. This is consistent with the literature which suggests that those individuals with more sensitive skin types are more likely to report consistent use of sun protection (Campbell & Birdsell, 1994). A significant

Table 3

Repeated Measures Group Differences on Dependent Variables

	Intervention Group		Control Group		
Dependent Variable	N	Mean(SD)	N	Mean(SD)	F
Sunscreen Use	52	2.85(1.26)	46	1.89(.97)	33.25**
Body Parts Protected	52	5.67(2.37)	47	4.17(2.62)	11.43**
Protective Behaviors	51	6.35(2.51)	46	4.8(1.86)	3.92*
Sun Exposure-Tanning (hrs/week)	52	1.19(1.98)	47	1.81(1.99)	3.34
Sun Exposure-Other (hrs/week)	52	7.71(9.00)	47	5.04(4.23)	0.035
Tanning Goal (1 dark tan - 5 no tan)	52	3046(2.28)	47	2.72(1.04)	0.44
Importance of a Tan (1 not at all- 10 very)	51	3.59(2.33)	45	4.73(2.54)	2.74
Perceived Effect of Participation	50	3.06(1.38)	45	1.69(.73)	35.55**

*significant at $p < .05$
**significant at $p < .01$

positive correlation was observed between sun protection behaviors and stage of change at both baseline and follow-up time points. Sunscreen use and the number of body parts protected by sunscreen were also significantly correlated with stage of change. Stage, as determined by the Stage of Change Survey, appears to be reflective of actual sun protection behavior. The goal of sun exposure endorsed by participants also significantly correlated with stage of change. Those who are likely to avoid becoming tan are also more likely to be classified in the latter stages of change. No significant correlations were observed between duration of sun exposure and stage of

change. For this sample, the Stage of Change Survey appears to be a valid predictor of sun protection practices, however it does not provide information about the extent to which sun exposure is occurring.

Table 4

Pearson r Correlations Between Dependent Variables and Stage of Change

Dependent Variable	*Baseline*	*Follow-Up*
Age	-.20	.30*
Education	.05	.20*
Skin Type	-.36**	-.40**
Sun Protection Behaviors	.49**	.70**
Sunscreen Use	.72**	.70**
Body Parts Protected	.54**	.50**
Sun Exposure: Tanning	.09	-.18
Sun Exposure: Other	.03	-.03
Goal of Sun Exposure	.49**	.52**

*significant at $p > .05$.
**significant at $p > .001$.

CHAPTER III

DISCUSSION

Phase 1 of this study demonstrated that the prevalence of sun protection and exposure behaviors in a large Mid-Western city is equivalent to the prevalence of such behavior in other areas of the country. Although Chicago, Illinois is a Midwestern urban area, the prevalence of skin cancer risk behaviors are such that prevention efforts are justified.

The results of Phase 2 suggest that the TTM can be a useful guide for developing interventions aimed at reducing skin cancer risk. The intervention was associated with an increase in sun protection behavior, particularly sunscreen use on all exposed skin areas. The intervention participants were also more likely than control participants to attribute their behavior changes and intentions to change to their participation in the project. Also, the degree of sun damage revealed by the UV photograph appeared to be associated with more consistent use of sunscreen for intervention participants at follow-up. The intervention was associated with a strengthening of the long-term consequence of sun exposure, i.e., skin cancer. This investigation also confirmed the stage hypothesis, which stated that the intervention should facilitate movement across the stages of change. Measuring stage changes may be a more sensitive means of testing the effects of an intervention because not all stages involve behavior change. Intervention participants were less likely than control participants to be in earlier stages of change such as precontemplation and

contemplation and more likely to be in latter stages of change such as action and maintenance at 2 month follow-up. Finally, the validity of the Stage of Change Survey was demonstrated when significant correlations were observed between sun protection behaviors and stage of change.

The intervention did not lead to decreases in sun exposure behavior which is the most effective means of reducing skin cancer risk. While the intervention group's sun protection behavior appeared to be controlled largely by skin cancer risk concerns, in both groups sun exposure behavior was controlled by the desire to be suntanned, a short-term consequence of sun exposure. Intervention group participants were no less likely to be tanned or to deem tanning as important than control group participants at follow-up, even though they were more likely to engage in sun protection behavior. Apparently, the intervention group became more concerned about their skin cancer risk, but this concern did not outweigh their desire for a tan. It appears as though these participants preferred to tan "safely" than to avoid sun exposure completely.

One limitation of this study is that the intervention and control groups were significantly different at baseline on certain variables. During data collection, intervention participants were more likely to approach the research site with interest in participating. The research site was decorated and the UV camera was in plain view. At times, several people would gather around the research site which generated interest among passersby who then approached the site with interest in participating. Those individuals might have had a pre-existing interest in and/or concern about skin cancer risk. Passersby who had no interest in and/or concern about skin cancer may

have been less likely to stop at the research site, and therefore less likely to participate. The research investigators who collected data from control group participants were mobile, not anchored to a research site. However, collecting control group data from an immobile site would likely have been more difficult without the intervention equipment (UV camera, sunscreen samples, etc) attracting interest from passersby. In effect, people would not likely stop to complete a survey, but might agree to if approached. Conversely, it would not have been feasible to mobilize the equipment and materials associated with the intervention. This difference in methods of data collected could have led to some sample differences. However, no baseline group differences occurred on Stages of Change survey scores, which would suggest that baseline group differences are not likely a result of differences in motivation to change.

The most important limitation of this study is that the intervention apparently had no effect on sun exposure, which is the most effective means of reducing skin cancer risk. Participant's behavior continued to be reinforced by the cosmetic consequences of sunbathing, i.e., tanning, and these consequences remained strong enough to maintain the behavior at follow-up. Also, duration of sun exposure was not associated with stage of change. Individuals classified in the action and/or maintenance stage of change may have been engaging in similar amounts of sun exposure as those classified in the precontemplation stage of change. While sunscreen is important for sun protection, it is not certain whether sunscreen does in fact decrease skin cancer risk (Diffey, 2000). Although previous prevention efforts have

targeted increasing precautionary behaviors (Rossi et al, 1994), reducing exposure should ultimately be the goal of skin cancer prevention.

Another limitation is that Chicago, Illinois is not considered a tropical or coastal area where skin cancer is a popular concern. Not only are there fewer summer months than in southern or western regions of the country, but people living in this region may be less likely to see themselves as at risk for skin cancer and less motivated to change their behavior. However, the Chicago beachfront is inundated with beach-goers and recreationers almost year round and sun exposure even during non-summer months can also contribute to skin cancer risk.

A drawback of this and similar studies is the use of self-report measures. Because the participant is asked to report their behavior while they are engaging in that behavior, self-reports can be corroborated with rater observation. However, the follow-up assessment did not occur on the beach and participants had to rely on their recall of past opportunities to engage in the behavior in question. No practical way exists, however, to collect follow-up data in the same setting as baseline data collection.

Future Research

The Transtheoretical Stages of Change Model has been used to guide intervention development in many areas of health behavior change, and appears to be a useful guide for conceptualizing skin cancer risk behavior change. Interventions targeting individuals at all stages of change should be applied to larger samples and

possibly in areas of this country and others where skin cancer rates are higher and ozone depletion is more substantial.

In future research, large scale versions of individualized package interventions could be administered in beach settings. Administering such interventions in the setting where risk behavior occurs is important because the intervention not only contacts individuals who are most likely to be in need of behavior change, but it also facilitates improved accuracy of measurement of safe behaviors. Most protective behaviors are observable, such as wearing protective clothing/hats and having sunscreen in possession. Observers can corroborate self-reports. Also, participants can immediately begin practicing new behaviors rather than waiting for the next opportunity to do so.

Additionally, future research should use the TTM to develop interventions that primarily emphasize reducing sun exposure. The reinforcing value of a suntan is high for people who frequently engage in sun exposure. Interventions may need to encourage the use of tanning alternatives such as self-tanning lotions and other cosmetic products that produce the appearance of a tan without sun exposure. The drawback of encouraging tanning alternatives is that it the product of the behavior, tanned skin, will continue to be associated with social reinforcement. People will continue to sunbath as long as that behavior is reinforced.

Another strategy is for interventions to emphasize the negative cosmetic consequences of suntanning such as premature aging. Those people with appearance-related concerns may be motivated to change when the adverse cosmetic effects of tanning are made salient. This strategy would seem to be especially effective for

women because of the high value society attaches to youthful appearance. The difficulty with this strategy is that premature aging is not entirely irreparable. The cosmetic and plastic surgery industries have assured people a second chance at youthful skin with treatments such as skin peels, face lifts, and anti-wrinkle creams, all created to undo visible skin damage. Again, the only consequence of sun exposure that cannot be reversed without behavior change is skin cancer. Unfortunately, the delayed onset and low probability affect the strength of skin cancer as a motivating variable. Researchers utilizing stage-matched interventions for skin cancer prevention need to identify and incorporate high probability, immediate consequences that reduce sun exposure behavior as well as increase sun protection behavior.

Appendix A

Human Subjects Institutional Review Board Consent Form and Approval

Anonymous Survey Consent
Western Michigan University-Department of Psychology

You are invited to participate in a research project entitled "Safe Sun Behavior and Attitudes of Mid West Summer Beachgoers" designed to analyze sunbathing behavior of beachgoers, being conducted by R. Wayne Fuqua, Ph.D. and Sherry L. Pagoto, M.A. from Western Michigan University, Department of Psychology.

This survey is comprised of 38 multiple choice and true/false questions and will take approximately 10 minutes to complete. Your replies will be completely anonymous, so do not put your name anywhere on the form. You may choose to not answer any question and simply leave it blank. If you choose to not participate in this survey, you may either return the blank survey or you may discard it as you wish. Returning the survey indicates your consent for use of the answers you supply. If you have any questions, you may contact R. Wayne Fuqua, Ph.D. at 616-387-4474, Sherry L. Pagoto, M.A. at 616-387-4492, the Human Subjects Institutional Review Board (616-387-8293) or the vice president for research (616-387-8293).

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board as indicated by the stamped date and signature of the board chair in the upper right corner. You should not participate in this project if the corner does not have a stamped date and signature.

Human Subjects Institutional Review Board

Kalamazoo, Michigan 49008-3899

WESTERN MICHIGAN UNIVERSITY

Date: 2 September 1999

To: Wayne Fuqua, Principal Investigator
Sherry Pagoto, Student Investigator for independent research project

From: Sylvia Culp, Chair Sylvia Culp

Re: HSIRB Project Number 99-07-16

This letter will serve as confirmation that your research project entitled "Safe Sun Behaviors and Attitudes of Mid West Summer Beach-Goers" has been **approved** under the **exempt** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may **only** conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: 2 September 2000

Appendix B

Phase 1: Sun Behavior Survey

1. AGE _____ 2. GENDER _____

3. EDUCATION (Check one)
____ Less than 12 years high school
____ High school diploma or equivalent
____ Some college
____ 4 year college degree
____ Graduate or professional degree

4. RACE (Check one)
____ African American
____ Asian/Pacific Islander
____ Hispanic/Latino
____ Multiracial
____ Native American
____ White
____ Other (Specify)

5. Are you using sunscreen right now? YES NO

6. What sun protection factor are you using right now?

a. Factor 0-2
b. Factor 3-8
c. Factor 9-14
d. Factor 15 or higher

7. Which of the following are you wearing or using RIGHT NOW? (Check all that apply)

____ Sunglasses
____ Hat that covers head and face
____ Shirt that covers back, chest, shoulders
____ Lip Protection with sun protection
____ Umbrella
____ Zinc oxide

8. Everyone's skin responds to the sun differently. In order to examine what type of skin you have, answer the following question. Assuming you DON'T have sunscreen, which of the following best describes your reaction to your FIRST exposure of the season to summer sun for 1 hour at midday?

a. A painful burn the next day and no tan 1 week later.
b. A painful burn the next day and a light tan 1 week later.
c. A slightly tender burn the next day and a moderate tan 1 week later.
d. No burn the next day and a good tan 1 week later.

9. On average, how many days in a typical week did you intentionally sunbathe during June, July, and August this year?

a. 0
b. 1
c. 2-3
d. 4-5
e. 6-

10. On average, how many hours per day?

a. less than 1 hour
b. 1-2 hours
c. 2-4 hours
d. 4-6 hours
e. more than 6 hours

11. On average, how many days per week this summer did you engage in outdoor activities (i.e., recreation, sports, gardening, house work, etc.) in the sun?

a. 0
b. 1 days
c. 2-3 days
d. 4-5
e. 6-7

12. On average, how many hours per day?

a. less than 1 hour
b. 1-2 hours
c. 2-4 hours
d. 4-6 hours
e. more than 6 hours

13. Which is true of your sun exposure this summer?

a. I try to get as dark as I can get.
b. I tan until I get the color that I want.
c. I like to get a little tan.
d. I avoid being tanned if I can.
e. I make every effort to avoid being tanned.

14. Generally, how often was sunscreen used when you have been out in the sun this summer?

a. very seldom
b. fairly seldom
c. fairly often
d. very often
e. always

15. What type of sun protection factor (SPF) does your sunscreen typically have?

a. Factor 0-2
b. Factor 3-5
c. Factor 6-10
d. Factor 11 or higher
e. Don't remember/Don't know

16. Which is true of the SPF (sun protection factor) of a sunscreen product?

a. the higher the SPF the more sun protection that product provides
b. the lower the SPF the less likely you are to burn
c. an SPF of 8 for example means that you are protected from the ultraviolet rays of the sun for 8 times as long as without sunscreen.
d. Both a and b
e. Both a and c

17. What parts of your body do you typically protect with sunscreen? (Circle all those that apply)

Face	Lips
Back	Neck
Legs	Stomach
Arms	All Exposed Areas

18. What parts of your body are protected with sunscreen right now? (Circle all those that apply)

Face	Lips
Back	Neck
Legs	Stomach
Arms	All Exposed Areas

19. Where do you typically get your sunscreen?

a. I borrow it from a friend, spouse, etc.
b. I buy it BEFORE I go to the beach.
c. I buy it AT the beach.

20. In an 8 hour day in the sun, how many times do you apply sunscreen?

a. once, at the beginning
b. once, somewhere in the middle of the day
c. every four hours
d. every 2 hours
e. every hour or more

21. What is your number 1 reason for USING SUNSCREEN when you are in the sun? (Check one)

____ Prevent a painful burn	____ Prevent a tan
____ Reduce my risk of developing skin cancer	____ Prevent wrinkling or aging
____ Prevent dry skin/acne	____ Skin condition
____ Prevent freckling/spots	

22. What is your number 2 reason for USING SUNSCREEN when you are in the sun? (Check one)

____ Prevent a painful burn
____ Reduce my risk of developing skin cancer
____ Prevent dry skin/acne
____ Prevent freckling/spots
____ Prevent a tan
____ Prevent wrinkling or aging
____ Skin condition

23. When you are in the sun and you DON'T use sunscreen, what are your reasons for NOT doing so? (Check up to 3)

____ I want a tan/sunscreen slows tanning
____ I don't think I am at risk for cancer
____ I never get burned
____ I'm too lazy/too much hassle
____ Too expensive
____ I have a skin condition
____ I'm embarrassed to put it on.
____ Don't like the way it feels (greasy)
____ I forget to bring it with me
____ I forget to put it on even when I have it
____ It irritates my skin

24. What are the reasons why you intentionally sunbathe or expose yourself to the sun? (Check up to 3)

____ I think I look better with a tan
____ I think my friends/others think I look better with a tan
____ I am/appear healthier when I am tan
____ Being out in the sun is a way to spend time with friends.
____ If I have a good tan, I can avoid getting burned.
____ I'm bored/have a lot of free time

25. On a scale from 1-10 how important is it for you to get a tan? (Circle one)

1 2 3 4 5 6 7 8 9 10

26. How many painful sunburns did you get this summer?

a. 0
b. 1-2
c. 3-4
d. 5 or more

27. How many painful sunburns have you had in your life?

a. 0
b. 1-2
c. 3-4
d. 5 or more

28. How often to you use each of these items when you are in the sun?

	Always	Most of Time	Sometimes	Never
Sunglasses	____	____	____	____
Sunscreen for body	____	____	____	____
Lip Protection with SPF	____	____	____	____
Hat	____	____	____	____
Umbrella	____	____	____	____
Protective clothing	____	____	____	____
Zinc Oxide	____	____	____	____

29. Has anyone in your family ever been diagnosed with skin cancer (melanoma)?
YES NO

30. Have YOU ever been diagnosed with skin cancer (melanoma)?
YES NO

31. How often do you examine your skin for signs of skin cancer development?

a. Never
b. Once a year or less
c. Once a month or less
d. More than once a month

32. Which statement describes your risk for developing skin cancer.

a. I'm at no risk for developing skin cancer.
b. I think I am at some risk for developing skin cancer.
c. I think I am at a pretty good risk for developing skin cancer.
d. I'm at high risk for developing skin cancer some time in my life.

33. Have you used tanning booths this year? YES NO

34. Over the last year, estimate the number of visits you made to the tanning booth?

a. 0
b. 1-5
c. 6-12
d. 13-20
e. more than 20

35. What are the reasons that you use tanning booths?
(Check up to 3)

_____ I think I look better with a tan
_____ I think my friends/others think I look better with a tan
_____ I am/appear healthier when I am tan
_____ If I have a good base tan, I can avoid getting burned.
_____ I'm bored/have a lot of free time
_____ I get to use it for free

36. Have you used sunless tanning cream this year? YES NO

37. How frequently?

a. once
b. once a month or less
c. once a week or less
d. more than once a week

38. In the future I plan to wear sunscreen....

a. as often as I do now
b. more often than I do now
c. less often than I do now

39. What do you think would motivate you to use sunscreen more often? (Check all that apply)

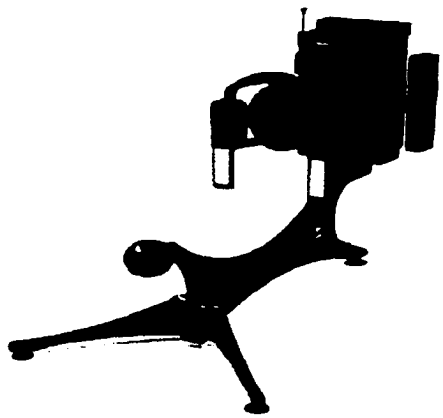
_____ Having sunscreen readily available on the beach
_____ Being reminded of the benefits of using sunscreen
_____ Being reminded of the harmful effects of not using sunscreen
_____ Being reminded/prompted to apply it when I need it
_____ Knowing the UV index on a given day (how many minutes it will take to burn)
_____ Finding out the extent to which my skin has already been damaged by UV rays.
_____ Seeing graphic pictures of skin cancer tumors
_____ Other

THANK YOU VERY MUCH!

Appendix C

Reflec UV Instant Camera System

Reflec UV Instant Camera System



- Easy to use
- Dual-mode flash takes standard and UV photos
- B&W Polaroid film
- Perfect positioning
- Compact and portable
- Includes carrying case
- Great sales tool for skin rejuvenation

Pricing Information

Appendix D

Human Subjects Institutional Review Board Consent Form and Approval

Western Michigan University
Department of Psychology
Principal Investigator: R. Wayne Fuqua, Ph.D.
Research Associate: Sherry L. Pagoto, M.A.

I have been invited to participate in a research project entitled "Promoting Healthy Behavior Change to Prevent UV Skin Damage using the Transtheoretical Stages of Change Model." This research is intended to examine the effects of a package intervention on sun exposure and the use of sun protection in beach-goers. This project is Sherry Pagoto's dissertation project.

I will be asked to undergo two brief interviews each of which involves a series of questions that pertain to sun exposure and sun protection behaviors. I will also be asked to provide general information about my self including my age, gender, racial background, and level of education. The interview will last approximately 15 minutes and will be conducted by Sherry Pagoto or another research associate. My responses will be recorded in a written document. The first interview will occur on a Chicago Park District beach and the second will occur via telephone 2 months after the first interview is completed. I will be asked to provide my first name, a telephone number where I can be contacted for the second interview, and a convenient time at which I can be contacted. After I have completed the first interview I may or may not be asked to participate in a brief intervention. This intervention will involve my being asked to have a photograph taken of the front of my face with a Polaroid camera that is fixed with a polarized lens. This photograph will reveal any epidermal pigmentation damage on the skin of my face. I will be asked to compare this photo with a sample set of photos that are graded for varying levels of skin damage. I will be given my photo to keep. I will then receive a written summary of my level of risk for skin damage and instructions as to how to change my behavior so as to reduce that risk. This information will be based on my interview responses and an examination of my photo by a research associate. I will then be asked to sign a commitment statement on a card which reads "My signature indicates that I agree to follow the instructions indicated on this card in order to reduce my risk for developing skin damage. I agree to give this card to a friend who I will ask to remind me to keep this commitment." I will be asked to comply with this commitment statement. Two months after the first interview I will be contacted by phone at the phone number I provided during the first interview. During this phone contact, I will be asked the same series of questions pertaining to my sun exposure and sun protection behavior that I was asked at the first interview. This phone contact should last approximately 15 minutes.

As in all research, there may be unforeseen risks to the participant. If an accidental injury occurs, appropriate emergency measures will be taken; however, no compensation or treatment will be made available to me except as otherwise specified in this consent form. One potential risk of my participation in this project is that I may be upset by viewing the epidermal pigmentation damage in the photograph that is taken of my face; however, Sherry Pagoto, M.A. is prepared to provide crisis counseling should I become significantly upset and she is prepared to make a referral if I need further consultation about this topic. I will be responsible for the cost of treatment if I choose to pursue it.

One way I may benefit from this activity is having my facial skin evaluated for sun damage, which research indicates motivates individuals to take action to prevent further damage. I may also benefit from having my skin damage risk assessed and receiving recommendations on how I might be able to protect my skin from further sun damage. Others who engage in sun exposure may benefit from the knowledge that is gained from this research

WESTERN MICHIGAN UNIVERSITY
H. S. I. R. B.
H. S. I. R. B.
Approved for use for one year from this date
JUN 2 9 2000
HSIRB Chair

I may also benefit from my participation by having my name placed into a lottery for $100 if I complete the two month follow-up phone interview by October 31, 2000. If my name is selected in this lottery, I will be notified by phone and have 60 days to respond with an address at which the lottery winnings can be sent. If I do not respond in 60 days the lottery will be conducted a second time and a new winner will be selected.

All of the information collected from me is confidential. That means that my name will not appear on any papers on which this information is recorded. The forms will all be coded, and Sherry Pagoto, M.A. will keep a separate master list with the names of participants and the corresponding code numbers. Once the data are collected and analyzed, the master list will be destroyed. All other forms will be retained for three years in a locked file in the principal investigator's laboratory. I will receive the only copy of my photograph and I will be responsible for the storage of this photograph. No other copies will exist.

I may refuse to participate or quit at any time during the study without prejudice or penalty. If I have any questions or concerns about this study, I may contact either R. Wayne Fuqua, Ph.D. at 616-387-4474 or Sherry L. Pagoto, M.A. at 616-387-4492. I may also contact the chair of Western Michigan University Human Subjects Institutional Review Board at 616-387-8293 or the vice president for research at 616-387-8298 with any concerns that I have.

s

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board as indicated by the stamped date and signature of the board chair in the upper right corner. Subjects should not sign this document if the corner does not have a stamped date and signature.

My signature below indicates that I have read and/or had explained to me the purpose and requirements of the study and that I agree to participate.

_____ _____

Signature Date

Consent obtained by: _____ _____

Initials of researcher Date

Human Subjects Institutional Review Board

Kalamazoo, Michigan 49008-5162
616 387-8293

WESTERN MICHIGAN UNIVERSITY

Date: 29 June 2000

To: R. Wayne Fuqua, Principal Investigator
Sherry Pagoto, Student Investigator for dissertation

From: Sylvia Culp, Chair Sylvia Culp

Re: HSIRB Project Number 00-04-04

This letter will serve as confirmation that your research project (now) entitled "Promoting Healthy Behavior Change to Prevent UV Skin Damage Using the Transtheoretical Stages of Change Model" has been **approved** under the **full** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may **only** conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: 29 June 2001

Appendix E

Sun Stage of Change Survey

Sun Stage of Change

Sun Protection Items

The following questions are about protecting yourself from too much summer sun exposure. There are several ways to protect yourself from the sun:
-by using sunscreen with a Sun Protection Factor (SPF) of 15 or more,
-by wearing protective clothing (for example, a hate with a wide brim, shirts, and long pants),
-by avoiding or limiting exposure to the sun in the midday hours.

1. Do you protect yourself from exposure to the sun consistently, that is, whenever you know you will be out in the sun for more than about 15 minutes?

2. Have you consistently protected yourself from exposure to the sun for the past 12 months?

3. Do you intend to consistently protect yourself from exposure to the sun in the next 12 months?

4. Do you intend to consistently protect yourself from exposure to the sun in the next 30 days?

Sunscreen Items

The next few questions are about protecting yourself from too much summer sun exposure by using sunscreens with an SPF of 15 or more.

1. Do you use a sunscreen with an SPF of at least 15 consistently, that is, whenever you know you will be out in the sun for more than about 15 minutes?

2. Have you been using sunscreens with an SPF of at least 15 consistently for the past 12 months?

3. Do you intend to use sunscreens with an SPF of at least 15 consistently in the next 12 months?

4. Do you intend to use sunscreens with an SPF of at least 15 consistently in the next 30 days?

Appendix F

Phase 2: Sun Behavior Survey

Sun Behavior Survey

1. AGE _____ 2. GENDER _____

3. EDUCATION (Check one)
____ Less than 12 years high school
____ High school diploma or equivalent
____ Some college
____ 4 year college degree
____ Graduate or professional degree

4. RACE (Check one)
____ African American
____ Asian/Pacific Islander
____ Hispanic/Latino
____ Multiracial
____ Native American
____ White
____ Other (Specify)

5. Are you using sunscreen right now? YES NO

6. What sun protection factor are you using right now?

a. Factor 0-2
b. Factor 3-8
c. Factor 9-14
d. Factor 15 or higher

7. Which of the following are you wearing or using RIGHT NOW? (Check all that apply)

____ Sunglasses
____ Hat that covers head and face
____ Shirt that covers back, chest, shoulders
____ Lip Protection with sun protection
____ Umbrella
____ Zinc oxide

8. Everyone's skin responds to the sun differently. In order to examine what type of skin you have, answer the following question. Assuming you DON'T have sunscreen, which of the following best describes your reaction to your FIRST exposure of the season to summer sun for 1 hour at midday?

a. A painful burn the next day and no tan 1 week later.
b. A painful burn the next day and a light tan 1 week later.
c. A slightly tender burn the next day and a moderate tan 1 week later.
d. No burn the next day and a good tan 1 week later.

9. Which is true of your sun exposure?

a. I try to get as dark as I can get.
b. I tan until I get the color that I want.
c. I like to get a little tan.
d. I avoid being tanned if I can.
e. I make every effort to avoid being tanned.

10. How often do you spend time in the sun in the summer during the hours 10am –4pm?

a. daily
b. 3-5 days a week
c. 1-2 days a week
d. less than 3 days a month
e. no more than once a month

11. Generally, how often was sunscreen used when you have been out in the sun so far this summer?

a. not at all
b. seldom
c. fairly often
d. very often
e. always

12. What type of sun protection factor (SPF) does your sunscreen typically have?

a. Factor 0-4
b. Factor 5-9
c. Factor 10-14
d. Factor 15 or higher
e. Don't remember/Don't know

13. Which is true of the SPF (sun protection factor) of a sunscreen product?

a. an SPF of at least 15 will prevent skin cancer completely
b. the lower the SPF the less likely you are to burn
c. an SPF of 8 for example means that you are protected from the ultraviolet rays of the sun for 8 times as long as without sunscreen.
d. I don't know.

14. What parts of your body do you typically protect with sunscreen? (Circle all those that apply)

Face	Lips
Back	Neck
Legs	Stomach
Arms	All Exposed Areas

15. What parts of your body are protected with sunscreen right now? (Circle all those that apply)

Face	Lips
Back	Neck
Legs	Stomach
Arms	All Exposed Areas

16. Where do you typically get your sunscreen?

a. I borrow it from a friend, spouse, etc.
b. I buy it BEFORE I go to the beach.
c. I buy it AT the beach.
d. I don't use it at all.

17. In an 8 hour day in the sun, how many times do you apply sunscreen?

a. not at all
b. once, at the beginning
c. at least every four hours

18. What is your number 1 reason for USING SUNSCREEN when you are in the sun? (Check one)

____ Prevent a painful burn
____ Reduce my risk of developing skin cancer
____ Prevent dry skin/acne
____ Prevent freckling/spots
____ Prevent a tan
____ Prevent wrinkling or aging
____ Skin condition

19. What is your number 2 reason for USING SUNSCREEN when you are in the sun? (Check one)

____ Prevent a painful burn
____ Reduce my risk of developing skin cancer
____ Prevent dry skin/acne
____ Prevent freckling/spots
____ Prevent a tan
____ Prevent wrinkling or aging
____ Skin condition

20. When you are in the sun and you DON'T use sunscreen, what are your reasons for NOT doing so? (Check up to 3)

____ I want a tan/sunscreen slows tanning
____ I don't think I am at risk for cancer
____ I never get burned
____ I'm too lazy/too much hassle
____ Too expensive
____ I have a skin condition
____ I'm embarrassed to put it on.
____ Don't like the way it feels (greasy)
____ I forget to bring it with me
____ I forget to put it on even when I have it
____ It irritates my skin

21. What are the reasons why you intentionally sunbathe or expose yourself to the sun? (Check up to 3)

____ I think I look better with a tan
____ I think my friends/others think I look better with a tan
____ I am/appear healthier when I am tan
____ Being out in the sun is a way to spend time with friends.
____ If I have a good tan, I can avoid getting burned.
____ I'm bored/have a lot of free time

22. On a scale from 1-10 how important is it for you to get a tan? (Circle one)

1	2	3	4	5	6	7	8	9	10
Not at All Important									Extremely Important

23. How many painful sunburns did you get this summer?

a. 0
b. 1-2
c. 3-4
d. 5 or more

24. How many painful sunburns have you had in your life?

a. 0
b. 1-2
c. 3-4
d. 5 or more

25. How often to you use each of these items when you are in the sun?

	Always	Most of Time	Sometimes	Never
Sunglasses	____	____	____	____
Sunscreen for body	____	____	____	____
Lip Protection with SPF	____	____	____	____
Hat	____	____	____	____
Umbrella	____	____	____	____
Protective clothing	____	____	____	____
Zinc Oxide	____	____	____	____

26. Has anyone in your family ever been diagnosed with skin cancer (melanoma)?
YES NO

27. Have YOU ever been diagnosed with skin cancer (melanoma)?
YES NO

28. How often do you examine your skin for signs of skin cancer development?

a. Never
b. Once a year or less
c. Once a month or less
d. More than once a month

29. Which statement describes your risk for developing skin cancer.

a. I'm at no risk for developing skin cancer.
b. I think I am at low risk for developing skin cancer.
c. I think I am at a moderate risk for developing skin cancer.
d. I'm at high risk for developing skin cancer.

30. Have you used tanning booths this year? YES NO

31. Have you used sunless tanning cream this year? YES NO

32. In the future I plan to wear sunscreen....

a. as often as I do now
b. more often than I do now
c. less often than I do now

Appendix G

Sun Sensitivity Assessment

Sun Sensitivity Assessment

1. What is the color of your natural scalp hair as a teenager?

1		2		3
Red	Blond	Light Brown	Medium Brown	Black

2. Which of the following would best describe your reaction, the next day, to direct exposure to 1 hour of noontime sun, for the first time in the summer? (blistering painful sunburn, painful sunburn, my skin turns pink or red but no pain, no redness or pain).

1	2	3
Blistering painful sunburn	Skin turns pink or red/no pain	No red or pain

3. How would you describe your untanned skin color? (fair, medium, or dark)

1	2	3
fair	medium	dark

High 3-4
Medium 5-6
Low 7-9

Appendix H

Commitment Cards

Mild Sensitivity Recommendations

1. Apply sunscreen or sunblock with at least 15 SPF during prolonged sun exposure (1 hour or more).
2. Wear protective clothing (long-sleeved shirts, hats, sunglasses) during peak UV hours (12pm-5pm).

"I commit to engage in the above behaviors for the remainder of the summer and in the future to protect my skin from sun damage and to reduce my risk for skin cancer."

_____
Your Signature

_____
Other Signature

Post this card in a conspicuous place as a reminder to protect your skin!

Moderate Sensitivity Recommendations

1. Apply sunscreen or sunblock with at least 15 SPF to ALL exposed areas during peak UV hours (12pm-5pm).
2. Wear protective clothing (long-sleeved shirts, hats, sunglasses) during peak UV hours (12pm-5pm).
3. Avoid sun exposure during peak UV hours (12pm-5pm) when possible

"I commit to engage in the above behaviors for the remainder of the summer and in the future to protect my skin from sun damage and to reduce my risk for skin cancer."

_____
Your Signature

_____
Other Signature

Post this card in a conspicuous place as a reminder to protect your skin!

High Sensitivity Recommendations

1. Avoid sun exposure during peak UV hours (12pm-5pm).
2. Apply sunscreen or sunblock with at least 15 SPF during to all exposed areas when outdoors for 15 minutes or more.
3. Wear protective clothing (long-sleeved shirts, hats, sunglasses) when outdoors for 15 minutes or more.

"I commit to engage in the above behaviors for the remainder of the summer and in the future to protect my skin from sun damage and to reduce my risk for skin cancer."

_____
Your Signature

_____
Other Signature

Post this card in a conspicuous place as a reminder to protect your skin!

Appendix I

Comparison Photographs

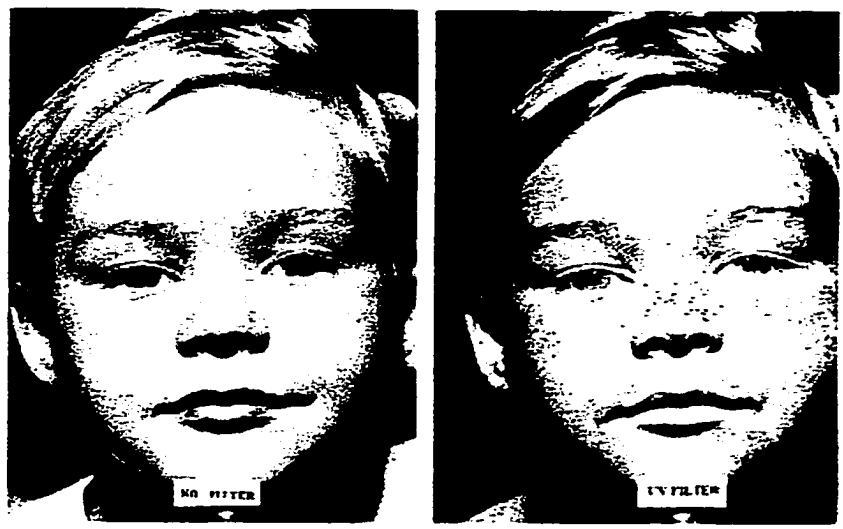


Photo 1. Mild Sun Damage

Photo 2. Moderate Sun Damage

Photo 3. Severe Sun Damage

Appendix J
American Cancer Society Pamphlet

Slip! Slop! Slap!™

It's not just a beach thing! Sun exposure adds up day after day. It happens whenever you're outdoors: gardening, sailing, skiing, fishing, hiking—just walking to and from your car. Sunlight reflects off water, sand, concrete, and snow and reaches below the water's surface. Ultraviolet (UV) rays are present even on cloudy days.

Everyone is at risk for skin cancer, whatever their skin color. Everyone needs to protect skin and eyes from the sun. Listed on the back of this card are actions you can take to reduce your risk of skin cancer.

Most skin cancers could be prevented by protecting ourselves from the sun's rays.

AMERICAN CANCER SOCIETY

SKIN PROTECTION FEDERATION

Hope. Progress. Answers.™

Enjoy the outdoors. Be sun-smart!

Limit sun exposure between 10 A.M. and 4 P.M., when the ultraviolet (UV) rays are most intense.

Slip! on a shirt. Choose shirts and pants to protect as much skin as possible.

Slop! on sunscreen. Choose a sunscreen with a Sun Protection Factor (SPF) of 15 or higher.

Slap! on a hat. Choose a hat that shades the face, neck, and ears.

Wrap! on sunglasses to protect your eyes from UV rays.

➤ **Caution:** Sunlamps and tanning booths are as harmful to your skin as the sun.

➤ **Important:** Some prescription drugs can greatly increase your skin's sensitivity to UV rays. Check with your pharmacist.

Parents: Take Note!

Avoiding sunburn during childhood and adolescence is very important in reducing the risk of skin cancer later in life.

Sunscreen is not recommended for children less than six months old. Keep infants in the shade and protected with clothing.

For more information about skin cancer, call toll free anytime:
1-800-ACS-2345
www.cancer.org

AMERICAN CANCER SOCIETY
SKIN PROTECTION FEDERATION
Hope. Progress. Answers.™

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