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Prevalence and Correlates of Sun Protection and Skin Self-Examination Practices Among Cutaneous Malignant Melanoma Survivors

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Little is known about the level of engagement and correlates of sun protection and skin self-exam among individuals diagnosed with melanoma. Participants ($N = 229$) completed measures of skin self-exam and sun protection practice and knowledge and attitudes. Approximately eighty-four percent of patients reported engaging in skin self-examination at least once in the past year. Engagement in sun protection practices was moderate. Self-exam practice was associated with gender, physician recommendation about self-exam, and perceived benefits and barriers of self-exam. Sun protection was associated with gender, age, medical status and health care access, physician recommendation, knowledge, and a number of psychological factors. Behavioral interventions to improve skin surveillance and sun protection may benefit from an emphasis on physician education regarding self-exam and sun protection, education regarding the efficacy of sunscreen and the risks associated with sunbathing, reducing perceived barriers to self-exam and sun protection, and reducing reliance on social influences on sun protection practices.

KEY WORDS: psychological factors; sun protection; skin self-examination; cancer survivorship.

INTRODUCTION

Cutaneous malignant melanoma incidence and mortality rates are increasing in White populations worldwide more rapidly than any other cancer site (American Cancer Society, 2006). There are several strategies individuals can utilize that are thought to reduce melanoma risk. Regular skin surveillance by total cutaneous examination and skin self-examination (SSE) are believed to increase the chances of detecting thinner, more curable melanoma lesions. In addition, individuals can engage in regular sun protection and sun avoidance during peak ultraviolet light hours (American Cancer Society, 2006; American Academy of Dermatology, 2006; Skin Cancer Foundation, 2006). Recommendations regarding performance of total cutaneous exam and SSE have been the subject of scientific disagreement. There have been no controlled trials evaluating the impact of total cutaneous exam on melanoma mortality, and there has been only one study supporting the link between SSE and reduced melanoma mortality (Berwick *et al.*, 1996). Because of this lack of mortality reduction data, some scientific groups do not recommend routine skin cancer surveillance (e.g., United States Preventive Services Task Force, 2001).

Because epidemiological evidence has not been gathered it may be premature to target average risk populations for interventions to improve skin cancer surveillance practices. However, a strong case can be made for focusing prevention and surveillance efforts on subgroups of individuals at increased melanoma risk. Individuals who have been diagnosed with melanoma are a subgroup of individuals who are at increased risk for developing a second primary melanoma or melanoma

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recurrence (American Academy of Dermatology, 2006; Brobeil *et al.*, 1997; Garbe *et al.*, 2003; Rhodes *et al.*, 1987). Although there is no evidence proving a link between skin surveillance and sun protection and risk for melanoma recurrence or a second primary melanoma, recent guidelines published by task forces suggest that survivors be counseled about this risk, taught how to perform SSE, instructed to conduct regular SSE, and instructed to bring new or changing skin lesions to the attention of a physician (Roberts *et al.*, 2002). There are no special guidelines for melanoma survivors regarding sun protection. However, sun protection would be considered particularly important for those who are at increased risk for a second melanoma due to a prior history.

Despite the potential importance of regular skin surveillance and protection among melanoma survivors, little is known about the prevalence of these practices in this population. The few studies that have been conducted suggest that engagement in skin surveillance is variable, with figures ranging from 13.2% to 70% of patients reporting ever performing SSE (American Cancer Society, 2006; Robinson *et al.*, 2002). There have been no studies evaluating sun protection practices among melanoma survivors, although one study has evaluated sun protection among non-melanoma skin cancer survivors and reported between 44% and 79% reported various sun protection habits after surgery (Rhee *et al.*, 2004).

There is also little known about factors contributing to engagement in skin cancer surveillance and prevention practices among melanoma survivors. A greater understanding of these factors may provide information to guide intervention efforts to improve acceptance of both behaviors. We selected a comprehensive set of psychological and non-psychological factors that we believed contribute to skin surveillance and protection behaviors. The set of psychological variables were drawn primarily from the concept of the teachable moment and from the Health Belief Model (Rosenstock, 1974). The teachable moment refers to a life event or transition that inspires a person to make significant health behavior change(s) that improve their health. These events or transitions are often related to one's personal health. Among melanoma survivors, the event would be the cancer diagnosis. According to McBride and colleagues (2003), the degree to which a cueing event such as a cancer diagnosis is significant enough to be a teachable moment for behavior change depends upon whether it increases perceptions of personal risk and prompts a strong distress reaction. Based on the teachable moment premise, perceived risk for melanoma recurrence and distress associated with melanoma were selected as two key constructs to include. Perceived skin cancer risk has been associated with higher frequency of SSE (Robinson *et al.*, 1998, 2002) and greater sun protection (Azzarello *et al.*, 2006) among persons at increased risk, and perceived risk for skin cancer has been associated with sun protection among average risk individuals (e.g., Aiken *et al.*, 1994). Distress has not been studied as a correlate of SSE or sun protective behavior among individuals at increased risk for melanoma due to a family history (Manne *et al.*, 2004). However, distress has been associated with other cancer screening and detection practices such as mammography (Kash *et al.*, 1992).

The Health Belief Model predicts that individuals will undertake a health behavior change if they perceive themselves to be at risk for a health problem, perceive the consequences of the health problem to be severe, perceive many benefits of undertaking the preventive health behavior, and perceive few barriers to undertaking the preventive health behavior. Perceived severity of skin cancer and photoaging with has been associated with sun protection practices among average risk individuals (Jackson and Aiken, 2000). This construct has not been evaluated as a correlate of SSE. Prior studies have suggested that perceived benefits and barriers are associated with less SSE among individuals at increased risk (Manne *et al.*, 2004; Robinson *et al.*, 2002). Benefits of sun protection, advantages of sunbathing and sunscreen barriers are known correlates of sun protection behaviors among average risk persons (Carmel *et al.*, 1994; Cokkinides *et al.*, 2001; Jackson and Aiken, 2000; Jones *et al.*, 2000; Lescano and Rodrigue, 1997; Mahler *et al.*, 1997) and sunscreen barriers have been associated with less sun protection among individuals at increased risk (Manne *et al.*, 2004).

Studies of sun protection behavior suggest two additional constructs may play a role in sun protection. Self-efficacy for sun protection predicts both sun exposure (Reynolds *et al.*, 1996) and intentions to use sun protection (Jackson and Aiken, 2000; Mahler *et al.*, 1997). Self-efficacy for performing a health behavior is a construct incorporated from the Social Cognitive Theory (Bandura, 1986) and is necessary for sustained performance of a habitual behavior such as sun protection. Prior studies have also indicated that norms or beliefs of others are

influential in sun protection behaviors. Having friends who use sunscreen is associated with sunscreen use (Wichstrom, 1994) and having friends who sunbathe is associated with sunbathing (Arthey and Clarke, 1995). The modeling of high-status persons such as movie stars and sports figures has also been shown to influence sun protection (Jackson and Aiken, 2000). Normative influences are a key component of the Theory of Reasoned Action (Azjen and Fishbein, 1980). Based on this literature, we evaluated sun protection norms, sunbathing norms and image norms for tanness as correlates of sun protection.

The final psychological construct included in our set of factors was the concept of stage of adoption from the Transtheoretical model (Rakowski *et al.*, 1996). We evaluated stage of adoption because the combination of past behavior and future intention to engage in health practices is important when considering an ongoing behavior change such as SSE and sun protection. This discrimination allows for an understanding of factors predicting failure to continue surveillance as well as those who intend to continue surveillance practices (Robinson *et al.*, 1998). In addition, stage of adoption of sun protection has been used to tailor behavioral interventions to increase sun protection (Weinstock *et al.*, 2002; Prochaska *et al.*, 2004, 2005).

Non-psychological factors have also been associated with SSE and sun protection and should be included in any attempt to understand these health behaviors. Potential factors include demographic variables, the survivor's medical history and health history (e.g., phenotypic risk factors), access to health care, melanoma knowledge, and the physician's recommendation and education about SSE and sun protection. Among average risk individuals, women and younger persons (Robinson *et al.*, 2002; Oliveria *et al.*, 1999) report engaging more in SSE, and age, ethnicity, gender have been associated with sun protection (Carmel *et al.*, 1994; Cokkinides *et al.*, 2001; Hall *et al.*, 1997). Higher education has been associated with greater engagement in sun protection among family members of melanoma patients (Azzarello *et al.*, 2006) and average risk persons (Purdue, 2002). Time since cancer diagnosis and the number of malignancies predict survivor's engagement in SSE (Robinson *et al.*, 2002). A personal history of skin cancer has been associated with sun protection (Hall *et al.*, 1997). Family history of skin cancer (Oliveria *et al.*, 1999) and phenotypic risk characteristics (e.g., freckling) are associated with SSE among individuals in the general population (Oliveria *et al.*, 1999; Robinson *et al.*, 2002) and family members of melanoma patients (Azzarello *et al.*, 2006; Manne *et al.*, 2004). Greater access to health care is associated with engagement in SSE (Oliveria *et al.*, 1999; Robinson *et al.*, 2002). Knowledge is a known correlate of both SSE (Robinson *et al.*, 2002) and sun protection (Keesling and Friedman, 1987). Finally, physician recommendation (Robinson *et al.*, 1998) and physician education about SSE (Manne *et al.*, 2004) are strong correlates of SSE. Thus, these variables were included in our set of contributing factors.

The present study had three aims. The first aim was to examine engagement in and stage of adoption of sun protection behaviors and SSE practices among individuals diagnosed with melanoma. The second aim was to examine the associations of psychological and non-psychological constructs with engagement in SSE and sun protection behaviors. We evaluated the two teachable moment constructs, risk and distress, first. Other psychological constructs were evaluated next: benefits and barriers, perceived severity, self-efficacy, and norms. Teachable moment constructs were evaluated first because these factors would considered most relevant among cancer survivors. The third aim was to evaluate the contribution of the proposed set of psychological factors *after* accounting for the contribution of non-psychological factors. We were interested in understanding whether psychological factors contributed after taking non-psychological factors into account because psychological factors could be targeted in behavioral interventions to improve practices. We did not evaluate engagement in total cutaneous skin exam because our sample was recruited from a cutaneous oncologist's practice during a follow-up visit where total cutaneous skin exam was performed.

METHOD

Participants and Procedures

229 patients seen at a large comprehensive cancer center in the Northeastern United States with melanoma participated. All participants lived within a four state geographical area surrounding the center. Criteria for inclusion were: a) diagnosed with cutaneous malignant melanoma; b) greater than 18 years of age, and; c) English speaking. During an outpatient follow-up visit, the attending oncologist described the study to the patient and interested

patients were provided with an informed consent, research authorization, and study survey and asked to mail in consent and survey. 321 patients were approached. 92 patients did not participate (29%). Thus the participation rate was 71%. Thirty-four percent gave no reason for refusing. The most common reasons for refusal were "not interested" (16%) and "no time" (26%). Thus, the final sample size was 229.

A comparison of patients who did not participate and participants in terms of current age, gender, age at diagnosis, and time since diagnosis, indicated that a greater percentage of participants were female (57.2%) than refusers (43.6%), χ^2 (320) = 4.9, $p < .05$.

Non-Psychological Measures

Demographic Information

Participant age, gender, ethnicity, marital status, income, and education were assessed.

Medical Status, Health History and Access to/use of Health Care

Medical status information included Breslow score (a grading system for prognosis) (Breslow, 1970), age and stage at diagnosis, whether the person had a recurrence, current disease status, and time since diagnosis. Health history included the number of objective melanoma risk factors, which consisted of five factors identified by Rigel and Carucci (2000): presence of blonde or red hair, fair skin, three or more blistering sunburns prior to age 20, history of three or more years of an outdoor summer job as a teenager, and presence of marked freckling on the upper back. In addition, the number of first degree relatives with melanoma was assessed. Medical access was assessed by whether participants had medical insurance, had a primary care physician they saw regularly, and had regular dental care.

Melanoma Knowledge

The Melanoma knowledge scale consisted of 23 true-false items assessing knowledge about the disease (e.g., "Melanoma is the most deadly form of skin cancer") and risk factors (sun exposure family history, skin color) ($\alpha = .67$).

SSE guideline knowledge was assessed by a single item asking how often the American Cancer Society recommends people conduct SSE (1 = *several times a year*).

Physician Recommendation and Education About SSE and Sun Protection

For SSE, two questions asked whether a doctor suggested the participant examine his/her skin and whether a doctor had shown the participant the best way to do SSE (*yes/no*). For sun protection, three items were summed: whether a doctor told the person to reduce the amount of time s/he spends in sun, to wear a hat or long sleeves when out in the sun, and to use sunscreen regularly (*yes/no*).

Psychological Measures

Perceived Melanoma Risk

A three item scale adapted from Schwartz and colleagues (1994) was used to assess melanoma risk. The first item assessed estimated percent risk of developing a recurrence of melanoma (0–100%). The second item assessed perceived risk for a recurrence compared with the average person of the same age and a third item assessed perceived melanoma risk compared with a similar family history of melanoma. The second and third items employed a Likert rating scale (1 = *much lower than other people*, 5 = *much higher than other people*). The three items were evaluated separately. An additional indicator of perceived risk was susceptibility to photoaging (Jackson and Aiken, 2000). Three items assessed this variable (e.g., "If I were not to use sun protection, I would be very susceptible to sun damage") (1 = *strongly disagree*, 5 = *strongly agree*) ($\alpha = .86$). The three risk items were analyzed separately.

Distress

The 15-item Impact of Events scale (Horowitz *et al.*, 1979) assessed cancer-specific distress ($\alpha = .92$). A single item measure assessed how distressed the participant presently was about his/her melanoma (1 = *extremely distressed*, 4 = *not at all distressed*).

SSE and Sun Protection Benefits and Barriers

The SSE benefits and barriers scale were adapted from Rakowski and colleagues' (1996) benefits and barriers for mammography as well as a measure used in our prior work with family members of patients with colorectal cancer (Manne *et al.*, 2002). Scale items are shown in Table I. The benefits scale had seven items ($\alpha = .71$) and the barriers scale had ten items ($\alpha = .74$).

Four sun protection benefits and barriers measures were administered: Perceived sun protection benefits and barriers measure was taken from Jackson and Aiken (2000) ($\alpha = .84, .74$, respectively). Glanz and colleagues (1999) sun protection behavior benefits scale consisted of six items that assesses how much the participant believes each sun protection habit would protect themselves against the sun ($\alpha = .70$). The perceived advantages of sunbathing (Jackson and Aiken, 2000) measure contained seven items ($\alpha = .94$).

Table I. SSE Benefits and Barriers Scale Items

Item
By doing SSE, I can find moles or growths on my skin that are cancerous or may become cancerous.[a]
Doing SSE is a part of overall good health care.[a]
I would be more likely to do SSE if my doctor said it was very important.[a]
SSE is very important for people with my history of cancer.[a]
Regular SSE would help me to live a long life.[a]
Those people who are close to me will benefit if I do regular SSE.[a]
Doing regular SSE would help me feel in control of my health.[a]
Doing regular SSE would help me avoid developing another serious form of skin cancer.
Doing SSE would provide me peace of mind about my health.[a]
I do not feel confident performing an SSE.
There are so many moles and freckles on my body that performing SSE would be difficult.
Doing my own SSE makes me nervous because I am not sure what skin cancer would look like.
The thought of finding an abnormal mole or growth makes me quite anxious.
Doing SSE would be very embarrassing.
Staying out of the sun lowers my risk for skin cancer and so I really do not need to do SSE regularly.
Doing SSE gets in the way of other things I have to do for myself and others.
It would take too much time to do regular SSE.
I would prefer a doctor examine my skin for signs of skin cancer rather than having to do my own SSE.
Doing a SSE would be somewhat difficult as I do not know exactly what I am looking for.

Note. SSE: skin self examination.
[a]Benefit scale.

Perceived Melanoma Severity

A five-item scale adapted from Aiken and colleagues (1994), and from our prior work was used to assess disease severity ($\alpha = .84$). Higher scores indicate higher perceived severity of melanoma.

Sunscreen self-efficacy was assessed using an eight-item scale developed by Jackson and Aiken (2000); ($\alpha = .90$). Items assessed confidence in using sunscreen in various situations.

Sun Protection, Sunbathing and Image Norms for Tanness

Sun protection norms examined family and friends' sun protection practices and attitudes (7 items) ($\alpha = .80$). Sunbathing norms consisted of five items assessing friends' sun bathing practices and attitudes ($\alpha = .64$). Image norms for tanness were assessed using five items examining fashions of paleness and tan among celebrities (Jackson and Aiken, 2000). Internal consistency of this scale was very low ($\alpha = .44$) and item-total correlations were consistently low, and thus the image norm scale was excluded from further analyses.

Outcome Measures

SSE Practice

Items were based on prior studies of SSE (e.g., Oliveria *et al.*, 1999). Participants were asked "how often have you performed a complete examination of your skin by examining all of your skin, both the front and back of your body, and the top of your scalp, for signs of usual moles or growths in the past year" A dichotomous indicator was created (never/ever). Among persons performing an SSE, thoroughness of examination was assessed by five additional items asking if the individual used the assistance of another person or a mirror when they conducted an examination of their own skin (1 = *never*, 6 = *always*) and whether the individual checked the following four specific areas during the most recent SSE: the upper and lower back, scalp, soles of feet and between the toes, and back of the neck and legs. These areas were selected for assessment because they are recommended in a comprehensive skin examination (American Academy of Dermatology, 2006).

SSE Stage of Adoption

Questions were modeled after algorithms for assessing stage of adoption for other cancer screening practices (Manne *et al.*, 2002; Rakowski *et al.*, 1996). The SSE practice item described above was used to assess performance. Intentions among persons not performing sun protection in the past year were assessed by asking participants to choose between two responses: "I have never seriously thought about engaging in sun protection" and "I am seriously thinking about engaging in sun protection in the next year." Intentions among persons who performed SSE in the past year were assessed using a single Likert-rated item, "*How likely are you to continue to perform skin self-examinations on a regular basis in the next year*?" (1 = *not at all likely*, 7 = *extremely likely*). Stage of adoption was a combination of performance and intention: Precontemplation = did not perform in the past year, is not considering; Contemplation = did not perform in the past year, is considering; Relapse risk = performed in the past year, future intention less than "somewhat likely," and Action = performed in the past year, future intention greater than "somewhat likely."

Sun Protection Practice

The sun protection habits scale (Glanz *et al.*, 2002) measured five protective habits (use sunscreen with SPF 15, wear a hat, wear a shirt with sleeves, stay in the shade, wear sunglasses). Participants were asked to rate how consistently they engaged in each habit when exposed to the sun for more than 15 minutes ($\alpha = .65$).

Sun Protection Stage of Adoption

Questions were modeled after algorithms for assessing stage of adoption for other cancer screening behaviors (e.g., Manne *et al.*, 2002; Rakowski *et al.*, 1996). Participants were asked how often they practiced sun protection in the past year (1 = *never,* 5 = *always*) and their intention to practice sun protection in the next year (1 = *not at all likely*, 7 = *extremely likely*). Intentions among persons not performing sun protection in the past year were assessed using a single item ("I have never seriously thought about engaging in sun protection," "I am seriously thinking about engaging in sun protection in the next year"). Intentions among persons who reported practicing sun protection in the past year were assessed using a single Likert-rated item assessing likelihood of practicing sun protection in the next year (1 = *not at all likely*, 7 = *extremely likely*). Stage of adoption was a combination of past performance and future intention: Precontemplation = "never" or "infrequently" engaged, has not seriously thought about engaging; Contemplation = "never" or "infrequently" engaged, seriously thinking about engaging, Relapse risk = "often" or "always" engaged, "not at all" to "somewhat likely" to practice in the next year, and Action = "likely" to "extremely likely" practiced in past year, "somewhat" to "extremely" likely to practice in the next year.

RESULTS

Descriptive Information

Descriptive information for non-psychological variables is included in Table II, and descriptive information for the psychological variables is summarized in Table III.

Engagement in Sun Protection and Skin Surveillance Practices

SSE

Engagement in SSE is shown in Table IV. 15.7% had never performed SSE in the past year. Twenty-three and a half percent of survivors reported conducting SSE more than once per month. In terms of thoroughness of examination, among those reporting engaging in SSE, approximately 48.2% of participants reported "often" to "always" having someone else assist them or using a mirror during their most recent SSE, 74% reported having someone else examine the upper and lower back, 33% reported having someone else examine the scalp, 59% had someone else check the soles of the feet and between the toes, and 77% had someone else check the back of the legs. To provide strict definition of thorough SSE, we used Weinstock's definition (2004). Participants who performed SSE were categorized as thorough performers of SSE if they endorsed "sometimes" to "always" having someone assist them or using a mirror during SSE and endorsed checking all four specified areas of the body during their last SSE. Using this criterion, 13.7% performed a thorough SSE the last time they conducted SSE.

Table II. Non-Psychological Variables Included in the Analyses

Variable	*n*6.0pt1,50.0pt	%	*M*	SD	Range
Demographic					
Age			53.8	14.53	19–85
Gender					
Men	98	42.8			
Women	131	57.2			
Educational level					
High school or less	55	24.2			
College or business degree	86	37.9			
Some graduate school	46	20.1			
Graduate degree	40	17.6			
Ethnicity					
Caucasian	227	99.1			
Non-caucasian	2	0.9			
Income			$40–50,000	$10,000	$10–100,000
Medical status, health history and access					
Breslow score			0.91	1.33	0–11
Age at diagnosis (yrs)			51.57	14.87	18–84
Stage at diagnosis					
0	20	8.8			
1	149	65.4			
2	41	18.0			
3	15	6.6			
4	3	1.3			
Time since diagnosis (yrs)			2.3	4.13	1.5–2.2
Recurrence since original diagnosis (yes)	16	7.0			
Number of melanoma objective risk factors					
0	6	2.6			
1	28	12.2			
2	90	39.3			
3	75	32.8			
4	26	11.4			
Number of FDRs with melanoma					
0	187	81.7			
1	37	16.2			
2	4	1.7			
Has medical insurance (yes)	224	97.8			
Has primary medical doctor (yes)	215	94.7			
Has regular dental care (yes)	207	90.8			
Knowledge					
Melanoma knowledge			17.47	1.97	10–22
Knowledge of SSE guideline (yes)	46	26.6			
Physician recommendation (yes)					
Has SSE recommendation	183	80.3			
Physician shown how to do SSE	105	46.1			
Physician shown what lesion looks like	160	70.2			
Physician suggests sun avoidance	164	72.2			
Physician suggests hat or long sleeves	159	70.0			
Physician suggests sunscreen	185	81.5			

Note. CMM: cutaneous malignant melanonma; FDRs: first degree relatives; SEE: skin self-examination.

Sun Protection Practices

Average engagement in sun protection is shown in Table IV. The mean item rating on the habitual sun protection practices scale corresponded to midway between "sometimes" and "often" ($M = 3.57$). An examination of frequencies indicated that the frequency of sun protection practices varied considerably. A greater proportion of participants wore sunglasses and used sunscreen than wore a hat or a shirt

Table III. Descriptive Information on Psychological Variables Included in the Model

Variable	*M*	SD	Range
Perceived risk and distress			
Perceived risk for recurrence	56.95	29.30	0–100
Risk compared with similar family history	3.56	0.87	1–5
Risk compared with same age person	4.32	0.77	1–5
Risk for photoaging	5.38	3.12	3–18
IES	16.86	15.67	0–63
Distress about melanoma	3.14	0.76	1–4
Severity	.78	1.24	1–6
Benefits and Barriers			
Sun protection benefits	37.13	7.38	12–48
Sun protection barriers	13.78	8.11	7–87
Glanz benefits of sun protection	26.44	2.87	16–30
Advantages of sunbathing	23.89	9.87	7–42
SSE benefits	32.71	3.97	8–36
SSE barriers	26.78	8.01	10–50
Sunscreen self-efficacy	23.26	7.97	8–40
Normative influences			
Sun protection norms	25.03	6.90	7–42
Sun bathing norms	15.69	5.25	5–30

Note. IES: impact of events scale; SSE: skin self-examination.

Table IV. SSE and Sun Protection Habits and Stage of Adoption

Variable	*n*	%	*M*	SD	Range
SSE in past year					
Never	36	15.7			
Ever	193	84.3			
Once	7	3.1			
2–3 times	51	22.2			
4–5 times	42	18.3			
6 times (every other month)	3	1.3			
12 times (monthly)	35	15.3			
>12 times	54	23.5			
Sun protection habits[a]					
Use sunscreen	136	59.4	3.67	1.27	1–5
Wear hat	102	44.5	3.06	1.48	1–5
Wear shirt	103	44.9	3.21	1.30	1–5
Seek shade	122	53.2	3.46	1.20	1–5
Wear sunglasses	162	70.7	3.94	1.22	1–5
Average total habits score			3.57	0.83	1–5
SSE stage of adoption					
Precontemplation	17	7.4			
Relapse risk	6	2.6			
Contemplation	19	8.3			
Action	187	81.7			
Sun stage of adoption					
Precontemplation	5	2.6			
Relapse risk	1	0.5			
Contemplation	55	28.5			
Action	132	68.4			

Note. SSE: skin self-examination.
[a]Number of participants rating "often" to "always."

with sleeves on a regular basis when in the sun for more than 15 minutes. For example, 70.7% of participants reported "often" or "always" wearing sunglasses when in the sun for more than 15 minutes whereas 44.5% reported "often" or "always" wearing a hat and 44.9% reported "often" or "always" wearing a shirt with sleeves when in the sun for more than 15 min.

SSE and Sun Stage of Adoption

Stage frequencies are shown in Table IV. The majority of participants were in the "action" stages of SSE and sun protection. Because there were few participants in the relapse risk stage of adoption for sun protection, this subject (and this category) was excluded from further analyses.

Correlates of SSE and Sun Protection

Overview

Education was combined into three categories, ethnicity was combined into two categories (Caucasian/non-caucasian), and marital status was combined into two categories (married/not married). A dichotomous category was formed for SSE (never/ever performed SSE in past year). A continuous variable for the mean item rating of sun protection behavior engagement was used. As described above, two "stage" variables were created, one for SSE and one for sun protection. Separate analyses were conducted for the four outcome variables.

Independent variables were partitioned into *six* separate classes of candidate correlates: 1) Demographics: age, gender, education, ethnicity, income, marital status; 2) Medical status, health history and access: Breslow score, stage at diagnosis, age at diagnosis, recurrence since first primary (*yes/no*), current disease status, and time since diagnosis, insurance status, engagement in regular dental care, access to primary physician, number of first degree relatives with melanoma, number of additional melanoma risk factors; 3) Knowledge; 4) Physician recommendation; 5) Perceived melanoma risk and cancer-related distress (for sun protection,

Table V. Logistic Regression Results for Separate Classes of Predictors for Skin Self-Examination Compliance and Stage of Adoption

Variable	β	Wald χ^2	p	OR
	Dependent variable: SSE compliance			
Demographic variables				
Gender	.75	4.10	.04	2.10
Physician recommendation				
Physician shown how to do SSE	.94	5.48	.02	2.50
Physician shown appearance of lesion	.77	4.24	.04	2.20
Physician recommendation	1.04	6.84	.01	2.80
Psychological variables				
SSE barriers	−.10	14.52	.00	0.90
	Dependent Variable: SSE stage of adoption			
Demographics				
Gender		10.59	.001	3.01
Physician recommendation				
Physician shown how to do SSE		12.11	.001	3.69
Physician shown appearance of lesion		11.54	.001	3.13
Physician recommendation		5.63	.018	2.39
Psychological variables				
SSE benefits		6.52	.01	0.91
SSE barriers		15.77	.000	1.10
Severity		5.07	.02	0.74

Note. OR: odds ratio; SSE: skin self-examination.

susceptibility/risk for photoaging was added to the model), 6) Additional psychological factors: For sun protection habits, severity, sun protection benefits and barriers, advantages of sunbathing, sun protection benefits, sun self-efficacy; for SSE, severity, SSE benefits and barriers; normative influences (for sun protection only).

The analyses for each outcome measure were conducted in three stages. First, separate regressions were used to identify variables from within each class that were significantly associated with each outcome. Second, significant variables within each category were evaluated together to determine whether they were significant predictors after taking into account the contribution of other variables within each class. Third, psychological factors were entered into the equation after non-psychological factors. Variables selected from the non-psychological classes were combined and entered into the regression equation in one step. Variables selected from the psychological categories were entered in a second step, with the non-psychological factors from the first step forced to remain in the model. Backward selection was used to choose the final set of psychological variables to retain in the model. The final model contained only psychological variables that were significantly associated with outcomes once adjustments were made for non-psychological variables.

SSE

Separate logistic regression analyses were conducted for each variable within each class of variables in the first step. Results of separate regression analyses, shown in Table V, indicated the following variables were associated with SSE: 1) Demographic: gender; 2) Medical status, health history and access: no variables; 3) Physician recommendation: physician recommends SSE, physician shown how to perform SSE, physician shown what a suspicious lesion looks like; 4) Knowledge: no variables; 5) Perceived risk and distress: no variables; 6) Additional psychological factors: SSE barriers. Results of analyses entering all variables together within each class when there was more than one variable in a class indicated that physician recommendation did not remain significant. Results of the final logistic regression entering gender and SSE barriers (Table VI) indicated that both gender and SSE barriers were significantly associated with SSE. Participants who performed SSE were likely to be of female gender (60.1%).

Sun Protection Habits

Results are shown in Table VII. Results of separate regression analyses indicated the following

Table VI. Summaries of Hierarchical Logistic Regression Analysis: Association of Psychological Factors with SSE and SSE Stage After Accounting for Non-Psychological Factors

Variable	β	Wald χ^2	p	OR
	Dependent variable: SSE			
Non-psychological variables				
Gender	.69	3.08	.08	1.99
Psychological variables				
SSE barriers	−.10	13.12	.00	0.91
	Dependent variable: SSE Stage of Adoption			
Non-psychological variables				
Gender		8.35	.004	2.8
Physician shown how to do SSE		8.68	.003	0.30
Psychological variables				
SSE barriers		7.35	.007	1.07

Note. OR: odds ratio; SSE: skin self-examination.

variables were associated with sun protection habits: 1) Demographic: age; 2) Medical status, health history, and access: dental care, time since diagnosis, recurrence; 3) Physician recommendation: recommended wearing shirt, hat, or long sleeves when in the sun; 4) Knowledge: no variables; 5) Perceived risk and distress: risk and Impact of Events scale score; 6) Additional psychological factors: Sun protection barriers, advantages of sunbathing, benefits of sun protection and self-efficacy; sun protection norms. Results of analyses entering all variables together within each class (when more than one variable within a class was associated with the outcome) indicated the following variables were associated with sun protection: 1) Demographic: age; 2) Medical status, health history and access: dental care, time since diagnosis; 3) Physician recommendation: physician recommends wearing shirt, hat or long sleeves when in the sun; 4) Knowledge: no variables; 5) Perceived risk and distress: risk and Impact of Events scale score; 6) Additional psychological variables: advantages of sunbathing; sun protection norms. Results of the final regression entering age, dental care, time since diagnosis, physician recommending wearing shirt, hat or long sleeves when in the sun in the first step, and the psychological variables of perceived risk, Impact of Events scale score, advantages of sunbathing, and sun protection norms, are shown in the top panel of Table VIII. Less likelihood of regular dental care, greater likelihood of physician recommendation to wear sun protective clothing, fewer perceived advantages of sunbathing, and higher sun protection norms were significantly associated with higher sun protection habits.

SSE Stage

Ordinal logistic regression (logistic regression with a cumulative logit link function) was used to evaluate the association of each predictor variable with each ordinal outcome measure. Results are shown in the bottom panel of Table V. Results indicated the following variables were associated with stage of adoption of SSE: 1) Demographic: gender; 2) Medical status, health history and access: no variables; 3) Knowledge: no variables; 4) Physician recommendation: physician recommends SSE, shown how to perform SSE, shown what a suspicious lesion looks like; 5) Risk and distress: none; 6) Additional psychological variables: SSE benefits, SSE barriers, and severity. Results of analyses after including all variables found to be significant within a single class together indicated the following were associated with adoption of SSE within the two classes in which more than one factor was significant: 1) Demographic: gender; 2) Medical status, health history and access: none; 3) Knowledge: none; 4) Physician recommendation: physician shown how to perform SSE; 5) Risk and distress: none; 6) Additional psychological variables: SSE barriers. The factors identified by stepwise selection within each of the non-psychological blocks were entered into the model to predict each outcome. These factors were then forced to remain in the model while stepwise selection was used to identify psychological factors that were significant predictors of outcome after adjustment for the non-psychological factors included in the model. Results are shown in the bottom panel of Table VI. Results indicated that gender, whether the physician had shown the participant how to perform SSE, and SSE barriers were significantly associated with SSE stage. Thus, a psychological factor was a significant predictor of SSE stage. Participants who were in the action stage were more likely to be of female gender and to perceive fewer barriers. Participants in the precontemplation and relapse risk stages were more likely to be male.

Sun Protection Habits Stage

Ordinal logistic regression (logistic regression with a cumulative logit link function) was used to

Table VII. Regression Results for Separate Classes of Predictors for Sun Protection Habits and Sun Protection Stage of Adoption

Variable	β	F	Wald χ^2	p	OR
	Dependent variable: Sun protection habits				
Demographics					
Age	.21	10.08**		.002	
Medical Status/health history and access					
Dental care	.10	4.93*		.03	
Time since diagnosis	.19	8.48**		.004	
Recurrences	.45	4.41*		.037	
Knowledge					
Melanoma knowledge	.19	8.08**		.005	
Physician recommendation					
Recommend wear hat/shirt	.16	5.59*		.019	
Teachable Moment constructs					
Perceived risk	.17	6.5*		.01	
IES	−.16	5.49*		.02	
Additional psychological factors					
Sun protection barriers	−.16	5.9*		.02	
Advantages of sunbathing	.26	15.57***		.000	
Benefits of sun protection	.20	9.27***		.003	
Sunscreen self-efficacy	.19	8.20**		.005	
Norms for sun protection	−.25	14.88***		.000	
Sunbathing norms	.20	9.21**		.003	
	Dependent variable: Sun protection habits stage of adoption				
Demographics					
Gender			13.96	.000	2.92
Medical status/health history and access					
Dental care			12.43	.000	0.21
Knowledge					
Melanoma knowledge			10.92	.001	0.78
Psychological factors					
Sun protection barriers			12.47	.000	1.07
Benefits of sun protection			7.49	.006	0.88
Sunscreen self-efficacy			30.54	.000	0.89
Melanoma severity			8.99	.003	0.70

Note. OR: odds ratio; SSE: skin self-examination.
*$p < .05$; **$p < .01$; ***$p < .001$.

evaluate the association of each predictor variable with sun habits stage of adoption. Results, shown in the bottom panel of Table VII, indicated the following variables were associated with sun protection habits stage of adoption: 1) Demographic: gender; 2) Medical status, health history and access: dental care; 3) Knowledge: melanoma knowledge; 4) Physician recommendation: no variables; 5) Risk and distress: none; 6) Other psychological variables: sun protection barriers, benefits of sun protection, severity, and sun protection self-efficacy. Results of analyses after including all variables found to be significant within the psychological variables category together indicated that sun protection self-efficacy was associated with sun habits stage of adoption. The factors identified by stepwise selection within each of the non-psychological blocks were entered into the model to predict each outcome. These factors were then forced to remain in the model while stepwise selection was used to identify psychological factors that were significant predictors of outcome after adjustment for non-psychological factors. Results (bottom panel, Table VIII) indicated that gender, dental care, knowledge and sunscreen self-efficacy were significantly associated with sun protection stage. Post-hoc comparisons indicated that participants who were in the action stage of adoption were more likely to be of female gender (59%). A greater proportion of participants in the action stage had seen a dentist in the past year (94%) versus participants in the precontemplation stage (50%). Participants in the action stage had higher melanoma knowledge and higher self-efficacy than participants in the precontemplation stage of sun protection habits adoption.

Table VIIII. Summaries of Hierarchical Regression Analysis: Association of Psychological Factors with Sun Protection Habits and Sun Stage after Accounting for Non-Psychological Factors

Variable	β	R^2	F	Wald χ^2	p	OR
	Dependent variable: Sun protection habits					
Non-psychological variables		.05	4.11*		.01	
Age	.02					
Time since diagnosis	.05					
Dental care (yes)	−.14*					
Physician recommends hat/shirt	.15*					
Psychological variables		.16	5.61***		.000	
Perceived risk	12					
IES	−.03					
Advantages of sunbathing	.18*					
Sun protection norms	−.23*					
	Dependent variable: Sun protection habits stage of adoption					
Non-psychological variables						
Gender				4.93	.03	2.02
Dental care (yes)				5.93	.01	0.32
Melanoma knowledge				8.38	.00	0.79
Psychological variables						
Sunscreen self-efficacy				18.64	.00	0.91

Note. OR: odds ratio; IES: impact of events scale. *$p < .05$; **$p < .01$; ***$p < .001$.

Correspondence Between SSE and Sun Protection

Analyses indicated that participants who performed one or more SSE in the past year did not engage in significantly more sun protection ($t(226) = 1.6.\ p > .05$).

DISCUSSION

Cutaneous oncologists agree that it is important for melanoma survivors to engage in regular SSE and sun protection. However, the level of engagement in these behaviors among survivors has received relatively little attention. Our results indicate that engagement in SSE in the prior year was high. Our findings were similar to those reported by Robinson and colleagues (1998) and suggest that vast majority of melanoma survivors perform SSE. About forty percent of participants performed SSE at least monthly. However, there are two issues that should be noted. First, among those survivors conducting SSE, only 13.7% performed thorough skin self-examination. These findings are similar to results reported by Weinstock and colleagues (2004) among patients seen in a primary care practice and suggest that, although many skin cancer survivors conduct regular SSE, the thoroughness of these examinations may not be adequate in many cases. Second, almost 24% of survivors performed SSE more frequently than once a month. This level of SSE may be problematic, because it may be harder for the patient to spot changes in moles. Post-hoc comparisons of survivors conducting SSE more at more frequent intervals than monthly did not suggest that cancer-related distress was associated with screening. Future research should evaluate why patients engage in such frequent SSE, and health care professionals should educate survivors regarding appropriate intervals for SSE and the rationale for engaging in monthly exams.

It was surprising that engagement in sun protection was not higher, particularly given the fact that physician advice about sun avoidance and protection was so widely provided. Because other investigators have not used the same sun protection scale as employed in the present study, comparisons with other results cannot be made. We can compare our results with a recent study we conducted of family members of melanoma which used the same scale (Manne *et al.*, 2004). Average ratings across most sun protection habits were consistently about a half a point higher than our study of family members. Thus, sun protection habits appeared to be adopted more regularly among survivors than their family members. While physician education about SSE was provided to the majority of patients, it is somewhat surprising that only half of the sample reported they had been shown how to perform SSE. It is interesting to note that there was variability among the five sun protection practices. Health care professionals counseling survivors about sun protection should be aware that survivors are less likely to wear shirts with sleeves and hats and more likely to wear sunglasses and sunscreen, and may wish to focus more on education regarding appropriate sun protection attire. The internal consistency of the sun protection habits index was relatively low, indicating that sun protection may not be a univariate construct among melanoma

survivors. A composite index may not be as useful an indicator of sun protection behavior among melanoma survivors.

It is surprising that the teachable moment constructs we hypothesized would be associated with SSE and sun protection, perceived risk and distress, were not associated with SSE and were only associated with sun protection habits in univariate analyses. The findings regarding perceived risk are particularly surprising because prior studies have found that perceived risk is associated with SSE among persons at risk due to a personal or family history of skin cancer (Robinson *et al.*, 1998, 2002) and sun protection among family members of persons with melanoma (Azzarello *et al.*, 2006) and among average risk individuals (Borland *et al.*, 1990; Cody and Lee, 1990) One possible explanation for these findings is that perceived risk for recurrence was relatively high in this population and thus there was little variability in perceptions of risk. The majority of the sample (88%) rated their risk for melanoma recurrence as higher than the average person of the same age, and approximately half of the sample rated their risk for melanoma recurrence as higher than a person with a similar family history of melanoma. Thus, it is possible that a "ceiling effect" in this sample explained the lack of association between risk and screening practices among survivors. A second explanation is our risk measure, which did not contain perceptions of risk for a new primary melanoma. A similar explanation may explain the lack of findings for cancer-related distress. Although the average score on the Impact of Events scale was not extremely high and there was a wide variability in the Impact of Events scale scores, scores on the measure assessing current distress about cancer were high. The majority of the sample (87%) rated themselves as presently "quite" or "extremely" distressed about their diagnosis. Because the association between cancer screening and distress has been inconsistent in the literature (Schwartz *et al.*, 1994; van Dooren *et al.*, 2003) it will be important to use prospective methodologies to evaluate the association between distress and SSE and sun protection. Overall, the findings supporting both risk and distress in screening practices among melanoma survivors are not strong. These findings suggest that assumed mechanisms underlying the "teachable moment" may not motivate screening practices among melanoma survivors and suggest that future studies assessing cancer screening among melanoma survivors should not focus solely on these two factors.

Our findings provide only partial support for Health Behavior Model constructs as correlates of SSE. Only one construct from the Health Behavior Model, perceived barriers to performing SSE, was associated with SSE. Our findings point to a limited role for commonly-studied psychological factors in SSE among survivors and a stronger role for physician education about how to perform SSE. Physicians should be aware that their patients may need to be shown how to correctly perform SSE. Females were mores likely to perform SSE. A similar gender difference with regard to SSE was noted in previous work (Berwick *et al.* 1996; Oliveria *et al.*, 1999; Robinson *et al.*, 2002).

Psychological constructs played a slightly stronger role in sun protection. Fewer perceived advantages of sunbathing, greater self-efficacy and higher sun protection norms were significantly associated with higher sun protection habits or sun protection stage of adoption. Our findings regarding sunscreen self-efficacy are consistent with Jackson and Aiken (2000) and also consistent with other work with family members of melanoma patients (Azzarello *et al.*, 2006; Manne *et al.*, 2004). The findings regarding the role of sun protection norms extend studies focusing on average risk and college age persons (Arthey and Clarke, 1995; Banks *et al.*, 1992; Jackson and Aiken, 2000) and family members of patients who are at increased familial risk for skin cancer (Manne *et al.*, 2004). Sun protection among melanoma survivors appears to be associated with the opinions and sun protection practices of friends. The non-psychological factors associated with sun protection were largely consistent with prior work. Previous studies have also shown that males are less likely to use sunscreen (Keesling and Friedman, 1987) and more likely to wear a hat (Hill *et al.*, 1991) while women are more likely to wear a shirt or use other upper body protection (Hill *et al.*, 1991).

Before closing, there are a number of study limitations that should be mentioned. Most importantly, self-report measures of SSE and sun protection may not be valid or reliable. Self-reports of SSE may be subject to social desirability (Weinstock *et al.*, 2004). Survivors may be more likely to feel social pressure to report SSE than the general population, and social desirability factor may have resulted in a positive reporting bias to our prevalence figures. Unfortunately, there is no objective measure of home performance SSE. The validity of self-reported sun protection behavior is a similar concern. A second measurement issue regards our measures of sun

protection and SSE stage of adoption. Another measure of sun stage of adoption has been employed by other investigators (Rossi *et al.*, 1995) which allows categorization into preparation and maintenance stages of adoption. We may have had more variability in sun stage of adoption if we had used this measure. In addition, we asked participants about sun protection in general, rather than asking about stage of adoption for each sun protection habit individually. As was noted previously, there was variability in engagement of sun protection habits (e.g., hats were worn less frequently than sunglasses) and separate measures of stage of adoption for each sun habit may have yielded more variability in sun protection stage of adoption. The SSE stage of adoption measure did not take into account either SSE thoroughness or overly frequent SSE. Thus, this measure was not an extremely sensitive SSE measure for the survivor population. Third, the study used a cross-sectional methodology. Causality cannot be inferred from this type of design. Fourth, our sample was comprised of patients in a comprehensive cancer center who were being seen for a follow-up appointment. The vast majority of participants were insured and all received a total cutaneous exam from the oncologist at the cancer center. Thus, our sample was likely biased towards patients with access to medical care and patients who comply with post-treatment care. The recruitment source may have biased the rates of SSE by accounting for the large proportion of participants who engaged in regular SSE in the past year. Fifth, our sample may be biased as refusers were more likely to be male. Because males were less likely to perform SSE, our rates of SSE may have been higher in the present sample than in the general population of melanoma survivors. Finally, we did not include a measure of sun exposure or sunbathing.

In terms of theoretical implications, the results of the present study suggest that psychological constructs taken from key health belief models do not play as strong a role in understanding screening practices among melanoma survivors as these constructs have played in understanding behavior of the general population. Future work should entertain novel conceptualizations of screening in this population. Our findings have implications in terms of interventions to improve acceptance of screening and improve sun protection practices among melanoma survivors. First, male melanoma survivors were less likely to engage in SSE and sun protection and thus interventions targeted to male survivors may prove beneficial. Second, reducing reliance on the beliefs of friends and the general population regarding sun protection, reducing perceived barriers to sun protection, and bolstering confidence in sunscreen use may improve sun protection. Finally, it is important that dermatologists and other health care professionals providing care to melanoma survivors educate survivors about correct SSE performance and the importance of wearing protective clothing when out in the sun, discuss the disadvantages of sunbathing, and counsel patients to be role models for family and friends regarding sun protection.

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REFERENCES

Aiken, L. S., West, S. G., Woodward, C. K., and Reno, R. R. (1994). Health beliefs and compliance with mammography-screening recommendations in asymptomatic women. *Health. Psychol.* 13: 122–129.

American Academy of Dermatology. (2006). Available from http://www.aad.org. (homepage on the Internet). Retrieved, May 30, 2006.

American Cancer Society. (2006). Online Resources. Available from http://www.cancer.org (homepage on the Internet) (revised 2/28/2006).

Arthey, S., and Clarke, V. A. (1995). Suntanning and sun protection: A review of the psychological literature. *Soc. Sci. Med.* 40(2): 265–274.

Azjen, I., and Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Prentice-Hall, Englewood Cliffs, NJ.

Azzarello, L. M., Dessureault, S., and Jacobsen, P. B. (2006). Sun-protective behavior among individuals with a family history of melanoma. *Cancer Epidemiol. Biomarkers Prev.* 15(1): 142–145.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall, Englewood Cliffs, NJ.

Banks, B. A., Silverman, R. A., Schwartz, R. H., and Tunnessen, W. W. (1992). Attitudes of teenagers toward sun exposure and sunscreen use. *Pediatrics* 89(1): 40–42.

Berwick, M., Begg, C. B., Fine, J. A., Roush, G. C., and Barnhill, R. L. (1996). Screening for cutaneous melanoma by skin self-examination. *J. Natl. Cancer Inst.* 88(1): 17–23.

Borland, R., Hill, D., and Noy, S. (1990). Being sunsmart: Changes in community awareness and reported behaviour following

a primary prevention program for skin cancer control. *Beh. Change* 7(3): 126–135.
Breslow, A. (1970). Thickness, cross-sectional area and depth of invasion in the prognosis of cutaneous melanoma. *Ann. Surg.* 172: 902–908.
Brobeil, A., Rapaport, D., Wells, K., Cruse, C. W., Glass, F., Fenske, N., *et al.* (1997). Multiple primary melanomas: Implications for screening and follow-up programs for melanoma. *Ann. Surg. Onc.* 4: 19–12.
Carmel, S., Shani, E., and Rosenberg, L. (1994). The role of age and an expanded health belief model in predicting skin cancer protective behavior. *Health Educ. Res.* 9(4): 433–447.
Cody, R., and Lee, C. (1990). Behaviors, beliefs, and intentions in skin cancer prevention. *J. Beh. Med.* 13(4): 373–389.
Cokkinides, V. E., Johnston-Davis, K., Weinstock, M. A., O'Connell, M. C., Kalsbeek, W., Thun, M. J., *et al.* (2001). Sun exposure and sun-protection behaviors and attitudes among U.S. youth, 11 to 18 years of age. *Prev. Med.* 33: 141–151.
Denmark-Wahnefried, W., Aziz, N. M., Rowland, J. H., and Pinto, B. M. (2005). Riding the crest of the teachable moment: promoting long-term health after the diagnosis of cancer. *J. Clin. Onc.* 23(24): 5814–5830.
Garbe, C., Paul, A., Kohler-Spath, H., Ellewanger, U., Stroebel, W., Schwarz-Schlagenhauff, B., *et al.* (2003). Prospective evaluation of a follow-up schedule in cutaneous melanoma patients: Recommendations for an effective follow-up strategy. *J. Clin. Onc.* 21: 520–529.
Glanz, K., Geller, A. C., Shigaki, D., Maddock, J. E., and Isnec, M. R. (2002). A randomized trial of skin cancer prevention in aquatics settings: The Pool Cool program. *Health Psychol.* 21: 579–587.
Glanz, K., Lew, R. A., Song, V., and Ah Cook, V. (1999). Factors associated with skin cancer prevention practices in a multiethnic population. *Health Educ. Beh.* 26: 344–359.
Hall, H., May, D. S., Lew, R. A., Koh, H. K., and Nadel, M. (1997). Sun protection behaviors of the U.S. white population. *Prev. Med.* 26: 401–407.
Hill, D., White, V., Borland, R., and Cockburn, J. (1991). Cancer-related beliefs and behaviours in Australia. *Aust. J. Public Health* 15: 14–23.
Hochbaum, G. M. (1958). *Public Participation in Medical Screening Programs: A Sociopsychological Study*. US Government Printing Office, Washington, DC.
Horowitz, M., Wilner, N., and Alvarez, W. (1979). Impact of event scale: A measure of subjective stress. *Psychosom. Med.* 41: 209–218.
Jackson, K. M., and Aiken, L. S. (2000). A psychosocial model of sun protection and sunbathing in young women the impact of health beliefs, attitudes, norms, and self-efficacy for sun protection. *Health Psychol.* 19(5): 469–478.
Jones, J., Harris, P., and Chrispin, C. (2000). Catching the sun: an investigation of sun-exposure and skin protective behaviour. *Psychol. Health Med.* 5(2): 131–141.
Kash, K., Holland, J., Halper, M., and Miller, D. (1992). Psychological distress and surveillance behaviors of women with a family history of breast cancer. *J. Natl. Cancer Inst.* 84: 24–30.
Keesling, B., and Friedman, H. S. (1987). Psychosocial factors in sunbathing and sunscreen use. *Health Psychol.* 6(5): 477–493.
Lescano, C. M., and Rodrigue, J. R. (1997). Skin cancer prevention behaviors among parents of young children. *Child. Health Care* 26(2): 107–114.
Mahler, H. I. M., Fitzpatrick, B., Parker, P., and Lapin, A. (1997). The relative effects of a health-based versus an appearance-based intervention designed to increase sunscreen use. *Am. J. Health Promot.* 11: 426–429.
Manne, S., Fasanella, N., Connors, J., Floyd, B., Wang, H., and Lessin, S. (2004). Sun protection and skin surveillance practices among relatives of patients with malignant melanoma: Prevalence and predictors. *Prev. Med.* 39: 36–47.
Manne, S., Markowitz, A., Winawer, S., Meropol, N., Haller, D., Rakowski, W., Babb, J., and Jandorf, L. (2002). Correlates of colorectal cancer screening compliance and stage of adoption among siblings of individuals with early onset colorectal cancer. *Health Psychol.* 21(1): 3–15.
McBride, C. M., Emmons, K. M., and Lipkus, I. M. (2003). Understanding the potential of teachable moments: the case of smoking cessation. *Health Educ. Res.* 18(2): 156–170.
Oliveria, S. A., Christos, P. J., Halpern, A. C., Fine, J. A., Barnhill, R. L., and Berwick, M. (1999). Evaluation of factors associated with skin self-examination. *Cancer Epidemiol. Biomarkers Prev.* 8: 971–978.
Prochaska, J. O., Velicer, W. F., Rossi, J. S., Redding, C. A., Greene, G. W., Rossi, S. R., *et al.* (2004). Multiple risk expert systems interventions: Impact of simultaneous stage-matched expert system interventions for smoking, high -fat diet, and sun exposure in a population of parents. *Health Psychol.* 23(5): 503–516.
Prochaska, J., Velicer, W. F., Redding, C., Rossi, J. S., Goldstein, M., DePue, J., *et al.* (2005). Stage-based expert systems to guide a population of primary care patients to quit smoking, eat healthier, prevent skin cancer, and receive regular mammograms. *Prev. Med.* 41: 406–416.
Purdue, M. P. (2002). Predictors of sun protection in Canadian adults. *Can. J. Public Health* 93(6): 470–474.
Rakowski, W., Dube, C. A., and Goldstein, M. G. (1996a). Considerations for extending the transtheoretical model of behavior change to screening mammography. *Health Educ. Res.* 11: 77–96.
Rakowski, W., Ehrich, B., Dube, C. A., Pearlman, D. N., Goldstein, M. G., Rimer, B. K., *et al.* (1996b). Screening mammography and constructs from the transtheoretical model: Associations using two definitions of the stages-of-adoption. *Ann. Beh. Med.* 18: 91–100.
Reynolds, K., Blaum, J., Jester, P., Weiss, H., Soong, S., and DiClimente, R. (1996). Predictors of sun exposure in adolescents in a southeastern US population. *J. Adolesc. Health* 19: 409–415.
Rhee, J. S., Mattews, A., Newburg, M., Smith, T. L., Burzynski, M., and Nattinger, A. B. (2004). Quality of life and sun-protective behavior in patients with skin cancer. *Arch. Otolaryngol. Head Neck Surg.* 130: 141–146.
Rhodes, A. R., Weinstock, M. A., Fitzpatrick, T. B., Mihm, M. C. Jr., and Sober, A. J. (1987). Risk factors for cutaneous melanoma. A practical method of recognizing predisposed individuals. *JAMA* 258(21): 3146–3154.
Rigel, D. S., and Carucci, J. A. (2000). Malignant melanoma: prevention, early detection, and treatment in the 21st century. *CA Cancer J. Clin.* 50(4): 215–236.
Roberts, D. L. L., Anstey, A. V., Barlow, R. J., Cox, N. H., Newton-Bishop, J. A., Corrie, P. G., *et al.* (2002). U.K. Guidelines for the management of cutaneous melanoma. *Br. J. Dermatol.* 146: 7–17.
Robinson, J., Fisher, S., and Turrisi, R. (2002). Predictors of skin self-examination performance. *Cancer* 95(1): 135–146.
Robinson, J. K., Rigel, D. S., and Amonette, R. A. (1998). What promotes skin self-examination? *J. Am. Acad. Dermatol* 39: 752–757.
Rosenstock, I. M. (1974). The Health Belief Model and preventive health behavior. In Becker, M. H. (Ed.), *The Health Belief Model and Personal Health Behavior* (pp. 27–59). Charles B. Slack. Thorofare, NJ.
Rossi, J. S., Blais, L. M., Redding, C. A., and Weinstock, M. A. (1995). Preventing skin cancer through behavior change. *Dermatol. Clin.* 13(3): 613–622.
Schwartz, M. D., Lerman, C., Miller, S. M., Daly, M., and Masny, A. (1994). Coping disposition, perceived risk, and

psychological distress among women at increased risk for ovarian cancer. *Health Psychol.* 14: 232–235.

Skin Cancer Foundation. (2006). Sun Safety, Available from http://www.skincancer.org (homepage on the Internet). Retrieved, May 30, 2006.

U.S. Preventive Services Task Force Screening for skin cancer. (2001). Recommendations and rationale. Rockville, MD: Available from http://www.ahrq.gov/ajpmsu- pl/chlarr.htm. (homepage on the internet). Updated on May 25, 2005, cited on 2001.

van Dooren, S., Rijnsburger, A. J., Seynaeve, C., Kriege, A., Duivenvoorden, H. J., Bartels, C. C., *et al.* (2003). Psychological distress and breast self-examination frequency in women at increased risk for hereditary of familial breast cancer. *Community Genet* 6(4): 235–241.

Weinstock, M., Rossi, J., Redding, C., and Maddock, J. (2002). Randomized controlled community trial of the efficacy of a multicomponent stage-matched intervention to increase sun protection among beachgoers. *Prev. Med.* 35(6): 584–592.

Weinstock, M. A., Risica, P. M., Martin, R. A., Rakowski, W., Smith, K. J., Berwick, M., *et al.* (2004). Reliability of assessment and circumstances of performance of thorough skin self-examination for the early detection of melanoma in the Check-It-Out project. *Prev. Med.* 38: 761–765.

Wichstrom, J. (1994). Predictors of Norweigan adolescents' sunbathing and use of sunscreen. *Health Psychol.* 13: 412–420.