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Sun protection and skin self-examination in melanoma survivors

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Abstract

Patients diagnosed with melanoma are at risk for developing recurrent and second primary disease. Skin self-examination (SSE) and sun protection are standard clinical recommendations to minimize risk. In this study we examined performance of these behaviors in individuals with melanoma drawn from the general population. Potential participants (N=148) with a first primary melanoma diagnosed in 2000 were identified through a population-based cancer registry in New Jersey, USA. One hundred and fifteen individuals participated in a 30-minute telephone interview concerning behavioral adherence with SSE and sun protection, self-efficacy for performing these behaviors, and perceived risk of developing another skin cancer. We utilized logistic regression to estimate potential associations of demographic, medical, and psychosocial factors with SSE and sun protection, respectively. Seventeen percent of subjects reported performing comprehensive SSE at least once every two months and 23% engaged in regular sun protection. Utilization of SSE was related to the presence of moles (OR= 4.2, 95% CI: 1.1-15) and higher SSE self-efficacy (OR= 14.4, 95% CI: 1.9-112). Regular sun protection was related to older age (>60 years; OR= 3.3, 95% CI: 1.3-8.7), being female (OR= 2.8, 95% CI: 1.1-7.3) and higher sun protection self-efficacy (OR= 5.0, 95% CI: 1.4-18). These factors remained significant in multivariate models. In this group of primary melanoma survivors, the rates of SSE and sun protection are comparable to, but do not exceed, general population estimates. This study provides justification for further research to address barriers to prevention and control behaviors in melanoma survivors.

Introduction

Melanoma is the most serious form of skin cancer, accounting for over 70% of skin cancer deaths in the United States [1]. It is expected that 62,480 new cases of melanoma will be diagnosed this year in the United States [1]. Despite a 95% survival rate for thin, early stage melanomas [2], even these patients are at risk for recurrent and new primary disease. For

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instance, rates of recurrence are 10-20% over five years in those that are sentinel node negative at the time of initial diagnosis [3,4], and the cumulative probability of having a second primary diagnosed in five years is approximately 5%, a 25-fold increase in risk over the general population [3,5-7].

Comprehensive skin self-examination (SSE) may lead to earlier diagnosis of recurrence or second primary disease. One study found that 44% of diagnosed recurrent melanoma was initially detected by patients based on symptoms that raised suspicion of metastasis [2]. There is no prospective evidence that SSE adopted after melanoma diagnosis reduces melanoma-related morbidity and mortality, but case-control evidence indicates that performance of SSE is related to a reduced risk of advanced disease [8], and that even heightened skin awareness may increase survival [9].

While sun protection may decrease the risk of primary melanoma in adulthood [10], there is no evidence that sun protection after melanoma diagnosis decreases the risk of developing recurrent or second primary disease. In fact Berwick and colleagues [9] reported that higher levels of sun exposure prior to the diagnosis of melanoma was related to *decreased* mortality from melanoma, possibly because melanomas diagnosed in the absence of high levels of sun exposure are more lethal. Nonetheless, ambient and recreational sun exposure at any age may increase risk of a new primary [11]. While the relationships between these behaviors and morbidity and mortality are quite complex and likely indicate various subtypes of melanoma with distinct etiologies, clinical recommendations after melanoma diagnosis currently include frequent physician follow-up and patient education about sun protection and SSE [2,3,12-15].

Given the recommendations to perform SSE and sun protection, and the suggestion that these changes may influence secondary prevention of melanoma, we conducted a study of the practice of these behaviors in a population-based sample of melanoma survivors. We also examined potential medical, demographic, and attitudinal covariates of adherence with advice to practice SSE and sun protection. Attitudinal covariates included in the study were the perception of cancer risk and behavioral self-efficacy or confidence in the ability to perform SSE and self-examination. Most health behavior theories posit that the perception of being at risk for illness motivates self-protective health behavior [16-22]. In addition, risk perception is implicitly included in the Transtheoretical Model of Health Behavior Change [23], since “consciousness raising” about the hazards of a risk behavior is proposed as being related to movement towards greater contemplation of health behavior change [24]. Cancer risk perception has also been included in the integrative framework of cancer control intervention adherence [25], and risk perceptions are critical components of the decision-making process regarding screening and behavior change in cancer contexts [26]. Self-efficacy, or the confidence and awareness to perform an activity is also a known motivator of behavior change [27].

Materials and Methods

Study Population

Individuals (N=148) diagnosed with melanoma who were recent participants in an international population-based study [28] were invited to participate in a survey. The larger international study included incident cases identified through population-based registries from 9 geographic regions in North America, Europe, and Australia. The objectives and scope of the study (Genes, Environment, and Melanoma: GEM) were to further identify the role of genetics and the environment in the development of multiple primary melanoma. Investigators from the coordinating center (Memorial Sloan-Kettering Cancer Center, New York, USA) developed the idea for the present study in which behavioral practices in those newly diagnosed with melanoma could be assessed. GEM study participants who had expressed a willingness to

partake in future related research were contacted. These individuals had been identified through a population-based cancer registry in New Jersey, USA, and had a histologically confirmed invasive first primary melanoma diagnosed in 2000. The remainder (22%) could not be reached after five telephone attempts (N=20), refused participation (N=10), or had died (N=3). All individuals provided written, informed consent to participation. This study was approved by the Institutional Review Boards at Memorial Sloan-Kettering Cancer Center and the New Jersey Department of Health and Senior Services.

Procedure

In the original study, participants were deemed eligible with a confirmed diagnosis of an incident first primary melanoma or a second or higher order melanoma as defined by a specific time period for each population-based center. Participants completed a baseline telephone interview, reported on demographic and cutaneous risk characteristics, sun exposure history prior to diagnosis, family history and personal history of skin cancer and other cancers. Clinical characteristics were derived from the original pathology report. Eligible participants who consented to re-contact for additional research received a letter of introduction and those who did not affirmatively decline further contact were telephoned by a trained interviewer. Only individuals with a first primary melanoma were approached for this follow-up study. The 30-minute questionnaire included questions about behavioral strategies to reduce melanoma risk and beliefs and attitudes about melanoma risk reduction. Participants were also asked about family discussions about melanoma risk, and these results are reported elsewhere [29].

Measures

We assessed whether individuals were performing deliberate and systematic SSE at least once every two months for the following body parts: arms and face, front of legs, side of body, back of legs, side of legs, bottom of feet, back of thighs, upper back and shoulders, mid and lower back in accordance with published methodology [8,30] and calculated a summary score [30], such that if an individual reported screening all but one of the body sites captured, the individual was considered adherent to total SSE.

We assessed adherence with sun protection strategies (frequency of sunscreen use on sunny summer days, the sun protection factor [SPF] of sunscreen if used, wearing a hat, shade seeking, and the use of protective clothing [long-sleeved shirts] when outside on sunny summer days for more than one hour) using the skin cancer risk factor module from the Behavioral Risk Factor Surveillance System [30]. We designated those who responded “always” or “nearly always” to three of the four strategies on sunny summer days (sunscreen, hat wearing, shade seeking and protective clothing use) as “adherent” to regular sun protection.

In accordance with diverse health behavior theories [17-22] that prioritize risk perceptions and self-efficacy as common antecedents of protective behavior change [27,32], we assessed perceived risk for developing melanoma in the future compared to other melanoma patients of their same age and sex (much less=1 to much more=5). We assessed SSE self-efficacy, defined as the extent to which the subject felt capable of performing SSE, or of asking a partner or physician to help examine their skin this way (1=“Not at all” to 4= “extremely” capable). To assess sun protection self-efficacy, we assessed the extent to which the subject felt capable of performing sun protection behaviors including limiting sun exposure between 10 am and 4 pm, wearing protective clothing like long sleeves; using SPF 15 sunscreen, and avoiding tanning salons.

Clinical characteristics were derived from the original pathology report and included date of diagnosis, depth of tumor, anatomic site of tumor, and histologic subtype. Other demographic data and melanoma risk factors were already part of their research record [28] and we included

these patient characteristics in the current study: skin, hair and eye coloring; the presence of freckles and moles; susceptibility to sunburn and ability to tan (when unprotected and exposed to bright light in the summertime); average hours of sun exposure for weekends and weekdays respectively during warmer months in the decade year (e.g. age 20, 30) prior to diagnosis, family and personal history of cancer based on prior epidemiological studies of melanoma risk factors [33-35].

Statistical methods

We calculated frequencies, percentages, and mean values for variables of interest utilizing SAS statistical software (SAS Institute, Cary, NC). We conducted univariate logistic regression to test for potential associations between each covariate and the summary scores for SSE and sun protection, respectively, to examine the unique importance of each covariate that was significantly related to the behavioral outcome. Multivariate regression was carried out to test all factors significant at the univariate level in the presence of each other.

Results

Descriptive Statistics

One-hundred and fifteen individuals (response rate=78%) participated in the current study and were interviewed from 9 to 30 months post-diagnosis (time since interview was not related to adherence with SSE or regular sun protection, all *p*'s > 0.05). The remaining individuals (22%) could not be reached after five telephone attempts (N=20), refused participation (N=10), or had died (N=3). In the original study, response rates were lower, 54% in the single primary melanoma group [28] but the total number of individuals screened for eligibility was 4574 and identified through 9 different study sites.

In Table 1 we describe patient characteristics. Most (99%) were Caucasian, the average age was 60 years (20-90 years), over half (55%) were female, and 68% had completed education past high school. The average thickness of melanoma tumors was 1.04 mm for the 69 patients (60%) whose pathology reports had reported Breslow thickness, with 17% having a tumor thickness greater than 1 mm. Most participants had cutaneous risk factors for melanoma such as fair skin (83%), light hair (86%) and light eyes (79%) [33-35]. Slightly over half (52%) reported freckling, 61% reported moles, 55% reported the ability to tan easily, and 37% were susceptible to sunburn. Average sun exposure in the decade year prior to diagnosis was 2.4 hours on weekdays and 3.6 hours on the weekend. Although everyone in this study had a previous diagnosis of melanoma, 34 individuals had a prior cancer history including 28 with non-melanoma skin cancer and nine reporting any other type (e.g. breast, prostate). Eighty-six (75%) reported a family history of cancer, including non-melanoma skin cancer, in at least one near blood relative such as a parent, grandparent, sibling, or child.

Twenty individuals (17%) conducted deliberate and systematic SSE as defined as “always or nearly always” examining all but one of these body parts, as shown in Table 2. In total, less than one-quarter of the sample (23%) met the criterion for regularly conducting all but one sun protection practice (Table 3) and this includes the 12 participants (10%), who noted s/he “never went out in the sun,” thus were classified as practicing full sun protection. Of note, less than half of the sample were “always or nearly always” wearing protective clothing or seeking the shade while out in the sun, as shown in Table 3. However, 57% were “always or nearly always” using sunscreen, at an average reported SPF of 25.

Logistic Regression

We evaluated the possible association between each covariate and comprehensive SSE, and regular sun protection, respectively. Each continuous variable (e.g. age) was dichotomized at

the mean. As shown in Table 4, individuals who reported having moles, as compared to those reporting no moles, were more likely to report conducting comprehensive SSE (OR=4.2, 95% CI: 1.1-15, p=0.03). Reporting higher SSE self-efficacy was also associated with comprehensive SSE (OR=14.4, 95% CI: 1.9-112, p=0.01), and both of these factors remained significant in the multivariate model which included both variables (OR for moles=3.8, 95% CI: 1.0-14, OR for self-efficacy=14.3, 95% CI: 1.8-112, $ps < 0.05$).

In Table 4, significant predictors of regular sun protection strategies included older age (>60; OR=3.3, 95% CI: 1.3-8.7, p=0.01), being female (OR=2.8, 95% CI: 1.1-7.3, p=0.04) and higher sun protection self-efficacy (OR=5.0, 95% CI: 1.4-18, p=0.01). Again, each factor remained significant in the multivariate model which included these three factors (OR for age=5.2, 95% CI: 1.8-15, OR for sex=3.5, 95% CI: 1.2-10, OR for self-efficacy=7.3, 95% CI: 1.9-29, $ps<0.05$).

Discussion

This study assesses regular sun protection and skin screening practices in individuals recently diagnosed with a first primary melanoma, and is among the first to examine these issues in a population-based sample collected outside the clinic setting. In terms of SSE, few participants consistently practiced comprehensive SSE (17%), and most participants reported inconsistent SSE across anatomic sites. For example over 60% reported that they regularly examined their arms and face, but fewer than 40% reported examining other anatomic sites such as regions of the back. One consequence of this may be that melanoma survivors might find abnormalities more readily during casual day-to-day activities such as dressing or grooming, but may miss skin changes on areas of the body that are less easily observed, such as the lower back. These rates of comprehensive SSE are comparable to those reported for melanoma survivors drawn from clinical populations (14% to 33%;[36,37]) and are also consistent with the general population (9-18%;[8,30,38]. Rates of adherence with other patient-initiated screening strategies in cancer survivors are quite consistent with our findings. For example, in a recent follow-up of survivors of childhood cancer, approximately 27% of females reported breast self-exam and 17% of males reported testicular self-exam [39]. A comparable rate of testicular self-exam was also recently reported [40]. In a study of breast cancer survivors, monthly breast self-exam was reported in 40% of the women [41]. In contrast, however, rates of clinically recommended screening strategies performed by physicians in clinic settings including mammography, clinical breast examination, prostate-specific antigen testing, and fecal occult blood testing are significantly higher among cancer survivors than in the general population [42]. Accordingly, factors related to the adoption of clinical as well as self-administered strategies may be different and require distinct intervention strategies to improve continued maintenance in survivorship cohorts.

Despite the evidence that melanoma recurrences and second primary diagnoses are often found by patients themselves [2,3], and that subsequent diagnoses tend to be thinner than initial diagnoses [43], this study documents useful opportunities for behavioral intervention to increase utilization of thorough, full-body SSE in melanoma survivors. In particular, these patients may need encouragement to engage family members in helping them see parts of the body that are less easily observed in casual activities.

Sun protection practices were also performed inconsistently. Only about one quarter of the participants in the current study (23%) practiced regular sun protection. Similarly, Manne and Lessin (2006) [37] recently documented that among melanoma survivors drawn from physician practices, average habitual sun protection practices (sunscreen, protective clothing use) fell between “sometimes” and “often.” We found that use of sunscreen was the most frequently utilized strategy of sun protection, with more than half (57%) in our population-based sample

reporting that they used sunscreen always or nearly always. These rates exceed those reported in the general population (28% to 32%; [44,45]. Similarly, Lee et al. (2007) [46] reported that melanoma patients were spending less time outdoors than non-melanoma controls and were using protective means such as clothing and sunscreen while out in the sun. However, these rates are lower than that reported for post-surgical patients with non-melanoma skin cancer, where 68% reported regular use of sunscreen after their recovery from surgery [47]. Recent population-based estimates show that rates of deleterious sun exposure in cancer survivors are similar to those reported for the general population [48]. Overall, this study shows that the rates of melanoma-related protective behaviors after diagnosis do not consistently exceed that reported in general population samples. The exception is sunscreen use, which alone is not adequate sun protection [49,50]. Given the clinical recommendations to perform these behaviors, these findings indicate the need for enhanced education and counseling about sun protection and skin examination for melanoma survivors.

Our findings also indicate that measurement strategies for melanoma health behaviors may not completely capture the health behavior choices made by these survivors. Interestingly, 10% of this sample reported complete sun avoidance; therefore questions about sun protection strategies were not relevant. While the numbers are small, this group was also on average older than the remaining sample. Complete sun avoidance might be associated with significant cancer-related distress, and may also limit physical activity and recreation critical to the reestablishment or maintenance of survivors' physical health, mental health, and quality of life. As well there is suggestion that some sun exposure prior to diagnosis may be protective against melanoma-related mortality [9]; as such, this phenomenon warrants further examination among melanoma survivors. This phenomenon reflects a potential limitation in transferring measurement strategies validated in the general population to melanoma survivors without pilot testing and revalidation.

Those participants who reported moles and higher SSE self-efficacy were more likely to conduct SSE. Although our estimate for the association between SSE self-efficacy and SSE itself were significant, the confidence intervals were wide. With larger sample sizes, it is possible that our estimates may become attenuated. It is likely that those with moles may have received clearer or more frequent physician recommendation for SSE, and over half of the participants reported having moles (few to many). The findings from the current study are consistent with findings drawn from other samples at high risk for melanoma [51-54]. More surprisingly, however, performance of SSE was not significantly related to perceived risk, other demographic or risk factors, or cancer history or family history. This is inconsistent with prior literature examining predictors of SSE in high-risk groups in which younger age, education, optimism, recent exams or instruction, and concern for cancer were all associated[12,52, 54-56].

In terms of regular sun protection, those who were older, female, and had greater confidence in their ability to practice sun protection were most likely to do so. Again, our degree of confidence in the positive association between self-efficacy and this behavior itself may be diminished by the small numbers in our study. In prior studies assessing predictors of sun protection in first-degree relatives of melanoma patients, self-efficacy but not age or gender were related to increased utilization of sun protection [55]. Geller and colleagues [53] found that female first-degree relatives were more likely to use sunscreen than males, but did not assess self-efficacy for sun protection. Prior research examining health behaviors after melanoma diagnosis show physician recommendation to engage in SSE, physician examination, and sun protection increase after melanoma diagnosis, but are by no means universal [57]. Therefore, we cannot assume that those diagnosed with melanoma will be more likely to adopt prevention and control efforts after their diagnosis. Intervention efforts should address and support self-efficacy for SSE [51] and sun protection. Further research is needed

to clarify the extent of physician counseling and education after melanoma diagnosis, as well as the impact on patients' adoption of behavioral strategies after receipt of this advice.

We note some limitations in this study. The behaviors reported here were based on self-report and not direction observation and this may potentially affect what melanoma patients may recall or want to report about their behaviors. We encouraged honesty by assuring that a wide range of health behaviors were normal, and that their honest responses would aid in the development of future education programs. It is possible that social desirability bias, or the desire for participants to over report disease-prevention activities, was influential to our participants' responses especially given the fact that these are cancer survivors and that the surveys were completed via telephone. Recall bias, or the inability to correctly recall accurate behaviors may have also been a limitation as time had elapsed from diagnosis to interview. The average length of time from diagnosis to participation was 1.7 years, although telephone interviews are a well-accepted strategy for eliciting self-reported behavioral information [58]. These factors should be taken into account in future research targeting cancer survivors with respect to screening practices.

Furthermore, our population was small and typically an older, largely female group that might not be fully representative of all melanoma survivors. Demographic and cutaneous characteristics were similar throughout the group and consistent with classic risk factors for melanoma. Additionally, we evaluated self-efficacy and behaviors at the same time point, ruling out the possibility of evaluating predictive relationships between these variables. We did not collect information concerning whether each participant had received physician recommendation or behavioral education, which would have been a useful factor to consider in their adoption of these behaviors. Finally, we did not comprehensively examine potential attitudinal or psychosocial factors that may be related to the uptake of SSE and sun protection strategies due to space constraints. This study, however, is among the first to examine behavioral prevention and control in survivors in a population-based sample, which increases our ability to generalize these findings to the general population of survivors who may not be seen in clinic settings. Descriptive work examining screening and sun protection strategies, as well as other aspects of melanoma survivorship, is critically needed to develop appropriate intervention strategies to increase the quality and length of life among these individuals.

Multiple studies on survivorship have found that rates of behavioral counseling are not ideal in these populations. Survivors themselves report the need for further information regarding guidelines for follow-up care and surveillance [59,60]. The Institute of Medicine's Executive Summary on survivorship has stressed that prevention for recurrence, surveillance for cancer spreading, and specific information on the timing and content of follow-up should be part of a patient's care plan following diagnosis and treatment [61]. Survivors report an interest in self-care practices and in receiving evidence-based information [60,62]. Caregivers including nurse practitioners report providing education less often than they should [63]. Nurses and primary care physicians together can reinforce and encourage prevention practices [64] and can play a pivotal role in reducing the disease burden of malignant melanoma [63-65]. Specifically, preventive sun advice mediated by a doctor's consultation, didactic tools such as a photo test, or information on tanning have been well received and show positive delivery to patients, especially those at-risk [66,67]. Performing regular full-body examinations and sun protection practices and avoidance of tanning booths are all documented detection and prevention practices [65] and should be continuously practiced. Risk behaviors such as smoking and diet have been reported to be discussed more than the topic of sun exposure, and patient counseling has been correlated with prior advice, multiple visits and higher satisfaction with care [59]. Furthermore, efforts such as combining with other cancer prevention programs or screening in the workplace have already proven to be successful in increasing uptake of sun protection practices and noting a substantial decrease in incidence of thick melanomas [68,69]. Continued

efforts on caregivers' parts to educate, reassure, and reinforce practices can continue to satisfy melanoma survivor's needs for evidence-based information. The timing and content of follow-up can help to improve detection and prevention, even after diagnosis and treatment of this disease.

Conclusion

We found that among melanoma survivors drawn from the general population, rates of performing thorough SSE and engaging in sun protection strategies are comparable to, but do not exceed general population estimates of these behaviors. Sunscreen use was slightly higher here than in the general population. The use of these preventive strategies was not consistently related to medical factors or cutaneous risks for melanoma, or to previous or family history of cancer. Strategies to increase utilization of SSE should address the idea that exams may help to find new melanomas at a very early stage considering melanoma can be a severe disease. Patients should be counseled that they are at a markedly higher risk for a second primary melanoma at any body site. This study provides justification for intervention research to increase prevention and control practices in melanoma survivors.

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Table 1

Demographic and clinical characteristics of single primary melanoma patients (N=115)

Covariate	Frequency (N (%))
Age at diagnosis	
≤ 60	56 (49%)
> 60	59 (51%)
Sex	
Male	52 (45%)
Female	63 (55%)
Education	
≤ High school	37 (32%)
> High school	78 (68%)
Breslow depth[a]	
≤ 1mm.	50 (43%)
> 1mm.	19 (17%)
Anatomic site	
Head and neck	18 (16%)
Trunk, arms, or legs	97 (84%)
Skin color	
Fair	96 (83%)
Olive/brown	19 (17%)
Hair color[a]	
Red or light	99 (86%)
Dark brown/black	9 (8%)
Eye color[a]	
Light	91 (79%)
Dark	21 (18%)
Freckles	
None	55 (48%)
Few or many	60 (52%)
Moles[a]	
None	42 (37%)
Few or many	70 (61%)
Ability to tan[a]	
No	51 (44%)
Yes	63 (55%)
Susceptibility to sunburn	
No	68 (59%)
Yes	42 (37%)
Previous history of cancer	
No	81 (70%)
Yes	34 (30%)
Family history of cancer	

Covariate	Frequency (N (%))
No	29 (25%)
Yes	86 (75%)
Weekday hours of sun exposure	
≤ 2.4 hours	68 (59%)
> 2.4 hours	47 (41%)
Weekend hours of sun exposure	
≤ 3.6 hours	55 (48%)
> 3.6 hours	60 (52%)

[a]Percentages based on available data and does not include responses skipped or missing for some participants

Table 2

Frequency of Skin Self-Examination (SSE)[a] (N=115)

Part of Body	Always or Nearly Always	Sometimes or Seldom	Never
Arms and Face[b]	81 (71%)	24 (21%)	9 (8%)
Front of Legs	69 (60%)	34 (30%)	12 (10%)
Side of Body	44 (38%)	46 (40%)	25 (22%)
Back of Legs	43 (37%)	43 (37%)	29 (25%)
Side of Legs	49 (43%)	43 (37%)	23 (20%)
Bottom of Feet[b]	19 (17%)	20 (17%)	55 (48%)
Back of Thighs	39 (34%)	38 (33%)	38 (33%)
Upper Back/Shoulders	44 (38%)	41 (36%)	30 (26%)
Mid/Lower Back[b]	39 (33%)	40 (35%)	35 (30%)

[c]Those who screened all the parts of the body (except one) “always or nearly always” were N=20 (17%).

[a]As defined in Berwick, et al., 1996; Weinstock, 1999

[b]Percentages based on available data and does not include responses skipped or missing for some participants

Table 3

Frequency of sun protection practices[a] (N=115)

Sun protection behavior	Always or Nearly Always	Sometimes or Seldom	Never	Never Went Out in Sun
Sunscreen use[b]	65 (57%)	30 (26%)	8 (7%)	12 (10%)
Shade seeking	50 (43%)	49 (43%)	4 (3%)	12 (10%)
Wearing hat[c]	37 (32%)	27 (23%)	37 (32%)	12 (10%)
Wearing long-sleeve	15 (13%)	39 (34%)	47 (41%)	12 (10%)

[a] As defined in Centers for Disease Control and Prevention. (2000). Behavioral Risk Factor Surveillance System User's Guide. Atlanta, GA.

[b] Of those sunscreen users, the average sunscreen SPF was 25 (range 6-60)

[c] Percentages based on available data and does not include responses skipped or missing for some participants

Table 4

Predictors of Skin Self-Examination (SSE) and sun protection practices (N=115)

	SSE		Sun protection	
Covariate	**Unadjusted OR (95% CI)**	**Adjusted OR[b] (95% CI)**	**Unadjusted OR (95% CI)**	**Adjusted OR[b] (95% CI)**
Age at diagnosis				
≤ 60				
> 60	0.6 (0.2-1.5)		3.3 (1.3- 8.7)*	5.2 (1.8-15)*
Sex				
Male				
Female	1.3 (0.5-3.5)		2.8 (1.1-7.3)*	3.5 (1.2-10)*
Education				
≤ High school				
> High school	0.7 (0.2-1.8)		0.5 (0.2-1.1)	
Breslow depth				
≤ 1mm.				
> 1mm.	2.8 (0.8-9.9)		2.1 (0.6-7.0)	
Anatomic site				
Head and neck				
Trunk, arms, or legs	0.5 (0.1-2.6)		1.4 (0.4-4.3)	
Skin color				
Fair				
Olive/brown	0.9 (0.2-3.3)		1.8 (0.6-5.2)	
Hair color				
Red or light				
Dark brown/black	0.6 (0.2-1.8)		1.5 (0.6-3.9)	
Eye color				
Light				
Dark	1.1 (0.3-3.7)		(0.3-3.2)	
Freckles				
None				
Few or many	1.1 (0.4-3.0)		0.5 (0.2-1.2)	
Moles				
None				
Few or many	4.2 (1.1-15)*	3.8 (1.0-14)*	0.8 (0.3-1.9)	
Ability to tan				
No				
Yes	(0.4-2.7)		2.0 (0.8-4.8)	
Susceptibility to sunburn				
No				
Yes	0.6 (0.2-1.5)		0.5 (0.2-1.3)	
Previous history of cancer				
No				

	SSE		Sun protection	
Covariate	**Unadjusted OR (95% CI)**	**Adjusted OR[b] (95% CI)**	**Unadjusted OR (95% CI)**	**Adjusted OR[b] (95% CI)**
Yes	1.3 (0.4-4.0)		0.6 (0.2-1.5)	
Family history of cancer				
No				
Yes	0.5 (0.1-1.7)		1.4 (0.5-3.8)	
Weekday hours of sun exposure				
≤ 2.4 hours				
> 2.4 hours	0.6 (0.2-1.6)		0.7 (0.3-1.8)	
Weekend hours of sun exposure				
≤ 3.6 hours				
> 3.6 hours	0.7 (0.3-1.9)		0.9 (0.4-2.1)	
Perceived risk of recurrence				
Low (≤3.9)				
High (>3.9)	1.7 (0.6-5.0)		0.5 (0.2-1.2)	
Self-efficacy for SSE				
Low (≤7.5)				
High (>7.5)	14.4 (1.9-112)*	14.3 (1.8-112)*	1.1 (0.4-2.8)	
Self-efficacy for sun protection				
Low(≤10.8)				
High(>10.8)	1.6 (0.5-4.8)		5.0(1.4-18)*	7.3 (1.9-29)*

* Significant at $p<0.05$