Healthcare providers' sun-protection promotion and at-risk clients' skin-cancer-prevention outcomes☆

J.D. Robinson, Ph.D.,[a],* K.J. Silk, Ph.D.,[b] R.L. Parrott, Ph.D.,[a] C. Steiner, RN, MN,[c] S.M. Morris, M.A.,[d] and C. Honeycutt, M.A.[a]

[a] Department of Communication Arts and Sciences, Pennsylvania State University, University Park, PA 16802, USA
[b] Department of Communication, Michigan State University, East Lansing, MI, USA
[c] Cancer Control Section, Georgia Department of Human Resources, Atlanta, GA, USA
[d] Institute for English Language Program, Harvard University, Cambridge, MA, USA

Abstract

Background. This study aims to determine whether healthcare providers' (HCPs') communication dealing with sun-protection (i.e., counseling) is associated with clients' skin-cancer-related prevention practices, detection self-efficacy, and knowledge.

Methods. Secondary analysis of two surveys of 1,469 randomly sampled farmers and soccer participants from southeast and coastal Georgia.

Results. Farmers and soccer participants who report ever having been counseled by a HCP about how to protect their skin from the sun report being more likely to wear sunscreen ($P < 0.05$), get clinical exams of their skin ($P < 0.001$), be certain that they can recognize unhealthy changes in their skin ($P < 0.001$), be certain that they know how to perform a skin exam ($P < 0.001$), and be knowledgeable about skin cancer prevention ($P < 0.05$ and $P < 0.001$, respectively); soccer participants are additionally more likely to wear protective headgear ($P < 0.05$) and perform monthly self-exams of their skin ($P < 0.001$). All analyses incorporated three control variables: participants' prior history of skin cancer, age, and non-HCP-derived skin-cancer awareness.

Conclusions. Findings suggest that HCPs' counseling can positively shape skin-cancer-related prevention practices, detection self-efficacy, and knowledge. Additional research is needed on HCPs' actual communication about skin cancer and sun protection and its influence on client outcomes.
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Introduction

Skin cancer is the most common cancer in the United States [1]. Previous studies of secondary skin-cancer prevention have focused primarily on screening [2–8]. A less-researched form of secondary prevention, and the focus of this manuscript, is healthcare providers' (HCPs') communication (or counseling) dealing with sun-protection promotion.

Perhaps the largest, and most influential, population of HCPs are physicians and nurses. Despite the facts that (1) physicians are encouraged to counsel patients about sun protection [2,9], (2) over 90% of physicians report they believe that they should counsel patients about sun-protection behaviors regardless of patients' risk [10], and (3) most patients report that physicians should counsel them about prevention strategies related to lifestyle behaviors [11], the rate at which physicians counsel is quite low (e.g., 29% re sunscreen; 6% re other sun-protection measures) [10]. There are a variety of theoretical and practice-based reasons why HCPs' communication dealing with sun-protection promotion can positively affect clients' behaviors. Social cognitive theory [12] suggests that communication has the

potential to increase persons' self-efficacy, or their self-rated confidence in their ability to perform the necessary practices to prevent skin cancer, such as conducting self-examinations and recognizing unhealthy changes in their skin. A majority of patients perceive that HCPs are authoritative sources of health and lifestyle advice generally [13], perceive that HCPs are preferred and credible sources of information about skin cancer specifically [14], and report a willingness to take physicians' advice [15]. Initial evidence worldwide suggests that educational programs about skin cancer and its prevention can positively effect at least short-term attitudinal and behavioral change [16], such as knowledge about skin-cancer prevention (e.g., knowing to apply sunscreen 20–30 min before exposure) and the enactment of primary and secondary prevention practices, such as wearing sunscreen and performing monthly self-examinations. One study [17] found that patients' self-reported skin-cancer-prevention discussions with HCPs were significantly associated with patients performing self-examinations of their skin.

This article examines two at-risk populations who, due to occupation or recreation, have routine and lengthy sun exposure: South Georgian farming families and parents and coaches of soccer-playing youth. As part of two community-based projects [18,19], this secondary analysis considers whether persons who reported having ever received sun-protection counseling from a HCP reported greater frequency of engaging in primary and secondary skin-cancer-prevention practices, greater skin-cancer-detection self-efficacy, and greater knowledge about skin-cancer prevention.

Methods

Participants

A combined total of 1,469 participants were drawn from baseline data from two prior skin-cancer-prevention studies [18,19] conducted in eight counties in South Georgia (i.e., sun-belt region). One project [18] involved a random sample of farmers (n = 480; 62% response rate) and their wives (n = 206; 51% response rate) who responded to a phone survey. Farmers' wives were included because, in Georgia, farming is a family business [20]. The second project [19] involved soccer coaches (n = 141; 95% response rate) and parents of soccer youth (n = 642; 89% response rate), all of whom responded to a self-administered survey. The first project took place from 1994–1998, the second project took place from 1995–1999, and the projects' community-based activities did not overlap in exposure or reach. These two populations were selected because they are both in the same geographic area of the nation, and thus are similar in terms of exposure to geographic ultraviolet intensity levels and in terms of access to similar public-health programs regarding the topic of sun exposure and skin-cancer prevention [14,21]. Additionally,

both populations have been ignored in previous public-health and other sun-protection promotion efforts, despite the documented increase in the incidence and prevalence of skin cancer [19,21] and despite the fact that these populations cannot avoid the sun if they wish to pursue either occupational or recreational pursuits.

Measures

All participants responded to a survey addressing skin-cancer prevention and detection at the beginning of each project (before intervention) to guide program design [14,18]. The projects' foci were community based and included the perceived effects of HCPs on sun-protection practices. Hence, the independent variable was participants' answers (Yes or No) to the following question, which was

Table 1
Prevalence of responses for dependent variables

Dependent variables	Scale	Farmer % (n = 686)	Soccer % (n = 783)
1. How often do you wear sunscreen of SPF 15 or more while in the sun?	1. Never	48.8	6.9
	2. Seldom	16.0	8.7
	3. Sometimes	14.3	28.7
	4. Frequently	11.2	39.0
	5. Always	9.6	16.7
2. How often do you wear a long-sleeved shirt while in the sun?	1. Never	34.5	49.3
	2. Seldom	22.9	29.4
	3. Sometimes	20.0	16.9
	4. Frequently	8.3	4.1
	5. Always	14.3	0.4
3. How often do you wear a wide-brimmed hat/cap with flap while in the sun?	1. Never	34.4	22.2
	2. Seldom	11.5	19.7
	3. Sometimes	15.6	28.4
	4. Frequently	12.4	23.6
	5. Always	26.1	6.1
4. How often do you perform monthly self-exams of your skin?	1. Never	23.9	15.1
	2. Seldom	16.0	25.5
	3. Sometimes	22.3	35.4
	4. Frequently	24.9	18.6
	5. Always	12.8	5.4
5. How often do you get a doctor/nurse to perform a clinical exam of your skin?	1. Never	49.7	46.4
	2. Seldom	20.1	28.4
	3. Sometimes	17.1	18.9
	4. Frequently	9.8	4.9
	5. Always	3.4	1.5
6. How certain are you that you could recognize unhealthy changes in your skin?	1. V. Uncertain	15.7	3.2
	2. Uncertain	46.1	17.5
	3. Neither	30.5	13.9
	4. Certain	7.1	49.0
	5. V. Certain	0.6	16.3
7. How certain are you that you know the steps to follow for doing a skin exam to help detect skin cancer	1. V. Uncertain	15.5	9.8
	2. Uncertain	23.6	36.3
	3. Neither	25.1	17.5
	4. Certain	25.7	27.7
	5. V. Certain	10.2	8.7
8. Knowledge about skin cancer detection and prevention	0. Correct	15.0	11.0
	1. Correct	29.4	19.8
	2. Correct	28.3	24.3
	3. Correct	17.6	24.5
	4. Correct	7.3	13.7
	5. Correct	2.3	6.8

identical in both previous studies: "Have you ever received information from a medical professional, such as a doctor or nurse, about how to prevent skin cancer?" We refer to this variable as HCP sun-protection counseling. Of the eight dependent variables, three were single-item measures of participants' primary-prevention practices and two were single-item measures of participants' secondary-prevention practices (Table 2). These prevention behaviors are recommended by the American Academy of Dermatology and the Centers for Disease Control and Prevention [22] and were measured with a five-point, Likert-type scale (Table 1). Two of the dependent variables were single-item measures of participants' skin-cancer-detection self-efficacy (Table 2), which were also measured with a five-point, Likert-type scale (Table 1). The final dependent variable, skin-cancer-prevention knowledge, was created by summing participants' correct responses to five multiple-choice questions dealing with screening and primary prevention (Table 1 and Appendix A). The knowledge items used in this research relate to basic information that should precede the behaviors being promoted [23]. There were three control variables,

Table 2
Summary of *t* test results for farmers and soccer participants

Dependent variables	Farmer $n = 686$ Mean (SD)	Soccer $n = 783$ Mean (SD)	Mean difference	*t* Value
Primary prevention				
1. How often do you wear sunscreen of SPF 15 or more while in the sun?	2.17 (1.39)	3.50 (1.08)	1.33	20.31**
2. How often do you wear a long-sleeved shirt while in the sun?	2.45 (1.40)	1.77 (0.90)	0.68	− 10.90**
3. How often do you wear a wide-brimmed hat/cap with flap while in the sun?	2.84 (1.62)	2.72 (1.22)	0.12	− 1.65
Secondary prevention				
1. How often do you perform monthly self-exams of your skin?	2.87 (1.37)	2.74 (1.09)	0.13	− 2.03**
2. How often do you get a doctor/nurse to perform a clinical exam of your skin?	1.97 (1.17)	1.87 (0.98)	0.10	− 1.78
Detection self-efficacy				
1. How certain are you that you could recognize unhealthy changes in your skin?	2.31 (0.84)	3.58 (1.06)	1.27	25.66**
2. How certain are you that you know the steps to follow for doing a skin exam to help detect skin cancer	2.92 (1.23)	2.89 (1.17)	0.03	− 0.38
Knowledge				
1. Knowledge about skin cancer detection and prevention (Appendix A)	1.80 (1.24)	2.30 (1.40)	0.50	7.37**

**$P < 0.001$.

including participants': (1) prior history of skin cancer (farmers reported 14.1% Yes and 85.9% No; soccer participants reported 5.2% Yes and 94.8% No); (2) age (for farmers, range = 18–91, mean = 49.74, and SD = 12.59; for soccer participants, range = 20–80, mean = 39.05, and SD = 5.34); and (3) exposure to sun protection information from sources other than HCPs. The latter control variable was operationalized as a summative measure comprised of three items (similar in wording to the independent variable, above) measuring whether participants had acquired such information from the media (i.e., television, newspaper, radio, magazines), family members, and/or friends, respectively (0 = *no awareness*; 3 = *maximum awareness*) (for farmers, range = 0–3, mean = 2.12, and SD = 0.86; for soccer participants, range = 0–3, mean = 1.27, and SD = 0.84).

Statistical analysis

Multiple regression analyses were conducted using the Statistical Package for Social Sciences (SPSS) 9.0. Because less than 2% of the data were missing for all variables, missing data were handled with the process of mean substitution [24]. A multiple regression analysis was performed for each of the eight dependent variables. The three control variables (see above) were entered in the first step. The independent variable of HCP sun-protection counseling was entered in the second step.

Results

Results of one-way ANOVAs (Table 2) revealed that farmers and soccer participants were not significantly different with respect to wearing protective headgear, receiving clinical examinations of their skin, or their skin-cancer-detection self-efficacy regarding how to perform a self-examination of their skin. However, compared to soccer participants, farmers wore sunscreen less often, wore long-sleeved shirts more often, performed monthly self-examinations of their skin more often, had lower detection self-efficacy with regard to recognizing unhealthy changes in their skin, and were less knowledgeable about skin-cancer prevention practices.

Concerning farmers, in multiple regression analyses (Table 3), HCP-counseling emerged as a significant predictor for the primary-prevention practice of wearing sunscreen [$F_{(4,681)} = 15.82$, $R^2 = 0.08$], the secondary-prevention practice of obtaining clinical examinations of their skin [$F_{(4,681)} = 29.68$, $R^2 = 0.14$], self-efficacy regarding detecting unhealthy changes in their skin [$F_{(4,681)} = 20.75$, $R^2 = 0.10$], self-efficacy regarding performing self-examinations of their skin [$F_{(4,681)} = 40.08$, $R^2 = 0.19$], and knowledge about skin-cancer prevention [$F_{(4,681)} = 5.35$, $R^2 = 0.03$]. HCP-counseling was not significantly associated with wearing long-sleeved shirts, wearing protective headgear, and performing monthly self-examinations of their skin.

Table 3
Farmer sample: beta weights, R^2 change, and t values for the unique effects of HCP counseling on skin-cancer-related variables

Dependent variables	b	R^2 change	t
Primary prevention			
1. How often do you wear sunscreen of SPF 15 or more while in the sun?	0.08	0.006	2.05*
2. How often do you wear a long-sleeved shirt while in the sun?	0.06	0.003	1.49
3. How often do you wear a wide-brimmed hat/cap with flap while in the sun?	0.05	0.002	1.12
Secondary prevention			
1. How often do you perform monthly self-exams of your skin?	0.07	0.004	1.67
2. How often do you get a doctor/nurse to perform a clinical exam of your skin?	0.13	0.01	3.28**
Detection self-efficacy			
1. How certain are you that you could recognize unhealthy changes in your skin?	0.22	0.04	5.54**
2. How certain are you that you know the steps to follow for doing a skin exam to help detect skin cancer	0.18	0.03	4.72**
Knowledge			
1. Knowledge about skin cancer detection and prevention (Appendix A)	0.12	0.01	2.85*

Controlling for participants' history of skin cancer, age, and awareness of skin-cancer prevention derived from other sources (i.e., friends, family, and media).
* $P < 0.05$.
** $P < 0.001$.

Concerning soccer participants, in multiple regression analyses (Table 4), HCP-counseling emerged as a significant predictor for the primary-prevention practices of wearing sunscreen [$F(4,778) = 7.31$, $R^2 = 0.03$] and wearing protective headgear [$F(4,778) = 7.66$, $R^2 = 0.03$], the secondary prevention practices of performing monthly self-examinations of their skin [$F(4,778) = 21.78$, $R^2 = 0.10$] and obtaining clinical examinations of their skin [$F(4,778) = 40.68$, $R^2 = 0.17$], self-efficacy regarding detecting unhealthy changes in their [$F(4,778) = 12.96$, $R^2 = 0.06$], self-efficacy regarding performing self-examinations of their skin [$F(4,778) = 18.19$, $R^2 = 0.08$], and knowledge about skin-cancer prevention [$F(4,778) = 6.03$, $R^2 = 0.03$]. HCP-counseling was not significantly associated with wearing long-sleeved shirts.

Comment

This research examined the relationship between persons' reports of having ever been counseled by a HCP about how to protect their skin from the sun and their skin-cancer-related prevention practices, detection self-efficacy, and knowledge. Two potentially at-risk populations were examined: South Georgian farmers (and their wives) and soccer participants (i.e., coaches and parents of soccer youth). In both populations, reports of HCP counseling were positively associated with skin-cancer-prevention outcomes, including primary prevention practices (e.g., wearing sunscreen), secondary prevention practices (e.g., obtaining clinical examinations of their skin), detection self-efficacy (e.g., recognizing unhealthy changes in their skin), and knowledge. Compared to farmers, counseling was associated with a wider range of primary and secondary prevention practices for soccer participants (e.g., wearing protective headgear and performing monthly self-examinations of their skin).

Findings have implications for occupational and recreational groups too often neglected in previous sun-protection-promotion efforts. It is widely documented that farmers have

Table 4
Soccer sample: beta weights, R^2 change, and t values for the unique effects of HCP counseling on skin-cancer-related variables

Dependent variables	b	R^2 change	t
Primary prevention			
1. How often do you wear sunscreen of SPF 15 or more while in the sun?	0.10	0.01	2.74*
2. How often do you wear a long-sleeved shirt while in the sun?	0.05	0.002	1.31
3. How often do you wear a wide-brimmed hat/cap with flap while in the sun?	0.08	0.01	2.25*
Secondary prevention			
1. How often do you perform monthly self-exams of your skin?	0.21	0.04	6.03**
2. How often do you get a doctor/nurse to perform a clinical exam of your skin?	0.34	0.11	9.97**
Detection self-efficacy			
1. How certain are you that you could recognize unhealthy changes in your skin?	0.22	0.05	6.15**
2. How certain are you that you know the steps to follow for doing a skin exam to help detect skin cancer	0.28	0.07	7.71**
Knowledge			
1. Knowledge about skin cancer detection and prevention (Appendix A)	0.13	0.02	3.58**

Controlling for participants' history of skin cancer, age, and awareness of skin-cancer prevention derived from other sources (i.e., friends, family, and media).
* $P < 0.05$.
** $P < 0.001$.

an elevated relative risk of death from nonmelanoma skin cancers and of developing lip cancer [25–30]. Although contradictory evidence exists [31], several studies have also found that farmers have an elevated relative risk of death from melanoma skin cancers [25,26]. In the state of Georgia in 1992 (the latest data available when both aforementioned research projects began), the incidence of new melanoma cases and deaths due to melanoma was 33% and 31% higher than the national average, respectively [32]; according to the 1994–1998 SEER Cancer Statistics Review, these rates are now equal to the national average. In many southern states, including Georgia, soccer has become a nearly year-round sport. In 1997, an estimated 60,000 youths in Georgia between the ages of 6 and 14 played soccer, with nearly 6,000 coaches, and almost as many parents, in attendance [21]. In 1998, total U.S. participation in soccer reached 18.2 million [33].

Because of their occupation and/or recreational pursuits, it is difficult for farmers and soccer participants to reduce their sun exposure. Thus, for at least these populations, HCP counseling about skin cancer and how to adapt to risk seems to be an important secondary-prevention strategy [18]. Research suggests that many skin cancers, especially squamous-cell carcinoma, are preventable by taking a variety of sun-protection measures [34,35], such as avoiding deliberate tanning, limiting exposure to the sun between 10 a.m. and 4 p.m., wearing sunscreen with a SPF rating of 15 or higher, and wearing protective clothing, such as long-sleeved shirts and wide-brimmed hats [22,36]. Thus, the prevalence of skin cancers in these at-risk groups has the potential to be reduced through appropriate education and persuasive messages.

Clients' encounters with HCPs—especially primary-care physicians, who are typically the first to be seen—are theoretically and logistically prime environments for counseling about sun protection. Healthcare needs to endeavor to increase HCPs' currently low rates of counseling about sun protection. Although there are numerous reasons why HCPs do not counsel [37], a central one appears to be HCPs' low self-efficacy regarding counseling [38–43]. Fortunately, research shows that, for a variety of lifestyle behaviors, such as diet and smoking, short HCP-training sessions that are accompanied by simple office-support programs can increase HCPs' counseling rates, which in turn decrease patients' health-risk behaviors [44]. Thus, it is likely that HCP training that addresses sun protection can be efficacious.

This study has several limitations. First, it did not control for participants' education levels or skin types. Second, we relied on participants' self-reports, which are subject to recall and social-desirability biases [45,46]. Although participants' reports of the frequency with which their HCPs discuss health-risk behaviors might be moderately inflated relative to what actually occurs [47–51], research shows that persons' self-reports of physicians' prevention-based directives (e.g., to get a mammogram) are both reliable and valid (for a review, see Ref. [52]). Future research needs to study HCPs'

and at-risk populations' actual skin-cancer-related communication. This focus is strikingly absent in the lifestyle-counseling literature generally. For example, most of the successful interventions into HCPs' counseling about smoking and drinking implement a variety of preencounter training sessions and measure their effect on postencounter health- and behavioral outcomes. Although participating in such interventions increases HCPs' reports that they communicated with their patients about lifestyle behaviors [53,54], research provides "little evidence that physicians will voluntarily employ (intervention) techniques after receiving a training session" [55]. In sum, the very communication strategies that explain and predict clients' behavioral change—strategies that have been shown to affect patients' adherence generally [56]—have been relegated to the proverbial black box. Future research needs to focus on the interactional circumstances in which discussions about sun protection arise, how such topics emerge in interaction, the messages that HCPs use to persuade their clients to protect their skin from the sun, the communication strategies that clients use to resist such attempts, and ultimately how these interactional variables affect clients' subsequent sun-protection behavior.

Appendix A. Five multiple-choice questions summed for the dependent variable of skin-cancer-prevention knowledge

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1. How often should you conduct an exam of your own skin to help detect skin cancer?
   A. Whenever you take a shower.
   B. Once a month.*
   C. Once a year.
   D. Don't know/not sure.
2. How often should you get a clinical exam of your skin to help detect skin cancer?
   A. Only if you detect a chance in your skin.
   B. Once every five years.
   C. Once a year.*
   D. Don't know/not sure.
3. What type of material should you look for when selecting a protective shirt to wear while working in the sun?
   A. Loosely fitting and tightly woven.*
   B. Tightly fitting and tightly woven.
   C. Loosely fitting and loosely woven.
   D. Don't know/not sure.
4. How long before going out in the sun should you apply sunscreen for it to be most effective?
   A. 20–30 minutes.*
   B. Just before going in the sun.
   C. 5–10 minutes.
   D. Don't know/not sure.
5. Which of the following types of hats provides the best protection from the sun?
   A. Wide-brimmed straw hat.
   B. Baseball cap.
   C. Tightly woven wide-brimmed cloth hat.*
   D. Don't know/not sure.

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* Correct answer.

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