Sun-Protective Behaviors of California Farmworkers

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Objective: *Farmworkers are exposed to long hours of solar ultraviolet radiation (UVR), placing them at higher risk for skin cancer. The goal of this study was to evaluate farmworkers' sun exposure behaviors.* ***Methods:*** *Farmworkers (n = 326) in the San Joaquin Valley of California were interviewed about their sun protective behaviors; these behaviors also were observed directly and these data were used to assess whether participants adequately protected against UVR exposure.* ***Results:*** *All participants were Latino men with a mean age of 33 years. Although rates of wearing any hat and long-sleeved shirts were high, rates of wearing wide-brimmed hats and sunscreen were low.* ***Conclusions:*** *This study is important because there is limited research focused on farmworkers' protective behaviors against UVR exposure. Interventions to improve sun protection behaviors of farmworkers are needed.* (J Occup Environ Med. *2005;47:1244–1249*)

Ultraviolet radiation (UVR) exp is a key risk factor for both noma and nonmelanoma skin cer.[1–5] To reduce UVR exp organizations in the United S such as the American Cancer ety, recommend the use of prot clothing and sunscreen.[6] Farm ers are an important occupa group to target regarding UVI tection because they spend a amount of their work shift exposed to UVR. Although t knowledge, skin cancer rates a farmworkers are not known, s of farmers have shown increa risk of skin cancer.[7] Farmwo perform many of the same ta farmers. Still, there are differe such as exposure to pesticides may put farmworkers at a high for developing skin cancer.

To our knowledge, no studie been published that report ra overall sun protection beh among US farmworkers, incl skin protection. However, two ies have addressed eye protect farmworkers.[8,9] All participa both studies were of Latino eth Base rates of sunglasses[9] and glasses (clear or tinted)[8] were to be low. However, several s have evaluated sun-protective b iors among US farmers.[10–1 though information about fa sun-protective behaviors m helpful, its generalizability to workers may be limited, becau two occupational groups often differ in a variety of ways (eg cific job tasks, ethnicity, lang educational level, socioecon status). Therefore, the primary

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of the current study was to evaluate farmworkers' knowledge, perceptions, and behaviors regarding ultraviolet radiation (UVR) protection.

Materials and Methods

Participants and Setting

This observational, cross-sectional study was conducted during the summer of 2002 in the San Joaquin Valley of California. The farm from which participants were recruited consisted of 3000 acres in Tulare and Fresno counties and harvested different classes of nectarines, plums, and pomegranates. After obtaining permission from the farm owner and farm managers, a convenience sample was recruited by approaching 21 of 28 work crews, each consisting of 12 to 18 farmworkers. To participate, subjects had to speak Spanish or English and consent to participate in the study. A total of 326 male farmworkers was recruited, with a consent rate of 97%. Each participant was Latino, with Spanish as his primary language. Approval from the San Diego State University Institutional Review Board was granted before beginning data collection.

Measures and Assessment Procedures

The bicultural male interviewer (R.S.) explained the purpose of the study to each selected crew and then approached each crew member individually to explain the consent procedure and obtain oral informed consent. Then, each participant, while picking nectarines and/or plums, was interviewed in Spanish for approximately 15 to 20 minutes. In addition, at the time of the interview the interviewer observed and recorded the body coverage of each participant.

The primary instrument used in this study was a questionnaire with 61 close-ended items. The survey was pilot-tested in a group of farmworkers before its implementation. Information asked of the participants included the following: demographic items (age, marital status, education level, and birthplace), skin type/sun sensitivity (ie, propensity to tan or burn),[13] number of years working as a farmworker, hours worked per day, previous education on skin cancer protection, history of skin cancer, and sun-protective behaviors.

The questionnaire's items addressing sun-protective behavior had been used in a previous study in which the sun-protective behaviors of three groups of outdoor workers were assessed (postal, construction, and transportation workers)[14]; however, the original items were modified slightly for the purposes of the current study. The participants were asked how often they perform the following behaviors when in the sun for more than 15 minutes: (1) wear something on the head, (2) wear a hat with a surrounding brim of at least a 2½ inch border, (3) wear a long-sleeved shirt or blouse, (4) wear a shirt with a collar, (5) limit time exposed to sun at midday, (g) wear sunscreen with an SPF of 15 or higher, (7) wear sunglasses, and (8) wear gloves. An item addressing hand coverage, one that is relevant to the population of farmworkers, was added to the revised survey. Also, in contrast to the earlier survey, the participants were not asked about whether they wore long pants because they were required by their employer to wear long pants every day. The item responses were based on a Likert-type scale (Never = 1, Rarely = 2, Sometimes = 3, Often = 4, Always = 5). The same set of questions was asked twice—once to address the sun-protective behaviors during the summer (June to July) and once to address the sun-protective behaviors during the winter (November to March).

In addition to asking the participants about their sun-protective behaviors, the interviewer observed and recorded the following: head/face coverage, upper-body coverage, the wearing of sunglasses, leg coverage, and feet coverage. A Solar Protection Score (SPS) based on the work of Girgis and colleagues[15] was then computed to assess whether the farmworker was adequately protected the day of the interview, based on the recorded observations. Although Girgis and colleagues computed their scores based on coverage of a body site by *either* clothing or sunscreen, our scores in this and a previous study[14] were based on clothing coverage only.

Analysis

To compute the SPS, each individual body site was given a score, which is weighted based on the comparative risk for developing skin cancer in that area of the body.[15] The body site scores for each participant were then summed to create a total score, used to determine overall coverage. The range of possible scores was 0 to 16. A farmworker who received a score of 12 or greater, indicating 75% body coverage, was considered to be adequately sun protected at the time of the observation.[15]

The Statistical Package for the Social Sciences (SPSS; SPSS Institute, Chicago, IL) was used to analyze the data. Means and frequency distributions were described for selected items in the survey. We conducted *t*-tests to determine whether those workers who had higher versus lower levels of wide-brim hat use, long-sleeved shirt use, or perceived risk of skin cancer differed on number of years employed as a farmworker. Finally, χ^2 tests were conducted to determine if there was an association between skin type and the following variables: wide-brim hat use, long-sleeved shirt use, and perceived risk of skin cancer.

Results

Description of Study Subjects

The age range for the 326 male Latino farmworkers was 15 to 80 years ($M = 32.79$, $SD = 13.14$). The range for time spent as a farmworker was 0.25 to 52 years ($M = 14.23$, $SD = 11.37$). As shown in Table 1,

TABLE 1
Description of Study Participants (N = 326)

Variable	N (%)
Marital status	
Married	172 (52.8)
Single	153 (46.9)
Divorced	1 (0.3)
Education	
8th grade or less	297 (91.1)
9–12th grade	26 (8.0)
Some college	1 (0.3)
Bachelor's degree or higher	2 (0.6)
Skin type*	
I	23 (7.1)
II	48 (14.7)
III	134 (41.1)
IV	120 (36.8)
Eye color	
Brown	238 (73)
Hazel/Green	21 (6.4)
Blue	3 (0.9)
Grey	4 (1.2)
Black	60 (18.4)
Hair color	
Blond	4 (1.2)
Light brown	5 (1.5)
Medium brown	57 (17.5)
Dark brown	260 (79.8)
Untanned skin color	
White	15 (4.6)
Olive/dark white	40 (12.3)
Light brown	129 (39.6)
Dark brown	141 (43.3)
Black	1 (0.3)

*From Fitzpatrick.[13]

TABLE 2
Frequency Distributions for Sun Safety Behaviors (in Percent)*

Behavior	Never	Sometimes	Half the Time	Often	Always
Wear any hat	0.3 (0.7)	0 (0.3)	0 (0)	0.3 (0.3)	99.4 (98.7)
Wear wide-brim hat	76.7 (87.0)	6.4 (3.0)	7.4 (4.0)	2.5 (0.7)	7.1 (5.3)
Wear long-sleeved shirt	5.2 (4.0)	1.5 (1.3)	10.1 (5.0)	5.8 (0.7)	77.3 (89.0)
Wear shirt with collar	5.5 (3.0)	2.1 (2.7)	11.7 (9.0)	6.7 (3.0)	73.9 (82.7)
Wear sunglasses	92.0 (94.7)	4.6 (1.3)	1.5 (1.3)	0.6 (0.3)	1.2 (2.3)
Limit exposure to sun during work hr	99.4 (98.7)	0 (0.7)	0.6 (0)	0 (0)	0 (0.7)
Wear sunscreen SPF 15 or higher	97.2 (98.0)	0.3 (0.3)	0.3 (0)	0.6 (0.3)	1.5 (1.3)
Wear gloves	91.4 (31.6)	3.4 (4.0)	3.4 (4.7)	0.3 (3.7)	1.5 (56.1)

*Summer data (n = 326) are presented in the top half of each row, and Winter data (n = 301) are presented in parentheses in the bottom half of each row.

the majority of the farmworkers had an 8th-grade education or less. Approximately one-half were married. As determined by the Fitzpatrick scale,[13] approximately 78% had a skin type with a high propensity to tan and a low propensity to burn. Of the entire sample, only one person reported having had skin cancer, the type of which was unknown. Of the sample, 86.5% reported having no type of health insurance. Crops that participants spent the most time harvesting in the past 12 months included strawberries, citrus fruits, grapes, onions, apples, and other (eg, plums, peaches, nectarines).

Sun Safety Behaviors

Interview Items. Table 2 presents the data for the frequency of performing eight sun safety behaviors, reported for both summer and winter on Likert-type scales, with response options ranging from 1 (never) to 5 (always). The number of participants reporting winter data (n = 301) was lower because not all of the 326 participants work during the winter months. As shown, nearly all participants reported always wearing a hat when in the sun for more than 15 minutes. However, approximately three-quarters of participants reported never wearing a hat with a 2.5-inch border brim. Additionally, more than three-quarters of the participants always wore shirts with long-sleeves or a collar. Only 2 participants out of 326 reported limiting sun exposure at all during work hours. Most participants did not wear gloves during the summer, whereas more than half of the participants wore gloves during the winter. When asked if they use sunscreen while working, only nine participants reported any use. In fact, only 63 participants (19.3%) reported knowing what sunscreen is and why it is used. More than 90% of the sample did not wear any type of sunglasses or protective gear for the eyes. The distributions for most of the behaviors appeared to be fairly comparable between the summer and winter months.

SPS. Table 3 lists the SPS for each individual body site, and for the total body, on the day of the observation. Also presented is the percent of subjects considered to have adequate protection for each individual body site, and for the total body, a score calculated using methods developed by Girgis and colleagues[15] and modified by Stepanski and Mayer.[14] For total SPS, which can range from a minimum value of 0 to a maximum value of 16, 12 and higher is considered adequate protection, indicating that 75% of the body areas are protected from the sun.[15] The mean for total body SPS was 15.45 (SD = 1.00). The lowest SPS values assigned were for coverage of the lower arm and neck; approximately 80% of participants' scores indicated adequate protection for those areas. Most participants were observed as using adequate face protection, although as noted earlier, most participants failed to protect their eyes with sunglasses on a regular basis.

Exploratory Analyses. The items for wide brim hat and long-sleeved shirt use during the summer were recoded into dichotomous variables: always/often versus other. Also, the item for perception of whether one is at risk of skin cancer was recoded into a dichotomous variable: yes versus no/don't know. The results of a two-tailed t-test indicated that participants who reported wearing a long-sleeved shirt in the summer "often" or "always" had worked as a farm-

TABLE 3
Solar Protection Subscores and Score (N = 326)

Body Site	Mean Score (SD)	Percent With Adequate Coverage
Face/head (3)*	2.9 (0.62)	95.4
Neck (1)	0.80 (0.40)	80.4
Shoulders (2)	2.00 (0.00)	100
Upper Arm (2)	2.00 (0.00)	100
Lower Arm (1)	0.80 (0.40)	79.8
Torso (3)	3.00 (0.00)	100
Legs (3)	3.00 (0.00)	100
Feet (1)	1.00 (0.00)	100
Total (16)	15.45 (1.00)	99.6

Possible scores for face/head and torso = 0 or 3; for shoulders and upper arm = 0 or 2: for legs = 0, 2, or 3.

*Maximum possible score per body site noted in column one in parentheses. Adequate was defined as the maximum value for each individual body site and as 12 or higher for the total score.

worker significantly longer than those who gave a response of less than often (M = 14.8 years, SD = 11.63 versus M = 11.4 years, SD = 9.58), t(323) = −2.034, P = 0.043. Likewise, results from another two-tailed t test indicated that participants who reported wearing a wide-brim hat in the summer "often" or "always" had worked as a farmworker significantly longer than those who gave a response of less than often (M = 18.8 years, SD = 11.9 vs. M = 13.7 years, SD = 11.2), t(323) = −2.35, P = 0.019.

Before conducting χ^2 tests, skin type was recoded into a dichotomous variable: high propensity to sunburn and low propensity to tan (skin types I and II) versus low propensity to sunburn and high propensity to tan (skin types III and IV). There was no significant association between skin type and frequency of wearing a wide brim hat in the summer; $\chi^2(1, N = 325) = 0.13$, P = 0.724. There also was not a significant association between skin type and frequency of wearing a long-sleeved shirt in the summer; $\chi^2(1, N = 325) = 0.505$, P = 0.477. Finally, there was not a significant association between skin type and perception of risk for developing skin cancer in the summer; $\chi^2(1, N = 325) = 2.39$, P = 0.122.

Discussion

This study focused on the solar protection behaviors of a group of farmworkers in the San Joaquin Valley of California. As illustrated by the SPS, almost all farmworkers adequately covered their bodies with clothing. The lowest solar protection subscore assigned was for the lower arm, followed by the neck and face. Still, even with the three lower subscores, most farmworkers were observed as being adequately covered. Also, most farmworkers reported that they frequently wore some type of hat, a long-sleeved shirt, and a long-sleeved shirt with a collar.

Although the findings noted above are encouraging, there is room for improvement of sun-protective behaviors in the at-risk population of farmworkers. For example, three-quarters of the sample reported that they do not wear a hat with at least a 2.5-inch brim; this exposes the ears, neck, and possibly the face, to UVR. The interviewer observed that most participants wore baseball caps, which provide adequate protection for the face but may leave ears and neck exposed to high levels of UVR.[16,17] According to anecdotal observations made by the interviewer, baseball caps are popular among this sample because farmworkers embed themselves between branches in order to access the fruit and this type of hat is less likely to interfere with this process. In contrast, wide-brimmed hats are obtrusive during the picking process. Additionally, although use of clothing on other body parts was high, the actual UVR protection afforded by these clothes is unknown. Clothing characteristics such as the density of the weave, color, fabric content, shrinkage, stretching, wetness, and durability impact the level of protection.[18,19] Thus, it is possible that even the skin covered by loosely woven and/or wet fabric was receiving high cumulative amounts of UVR.

Farmworkers' use of sunglasses and sunscreen wearing also warrants attention. A negligible amount of farmworkers reported that they ever wore sunscreen when in the sun for more than 15 minutes. In fact, less than a quarter of the participants knew what sunscreen was and/or knew how to use it. Also, most of the sample reported that they do not protect their eyes from sun exposure by wearing sunglasses, a finding that is consistent with two previous studies of eye protection among farmworkers.[8,9]

It also might be important to specifically target the sun-protective behaviors of new farmworkers because the study results indicate that participants who have been farmworkers for a longer period of time are more likely to wear sun-protective clothing. Perhaps this difference can be attributed to an increase in exposure to and experience with occupational

hazards. For instance, the more senior farmworkers may have had more health effects from pesticides. Dermatitis, which is caused by pesticide exposure, has been found to be a major dermatologic problem among farmworkers.[20] Thus, a previous history of skin problems may have prompted some participants to wear long-sleeved shirts.

No relationship was found in this study between wearing protective clothing and self-reported skin type. Perhaps skin type does not relate to sun-protective behavior in this case because, rather than protecting themselves from the sun, farmworkers might be wearing protective clothing to protect themselves from other occupational hazards, such as pesticides and thorny branches.

Neither the number of years as a farmworker nor skin type was related to perceived skin cancer risk. This finding may be attributable to the fact that this group had limited or no knowledge about the long-term effects of UVR exposure on the skin. In fact, 35% of the participants in the current study reported not having any knowledge of skin cancer. Moreover, more than half of the participants did not know their own risk or thought that they were not at risk for skin cancer.

The SPS findings from the current study were compared with those from Stepanski and Mayer,[14] who reported SPS values for three groups of outdoor workers (postal, construction, and transportation workers) in San Diego, California. The proportion of workers with overall adequate coverage was higher in the current study (99.6%) than in the Stepanski and Mayer sample (50.4%). One explanation for this could be that, as mentioned before, the farmworkers might be protecting themselves from additional occupational hazards (eg, pesticides, thorns).

Findings from this study also were compared with those from the Marlenga study,[10] which focused on the health beliefs, knowledge, and behavioral practices in the prevention of skin cancer among Wisconsin dairy farmers. In the Wisconsin dairy farmer population, 86% reported that skin cancer was a serious disease and 74% felt they were more susceptible to developing skin cancer given their occupation. In the present study, 63% of participants either did not know if they were at risk, or felt they were not at risk, for developing skin cancer. The difference between perceived risks for skin cancer may be due to the average level of education, which was 12 years for the Wisconsin farmers, as opposed to the current study, where the majority of the participants had an 8th-grade education or less. Also, the Wisconsin farmers may have had greater access to resources such as clinics and hospitals, than do farmworkers. Finally, in a study of predominantly white male California farmers with a mean age of 54 years, rates of consistent hat use were high (70%), whereas rates of sunscreen use were low (31%).[12] These patterns mirrored those found in our study. Only 36% of the farmers reported wearing long-sleeved shirts more than half the time, a considerably lower rate than the 83% (summer use) found in our study. This difference may be due, in part, to differences in job tasks between the two occupational groups.

There are several design-related issues that should be addressed. This study was cross-sectional and thus may only reflect the behavior of the population at a given point in time. Also, the study participants were selected in a specific geographic location for convenience, which may limit the generalizability of the results to other farmworkers. However, the sample's demographic characteristics are similar to those of another, larger, national survey of farmworkers.[21]

Another potential design problem is the influence of social desirability on the self-reporting of sun-protective behaviors. Participants might have been concerned that, if they did not respond in a manner that would favor the company or staff, employment would be jeopardized. However, the data from participant self-reports and the observational measures made the day of the interview were consistent, thereby increasing the validity of the self-report data.

Because the sample's proportion of the more sun-sensitive skin types (I and II) was relatively low (ie, 22%), some may question whether the participants represent a population at high risk for skin cancer. Although sun sensitivity is indeed an important risk factor for both melanoma and nonmelanoma skin cancers,[22] it may be erroneous to assume that the sample is at "low risk." The sample's chronic exposure to UVR,[1–5,9,23] combined with several of their solar risk behaviors, warrants attention. And, as these workers age, the importance of skin and eye examinations will increase. Moreover, more than one-fifth of the participants—a considerable minority—*had* sun sensitive skin. As we noted in an earlier report of an ethnoracially diverse sample of U.S.P.S. letter carriers, excluding groups or individuals within an occupational group (in research and/or programs) may cause both ethical and social problems.[24]

The current study had a number of strengths. First, we achieved a high response rate, which decreased self-selection bias. Second, the study included a relatively large number of participants. Third, interviews and observations were conducted by the same interviewer, which allowed for greater consistency in assessment across participants. Finally, this study provided new information about the sun-protective behavioral practices of farmworkers, data that had not been available previously.

The results of the current study suggest that farmworkers are adequately covered based on patterns of clothing use. However, the actual UVR protection afforded by the clothing is unknown, and the reasons for wearing the clothing may be influenced by occupational hazards not

related to sun safety. Furthermore, more than half of the participants either did not know their risk, or felt they were not at risk, for the development of skin cancer. Programs and interventions tailored to this population need to be developed so that farmworkers can be educated about skin cancer and also about ways to prevent harmful exposure to UVR. Researchers need to collect detailed data about the fabric characteristics of clothing typically worn by this population to assess UVR protection level. Likewise, education about and provision of clothing having the highest levels of sun protection[19] are needed. It also will be important to expand studies of farmworkers' sun protection practices to other geographical regions and to assess whether migratory patterns affect solar protection behavior.

A key issue to consider in future research is the type of crop(s) with which the farmworker is working, because the factors specific to dealing with some crops may increase or decrease the likelihood of sun safety practices. For example, farmworkers who harvest grapes probably are exposed to UVR for longer periods of time than farmworkers who harvest fruits from trees, as trees provide some shade. As stated previously, most participants from the current study were adequately covered. However, several participants told the interviewer that they wore long-sleeved shirts primarily for protection against pesticide residue and thorny branches. Crops with less pesticide residue and fewer thorny branches (eg, organic strawberries) may influence farmworkers to dress in a manner affording less upper body protection. Therefore, future studies should include farmworkers working with different types of crops.

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