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Safety and Health at Work

Original Article

Outdoor Workers' Use of Sun Protection at Work and Leisure

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A B S T R A C T

Background: Outdoor workers are at risk of high ultraviolet radiation exposure, and may have difficulty using sun protection. The objectives were to determine the prevalence of sun protection behaviors in a sample of outdoor construction workers, and to assess which factors predict better sun protection practices.
Methods: Participants were recruited via construction unions. Workers answered a questionnaire on demographics, skin cancer risk, sun protection behaviors, and job. Sun protection behavior scores (from questions on sunscreen use, sleeved shirt, hat, shade seeking, sunglasses) were calculated by converting Likert-scale answers to scores from 0 to 4, and taking the mean (separately for work and leisure). Determinants of sun protection behavior scores were examined for work and leisure using generalized linear models.
Results: Seventy-seven workers had complete questionnaire data (participation 98%). Sun protection behaviors used most often were hats (79% often/always) and sleeved shirts (82% often/always); least prevalent were shade-seeking (8% often/always) and sunscreen (29% often/always). For both work and leisure scores, the strongest predictor was skin type, with fairer-skinned individuals having higher sun protection behavior scores. Workers had higher scores at work than on weekends. Workplaces that required hats and sleeved shirts for safety purposes had higher protection behavior scores.
Conclusion: This high-participation rate cohort helps characterize sun protection behaviors among outdoor workers. Workers practiced better sun protection at work than on weekends, suggesting that workplace policies supportive of sun protection could be useful for skin cancer prevention in the construction industry.

1. Introduction

Nonmelanoma skin cancers (NMSC) are the most common malignancies in countries with a majority of light-skinned people, including Canada [1]. The main risk factor for NMSC is excessive exposure to solar ultraviolet radiation (UVR), which is of particular concern to people who work outdoors. UVR exposure is also causally-related to cutaneous melanoma, cataract and possibly ocular melanoma [2].

A recent review of skin cancer prevention strategies in outdoor workers revealed variability in the use of protection [3]. Even

within one industry (construction), the proportion of workers reporting rarely or never using sunscreen at work ranged from 25% in an Australian study [4] to 92% in a French study [5]. The most frequent protection method used by outdoor workers was sunglasses, although this may have been to prevent glare rather than for cancer prevention [3,6]. The construction industry employs the most outdoor workers of any sector in Canada [7] and is also a group that has shown less enthusiasm for practicing sun protection [8].

Occupational settings, including construction, represent a particular challenge for promoting sun safety and skin cancer

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prevention. A good example is provided by a study of workers who had already been treated for NMSC. Researchers found no difference in sun protection behaviors between those who worked indoors versus those who worked outdoors, even though outdoor workers' exposure was much higher, including in their leisure time [9]. The most common reason for not wearing sun protection reported was *didn't get around to putting it on*. Identifying the determinants of which sun protection behaviors are used (or not) by construction workers could lead to better defined policies for workplace prevention of skin cancer.

For the present study, data on sun protection behaviors were collected via questionnaires (demographic, work history, and task information), and these data were used to answer the following research questions:

(1) How prevalent are workplace sun protection behaviors among outdoor construction workers in British Columbia?
(2) What are the determinants of the protective behaviors identified in Question 1?

2. Materials and methods

2.1. Study design

The Outdoor Workers Project was a study that took place in summer 2013 in the Vancouver, British Columbia area (approximate latitude of 49°N). Workers filled out a questionnaire that included demographics, skin cancer risk factors, job characteristics, and sun protection behaviors undertaken while at work as well as in leisure time.

2.2. Study sample

Participants were recruited via trade unions and by approaching companies with outdoor operations via their health and safety staff. Several workers also learned about the study via word-of-mouth; some did not work in construction, but were mostly men working in male-dominated workplaces (horticulture/landscaping and wildlife protection), so they were invited to participate. Eligibility was met by those workers who were aged at least 18 years, and who spent part of an average workday outdoors. Although ideally the worker would have expected to work 5 days during their sampling week, those with more or less than 5 days scheduled were also invited to participate. All workers provided informed consent. The study protocol was approved by the University of British Columbia Research Ethics Board (certificate H11-01272).

2.3. Data collection and analytic variables

Data collection for the present study involved the use of a self-completed questionnaire. The questions were selected from a standardized set developed for measuring sun protection behaviors in outdoor workers [10]. A pilot version of the questionnaire was pretested on five workers, and modifications were made based on their feedback (mainly increased clarity on skin type and hair color descriptions).

Risk factor and demographic variables included the following: age; sex; number of hours spent outdoors between 10 AM and 4 PM on an average workday and leisure day (range, 1–6 hours); spending time in the sun to get a tan (often/always or sometimes/rarely/never); reporting more than one painful or blistering childhood sunburn (yes/no); reporting a family history of skin cancer (yes or no/don't know); skin type based on the Fitzpatrick scale [11], grouped as fair (type I and II), medium (type III) and dark (type IV or higher); eye color, grouped as light (blue, grey, or green) or dark (hazel and darker); hair color (blonde/red or brown/darker); number of sunburns in the previous summer (0, 1, or ≥ 2); and race (Caucasian or non-Caucasian). Job variables included education, industry, job title, description of tasks, and length of employment at the current job. Industry and occupation information was used to group workers into three broad categories. These were marine construction (pile driving, working on boats, dock building); land-based construction (road building and paving, concrete finishing, and residential construction); and horticultural/nonconstruction (golf course maintenance, wildlife protection, landscaping).

Data on sun protection behaviors were collected via Likert-scale answers (never, rarely, sometimes, often, always) to the questions outlined in Table 1. Questions on behaviors were asked identically but separately for work and leisure days. In addition, workers were asked how often they spent time in the sun in order to tan.

Leisure and work sun protection behavior scores were calculated by scoring each answer to the questions in Table 1 (wearing sunscreen, a sleeved shirt, a hat, sunglasses, and seeking shade) on a five-point ordinal scale ranging from 0 (never using the behavior) to 4 (always using the behavior) [12,13]. A composite score of all five behaviors was created by averaging these scores, separately for workdays (work protection behavior score) and leisure days (leisure protection behavior score), leading to scores in the range of 0 to 4.

2.4. Statistical analyses

Differences in the use of sun protection behaviors between work and leisure were tested using McNemar test to compare the proportion who often or always practiced the behavior by setting. Hours spent outdoors and the sun protection behavior scores were also compared between work and leisure time, using paired *t* tests. Multiple linear regression using SAS PROC GLM (SAS Version 9.3 for Windows; SAS Institute Inc, Cary, NC, USA) was used to model the determinants of sun protection behavior scores separately for work and leisure. Manual backwards stepwise regression was used. Explanatory variables considered for entry into the model were demographic (sex, age, race), personal risk factors (skin type, hair and eye color, having had more than one childhood sunburn, number of sunburns the previous summer, family history of skin cancer), and training and work characteristics (education, job group, job tenure). The best fit model was chosen by removing the least significant variable one by one, and leaving those variables in the model where *p*-values were below 0.2. Model results were produced as least squares means for ease of interpretation.

3. Results

Seventy-eight of 80 outdoor workers were recruited (two refused, for a participation rate of 98%). For this study, one worker

Table 1
Sun protection behavior questions from the Outdoor Workers Project questionnaire

For the following questions, think about what you do when you are outside AT WORK during the summer on a warm sunny day.
1. How often do you wear SUNSCREEN?
2. How often do you wear a SHIRT WITH SLEEVES that cover your shoulders?
3. How often do you wear a HAT?
4. How often do you stay in the SHADE or UNDER AN UMBRELLA?
5. How often do you wear SUNGLASSES?

Answers were on a five-point scale: never, rarely, sometimes, often, or always.