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Adoption of Sun Safe Work Place Practices by Local Governments

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Abstract

Context—Outdoor workers are especially susceptible to skin cancer, the most common, but also one of the most preventable, forms of cancer. Colorado, the location of the study, has the second highest rate of skin cancer deaths in the nation.

Objective—Local government managers in Colorado—in municipalities, counties and special districts—were surveyed in order to ascertain the extent to which they engage in formal (written) and informal practices to protect their outdoor workers against excessive exposure to sun.

Design—The survey consisted of 51 question assessing awareness of formal or informal practices for sun protection of outdoor workers. An index of practices--the study's dependent variable--was created that was comprised of practices such as providing employees free or reduced-cost sunscreen, wide-brimmed hats, sunglasses, long-sleeved work shirts, long work pants, and temporary or permanent outdoor shade shelters. Proscriptive policies, such as restricting the use of broad brimmed hats, were subtracted from the index. Surveys were completed by 825 administrators representing 98 jurisdictions. Responses from administrators in the same jurisdiction were averaged.

Results—Over 40 percent of responding jurisdictions indicated that they engaged in informal sun safety practices. Tests conducted to determine what variables might account for the adoption

of these sun protection practices found that the degree to which a community could be regarded as cosmopolite and as having an individualistic political culture were significant predictors. Type of government was also significant. Although, higher community income was a significant predictor, neither local government budget nor size was significant.

Conclusions—The adoption of sun safe practices bears low costs with potentially high returns. Findings from this study suggest that awareness campaigns might most effectively target cosmopolite communities, but that the greatest impact might be achieved by targeting localite communities. Government size and budget do not appear to be constraints in the adoption of sun safe practices.

Increasingly, local governments work to improve the health and safety of their employees. For example, Mesquite, Texas developed an employee health center resulting in lower personnel medical costs \$1 – 1.5 million annually. Likewise, Dublin, Ohio reduced the number of employees in the ‘high risk health’ category from 11.1 to 5.4 percent.¹ Although some practices (i.e., typical behaviors in an organization) are mandated by outside agencies, such as OSHA, many are voluntarily adopted by local governments because they promise significant benefits both in safeguarding productivity and containing medical insurance costs.

An often-ignored employee health issue is skin cancer, the most common cancer in the United States, with 3.5 million new cases reported each year.² Skin cancer, which is associated with excessive exposure to solar ultraviolet radiation,³ is a threat to the nine million outdoor workers in the United States.⁴⁻⁶ Fortunately it is one of the most preventable forms of cancer.² Health authorities recommend that outdoor workers: avoid sunburn; limit time in the sun; reduce sun exposure at midday; use and reapply sunscreen with an SPF of 30 or higher; and wear protective clothing including hats and eyewear.

Skin cancer is preventable, but programs designed to promote sun safe workplace practices have had mixed results.⁷ However, Buller, Andersen, Walkosz, and associates⁸⁻¹² developed and tested a health communication program promoting sun safety practices with North American ski industry employees that produced good compliance with recommended practices.

Promoting Sun Safety by Local Governments

Based on the success of the ski industry study, a new program, Sun Safe Workplaces (SSW), was developed and implemented with local governments in Colorado, a state tied for second in the nation for the highest skin cancer mortality rate.¹³ SSW was designed to examine whether sun safety practices and written policies would be adopted by local governments (municipalities, counties and special districts) as the result of using a multi-channel program combined with the availability of model personnel policies. The findings reported here are based on a pre-intervention survey of 825 officials in 98 participating local governments. Few of the responding officials (9.94%) reported that their department had a formal (written) policy or training standard for SSW practices. However, 41.3 percent indicated that their organization had “unwritten standard operating, administrative, or training procedures...intended to improve the sun protection of employees....” The strong prevalence

of unwritten policies or practices raised the research question considered here: What community and organizational characteristics account for the voluntary adoption of SSW practices?

Predictive Community and Organization Characteristics

Research by Bingham¹⁴ on factors affecting the adoption of innovations by local governments distinguished two sets of system variables--organizational structure and organizational characteristics; and two types of environmental variables--community characteristics and community demand. Perry and Kramer's¹⁵ study - of computer technology adoption by local governments developed a similar model employing three clusters of explanatory variables: extra-organizational and intra-organizational characteristics and a third cluster related to attributes of the innovations themselves (e.g., complexity, cost, etc.). Kearney's¹⁶ model contained three clusters of variables, but his third cluster is related to the characteristics of innovators and change agents. Two common elements in these models are community characteristics, describing the organizational environment and the population it serves, and characteristics of the organizations themselves.

Community Characteristics

Considerable research on the adoption of innovations by local governments focuses on the use and application of computer-based technology (labeled "e-government") ranging from improved analytics (e.g., geographic information systems) to two-way communication with citizens (e.g., 3-1-1 systems). Several community characteristics are commonly associated with early adopter local governments: 1) population size, with larger communities usually being more innovative¹⁷⁻²⁰; 2) socioeconomic variables, with communities having greater income and education levels being more innovative^{14,21}; (3) having a cosmopolitan vs. a local orientation, with cosmopolitan communities being more innovative; and (4) cultural or political values, with more liberally-oriented communities favoring innovations. The effects of these last two characteristics merit further explanation.

Cosmopolite vs. Localite Communities

A strong predictor of the adoption of innovations is the extent to which an individual is a 'cosmopolite' versus 'localite.'^{22,23} Cosmopolites have more connections external to their own community. They are more attuned to news and current affairs, identify with and have knowledge of international cultures, and have heterogeneous interpersonal networks.^{24,25} Conversely, localite individuals communicate mainly with people in their own environment and are less attuned to outside information sources. Urban dwellers are generally more cosmopolite than rural residents.^{24,25} Indeed, Jeffres²⁶ has argued that cities are more than urban places with large populations; they are information hubs that facilitate communication and information exchange.

Earlier adopters use more cosmopolite channels and networks than do later adopters of innovations.^{22,23,27,28} Cosmopolitanism predicts adoption of medical and health innovations. Coleman, Katz and Menzel²⁹ showed that more socially-connected doctors adopted drugs

faster than socially-isolated doctors. Subsequent research³⁰ found that the drug tetracycline was adopted more quickly by cosmopolite doctors who more frequently visited out-of-town medical centers, read more medical journals, and were more attuned to the medical community at large. By contrast, socially-isolated doctors were slower to adopt new drugs. Rogers and Peterson³¹ reported that interpersonal professional networks connecting a community with previously adopting communities were predictive of the adoption of clean air ordinances.

Cosmopolitanism predicts innovation by local government. Holden, Norris and Fletcher¹⁷ found that centrally-located cities in a metro-region were more likely to adopt e-government innovations than suburban or exurban cities. Similarly, Reddick³² found that centrally-located cities were more likely to adopt customer service (3-1-1) systems. However, no prior studies have examined whether such diffusion patterns apply to employee health or safety practices. By examining the influence of cosmopolitanism on SSW practices, the present article extends prior literature to a new domain of public health.

Political Values

Among community characteristics associated with early adoption are political values or political cultures. Elazar³³ defines political culture as values, beliefs, attitudes and patterned forms of behavior that differentiate a group of people who live in geographic proximity. He developed a tripartite topology distinguishing: moralistic political cultures that orient toward the 'commonwealth', adopting policies that support a 'good society' for their citizens; individualistic political cultures that view the political arena as a 'marketplace' of competing interests based on primarily private, utilitarian motives; and traditionalistic political cultures that have ambivalent attitudes toward the marketplace and a paternalistic view of the 'commonwealth.'

Considerable research has refined and applied Elazar's typology³⁴⁻³⁶ mostly in relationship to electoral politics, but also in the adoption of innovations. In its political application, moralistic communities have been found to vote for Democrats, at least in presidential elections and primaries.^{37,38} For administrative reforms, political culture helps explain differences in voter registration laws and voting participation among the states. King observes that "political cultures which value individual participation in the political process have governments that adopt less restrictive legal requirements for registering voters and achieve higher rates of electoral participation".^{39(p. 127)} States with a moralistic political culture demonstrate more policy liberalism with a greater tendency to innovate.⁴⁰

With respect to general health, Kincaid⁴¹ found that metropolitan areas (SMSAs) having a predominantly moralistic political culture had high quality of life ratings, those with an individualistic culture received intermediate ratings, and those with a traditionalistic culture had low ratings. Regional cultures and communities accounted for significant variation in smoking attitudes and behaviors independent of smoking status and personal characteristics.⁴² States with moralistic political cultures have higher levels of state taxation, expenditures, and public services independent of other factors.^{34,43}

Public health initiatives are more likely in states with a moralistic political culture. Moralistic political culture is positively associated with increased medical coverage for state employees,³⁴ and with overall state health expenditures,⁴⁴ but negatively associated with African American mortality.⁴⁵ Blomquist,⁴⁶ in a study of water regulation in Indiana counties, found a strong correlation of moralistic cultures with water quality regulations but not with water quantity.

This suggests several hypotheses, tested in the research reported here, that account for why some local governments in Colorado would chose to adopt informal SSW practices.

H1. Higher levels of community income will be positively associated with earlier adoption of sun safe workplace practices.

H2. Higher levels of community cosmopolitaness will be positively associated with earlier adoption of sun safe workplace practices.

H3. Higher community liberal political values will be positively associated with earlier adoption of sun safe workplace practices.

Organizational Characteristics

Several characteristics of local governments correlated with the adoption of innovations have been identified, including: 1) size; 2) resources; 3) type; and 4) governance structure and professionalism. As with communities, organizational size is associated with early adoption; with larger local governments tending to be more innovative.^{14,17-20,47,48} The connection with size may be associated with external demands on larger governments to provide more services to more people, often with smaller per capita budgets.^{49,50} However, Hage and Aikem⁵¹ found that smaller governments may actually have greater flexibility and therefore find it easier to be early adopters, while Reddick³² in a study of 3-1-1 systems found that size did not correlate with early adoption.

Fiscal resources, which may be related to size, are also a factor in adoption. Larger organizations have larger budgets, though the size of a budget is less predictive than the presence of slack or discretionary resources.^{14,18} Conversely, fiscal stress correlates with adoption; that is, when governments have tight resources they adopt new practices and/or technologies that promise budget savings.⁵² Professional staff expertise in the area of the innovation is associated with adoption. Again, larger organizations would presumably have greater diversity of staff skills (e.g., people with IT or GIS abilities).

The type of local government—city, county or special district—also predicts early adoption, but primarily when combined with structural factors related to governance. Council-manager municipal governments and council-administrator county governments were more likely to be early adopters of e-government practices.^{17,18} The ability of managers to act with professional independence vs. having most of their decisions subject to political review and approval provides them with the ability to adopt innovations.^{18,49,53,54} However, Reddick³² found with 3-1-1 systems that there was a greater rate of adoption among mayor-council vs. council-manager municipalities. Consideration of the characteristics of local governments suggests two additional hypotheses to be tested:

H4. Early adoption of sun safe workplace practices vary by type of local government.

H5. Early adoption of sun safe workplace practices is greater when higher levels of resources are available to local governments within type.

Methods

Sample

In selecting a sample for the study, all potentially eligible cities, counties, and special districts in Colorado with at least 3000 residents were stratified by region (the urban Front Range, eastern high plains, and the Western Slope) and randomly ordered using a computerized program. Project staff then attempted to contact the senior manager in each jurisdiction (e.g., city manager) working down the randomized list until a statistically valid participation quota was met. Of 571 organizations invited to participate in the study, 180 were found to be ineligible and 91 never responded. Of the remaining 300, 135 organizations agreed to participate, 113 refused and 52 had not decided on participation before enrollment was closed. Ultimately, 98 local jurisdictions provided their formal written workplace policy documents and had at least 6 senior administrators, representing individual departments within the jurisdiction, complete the pretest questionnaire.

Individual departmental administrators within jurisdictions that agreed to participate were sent email and regular mail invitations to complete the questionnaire which was online. They were also sent reminders weekly for one month. A total of 972 administrators were invited to complete the baseline questionnaire and 825 (84.9%) completed it. The data reported here is from these 98 jurisdictions and 825 respondents.

Baseline Questionnaire

The baseline questionnaire contained 51 items that assessed awareness of formal (written) and informal practices for sun protection of outdoor workers. The questionnaire also included items concerning: perceived risk for skin cancer; personal sun protection practices and history of sunburn and of skin cancer; manager's innovativeness; and opinion leadership.

A SSW index was embedded in the questionnaire. In part, the index consisted of responses to the overarching question: "Does your organization provide any of the following items to employees free or at reduced cost to help protect them from overexposure to the sun while at work?" Individual items included under this question asked about such things as the practice of using sunscreen, wide brimmed hats, etc. Each item was scored as "1" for yes or "0" for no. There were seven prescriptive practices or items underlying this question yielding a maximum score for the SSW index of 7.

The index also incorporated responses to the question: "Does your organization have any policies that make it more difficult for employees to use sun protection? Specific items included restricting the use of sunglasses, restricting the use of shade structures, etc. There were six proscriptive policies or items that could yield a total score for the SSW index of minus 6. All departments within a participating jurisdiction were scored separately, and then

their scores were averaged. This average score was used for purposes of statistical analysis. The average score for jurisdictions was 2.42 with a standard deviation of 0.99.

Cosmopolitanism was measured by distance from a major airport (within 100 miles). This operationalization of cosmopolitanism is consistent with the abundant literature indicating that localite orientation and isolation is negatively associated with cosmopolitanism and travel is highly and positively associated with other measures of cosmopolitanism.²²

Statistical Analysis

The study's dependent variable consisted of the index of SSW practices for participating jurisdictions. The index was treated as a continuous variable in all analyses. It is normally distributed with a p -value = 0.15. Independent variables consisted of the community and organizational variables identified in our hypotheses, including: average household income in the jurisdiction, level of cosmopolitanism, political culture, type of government, and level of government resources. The influence of these variables was assessed using: two sample t -tests (PROC TTEST in SAS) for dichotomous predictors; ANOVA (PROC GLM in SAS) for nominal predictors with 3 categories; or simple linear regression models (PROC GLM in SAS) for continuous predictors. A two-tailed alpha criterion of 0.05 was used for all models.

Results

Three hypotheses tested effects of community characteristics on adoption of SSW practices. Hypothesis one, which posited a positive relationship between higher income within a jurisdiction and early adoption of SSW practices was supported. Average household income (based on the 2010 Census as obtained from the Department of Local Affairs) was used for cities and counties. Since income is not calculated for special districts, the income for the county within which they fell was used; and for districts falling in more than one county a weighted average was used ($F = 5.32$; $p = 0.0233$, $\eta^2 = .05$). A corollary assumption is that a higher level of education in a community correlates with early adoption. This assumption, using the percentage of a jurisdiction's population with a bachelor's degree or higher as the measure, was not supported ($F = 1.63$, $p = 0.2053$).

The second hypothesis posited that more cosmopolitan communities are more likely to be adopters of SSW practices. This hypothesis was strongly supported ($F = 16.41$; $p = 0.0001$, $\eta^2 = .16$).

A third hypothesis predicted that early adoption will be correlated with political culture or values. Initially, in trying to test this hypothesis, Elazar's map of cultures was used, but no significant relationship was found (chi-square = 4.8604, p -value = 0.088). At the suggestion of Robert Lovey, professor of political science at Colorado College and co-author with Tom Cronin of *Colorado Politics and Government*,⁵⁵ counties with moralistic and traditionalist political cultures were collapsed. These cover all of the counties that voted for the Democratic presidential candidate for the last 24 years. Using this party division, political cultures showed a significant association with adoption of SSW practices (two-sample t -test where $t = 2.34$, $p = 0.0212$, $\eta^2 = 0.054$). However, the result was opposite from the

direction predicted. Rather than the Democratic/liberal communities, it was the Republican/conservative communities who were the dominant early adopters.

Two additional hypotheses considered the effects of organizational characteristics on adoption. Hypothesis four posited that type of government (municipality, etc.) affects early adoption, primarily when type is combined with governance structure; that is, when the local government is run by professional managers who are relatively insulated from supervision by elected officials. Unfortunately, the survey conducted for this study only considered type but not governance structure. Nevertheless, very few counties in Colorado operate under home rule charter, which means that their managers are more closely supervised by commissioners. Special districts have elected boards, but tend to be fairly apolitical. Approximately two-thirds of Colorado municipalities operate under a council-manager organizational structure. Given these governance distinctions, a test of hypothesis four would presumably show municipalities with the highest number of early adopters, followed by special districts and then counties.

In the present study, a comparison of SSW practices by government type did reveal a significant difference ($F = 4.13$, $p = 0.0191$). Counties had more SSW practices (mean = 2.68) than cities (mean = 1.72; least squares means for the two groups = 0.0161), with special districts falling closer to counties in their average number of practices (mean = 2.37). This was not consistent with hypothesis four.

The final hypothesis holds that within government type, adoption will vary by the level of resources available, with those governments having greater resources (but especially “slack” or surplus resources) more likely to be adopters. To test this relationship a subsample of early adopter local governments was identified; that is, those reporting SSW practices above the mean for their type. The overall budget of governments in the sample was divided by the jurisdiction's population to construct a normalized level of resources available. Population and budget data for 2009 were obtained from the Colorado Department of Local Affairs. This data is available for cities and counties but not for special districts and there were few counties in the sample. Thus only cities were included in the analysis. For adopter cities, per capita expenditures ranged from a high of \$4,878 to a low of \$475. It can reasonably be assumed that budgets at the high end of this range have slack. In this sample, there is no support for the hypothesis that budget size correlates with early adoption of SSW practices. See Table 1 for a summary of all findings.

Discussion

One of the most interesting findings in the present study was that, as hypothesized, local government jurisdictions serving more cosmopolite and affluent communities were most likely to engage in SSW practices. Theoretically, this finding extends research on diffusion of innovations regarding cosmopolite versus localite communities to health promotion. Cosmopolite communities tend to have residents with higher incomes and the present study also found a strong correlation between community income and the adoption of sun safe practices. Community income may indirectly affect the type of personnel hired by local governments. Presumably more affluent communities are more desirable places to work and

live and should therefore attract more competitive supervisory employees who are themselves more cosmopolitan. Health communication with local governments in such communities may be easier because their managers are presumably professionally well-networked and may already have familiarity with the benefits of sun safe practices. The education level of communities was unrelated to adoption of sun safety practices suggesting that benefits of cosmopolitanism have less to do with education levels of residents than with organizational personnel and their communication networks.

Another income-related variable, local government budgets, was not significantly related to early adoption. The literature on adoption suggests that local governments with greater resources, and especially slack resources, are more likely to be early adopters. That research, however, focused on the adoption of e-government innovations that involve significant equipment and personnel costs. While the present study found that some early adopting communities had high per capita expenditures, others had relatively modest levels indicating that adoption may differ by type of expenditure and context.

Theory and previous research suggests that communities with a moralistic political culture are more concerned with resident's health and wellbeing and presumably of their employees. However, our findings indicate that, to the contrary, individualistic communities are more likely to be early adopters of sun safe practices. Since individualistic communities place a premium on government efficiency and effectiveness, it may be that their high rate of adoption reflects a perception that SSW practices yield a return in the form of better employee productivity, improved health and lower health costs.

The literature on the adoption of innovations by local governments suggests that organizations with professional management insulated from detailed political oversight are more likely to be early adopters. For the present study, this suggests that cities should be the early adopters since the majority of Colorado municipalities operate under the council-manager form of government. To the contrary, counties were the early adopters, followed by special districts. Why this is the case is not clear. However, it should be noted that the urbanized Colorado Front Range counties all operate with professional managers and that during their careers managers tend to move back and forth between county and municipal positions. This may dampen the influence of organizational type on adoption.

Health Promotion Implications

This study has implications for health promotion in government workplaces. First, public health experts trying to stimulate diffusion of new health practices might target cosmopolitan communities that are primed to move. Yet, potential gains may be greatest by targeting localite communities since these are more isolated. Second, unlike e-government innovations, because the adoption of SSW practices involve low costs and significant saving in downstream health care expenses, local government budget constraints, are not a significant factor here. Likewise, government size, which affects the adoption of expensive innovations, does not appear to be a constraint here. Third, the finding that individualistic communities are significant early adopters suggests that SSW practices are perceived non-ideologically, as good work place practices with practical benefits. Similarly, benefits from the adoption of these practices does not appear to raise political concerns which come into

play when governmental departments are under more direct supervision by elected officials. In short, health care promotion should stress low cost, modest behavioral changes and potentially significant personal and organizational benefits.

Limitations

As with any study, limitations on the conclusions should be acknowledged. First, these data are limited to Colorado and may generalize best to Rocky Mountain and western states. However, Colorado has the highest altitude and some of the highest solar ultraviolet radiation (UV) in the nation, the primary cause of skin cancer. Prior findings show that people living at higher altitude near ski areas are most aware of the dangers of UV.^{56,57} Thus, it is unlikely that the factors associated with SSW practices would change in other states. Nonetheless, data from other states are needed to corroborate these findings. Second, like the population of Colorado itself, most of the jurisdictions within this sample are on the urbanized Front Range of the state (just east of the Rocky Mountains) and may over-represent more cosmopolite locations. Future studies should oversample rural areas to achieve better balance. Finally, the outcome measures in this study are from managers' reports of practices not the actual policies or behaviors of these organizations. The validity of such findings would be increased if written policies of government organizations were sampled or if actual behavior of managers and employees could be observed.

Future Research

Given the omnipresent threat of skin cancer in outdoor workers, future research should find creative, theory-based methods of improving SSW protection. Studies should explore whether institutional or individual interventions or a combination are most effective in improving sun protection by persuading organizations to adopt SSW policies or practices that institutionalize sun safety. In addition, individual interventions targeted directly at outdoor workers should be tested to ascertain the best ways of convincing employees to adopt sun protection practices personally.

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Table 1

Summary of Hypotheses and Findings

Hypotheses	F score	Significance (p)	Eta ²	Two-Sample t-test	Least square means for two groups
H1. Higher levels of community income will be positively associated with earlier adoption of sun safe workplace practices.	1.63	0.0233	0.05		
H2. Higher levels of community cosmopolitanism will be positively associated with earlier adoption of sun safe workplace practices.	16.41	0.0001	0.16		
H3. Higher community liberal political values will be positively associated with earlier adoption of sun safe workplace practices.		0.0212	0.054	2.34	
H4. Early adoption of sun safe workplace practices vary by type of local government.	4.13	0.0191			0.0161
H5. Early adoption of sun safe workplace practices is greater when higher levels of resources are available to local governments within type.	Missing data, not able to test for statistical significance. Available data does not support this hypothesis.				