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Preventive care utilization: Association with individual- and workgroup-level policy and practice perceptions

Erika L. Sabbath, ScD[*],
Boston College, School of Social Work, Chestnut Hill, MA

Emily H. Sparer, ScD,
Center for Community-based Research, Dana-Farber Cancer Institute, Boston, MA

Department of Social and Behavioral Sciences, Harvard T.H. Chan School of Public Health, Boston, MA

Leslie I. Boden, PhD,
Department of Environmental Health, Boston University School of Public Health, Boston, MA

Gregory R. Wagner, MD,
Department of Environmental Health, Harvard T.H. Chan School of Public Health, Boston, MA

Dean M. Hashimoto, MD, JD,
Workplace Health and Wellbeing, Partners HealthCare System, Boston, MA

Boston College Law School, Chestnut Hill, MA

Karen Hopcia, ScD, and
Workplace Health and Wellbeing, Partners HealthCare System, Boston, MA

Glorian Sorensen, PhD
Center for Community-based Research, Dana-Farber Cancer Institute, Boston, MA

Department of Social and Behavioral Sciences, Harvard T.H. Chan School of Public Health, Boston, MA

Abstract

Preventive medical care may reduce downstream medical costs and reduce population burden of disease. However, although social, demographic, and geographic determinants of preventive care have been studied, there is little information about how the workplace affects preventive care utilization. This study examines how four types of organizational policies and practices (OPPs) are associated with individual workers' preventive care utilization. We used data collected in 2012 from 838 hospital patient care workers, grouped in 84 patient care units at two hospitals in Boston. Via survey, we assessed individuals' perceptions of four types of OPPs on their work units. We linked the survey data to a database containing detailed information on medical expenditures. Using multilevel models, we tested whether individual-level perceptions, workgroup-average

[*]Address correspondence to: Erika L. Sabbath, ScD, School of Social Work, McGuinn 202, 140 Commonwealth Ave, Chestnut Hill, MA 02467, erika.sabbath@bc.edu, 617-552-2934.

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perceptions, and their combination were associated with individual workers' preventive care utilization (measured by number of preventive care encounters over a two-year period). Adjusting for worker characteristics, higher individual-level perceptions of workplace flexibility were associated with greater preventive care utilization. Higher average unit-level perceptions of people-oriented culture, ergonomic practices, and flexibility were associated with greater preventive care utilization. Overall, we find that workplace policies and practices supporting flexibility, ergonomics, and people-oriented culture are associated with positive preventive care-seeking behavior among workers, with some policies and practices operating at the individual level and some at the group level. Improving the work environment could impact employers' health-related expenditures and improve workers' health-related quality of life.

Keywords

preventive health care; organizational policies; psychosocial factors; health care utilization

Introduction

In 2014, the average American consumed over $9,500 worth of health care. This translates to $3 trillion spent annually in the US, or 17.5% of the national gross domestic product (GDP) (1), far more than other OECD countries (2).

Of US health care expenditures in 2014, approximately 3% was spent on preventive care (3). Preventive care holds potential both for reducing future health care costs and decreasing burden of disease in the population. Direct cost savings come from primary prevention: vaccinations, smoking cessation and weight loss programs, and routine measures that prevent disease development or longer-term costs outright, such as daily aspirin use or contraception (4, 5). Secondary prevention, in which diseases are caught early and before they progress (such as cancer screening, cholesterol screening, and osteoporosis screening), save fewer dollars in the short term but lead to more healthy life-years for people to remain active and economically productive, a net economic benefit (4, 6). Thus, initial investment in preventive care produces both short- and long-term economic, quality-of-life, and health benefits. Despite evidence that primary and secondary prevention can both save money and improve health, uptake of such services is relatively low. Guidelines state that adults should receive blood pressure checks at least once per year (7), and they should receive other screening procedures either annually or in longer intervals depending on the procedure (8).

Aside from the impact of insurance coverage status, several studies have examined other correlates of preventive care utilization. Utilization is lower among men (9), younger people (10), African-American people, and immigrants (11). But beyond these fixed factors, little is known about modifiable social factors, especially those at the group or community level, that may contribute to or inhibit utilization of preventive care services among those who are insured.

In the United States, approximately 50% of people receive health coverage through their employer (12). Employers therefore have a stake in increasing preventive care utilization, both for direct cost savings on health care and to improve employee productivity by reducing

illness and absence; for example, employees who get annual flu vaccines are less likely to miss work due to flu. But before organizations can increase use of preventive care services, workplace-specific determinants of that utilization must be identified. Organizational policies and practices (OPPs) within companies and workgroups are a particularly ripe area of inquiry into determinants of preventive care utilization because they concurrently affect many workers. OPPs are also structural workplace factors, and thus they may be easier to change, enforce, and maintain than individual-level behavior change.

Our goal was to test whether workers' own perceptions of four types of OPPs within their units, as well as the overall perceptions of these OPPs within their direct workgroup, were associated with individual-level preventive care utilization over a two-year period. We chose four types of OPPs shown in other studies to be associated with workers' health status—safety practices, ergonomic practices, people-oriented culture, and workplace flexibility (13–15). We hypothesized that in units with more worker-friendly OPPs, workers would have more preventive care visits than workers in units with less-positive OPPs, even though the policies and practices under consideration do not directly address preventive care. We also hypothesized that workgroup-average perceptions of OPPs would be more strongly associated with preventive care than individuals' perceptions of OPPs. These hypotheses are rooted in the National Institute for Occupational Safety and Health (NIOSH)'s Total Worker Health® model, which posits that workplace policies and practices may influence both work-related and non-work-related health outcomes (16).

Our hypotheses about the stronger health effects of workgroup-level versus individual-level exposure to the same phenomena are based on prior studies which found that certain psychosocial exposures at work—such as workplace verbal abuse, schedule control, or general work stress—have differing associations with health, depending on whether they are assessed at the individual or the unit level (17–20). Those studies found that individual perceptions of some workplace stressors can impact individual health directly. But for many stressors, when a certain proportion of workers in a workgroup experiences the same stressors, the stress becomes part of the group-level psychosocial work environment, potentially exerting health effects even on those who do not directly experience high levels of a given stressor directly.

Underlying the present analysis is a conceptual model of the relationship between work factors and health, in which organizational policies and practices drive the conditions of work, which in turn affect outcomes both for the worker and the enterprise (21). In the present study, OPPs are part of the "conditions of work," that are central to the model, specifically the organization of work. Preventive care is a proximal health outcome, because its utilization is theorized to mediate the association between OPPs and more downstream health outcomes that appropriate preventive care would address. This proximal outcome is hypothesized to ultimately impact both worker outcomes (prevention and early detection of illness) and enterprise outcomes (reducing absenteeism and its associated costs).

Methods

This study was conducted through the Harvard T.H. Chan Center for Work, Health and Wellbeing, with the approval of the human subjects committee of the Harvard T.H. Chan School of Public Health.

Sample

We used data from patient care workers employed at two large Boston-area academic medical centers that are part of Partners HealthCare System, Inc. In September 2012, 2,000 workers, grouped in 84 units, were randomly sampled to participate in a survey measuring several aspects of the work environment. Eight units were sampled at 100% and the remaining 76 units were sampled at 33%; all analyses take the sampling design into account. Eligible workers included registered nurses (RNs), patient care associates (PCAs), and clinical nurse specialists. Other health professionals, such as phlebotomists or physical therapists, were excluded. Other exclusion criteria included working for the hospital for less than 20 hours per week, being on leave for 12 or more weeks at the time of sampling, and being in a non-patient-care role. Of the 2,000 workers sampled, 1,595 (80%) responded to at least half the survey and so were eligible for inclusion.

In addition to the survey, Partners HealthCare System has partnered with the Harvard Center for Work, Health, and Wellbeing to create a database of worker information that can be merged directly with the survey data using secure study ID numbers. This database contains individual workers' administrative data—drawn from information regularly collected by the hospitals—in areas such as worker injury and post-injury outcomes, scheduling, workload, and health care utilization.

Within the hospitals, health care utilization data are managed by Truven Health Analytics (Ann Arbor, MI) and were incorporated into the database. The two hospitals are members of the Partners' self-insured employee health plan; an insurer acts as third-party administrator. We had access to health care utilization data from the employee health plan for 841 survey respondents (53%) from September 2011-September 2013. Because the hospitals are located in Massachusetts, which has had an individual insurance coverage mandate since 2007, we do not expect underlying health coverage differences between members and non-members. We tested for and did not find evidence of differences in gender, race, marital status, or occupational title by enrollment status in the group health plan (all $p>0.20$); we did find differences by age, with plan members slightly older than non-plan members on average (42.5 versus 39.2 years, $p<0.001$). Of the 841 health plan members, 755 (90%) had complete data on study variables and were included in analyses. We also tested for and did not find difference in OPP scores (see "Exposures" below) by insurance coverage status.

All participants provided informed consent at the time of the survey. The study was approved by the human subjects committee at Harvard T.H. Chan School of Public Health.

Measures

Dependent variable: Preventive care utilization.—Our outcome of interest was workers' preventive care utilization, as measured by the number of separate visits by each

worker to health care providers during the two-year period that were classified as “Well/Preventive Care” by the health plan (range: 0 to 13, mean 2.65, SD 2.46; Table 1). These visits included annual physical exams, cancer screenings (breast, cervical, colon, prostate), vaccinations, routine gynecological care, screening for chronic conditions (diabetes, hyperlipidemia), and genetic screening. We eliminated visits coded as “factors influencing health status” (n=104) or “encounters for administrative reasons” (n=17). Patients may receive more than one type of preventive care in a given clinical visit or encounter. While guidelines around preventive care utilization focus on services received rather than number of clinical encounters, we would expect a healthy adult to have at least two preventive care visits over the two-year period based on the annual blood pressure screening guidelines (7).

Independent variables: Organizational policies and practices.—Our independent variables were worker perceptions of four types of organizational policies and practices (OPPs), assessed via the survey on five-point Likert scales. The first three OPPs assessed—safety practices, ergonomic practices, and people-oriented culture—are subscales of a broader OPP assessment instrument (15). Safety practices, which capture leadership, diligence, and training around occupational health and safety, were assessed by asking workers the extent to which they strongly agreed to strongly disagreed with each of five statements (Cronbach’s α for internal consistency reliability=0.86); for example, “Unsafe working conditions on the unit are identified and improved promptly”. Ergonomic practices, which capture the extent to which work activities are designed to reduce biomechanical workload, were assessed by asking workers the extent to which they strongly agreed to strongly disagreed with each of six statements (α=0.92); for example, “Work is designed to reduce lifting heavy equipment”. People-oriented culture, which captures trust and cooperation in the work environment, was assessed by asking workers the extent to which they strongly agreed to strongly disagreed with each of four statements (α=0.86); an example of a statement is, “Employees on my unit are involved in decisions affecting their daily work.” The fourth OPP was job flexibility (22), capturing individual control over shifts worked and the ability to attend to personal matters during the workday. Workers were asked seven questions (α=0.65), such as, “How much choice do you have over when you can take off a few hours? (very little to very much)”

For each of the four OPPs, items were summed, coded so that higher scores equaled more positive OPPs, and scaled so that all OPP measures were on a scale of 1 (worst) to 5 (best). Unit average scores were obtained by taking the mean score for that OPP measure for all respondents within the unit, drawing data from the 1,596 survey respondents rather than the subset with health care utilization data. We used OPP data from the larger sample to have more precise estimates of OPPs within units (average number of workers per unit=17.90 in survey sample versus 9.77 in the subsample analyzed in this paper). At both the individual and unit level, continuous OPPs ranged in correlation with each other (r for individual scores ranged from 0.14 [safety practices with flexibility] to 0.56 [safety practices with people-oriented culture]; r for unit scores ranged from 0.38 [people-oriented culture with flexibility] to 0.72 [safety practices with people-oriented culture]); all p’s for correlation <0.001. All OPPs were distributed normally, at both individual and unit levels, and so were analyzed continuously.

Covariates: We accounted for several covariates in regression models based on theoretical relevance and evidence of their association with preventive care utilization in other studies (9–11). All were assessed on the survey: gender, race/ethnicity (Hispanic, non-Hispanic white, non-Hispanic black, mixed race/other) age at survey (divided into 10-year categories: 30 or younger, 31–40, 41–50, 51 or older), job title (staff nurse, patient care associate, other), and typical shifts worked (day, evening, night, rotating).

Analyses

We used random-intercepts multilevel models to account for between-unit effects, specifying a negative binomial distribution because of the over-dispersed count nature of the preventive care visit data (mean=2.65, variance=6.04) and specifying units as random intercepts. We first modeled individually-assessed OPPs as predictors of individuals' preventive care visits; then modeled unit-average OPPs as predictors of individuals' preventive care visits. For each set of models, we conducted bivariate analyses and then adjusted for covariates (age, gender, race/ethnicity, job title, typical shifts worked). All analyses were conducted using the GLIMMIX procedure in SAS 9.4 (Cary, NC). All models include sampling weights to account for sampling design; this survey served as baseline data for a proof-of-concept health and safety intervention in eight of the units (23), and those units were oversampled. The sampling weights correct for that oversampling.

Results

Of the 755 workers in the analytic dataset, 80% were non-Hispanic white and 93% were women (Table 1). Participants were evenly distributed by age; 85% were staff nurses and 9% were PCAs, a low-wage position; 30% worked day shifts, 5% worked evenings, 24% worked nights, and 40% worked rotating shifts.

On a scale of 1 (worst) to 5 (best), the mean individual-level safety practices score was 3.78 (SD 0.77), the mean ergonomic practices score was 3.11 (SD 0.88), the mean people-oriented culture score was 3.71 (0.82), and the mean flexibility score was 2.57 (0.76).

In Tables 2 and 3, we present both unadjusted and adjusted statistical models, but we primarily focus our discussion on the adjusted models. In our first set of regression models (Table 2), we tested whether individual perceptions of the five OPPs were associated with preventive care utilization patterns after accounting for between-unit differences. In models adjusted for age, gender, race, occupational title, and shifts typically worked, only flexibility was associated with preventive care utilization; a one-unit positive difference in the flexibility scale was associated with 0.12 (95% CI 0.04,0.21) more preventive care visits. The other individual-level OPPs were not associated with preventive care utilization.

Next, we tested whether unit-level compositional measures of OPP perceptions were associated with preventive care utilization after accounting for between-unit differences (Table 3). In adjusted models, we found that unit-level ergonomic practices and people-oriented culture, were associated with greater preventive care utilization. A one-unit positive difference in ergonomic practices score was associated with 0.30 (95% CI 0.08,0.53) more preventive care visits. A one-unit positive difference in people-oriented culture score was

associated with 0.26 (95% CI 0.02,0.49) more preventive care visits. At the unit level, we did not observe significant differences in preventive care by unit-level safety practices or flexibility.

Because we averaged the OPP perceptions of all surveyed workers in units—and high- and low-wage workers in the same unit might have different perceptions of the same work environment—we repeated our analyses, restricting the sample to nurses only (n=644) in order to have a more homogeneous sample. Results are in Supplemental Tables A-C and are quite similar (in magnitude, direction, and significance) to the findings for the overall, more socioeconomically heterogeneous sample.

We also conducted a sensitivity analysis (Supplemental Table D) in which we include group- and individual-level perceptions in the same models. The results are essentially unchanged from when we modeled them separately.

Discussion

We tested the extent to which individually-assessed and unit-level organizational policies and practices (OPPs) were associated with health care workers' preventive care utilization. We found associations between certain OPPs and preventive care utilization, but the level, magnitude, and significance of effects varied by the specific type of policy or practice.

Prior research has shown that ergonomic and safety practices at the unit level are associated with lower risk of injuries, particularly musculoskeletal injuries (24, 25). However, those studies did not extend to non-occupational health outcomes. Here we found that ergonomic practices at the unit level were significantly associated with individuals' preventive care utilization. Our hypothesis at the outset was that OPPs related to health and safety precautions would exert a halo effect on workers' non-occupational health practices, consistent with the Total Worker Health® model (16); in other words, units that prioritized safety and health in the workplace would engender positive health behaviors in realms beyond occupational health. Lending support to this hypothesis is the finding that group-level, but not individual-level, ergonomic practices were associated with better preventive care utilization; the phenomenon was a feature of the broader work environment, rather than individual perception. Unit-level safety practices showed similar patterns of direction and magnitude, but fell short of statistical significance.

We found that more positive perceptions of people-oriented culture measured at the unit level, but not the individual level, were associated with higher preventive care utilization. People-oriented culture has, in other studies, been associated with health outcomes such as sleep deficiency (13), overall injury risk (25), and musculoskeletal injury risk (24), but has not to our knowledge been tested in association with non-occupational health outcomes. The people-oriented culture scale asks workers the extent to which they agree or disagree with questions about collegiality: employee involvement in decision-making, the quality of working relationships, trust among employees, and employee freedom to voice concerns. Unit-level people-oriented culture could be associated with workers' preventive care utilization patterns if workers trust each other to be able to cover each other's work during

short absences (such as for a doctor's appointment) and are treated with respect by both their peers and by supervisors. That respect could translate to helping workers prioritize important non-work commitments like doctor's appointments.

Workplace flexibility in general, and schedule control in particular, has been associated with outcomes such as better mental health (18, 26) and health-promoting behaviors (14), as well as organizational outcomes such as lower turnover and improved satisfaction (27, 28). In a prior study, flexibility was marginally associated both with better self-rated health and also with greater number of acute care visits to physicians (29). The associations we observed between flexibility and preventive care occurred at the individual, but not the unit, level. It is possible that managers apply flexibility permissions unevenly across their direct reports, with some employees given more flexibility than others. Larger units may also have multiple managers that have different practices regarding flexibility, which could wash out any unit-level effects when all employees' flexibility scores are combined. Thus, flexibility may vary across a unit in a way that more cultural factors like ergonomic practices do not.

Limitations and strengths

The greatest limitation of this study is sample size; with 755 workers total, and fewer than 10 people per unit on average, there is substantial risk of Type II error, especially because medical claims data are notoriously noisy. Because all workers worked at one of two hospitals within the same health system, generalizability may be limited. However, this lack of variation in employer is also a strength: employer-level conditions are inherently held constant, so between-unit differences reflect differences in policies and practices between workgroups, rather than different organizational cultures or industries. The data are also cross-sectional. However, reverse causation is unlikely due to the nature of the outcome and the exposures, especially those assessed at the unit level. We were also unable to disaggregate preventive care visits into different types (cancer screening, chronic disease screenings, well woman care, vaccinations), which may have shed some light on potential mechanisms.

Another limitation is that we used random effects at the unit level to identify associations between unit-level data and individuals' preventive care utilization. However, it is possible that by using random rather than fixed effects, our results may be biased if there are unobserved unit-level factors affecting preventive care utilization that are correlated with the OPPs we measured. Because we only have cross-sectional data on unit-level OPP perceptions, we are unable to eliminate this possible bias.

The greatest strength of this study is that we were able to use different data sources for preventive care claims and OPP data and merge them at the worker level, reducing the risk of common-method bias when workers self-report both exposure and outcome. The use of claims data allowed us to focus specifically on preventive care, rather than overall healthcare utilization.

Conclusions

Preventive care is a desirable health-relevant outcome. Over the long term, greater use of preventive care could lead to lower health care costs related to disease treatment and less sickness absence from work, reducing employers' health-related expenditures and improving workers' quality of life. In this study, certain organizational policies and practices, assessed at both the individual and the unit levels, were associated with workers' preventive care utilization patterns. This study suggests that changing organizational policies and practices, specifically around flexibility, ergonomics, and people-oriented culture, could prove beneficial for preventive care uptake. Such interventions may be more efficient than individually-oriented efforts to increase preventive care utilization or other health behaviors (23, 30). Moreover, improving flexibility and people-oriented culture could help foster other desirable health outcomes such as occupational injury reduction in addition to preventive care utilization.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1:

Distribution of exposures, outcomes, and sociodemographic characteristics in a cohort of Boston hospital workers (n=755)

	n/mean	Percent/standard deviation
Age		
30 or under	188	24.9
31–40	188	24.9
41–50	168	22.25
50+	211	27.95
Race/ethnicity		
Hispanic	30	3.97
Non-Hispanic white	606	80.26
Non-Hispanic black	66	8.74
Mixed race/other	53	7.02
Gender		
Man	52	6.89
Woman	703	93.11
Job title		
Staff nurse	644	85.3
Patient care associate	67	8.87
Other	44	5.83
Typical shifts worked		
Day	227	30.07
Evening	41	5.43
Night	183	24.24
Rotating	304	40.26
Individual-level OPPs		
Safety practices	3.78	0.77
Ergonomic practices	3.11	0.88
People-oriented culture	3.71	0.82
Flexibility	2.57	0.76
Unit level OPPs		
Safety practices	3.79	0.37
Ergonomic practices	3.11	0.38
People-oriented culture	3.70	0.36
Flexibility	2.58	0.32
Number of preventive care visits	2.65	2.46

Table 2:

Random-intercepts multilevel models of associations between *individual-level* organizational policies & practices and number of preventive care visits over a two-year period (B, 95% CI) in a cohort of Boston hospital workers. Each organizational policy or practice is modeled separately. Adjusted model controls for age, gender, race, typical shifts worked, and occupational title.

	Bivariate models			Adjusted models		
	B	**95% CI**	***p***	**B**	**95% CI**	***p***
Safety practices	−0.03	(−0.12,0.05)	*0.451*	−0.01	(−0.09,0.08)	*0.895*
Ergonomic practices	−0.06	(−0.13,0.01)	*0.111*	−0.01	(−0.08,0.07)	*0.816*
People-oriented culture	0.01	(−0.07,0.08)	*0.873*	0.01	(−0.07,0.09)	*0.756*
Flexibility	0.12	(0.03,0.20)	*0.005*	0.12	(0.04,0.21)	*0.003*

Table 3:

Random-intercepts multilevel models of associations between *unit-level* organizational policies & practices and number of preventive care visits over a two-year period (B, 95% CI) in a cohort of Boston hospital workers. Each organizational policy or practice is modeled separately. Adjusted model controls for age, gender, race, typical shifts worked, and occupational title.

	Bivariate models			Adjusted models		
	B	**95% CI**	***p***	**B**	**95% CI**	***p***
Safety practices	0.26	(0.01,0.50)	*0.040*	0.18	(−0.05,0.41)	*0.124*
Ergonomic practices	0.31	(0.08,0.55)	*0.009*	0.30	(0.08,0.53)	*0.010*
People-oriented culture	0.31	(0.07,0.56)	*0.014*	0.26	(0.02,0.49)	*0.031*
Flexibility	0.32	(0.06,0.58)	*0.018*	0.23	(−0.02,0.48)	*0.069*