

Measuring the Impact of Organizational Behaviors on Work Disability Prevention and Management

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Increased rates of work disability and its associated costs have prompted businesses to develop innovative approaches to managing the health and productivity of the work force. The paper 1) provides practitioners with the results of research that demonstrates the importance of employer organizational factors in preventing and resolving work disability, and 2) provides researchers with measures that can efficiently assess organizational factors and advance clinical research by incorporating contextual factors involved in occupational rehabilitation. Data from a series of studies in Michigan are reviewed and it is concluded that employer reports of organizational policies and practices (OPPs) are important in reducing the number of work-related disabilities and their consequences for the employee and for the company. We test the hypothesis that employee reports of OPPs are reliable and valid. To test the reliability and validity of an employee version of the same instrument, we used data from a prospective community-based study of 198 workers with carpal tunnel syndrome. Four OPPs were identified as important: people-oriented culture ($\alpha = .88$), safety climate ($\alpha = .88$), disability management policies and practices ($\alpha = .88$), and ergonomic practices ($\alpha = .88$). These four scales were shown to have strong test-retest reliabilities and predictive validity. It was concluded that the conceptual model guiding the research in Michigan was supported with research from another State, Maine, using an individual-level measure of OPPs.

KEY WORDS: organizational policies and practices; disability prevention; return to work.

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INTRODUCTION

Increased rates of work disability and its associated costs have prompted businesses to develop innovative approaches to managing the health and productivity of the work force (1). Work disability arises from complex interactions between the work environment and the individuals within it (2). Thus, there is need for a systemic and comprehensive approach to injury prevention and management, which incorporates the larger influences of the employer organization as well as the more tangible aspects of traditional safety measures and claims handling techniques (3). However, there has been only limited empirical assessment of the organizational context and its potential role in disability prevention (4).

To date, research has focused primarily on one-dimensional models of the determinants of disability (e.g., medical, economic, individual and job accommodation). But there is growing recognition that a broader multidimensional model is required to explain the phenomenon of work disability (5–8). Even the wider biopsychosocial model has required expansion to adequately integrate the influence of environmental factors—physical, policy, and attitudinal—that determine in large measure whether a specific impairment will result in a work disability in a specific situation (9).

Constructing a complete picture of the workplace factors that contribute to work disability incidence and its consequences requires an integrated framework. Such a framework must incorporate 1) the expected effects related to safety management and prevention (10,11) 2) the interventions and system of care for effectively managing health conditions and injuries that arise and minimizing their disabling effects through restoration and accommodation (3), and 3) the organizational climate and behaviors that comprise the context of the work place in which this transpires (12,13).

Practically, organizational-level research has been conducted separately from employee-level research. The typical approach to organizational research uses separate interviews conducted with one or several key organizational informants (14). A basic assumption in organizational research has been that valid measurement of organizational characteristics requires having representatives of management complete an interview or questionnaire. Workers have been considered too narrowly focused to observe company-wide patterns. Worker perceptions of policy are presumed to be limited to the personal work injury experience, whereas human resource/personnel manager assessments are presumed to be “objective” (15). When the focus of study is solely at the organizational level, this is a reasonable assumption. However, when the focus includes individual-level health change, it would be both reasonable and efficient to measure organizational policies and practices at the individual level.

To date, there is little information on employee assessments of organizational behaviors related to injury prevention and health. What little research exists suggests that workers can report on a variety of these conditions including organizational hierarchy (16), service quality policies and practices (17), and accident policies and practices (18). In this paper we hypothesize that employee reports of organizational policies and practices (OPPs) are reliable and valid.

Our purposes in this manuscript are two-fold. The first is to provide practitioners with the results of research that demonstrates the importance of employer organizational factors in preventing and resolving work disability. A general model of how organizational-level factors influence work disability and past work on this model in Michigan (9,19,20) are presented. The second is to provide researchers with measures that can efficiently assess

organizational factors and advance clinical research by incorporating contextual factors involved in occupational rehabilitation. Specifically, we examine the multidimensionality of employee reports of organizational policies and practices, the internal consistency and the test-retest reliability of the scales, the discriminant validity of the scales (i.e., the degree an item correlates more strongly with the scale it is hypothesized to be part of compared to other scales), and their predictive validity (i.e., the degree a scale predicts what it is hypothesized to predict).

Organizational Level Determinants of the Incidence and Outcomes of Disability

Figure 1 shows the conceptual model that guided the Michigan projects (9,19,20). The organizational environment includes a) organizational and business characteristics of the firm such as size, industry, work organization, and unionization, and b) managerial style

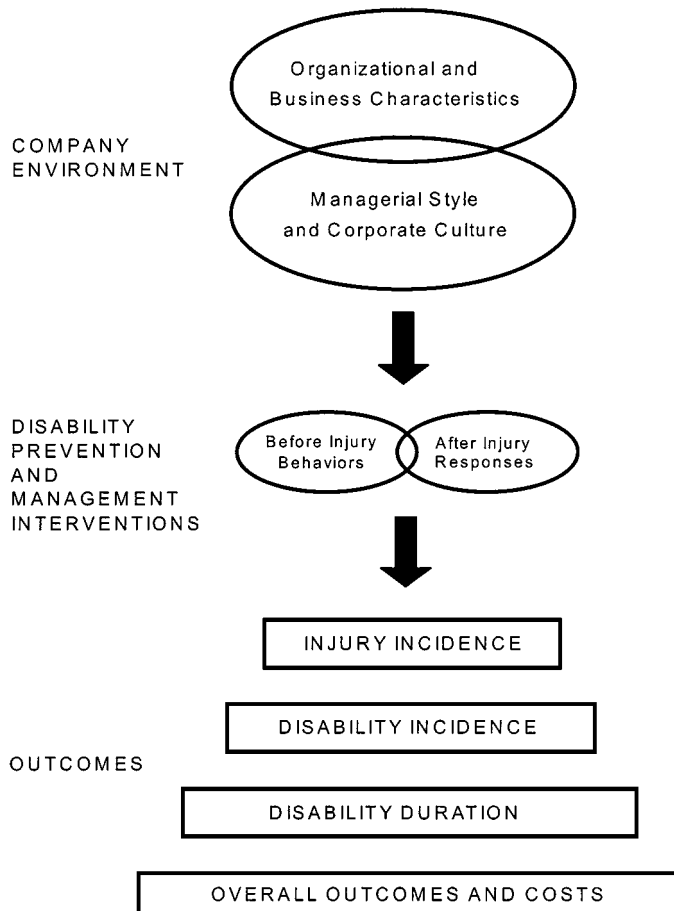


Fig. 1. Organizational influences on work disability (Reprinted with permission from *Rehabilitation Counseling Bulletin*, Vol. 42, December 1998, p. 101 © American Counseling Association).

and culture of the firm that shape the work climate and orientation toward employees. These latter characteristics, though relatively stable, are subject to change over time and thus can create the larger context for the direct disability-related initiatives.

At the next level, policies and practices intended to impact health, safety, and disability are theorized as emanating from the company environment through two types of interventions. The first set of policies and practices are implemented before injury, and are aimed at reducing potential risks and sustaining a safety climate. This includes interventions directed at the physical work environment through safety and ergonomics and at individuals to encourage healthy behaviors. The second set of policies and practices at this level are implemented after injury and include specific disability management techniques, such as physical restoration, case management, and provision of accommodations for early return to work.

Collectively, these disability prevention and management interventions represent strategies to minimize the incidence and disability consequences of injuries and diseases arising from the work place. Because these policy and practice interventions reflect discretionary firm behaviors, they are included as independent variables in the study. The Michigan studies sought to quantify the impact of each of these levels of interventions in the progression of the work disability process and in the achievement of disability prevention and management outcomes.

A set of disability performance indicators derived from OSHA log and workers' compensation data were developed as dependent variables for the study. As shown in Fig. 1, the levels of performance are staged in a progression of outcomes that begins with the incidence of injuries and illnesses, then to the reported incidence of work disability as measured by time lost from work, followed by the duration of disability, finally resulting in total disability costs.

Hunt and colleagues (9) organized the elements identified in Fig. 1 into three key areas 1) safety management and prevention, 2) a comprehensive system of care for managing work disability, and 3) organizational climate. All center on the nature of the bond between the employer and the worker. Employers committed to maintaining a healthy and productive workforce with highly trained workers are characterized by policies and practices that are different in nature, or at least in their level of achievement, than employers who consider workers a less valued and more disposable resource.

Safety management and prevention are not only critical for disability prevention, but also for the creation of an environment that communicates concern for the well-being of the worker. As noted in (10), three key elements are 1) management leadership expressed as financial commitment, policy implementation and active involvement in safety programs; 2) effective safety controls, training and evaluation to anticipate and manage hazards; 3) integration of safety programs into company operations to foster a perspective where human and economic concerns are balanced.

Comprehensive programs for managing work disability are often discussed as employer-based disability management (3,21). Within this framework, the central operational elements are a) a system of early contact and case management as soon as injuries or work disabilities are identified, and b) an organized process and appropriate services to facilitate the return to work of the disabled worker in a safe, timely, and productive manner (22,23).

These disability management programs have been associated with significant reductions in unnecessary utilization of private and public benefits and with the increased

likelihood of regaining and retaining the worker role. But the full potential of these programs is achieved when they are set within a larger framework of organizational climate, policies and practices that support them (9). For example, it is often stated that in effective employer programs, the claims management and RTW process are not perceived as adversarial, but as supportive of the well-being and productive participation of the worker. What defines adversarial or supportive extends beyond the boundaries of the medical department or claims staff to include the organizational climate (12,24).

Evidence Supporting the Model: The Michigan Studies

The original Michigan study was designed to find strategies that would reduce the incidence of workplace injuries and lower workers' compensation costs in the state of Michigan (19). An analysis of workers' compensation claims records revealed a difference in the claims rate (at least 10-fold) between the best performers and the worst performers in each of 29 industries examined. Four industries were selected for further analysis (food production, fabricated metals, transportation equipment, and health care services) to investigate the factors associated with this employer-level variation in claims rate.

A self-administered mail questionnaire was designed to probe areas believed to be important in determining the level of disability in the workplace, including organizational characteristics, disability management practices, and corporate climate of the establishment. It included 30 items that were labeled "Organizational Self Assessment," which asked employers to rate their establishment's performance on a 5-point Likert scale, assessing the frequency with which they achieved various behaviors in each of these areas. Selecting from the four industries those establishments scoring in the best 15% and the worst 15%, with at least 50 employees and one workers' compensation claim closed in 1986, a sample of 284 establishments was developed. A total of 124 of these establishments responded to the mail survey (44% response) conducted in 1988.

There were 11 organizational policies and practices among the 30 included in the instrument that were correlated with low-claims status. They are listed in Table I in the same words as they were presented to potential respondents. The results offered support for the hypothesis that organizational policies and practices correlate with workplace disability incidence. Further, company policies and practices related to low claim rates included safety and prevention interventions, procedures to prevent and manage disability, and an open managerial style and human resource orientation.

The second Michigan study was a larger, improved study of Michigan employers that focused more directly on disability prevention (9,20). The study featured a stratified random sample of 220 employers (46% response rate). Also, seven industries were surveyed, including six of the most hazardous eight industries, plus the most hazardous service industry (as indicated by Michigan OSHA data).

The survey instrument was extended in a number of ways to more completely cover the organizational policies and practices that were being evaluated. Instead of 30 items, the improved instrument included 95 items. An expanded set of covariates was also included to allow more complete control of other possible causes of observed differences. Last, an expanded set of performance outcomes was gathered from the sampled employers, and a 3-year observation period (1987–1989) was selected to reduce the random noise in the data.

The findings of the second Michigan study confirmed and extended the first study in important ways. The organizational policy and practice dimensions were regroupped

Table I. Means and Standard Deviations of Significant Policy and Practice Variables for High and Low WC Claims Groups^a

Item No.	Variable description	Groups				<i>F</i> ^b	<i>p</i>
		High		Low			
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
2	Unsafe behaviors of employees are monitored and corrected on a systematic basis.	3.31	1.14	3.84	1.11	6.89	.010
4	Safety training occurs as a regular part of orientation for new and transferred employees.	3.38	1.43	4.19	1.13	12.30	.001
5	Company leaders model and pay attention to safe behaviors.	3.51	1.20	4.01	1.02	6.41	.013
9	Information and communication travels both from the top down and from the bottom up within the organization.	3.47	1.02	3.86	0.88	5.04	.027
10	Employees participate in problem solving and decision making as a regular part of company operations.	2.62	1.03	3.16	1.01	8.67	.004
13	A profit-sharing or gain-sharing program is used to stimulate and reward productivity of employees at all levels.	1.78	1.40	2.60	1.81	7.56	.007
15	Light duty assignments and/or modified work are used to help restricted workers come back to work.	3.16	1.52	3.96	1.29	9.53	.002
18	An employee assistance program is used to help employees who are showing signs of problems that may interfere with work (e.g., alcoholism, stress, and personal problems).	2.44	1.44	3.06	1.54	5.59	.020
26	Procedures are used to monitor and encourage individual supervisors to assist the return of injured workers to their departments (e.g., incidence and costs of claims are assigned to departments).	2.05	1.28	2.97	1.47	13.34	.001
27	The company provides wellness programs and fitness resources to promote employee health.	1.53	0.86	2.43	1.47	17.02	.001
30	Employees are screened for job-related health or disability risks on a continuing basis.	2.31	1.49	2.99	1.42	6.97	.009

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^b*df* = (1.122) for each test.

with the guidance of factor analysis that both improved the precision of measured effects and provided increased confidence at the construct level. The resultant scales are listed in Table II, which also shows the Cronbach alpha reliability coefficient and number of scale items.

These eight organizational policy and practice scales were included in regression models that predicted establishment performance levels, controlling for a host of factors such as firm size, industry, union status, wage level, tenure of workers, workers' compensation insurance coverage, etc. Results from these multivariate estimations showed that a 10% higher self-rated achievement of "safety diligence" was associated, on the average, with a 17% better performance in lost workday rate, controlling for other influences. Similarly, a 10% better self-rated achievement of "proactive return-to-work program" was associated with a 7% fewer lost workdays, on average. Organizational policy and practice scales for "safety training" and "active safety leadership" were also correlated with better performance on some outcome measures.

Table II. Reliability Coefficients for Organizational Policy and Practice Scales Using Cronbach's Alpha^a

Scales	Number of items	Reliability coefficient
Active safety leadership	13	.88
Safety training	4	.72
Safety diligences	13	.89
Ergonomic solutions	4	.86
Disability case monitoring	10	.93
Proactive return-to-work	14	.92
Wellness orientation	3	.87
People-oriented culture	12	.96

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The distal factors representing the work climate of the organization were positively, but not significantly, correlated with the above outcomes. They were highly intercorrelated with the other significant practice factors, and are presumed to operate through these more proximal expressions of the organizational values. The study concluded that organizational attempts to reduce the number of work-related disabilities and reduce their consequences for the employee and for the company could be successful.

Despite the potential practical significance of these findings for employers and workers, there has been limited effort to date to replicate them and to refine the measures and include worker assessments. These were primary goals of the Maine Carpal Tunnel Study II that is the focus of the findings that follow.

METHODS

The Maine Carpal Tunnel Study II

The data used in these analyses were obtained from Maine Carpal Study II, a prospective observational community-based study of patients who received carpal tunnel surgery (CTS). Its forerunner, Maine Carpal Tunnel Study I (25,26), suggested that return to work has multiple determinants in patients with CTS, including worker- and workplace-specific factors. The overarching goal of Maine Carpal Tunnel II was to examine in detail the influence of multiple variables on the clinical and occupational outcome of carpal tunnel surgery. We chose one condition, CTS, and one treatment, surgery, to reduce the variability in underlying impairment and management, thereby permitting focused examination of psychosocial, economic, and organizational factors.

Workers were eligible for the study if they presented to 1 of 15 participating surgeons with symptoms including numbness or tingling in at least two of the first four fingers and symptoms whose duration was at least 1 month. The physician must have had the diagnostic impression of CTS and the diagnosis required confirmation with nerve conduction testing. Workers must have been employed at least 20 hr/week at the time symptoms developed, and been scheduled for carpal tunnel surgery. Exclusions included age less than 18 years, previous carpal tunnel surgery, pregnancy, and retirement or full-time student status. People without insurance benefits, such as temporary employees, contract employees, and some self-employed workers, are likely excluded using these criteria.

Eligible workers were identified in community medical practices. Participating physicians were distributed throughout the state, and represented orthopedic, plastic surgery, and neurosurgical specialties. Their names were faxed to the coordinating center in Augusta, Maine, where staff contacted patients (*sic* workers) to invite participation. Patients who were interested in participating were mailed questionnaires preoperatively, and at 2, 6, and 12 months postoperatively. Recruitment commenced in April 1997 and was completed in October 1998. It is difficult to estimate the proportion of eligible patients who were referred to the coordinating center, as we do not have an accurate count of the number of eligible patients seen during the study period. However, we demonstrated in Maine Carpal Tunnel Study I that this community-based recruitment strategy yielded a sample of surgically treated patients that was representative of all eligible patients in the practices with respect to age, sex, and outcomes including symptom severity, functional status, work status, and satisfaction with surgery 18 months postoperatively (25). These data suggest our sample was typical of workers undergoing carpal tunnel surgery in Maine during the study period.

Of 233 eligible patients referred to the coordinating center, 197 agreed to participate in the study and completed a baseline questionnaire. The number completing questionnaires at 2, 6, and 12 months were 168, 158, and 159, respectively.

The baseline features of the cohort are shown in Table III. The patients had a mean age of 46 (*SD* 9.5), a mean symptom severity score of 3.4 (*SD* 0.7), and a mean functional limitations score of 2.7 (*SD* 0.8). These scales are scored from 1 to 5, with 1 the best and 5 the worst possible score. The preoperative scores are comparable to those observed in the surgical patients in the initial Maine Carpal Tunnel Study (25). Just over half the patients were female and just over half received workers' compensation at some point during the study. Fewer than 10% had hired an attorney. Forty percent had some education beyond high school and 30% had annual household incomes in excess of \$50,000.

Measures of Organizational Policies and Practices

A major goal of this work was to review the original OPP items used in the Michigan research and reduce the number of questions in each scale. The Michigan questionnaire takes

Table III. Baseline Characteristics of the Maine Carpal Tunnel Study II Sample ($N = 197$)

	<i>N</i> (%)	Mean (median; 25–75% iles)
Baseline feature		
Age		46 (45; 39, 53)
Symptom severity score (1–5)		3.4 (3.3; 2.8, 3.9)
Functional limitations score (1–5)		2.7 (2.8; 2.2, 3.4)
Female	113 (57)	
Ever received compensation	111 (56)	
Attorney involved	17 (8.6)	
Annual household income		
Less than \$20,000	31 (16)	
\$20,000–\$50,000	101 (53)	
Greater than \$50,000	57 (30)	
Education		
Less than high school	24 (12)	
High school	95 (48)	
Beyond high school	77 (40)	

over 1 hr to complete. To create a testable short-form that retains the dimensions and specific concepts to be measured and takes 5–10 min to complete, the following steps were taken.

1. Factor analyses and reliability analyses used to establish the eight scales in the Michigan study were reviewed to reduce the number of items per scale without reducing the reliability. In examining the rotated factor structure, we applied a strict criterion: an item must load .5 or greater on the factor to be considered a candidate item, but must not load .3 or greater on any other factor.
2. The item-to-total scale correlation was examined to select those items with the most substantial correlation with the total scale. A correlation of .6 or greater between the item and the scale score was required to be included.
3. Excluded items were examined to determine whether a key element of the domain had been omitted. If an item was deemed conceptually central to the scale it was included. For example, three items were added to the proactive return to work dimension: the active coordination that occurs immediately post injury, the active assistance undertaken to make early return to work possible despite limitations in function, and the critical upper-level support that motivates the participation of reluctant or production-focused supervisors who can impede return to work placements from occurring.
4. The eight major dimensions and key concepts within each dimension were examined to determine whether important concepts had been missed. For example, in disability case management (DCM), early contact (within 24 hr) with the employee after injury has been hypothesized to be important in returning the worker to work. While there is little data on this “sentinel effect” we felt it was an important element of the DCM process to measure. This resulted in the addition of two items. The second was the degree the company practiced human-centered management practices, captured in Item 8, the treatment of safety equally with production and quality (27).

The final questionnaire was piloted in three focus groups to understand the worker burden. Focus Group #1 had 6 women and 1 man, Focus Group #2 had 2 women and 2 men, and Focus Group #3 had 7 women and 4 men. All participants had carpal tunnel syndrome. Workers had difficulty with a response scale that asked the worker to assess how much of the time the organization engages in a practice, but there was consensus that asking how much the worker agrees/disagrees with the statement is reasonable. Items that asked about specific people in the organization (e.g., responsibility for disability claim management and return-to-work coordination is assigned to a specific person or office in the company) or the role of the supervisor were deemed too difficult and were excluded.

Finally, we carefully reviewed each item to determine whether an employee could answer it, based on his or her own work experience and the relevance of the item to return to work (a major outcome of the Maine study). This led to dropping items (e.g., in people-oriented culture, job satisfaction was eliminated as not adding unique information). In addition, two items were added to capture the overall labor-management climate and labor-management climate specifically related to return to work (RTW). The final set of items developed for a worker-based measure of organizational policies and practices is listed in Table IV (the employer version can be obtained from the first author). We retained a 1–5 response scale to facilitate comparability with the employer measure, but changed

Table IV. Items Measuring Organizational Policies and Practices in the Employee Self-Report Questionnaire

1.	The company involves employees in plans and decisions made.
2.	Workers have trust in the company.
3.	Communication is open and employees feel free to voice concerns and make suggestions.
4.	Working relationships are cooperative.
5.	Workers tend to stay with the company for a long time.
6.	Top management is actively involved in the safety program.
7.	The company spends time and money on improving safety.
8.	The company considers safety equally with production and quality in the way work is done.
9.	Unsafe working conditions are identified and improved promptly.
10.	Equipment is well maintained.
11.	Action is taken when safety rules are broken.
12.	Employees reprovided training in safe work practices for the job hazards they will encounter.
13.	Jobs are designed to reduce heavy lifting.
14.	Jobs are designed to reduce repetitive movement.
15.	Someone from the company contacts the worker shortly after an injury or illness to express concern and offer assistance.
16.	The company keeps track of the injured worker's absence and return to work.
17.	The company works with the treating physician to develop a plan for return to work.
18.	The company makes accommodations such as special equipment, flexible hours or modified job duties to allow injured worker to return to work
19.	After the injured worker returns to work, the company follows up to adjust the work situation as needed.
20.	When injured worker can't return to their job, the company provides retraining.
21.	Labor and management work as partners in returning injured worker to work.
22.	Labor and management work as partners in health and safety.

the responses from amount of time (0–100%) to a strongly agree to strongly disagree scale with 3 “neutral.” Each employee is asked to respond about current job or most recent job if not currently working. The items measured correspond to the following dimensions:

1. *People-oriented culture* (Items 1–5). This is a broad measure of the culture of the company, measuring the extent the company involves employees in meaningful decision-making, where there is trust between management and employees, and openness to share information in a cooperative work environment.
2. *Active safety leadership* (Items 6–9). This is a measure of upper management's commitment and participation in safety issues. This commitment is manifest in management's involvement, commitment of company resources and people's time to promote safety, and active efforts to balance economic and health and safety actions.
3. *Safety diligence* (Items 9–11). These are the actual practices that company personnel engage in to protect employee safety. They include maintaining safe work environments and taking action to redress unsafe conditions.
4. *Safety training* (Item 12). This involves the timely implementation of worker training programs in safe job practices and the job hazards they will encounter.
5. *Ergonomic practices* (Items 13 and 14). These are measures of the company's use of basic activities to reduce the biomechanical workload (heavy lifting or repetitive movements) and thus “design-out” injury hazards.
6. *Disability management*. This is composed of two subdimensions, disability case management (Items 15–17) and proactive return to work (Items 18–20). Disability case management policies and practices identify and attempt to resolve lost workdays through early intervention, effective communication with providers, and

coordination of the needed medical and rehabilitative interventions. Proactive return to work is the education and accommodation assistance the company provides to return individuals back to work.

7. *Labor-management climate* (Items 21 and 22). This assesses the degree to which labor and management act as partners in health and safety and in particular returning the injured worker to work.

These questions were asked of all workers at 6 months. At baseline we asked a smaller set of questions (shown in the Appendix). We created four scales at baseline: people-oriented culture (Items j and k), safety practices (Items a–c), ergonomics (Item d), and disability management (Items e–i). These baseline measures are used to predict return to work at 6 months.

Statistical Analysis

To determine whether OPPs are measured by the seven hypothesized dimensions, a factor analysis with both varimax (orthogonal) and promax (oblique) rotation was performed (28). Because the scales are conceptually intercorrelated (an organization with a strong people-oriented culture is likely to also have similarly high ratings for the other dimensions), we report oblique rotation results. The basic process was to first conduct an exploratory factor analysis and using the criterion of eigenvalues greater than 1 and a Scree test to select the number of factors. Then using a factor-loading criterion of .4, we examined the underlying factor structure to determine potential scaling solutions.

Based on the factor structure and underlying conceptual basis of the factors, we specified a series of scales and examine their reliability and validity. To examine the internal reliability of the scales, Cronbach alpha's are reported with an acceptable level of internal consistency established at .7 (29,30). In addition, we examined the item-to-total correlations with a criterion that the correlation be greater than .4 for a well-established scale (31,32). Then we examined the degree to which an item correlates more strongly with the scale it is hypothesized to belong in as opposed to correlating more highly with another scale. This is often termed scaling success and a criterion of 90% success is applied (31,32).

The 2-week test–retest reliability of the OPP scales was examined using data from a random sample of 34 workers who received a second questionnaire with a reduced set of items 2 weeks after returning the 6-month questionnaire. To estimate the intrasubject reliability of reporting 2 weeks apart, we estimated the intraclass correlation coefficient (ICC) following (33). An ICC of .7 or greater is indicative of high reliability.

We tested the predictive validity of the OPP scales by examining their ability to predict return to work status at 6 months. It is hypothesized that greater people-oriented culture, safety practice, ergonomics practices, and disability management increase the odds of a worker returning to work after carpal tunnel surgery. In this analysis the baseline OPP measures were each entered into separate predictive logistic regression models that include gender (female = 1), age (continuous variable), and baseline CTS symptom severity (ordinal variable ranging from 1, no symptoms, to 5, severe symptoms). Six-month work status (1 = at work at 6 months) is the outcome. The advantage to using the reduced set of baseline OPP measures is that they are assessed prior to surgery. The disadvantage is that the scales do not include all the same questions. Yet, the baseline OPP scales were highly correlated

with the 6-month OPP measures (people-oriented culture $r = .52$, safety climate $r = .68$, ergonomic programs $r = .55$, disability management $r = .60$). Odds ratios are presented with standard errors (to estimate confidence limits) and p -values. Significant results have p -values less than or equal to .05.

RESULTS

Factor Analysis

In a preliminary factor analysis a 4- or 5-factor solution emerged using an eigenvalue greater than 1 and Scree test. Staying with the company a long time (Item 5) did not load on any factor and Item 16 loaded uniquely on one factor. Upon examination it was determined that (Item 16) measures a concept less central to the intervention aspects of disability management for the employer; instead, it represents an independent dimension as suggested by the factor analysis. Based on the preliminary results, we dropped Items 5 and 16 and specified a 4-factor solution with Promax rotation.

The results in Table V show that there are four factors using a factor-loading criterion of .4. All the hypothesized safety scales (active safety leadership, safety diligence, and safety training) load on factor 1 rather than separate factors as hypothesized. We refer to this as safety climate. Factor 2 captures the people-oriented culture as specified a priori. Factor 3 confirms that disability case management and proactive return to work are a much broader dimension—disability management as suggested a priori. Factor 4 is the ergonomics

Table V. Final Factor Analysis of 20 Items^a Included in the Measurement of Organizational Policies and Practices with Promax Rotation^b

Item ^c	Factors				Uniqueness ^d
	Safety climate (No. 1)	Disability management (No. 2)	People oriented culture (No. 3)	Ergonomics practices (No. 4)	
1	-.05860	.09171	.70249	.17131	.32421
2	.02941	.04805	.88066	-.04002	.17826
3	.19483	-.00846	.76129	-.03311	.24356
4	.19332	-.05905	.79482	.02052	.18908
6	.79568	.10136	.15019	-.14681	.21899
7	.86908	.12178	-.04861	-.03907	.19865
8	.71187	.02997	.21495	.01163	.21895
9	.89774	-.08983	.03729	.09938	.14602
10	.60411	.10863	.22488	.01284	.29342
11	.77039	-.13432	-.00847	.19236	.35561
12	.67159	.08453	-.05239	.15502	.37990
13	.28611	.12225	-.03880	.40317	.55462
14	.10887	.16083	.04238	.59183	.37462
15	-.20220	.51239	.29883	.32168	.31113
17	.07619	.66299	.01320	.14240	.34180
18	-.08582	.90654	-.04974	.05885	.24676
19	.05201	.80607	-.04465	.04844	.29101
20	.15125	.67657	-.04436	.09310	.34676
21	.11155	.86122	.09429	-.15219	.18296
22	.45383	.50368	.10817	-.10624	.25491

^aItems 5 and 16 were removed from the final factor analysis.

^bPromax rotation is based on the formulas in (34).

^cItem corresponds to question number in Table IV.

^dUniqueness represents the variance in an item unaccounted for in the factor solution.

practices scale as hypothesized. In all cases (except Item 13) the uniqueness is quite low, suggesting that the percentage of the variance in the variable explained by the factors is high. Uniqueness values over .6 are considered high, indicating a problem, and even Item 13 is not a definite problem by this definition (28).

The labor-management climate items did not separate into an independent factor. The general safety and health question (Item 22) loaded equally high on Factors 1 and 2. This question did not add significant information to the safety climate scale and thus we dropped it. The specific question pertaining to return to work (Item 21) loaded on the disability management factor and could be distinguished as a unique component in successful return to work efforts.

Four scales are both empirically and conceptually identified through the factor analysis: people-oriented culture (Items 1–4); safety climate (Items 6–12); ergonomic practices (Items 13 and 14); and disability management (Items 15, 17–21). These scales were created as summated averages varying between 1 and 5.

OPP Scale Properties

We next examined the scales and the properties of the scales. Table VI shows the Cronbach's alphas for all four scales. All alphas are greater than .7. When items are removed from the scales, the recalculated alpha drops, suggesting that each item makes some unique contribution. The item-to-scale correlations are all greater than .4. In every case the items correlated highest with scales to which they were hypothesized to belong. Therefore, scaling success was 100% for each scale indicating strong discriminant validity. In addition, we explored whether the OPP scale properties vary by whether the person is depressed or not

Table VI. Organizational Policy and Practices Scale Properties ($N = 140$)

Scale	Reliability	Item ^a	Reliability with item removed	Item-to-scale correlation	2-week test-retest ^b
People-oriented culture	.922	1	.918	.802	.88
People-oriented culture	.922	2	.886	.905	
People-oriented culture	.922	3	.898	.873	
People-oriented culture	.922	4	.891	.893	
Safety climate	.950	6	.941	.870	.85
Safety climate	.950	7	.893	.893	
Safety climate	.950	8	.939	.899	
Safety climate	.950	9	.937	.915	
Safety climate	.950	10	.944	.837	
Safety climate	.950	11	.947	.796	
Safety climate	.950	12	.948	.783	
Ergonomic practices	.760	13	.610	.781	.78
Ergonomic practices	.760	14	.610	.781	
Disability management	.922	15	.918	.765	.80
Disability management	.922	17	.910	.804	
Disability management	.922	18	.903	.853	
Disability management	.922	19	.902	.867	
Disability management	.922	20	.916	.747	
Disability management	.922	21	.902	.869	

^aItem corresponds to question number in Table IV.

^bThe 2-week test-retest reliability is estimated by calculating an intraclass correlation (ICC) following the formula $ICC = F - 1 / F + N - 1$ where F is the overall F -statistic and N (the number of groups, subjects) is observed twice and thus the number of group is 2. The sample for this calculation is 34.

(using a cutoff point of 52 on the mental health index of the SF-36 as recommended in (35), and by gender. In neither case did the basic scaling properties change. Finally, test–retest results are presented in Table VI. The ICCs range between .78 and .88, supporting the ability of workers to consistently respond over time to the same question. Because questions were also included about carpal tunnel functioning on the test–retest questionnaire, we were able to calculate an ICC for this established scale (36). The OPP ICCs compare favorably with the ICC (.95) for the carpal tunnel functioning scale.

The four OPP scales are intercorrelated. People-oriented culture is strongly correlated with safety climate ($r = .72$), ergonomic practices ($r = .58$), and disability management ($r = .64$). Ergonomic practices are correlated with safety climate ($r = .64$) and disability management ($r = .65$). Disability management is correlated with safety climate ($r = .67$).

The scales are reasonably distributed, with limited responses at the floor and ceiling. People-oriented culture has 9.6% of the responses at the floor (low) and 4.1% at the ceiling (high). Similarly, safety climate (11.1% at the floor and 2.8% at the ceiling), ergonomic practices (4.8% at the floor and ceiling) and disability management (1.4% at the floor and 4.1% at the ceiling) have a modest number of respondents endorsing either strongly agree (high) or strongly disagree (low) for all items in a scale. People-oriented culture has a mean of 2.72 and a *SD* of 1.09. Safety climate (Mean 2.47, *SD* 0.98) and ergonomic practices (Mean 3.08, *SD* 0.94) have similar means indicating that most respondents do not consider their employers to be strong in these policies and practices. However the mean for disability management (Mean 4.26, *SD* 1.53) suggests that this is one OPP where most employers have been active in creating programs and policies.

Predictive Validity

To examine the predictive validity of the scales we looked at how well baseline measures of a similar set of items predict work status at six months. Table VII shows the logistic regression results. As hypothesized, all four OPPs significantly predict six-month return to work after adjustment for age, gender and CTS symptom severity. The higher the value of each OPP scale the greater the odds a person had returned to work. Age, gender and symptom severity are non-significant in all four models. In each model the C-statistic is greater than .7 indicating a strong model fit (37).

DISCUSSION

In this paper we have described prior conceptual and empirical work in Michigan developing and testing a model of how organizational policies and practices affect work

Table VII. Predictive Validity of Organizational Policies and Practices (OPPs) Scales: Logistic Regression of 6-Month Work Status on OPP Scales ($N = 140$)

	Odds ratio ^a	Standard error	P-Value
People-oriented culture	1.86	.220	.006
Safety climate	1.59	.214	.0298
Ergonomic practices	1.77	.239	.0163
Disability management	2.24	.267	.0025

^aAll odds are adjusted for age, gender and baseline carpal tunnel syndrome symptom severity.

disability prevention and management. The model suggests that the broader company environment creates a context in which certain types of disability prevention and management interventions are implemented. Together these create an organizational ecology that influences work disability incidence, duration and costs. In particular, the results from Michigan point to the importance of OPPs for workers' compensation claims incidence and lost work-days for 7 industries where there were high rates of injuries and illnesses. However, the Michigan work only developed questionnaires for employer-level assessment. Building on the Michigan work, an alternative format of a revised questionnaire that can be answered by workers for measuring organizational policies and practices is presented. In a study of workers who have had carpal tunnel surgery, OPP scales are shown to be both reliable and valid. These results provide initial support for the use of this measure in worker surveys.

While the current work only focused on a population of workers with carpal tunnel syndrome electing surgery, we consider the findings supportive of the continued use of the scales in spite of the clear need for further methodological work. Importantly, the worker-level OPP scales replicate the key findings of the Michigan study. First, four scales emerged from the factor analysis that tap the three critical areas identified by Hunt and colleagues (9). People-oriented culture taps a significant element of the wider company environment. Both safety climate and ergonomic practices assess the safety and prevention activities that an organization invests in to reduce work disability incidence. Finally, disability management represents the continuum of interventions identified as critical to returning injured workers to work and reducing costs.

The commensurability of results using different outcomes in the Michigan (employer level) and Maine (employee level) studies further supports the utility of the model. Future research should continue to extend the research using additional outcomes.

While the four OPP dimensions represent conceptually distinct and operationally independent measures, they co-exist in a series of interdependent relationships as indicated by the high scale intercorrelations. It is likely that a people-oriented culture facilitates the development of a strong safety climate and the implementation of ergonomic practices that reduce risks, and fosters a disability management program that results in appropriate and productive work outcomes. These policies and practices would be consistent with a management perspective that views investments in people—through safety, health, and accommodation—as an equally important strategy to achieving the productivity and financial goals of the organization.

The lack of a strong independent effect for the labor-management scale is not surprising. Shannon and colleagues (4,38) have argued that the presence of a labor-management committee is not a reasonable measure of the role of the committee. In their own work they were unable to find a relationship (in multivariate analyses) between a more detailed series of questions and accident rates (38). We sought to identify a small set of broad perceptual items that capture the worker's view of the effectiveness of the labor-management partnership. The item that asked about this in relation to return to work identifies a pivotal factor in the acceptance and success of these programs. Warren (39) suggests that measures of workplace disagreement/conflict may be more useful indicators. More work is needed in this area that starts from a more comprehensive model of the labor-management relationship (40).

Further work is also needed to expand the ergonomic practices scale. The current items measure broad dimension of work (repetitiveness and lifting) that are likely generalizable across a range of jobs, but insufficiently capture all the relevant elements of ergonomic practices. In a sample with a wider range of industries, jobs, and clinical conditions more items may be necessary to describe the variation in ergonomics practices. This scale currently

has only two items and more conceptual and measurement work is required to identify a broader group of candidate items. The challenge will be to measure broad ergonomic practices reflecting organizational behavior rather than specific ergonomic interventions (e.g., reducing the number of lifts with twisting on an assembly line using a dynamic lifting model). The later is important to ergonomists seeking to change the work organization while the former is relevant to management trying to change how a group of people in the organization behave.

As researchers develop multidimensional models of return to work that include organizational factors they face a choice of asking employers a series of questions that can be linked to worker-level data or asking workers. The former is more costly and until this work considered the only scientifically valid approach (14). The development of the worker-level measures of OPPs allows researchers the opportunity to measure directly organizational behaviors in employee surveys.

However, it is important to continue testing the OPP measures reported herein. In the Maine Carpal Tunnel Study II, we will continue this work by comparing employer with employee responses. When disagreements are encountered we intend to call back both informants to understand the reasons for the discrepancies. It may be that workers are reporting on informal policies and practices. Further, the current project relies only on the reports of workers with a carpal tunnel syndrome. There is a need to extend this work to other worker populations and groups of employers. It may be that workers experienced in the disability system can validly report on many of the disability management practices. Over time, as evidence accumulates, we should be able to test whether worker-reported OPPs are better predictors of individual health outcomes, and employer-level OPPs better predictors of firm-level health outcomes.

While our research has demonstrated the predictive validity of the OPP measures we have not addressed the concurrent validity. It may be that the relationship between OPP scale scores and return to work is due to some characteristics of the injured worker or work environment that leads him or her to respond positively or negatively to the OPP items (e.g., a supportive or non-supportive supervisor or some personality trait) and to either return or not return to work. To demonstrate concurrent validity we would need to administer the questionnaire to a random sample of workers within supervisory units and demonstrate similar responses across units and individuals.

In recent research on return to work there has been a call for attention to the role of organizational factors (41,42). Future research needs to unpack the link between the organizational environment (distal determinants) and prevention (both interventions and outcomes). This will require a prospective study to explore the link between organization actions and prevention, and to better capture the RTW outcomes and costs that eventuate from them. Irrespective of the methodological work still ahead, the OPP scales represent a reasonable set of measures for advancing this research to capture organizational behavior relevant for predicting work disability prevention and management.

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APPENDIX

Organizational Policy and Practice Questions Asked at Baseline

- a. The company spends time and money on improving safety.
- b. Equipment is well maintained.
- c. Unsafe working conditions are identified and improved promptly.
- d. Jobs are designed to reduce repetitive movements.
- e. Injured workers on disability are evaluated regularly for potential return to work.
- f. The company monitors the duration of disability in order to identify workers in greatest need of rehabilitation and other services.
- g. The company modifies jobs and provides alternative jobs to help injured workers return to work.
- h. The company offers special equipment or flexible hours to allow injured workers to return to work.
- i. When injured workers can't return to their jobs the company provides retraining.
- j. Working relationships are cooperative.
- k. Communication is open and employees feel free to voice concerns or make suggestions.
- l. Workers tend to stay with the company for a long time.