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Accidental Outcomes: Attitudinal Consequences of Workplace Injuries

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A model of the attitudinal outcomes of the occurrence and severity of occupational injuries was developed and tested. The model postulates that workplace accidents result in a perceived lack of influence and a distrust of management, with the former also affecting the distrust of management. Both are hypothesized to predict job dissatisfaction. Exit (turnover intentions) and voice (perceptions of union instrumentality) are hypothesized as outcomes of job dissatisfaction. A sample of 9,908 employees was tested with the 1995 Australian Workplace Industrial Relations Survey database. Structural equation modeling provided strong support for the model with respect to accident occurrence, and the model was replicated across 8 different occupational groups. There was less support for the model with respect to accident severity.

The search for an understanding of occupational safety has historically received little attention in the organizational and management literatures (Campbell, Daft, & Hulin, 1982), a situation that has not changed since Campbell et al. conducted their initial survey (Zacharatos & Barling, 2002). Of the limited amount of research that has been conducted, a clear pattern can be discerned: The overwhelming majority of studies have focused on the predictors of occupational safety, or more specifically, on occupational accidents. Thus, research now consistently identifies negative perceptions of safety climate, both at the individual and the group level (Griffin & Neal, 2000; Hofmann & Stetzer, 1996; Zohar, 1980, 2000), pay-for-performance schemes (Kaminski, 2001), and job insecurity (Probst & Brubaker, 2001) as predictors of workplace injuries. In contrast, supportive supervision and leadership (Barling, Loughlin, & Kelloway, 2002; Butler & Jones, 1979; Dunbar, 1975; Hofmann & Morgeson, 1999; Parker, Axtell, & Turner, 2001), team work (Kaminski, 2001), and empowerment and job autonomy (Alampay & Beehr, 2001; Parker et al., 2001) all affect safety performance positively.

A separate, and even more limited, literature has focused on the outcomes of workplace accidents showing that accidents exert serious negative financial effects on organizations. In the first instance, workplace accidents exert a toll with respect to workdays lost because of injuries. Dupré (2000) estimated that in approximately half of the accidents that occurred in the European Union in 1996, the resulting absence from work was between 2 weeks and 3 months. In other countries such as Australia, compensated injuries resulted in an average of 2 months lost work in 1998–1999 (National Occupational Health and Safety Commission, 2000). Zacharatos and Barling (2002) reported that in Canada between 1993 and 1996, the number of workdays lost as a function of workplace accidents exceeded the number of workdays lost due to labor unrest. In the United States, 80 million days of lost productivity were associated with workplace accidents in 1998 (U.S. Bureau of the Census, 2000). The associated economic costs are staggering: Economic data in Canada indicate that the cost of each workplace injury is estimated to be $6,000, with the cost of each workplace fatality estimated to be $492,000 (Marshall, 1996). Similar to Canada, the cost of a work-

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place injury in Australia between 1998 and 1999 is calculated to be around $7,000, whereas the cost in the United States in 1992 was estimated conservatively to total $145 billion (Leigh, Markowitz, Fahs, Shin, & Landrigan, 1997). Despite the enormity of these costs, to date, there has been no sustained empirical focus on the attitudinal outcomes of workplace accidents, a significant omission given the potential conceptual and practical ramifications of this link. Yet there are compelling reasons to suggest that specific attitudes may well be associated with occupational injuries; in the present study, we developed and tested a model of attitudinal outcomes of workplace injuries.

Just why involvement in a workplace accident would be associated with lingering negative employee attitudes can be gleaned initially from research conducted on workplace disasters. Findings from empirical research show that outcomes of workplace disasters are differentiated in terms of whether the precipitating event or disaster was acute or chronic (Barling, Bluen, & Fain, 1987; Baum, Fleming, & Davidson, 1983; Pratt & Barling, 1987). Events are acute when the "low point" is reached virtually immediately, that is, when individuals believe that the likelihood of a recurrence of the event is close to zero. In contrast, events become chronic when the "low point" is not reached, that is, when individuals believe that the event might well recur, or that the negative consequences are still present and are not likely to abate in the foreseeable future (Baum & Fleming, 1993; Baum, O'Keefe, & Davidson, 1990). Thus, events such as the disaster at Three Mile Island are chronic because there is no obvious point at which participants can feel they will no longer develop negative effects, and therefore their chronic concerns can exert long-term effects (Barling et al., 1987; Pratt & Barling, 1987). These explanations may be especially relevant to an understanding of occupational safety, given that many of these original studies were based on workplace disasters (e.g., Barling et al., 1987; Baum & Fleming, 1993).

Unlike workplace fatalities, which are rare occurrences statistically,[1] the inherent accident risk in the workplace is never fully eliminated in that the "low point" is never reached. These outcomes differ in two important respects. First, workplace accidents are more frequent events than workplace fatalities. Data from different countries clearly support this assertion. Statistics from the United States indicate that approximately 6,000 employees are killed at work each year, with some 3.6 million others suffering from disabling injuries (Conway & Svenson, 1998; U.S. Bureau of the Census, 1997). In 1999, there were 833 work-related fatalities in Canada, with 379,395 employees suffering injuries serious enough to warrant compensation for wages lost due to time off work (Association of Workers' Compensation Boards of Canada, 2000). The situation is not necessarily any better elsewhere: In the United Kingdom, some 1.1 million people endure injuries at work each year (Health and Safety Executive, 1997). Across the European Union, there were close to 5 million workplace accidents in 1996, if one considers only those injuries that resulted in 3 days of lost work.

At the individual level, Probst and Brubaker (2001) observed in a longitudinal study that the best predictor of workplace injuries were workplace injuries in the previous 3 months. The researchers explained this finding in terms of the lowered safety knowledge and motivation and noncompliance with safety polices of injured employees. According to valence-instrumentality-expectancy theory (Vroom, 1964), employees with safety knowledge who are rewarded for adhering to safety policies are more likely to be motivated to comply. Although it is beyond the scope of this article, there is evidence suggesting that a large proportion of accidents are experienced by a relatively small percentage of the workforce (see McKenna, 1983). This can be explained by a small constellation of personality traits such as extreme extraversion and neuroticism (Hansen, 1989; Shaw & Sichel, 1971) and positive and negative affectivity (Iverson & Erwin, 1997), which have been found to predispose some individuals rather than others to be injured at work. Other factors that can explain accident-repeat propensity include exposure (e.g., jobs that involve a higher degree of potential risk), cumulative (e.g., an employee's physical condition deteriorates because of cumulative job stress), reinjury (e.g., an employee's injured part of the body is more susceptible to injury), and referred injury (e.g., an injury in one body part leads to injury in another; Pater, 1996). Given these various factors, it is doubtful that employees who are injured at work would believe that the likelihood of recurrence was close to zero.

Second, as noted previously, on average injuries result in anything between 2 weeks and 3 months off work (Dupre, 2000; National Occupational Health

[1] If the number of workplace fatalities from injuries *and* illnesses is considered, the number of deaths rises. In the United States, for example, 65,000 people die each year from work-related injuries and illnesses (Herbert & Landrigan, 2000).

and Safety Commission, 2000). Therefore, the physical consequences also linger for the average employee suffering from a workplace injury. Thus, no low point will have been reached, as a result of which workplace injuries may exert lingering, negative effects. Support for this notion emerges from research with victims of workplace violence in which the ongoing fear of experiencing future violence is associated with adverse personal and organizational consequences (Rogers & Kelloway, 1997; Schat & Kelloway, 2000). Workplace injury has also been linked with posttraumatic stress disorder (PTSD). In a study of injured employees, Asmundson, Norton, Allerdings, Norton, and Larsen (1998) reported a substantial portion to experience symptoms consistent with PTSD. These persistent psychological symptoms can include reexperiencing the injury (e.g., nightmares), hyperarousal (e.g., sleep difficulties), and the avoidance of feelings or activities related to the injury. The cognitive and behavioral problems associated with work-related injury can impair occupational functioning (Matthews, 1999).

An understanding of the specific outcomes of workplace injuries can also be gleaned from the ample empirical data showing that, in the face of negative events, people struggle to make sense of their environments, and being involved in an occupational accident that threatens one's basic safety would be no exception. The two theories of normal accidents (Perrow, 1984, 1994) and high reliability organizations (Roberts, 1989; Weick, Sutcliffe, & Obstfeld, 1999) provide frameworks for understanding the consequences of accidents for employees.[2] According to Perrow (1984), an accident is defined as "an unintended damage to people or objects that affects the functioning of the system" (p. 64). Accident risk is determined by characteristics associated with an organization and its technology. A distinction is made between interactive and linear complexity, whereby the former results in unintended, thus unpredictable, feedback loops in the production or manufacturing sequence. Weick et al. (1999) noted that interactive complexity characterizes "ordinary" as well as "extraordinary" manufacturing systems (e.g., Three Mile Island). The consequences of an accident for system employees (e.g., operators) is that they may develop a sense of limited confidence in management's ability to fully comprehend the complexities involved. This limited confidence may spillover to their own job due to the inherently uncontrollable aspects of the technological system they operate. This preoccupation with failure derives from the commonly shared appreciation that interactive complexities cannot be fully controlled (Weick et al., 1999). Because there is considerable ambiguity inherent in assigning causality for a workplace accident (DeJoy, 1994), attributional errors are also likely to occur (see Perrow, 1984, 1986). The defensive attribution error helps us to understand why the causes of a workplace injury will be attributed externally in general, whereas the fundamental attribution error leads to the prediction that employees will seek to place blame for their injuries on management in this situation. In both cases, the role of personal and situational factors would be minimized (Hofmann & Stetzer, 1998). Clarke's (1999) study provides some support for this. Although train drivers, supervisors, and managers all rated occupational safety as an important organizational issue, drivers erroneously estimated that their supervisors and managers had less knowledge and cared less about occupational safety than they actually did. Clarke pointed to the detrimental effects this would have for drivers' trust in their supervisors and managers, and the first path in the model posits that being injured in the workplace will result in a distrust of management (see Figure 1).

The second path in our model links workplace injury with a perceived lack of influence on the part of the employee. The belief that one can influence the environment is typically labeled control (e.g., Ganster & Fusilier, 1989), and there is a considerable body of evidence suggesting that such control beliefs can lessen the negative consequences of stressful events (e.g., Ganster & Fusilier, 1989; Greenberger & Strasser, 1986). Deriving from the frameworks of normal accidents (Perrow, 1984; 1994) and high reliability organizations (Roberts, 1989; Weick et al., 1999), accidents symbolize the interactive complexities in the technological system. Employees come to the realization that well-practiced action could lead to unintended consequences under some unknown conditions. Accordingly, this should result in lowered controllability appraisals of their jobs and the environment. Thomas and Ganster (1995) pointed out that comparatively little research has investigated the predictors of such control beliefs, and we suggest that one predictor is whether an individual has been injured at work. Indeed, there may be some veridical basis for employees' perceiving a lack of influence following a safety incident: Reason, Parker, and Lawton (1998) noted that management may well

[2] We thank a reviewer for suggesting the theories of normal accidents and high reliability organizations to buttress our explanation.

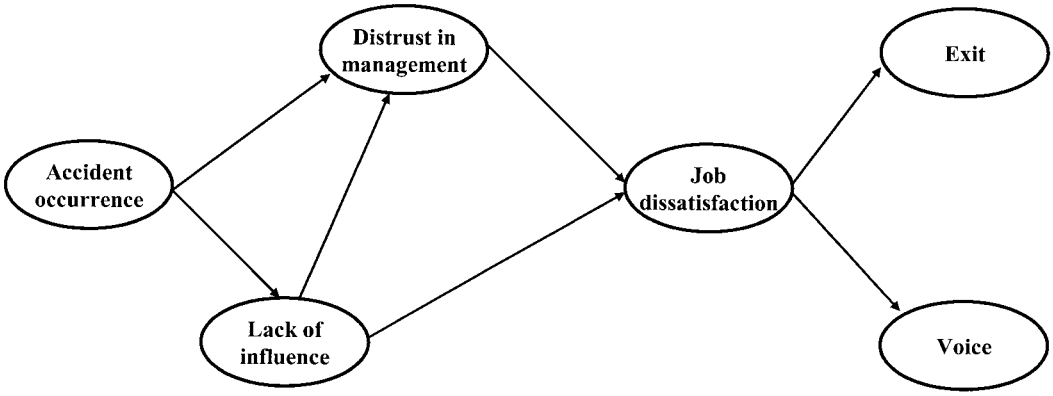

Figure 1. Proposed model of the attitudinal outcomes of workplace injuries.

react to injuries, especially serious injuries, by tightening their use of procedures and rules, thereby exerting greater control.

An understanding of responses to technological and human-made catastrophes sheds additional light on the reasons for this link. A considerable body of research focused on the psychological, behavioral, and physiological consequences of the incident at Three Mile Island (e.g., Baum & Fleming, 1993; Baum et al., 1990). One focus of this research was on contrasting the nature and consequences of natural and technological (or human-caused) incidents, and two results are especially salient. First, because catastrophes are rare and very infrequent (Perrow, 1984), the capacity of employees to learn from these unexpected events is lessened (Weick et al., 1999). Natural catastrophes generally had a clear end point, whereas human-caused incidents or disasters did not (Baum et al., 1983), again suggesting that workplace injuries may exert lingering consequences. Second, Davidson, Baum, and Collins (1982) showed that community residents exposed to the wide-ranging stress of the incident at Three Mile Island reported feeling less situational control. On the basis of this generalized response, we suggest that employees who experience a workplace injury are likely to feel less able to exert influence within their workplaces (Perrow, 1984, 1994; Weick et al., 1999).

Our model also proposes a link from perceived lack of influence to distrust in management. Traditional definitions of interpersonal trust emphasize the concepts of vulnerability at the expense of controllability (Kee & Knox, 1970; Mayer, Davis, & Schoorman, 1995). In this respect, interpersonal trust is viewed as the readiness of one person to be vulnerable relative to another, "irrespective of the ability to monitor or control that party" (Mayer et al., 1995, p. 712). This notion is exemplified in one of the items of Mayer and Davis's (1999) measure of trust, "I would be comfortable giving top management a task or problem which was critical to me, even if I could not monitor their actions" (p. 136). By placing considerable, if not total, emphasis on characteristics of the trustor, this conceptualization offers little personal agency to the trustee and accords situational variables a minor role at best. Yet recent research suggests that this conceptualization of trust may be somewhat limited, because leadership behaviors predict followers' interpersonal trust (Jung & Avolio, 2000), as do organizational processes that are perceived as fair to employees (Mayer & Davis, 1999). Consistent with these findings, we hypothesize that employees would be more willing to trust management if they believed they could monitor and control events in their workplace, including actions taken by their managers.

There is consistent evidence of a significant relationship between distrust in management and job dissatisfaction (Cook & Wall, 1980; Hammer & Berman, 1981; Hemmasi & Graf, 1993), and we predict that the feeling that management cannot be trusted will be associated with job dissatisfaction. Similarly, research shows that job satisfaction is enhanced when employees enjoy autonomy and can participate in decision making (Wall, Corbett, Martin, Clegg, & Jackson, 1990), and we also posit a link between the perceived lack of influence and job dissatisfaction. Support for this latter link is evident throughout the

literature on workplace control (see, e.g., Tetrick & LaRocco, 1987).

One of the most comprehensive conceptual frameworks offered to account for responses to job dissatisfaction is Hirschman's (1970) exit, voice, and loyalty model. At its most simple level, individuals can opt for one of two actions in the face of dissatisfaction. They can choose to exit the organization, or they can choose to stay and try and resolve their dissatisfaction, that is, use their individual or collective voice. Like other studies including the Hirschman's (1970) model within organizations (e.g., Withey & Cooper, 1989), we operationalize exit as the intent to leave the organization. Support for a link between job dissatisfaction and turnover comes from a different context: When management is perceived to handle layoffs in an unfair manner, employees withdraw from their jobs and their organizations (Brockner, 1990). However, we deviate somewhat from Freeman and Medoff's (1984) operationalization of voice as reflected in union representation. Within the organizational realm, the strongest, most consistent, and proximal predictor of the individual decision to join a union is individual perceptions of a union's instrumentality, that is, the likelihood that a union will be able to help employees solve their problems (Barling, Fullagar, & Kelloway, 1992). The link between job satisfaction and union instrumentality is well established in the literature (Davy & Shipper, 1993). Accordingly, we chose to focus on perceived union representation as a proxy for voice.

Lastly, we focused on two different indicators of workplace injuries. First, we assessed the occurrence of a workplace injury. Second, we addressed the severity of the injury, which necessitated an analysis of only those respondents who had been involved in a workplace accident. It is possible that injury occurrence and injury severity are substantively different and exert different effects on attitudinal outcomes. To date, however, there is little research on the morale-related outcomes of either of these indices of workplace accidents. Thus, we test the proposed model separately with both injury occurrence and injury severity as the exogenous variables.

Method

Participants

Participants in the first set of analyses focusing on injury occurrence were the 9,908 employees from the 1995 Australian Workplace Industrial Relations Survey (AWIRS95; Morehead, Steele, Alexander, Stephen, & Duffin, 1997) database for whom complete data were available on all study variables. AWIRS95 randomly selected employees from a stratified sample of 2,001 workplaces employing a minimum of 20 employees. Data on age (1 = 15–20 years, 2 = 21–24 years, 3 = 25–29 years, 4 = 30–34 years, 5 = 35–39 years, through 9 = 55 years or over) and education were categorized at source (1 = primary school, 2 = 11 years of education, 3 = completed secondary school, 4 = basic vocational qualifications, 5 = skilled vocational qualifications, 6 = diploma, 7 = undergraduate degree, and 8 = graduate degree). For the injury occurrence analyses, the mean age of the sample (60.4% male) was 5.34 (*SD* = 2.12, *Mdn* = 5), with the mean level of education being 4.17 (*SD* = 2.19, *Mdn* = 4). For the sample included in the injury severity data (*n* = 2,067, 35.2% female), the mean age was 5.27 (*SD* = 2.06, *Mdn* = 5), with a mean level of education of 3.97 (*SD* = 2.09, *Mdn* = 3). Both samples correspond to a mean age of 35–39 years old.

Instruments

All of the respondents in the survey were asked whether they have suffered a work-related injury or illness in the prior 12 months; 15,614 (83%) said they had not, with 3,182 (17%) responding affirmatively. Using a screening question focusing on work-related injury, we asked those who responded in the affirmative to indicate whether their most recent injury was a fracture, dislocation/strain/sprain, open wound, bruising/crushing, burn/scald, or an eye injury. Summing across these six items resulted in an index of injury occurrence ranging from 0 (*no injury*) to 6 (*multiple injuries*). A separate one-item index was used to assess injury severity, with only those respondents who had experienced an injury being asked to indicate the number of days of work they had missed as a result of the injury.

Perceived lack of influence in the workplace was measured with six items, indicating the amount of influence respondents felt they had over the type of work they do, how they do their work, their start/finish times, the pace of their work, decisions that might affect them, and the workplace or organization. Responding was on a 4-point scale (*none, a little, some, a lot*).

Distrust in management was measured with two items ("Workplace management are trustworthy" and "Workplace management and employees get on"). Responding occurred on a 3-point scale (*agree, neither agree nor disagree, disagree*). Turnover intentions were measured with a two-item scale ("I often think about leaving" and "This is a good place to work"—reverse coded). Lastly, voice was measured with four items, namely: Unions here . . . "do a good job in improving members' pay and conditions," "take notice of members' problems and complaints," "give members a say in how the union operates," and "do a good job representing members when dealing with management." Responding on all these latter scales was measured on a 3-point scale (*agree, neither agree nor disagree, disagree*). Other researchers have used similar measures of union instrumentality (e.g., Deery, Erwin, & Iverson, 1999).

Job dissatisfaction was measured with three items: the dissatisfaction derived from the opportunities to get a more senior job in the organization, the way in which management treat employees in the organization, and dissatisfaction with the job overall. Respondents rated each of these

Table 1
Descriptive Statistics and Intercorrelations of All Study Variables for Total Sample

Variable	*M*	*SD*	α	1	2	3	4	5	6	*M*	*SD*
1. Workplace accident	0.26	0.62		—	−.01	.03	−.02	.01	.01	8.17	5.62
2. Lack of influence	2.51	0.79	.82	−.12*	—	.32*	.38*	.31*	−.14*	2.36	0.78
3. Mistrust	2.11	0.73	.60	−.11*	.29*	—	.65*	.48*	−.15*	21.94	0.73
4. Dissatisfaction	2.17	0.73	.73	−.12*	.35*	.66*	—	.65*	−.19*	1.93	0.67
5. Turnover intentions	2.24	0.70	.54	−.12*	.29*	.45*	.61*	—	−.16*	2.04	0.72
6. Voice	2.13	0.66	.85	.03	−.09	−.14*	−.16*	−.15*	—	2.12	0.67

Note. Data for accident occurrence below the diagonal (N = 9,908); data for accident severity above the diagonal (N = 2,183). Pearson correlation coefficients derived from the two-item scale.
* $p < .01$.

items on a 3-point scale (*satisfied, neither satisfied nor dissatisfied, dissatisfied*).

Descriptive statistics, intercorrelations, and reliability data are presented in Table 1.

Analytic Strategy

Many studies choose to use a pairwise deletion strategy to deal with missing data or some form of mean substitution method. In contrast, we chose to follow the more conservative listwise deletion strategy. The very large initial sample made it possible to use this more conservative approach without any meaningful loss in statistical power. Although there were significant differences between the final sample and those excluded from the original sample (see Table 2), the effects sizes are small ($d < 2$), with the power for each test set equal to 1.

There are consistent differences between industrial sectors and across different jobs in accident rates, and it is critical that research reflects and account for such sectoral differences. One way in which this has been accomplished is to use dummy variables for different industrial sectors (e.g., Huselid, 1995). However, because there could be differences in injury rates between occupations within industries, we chose to impose a control at the occupational level.[3] To do so, we adopted a two-stage process. We first tested the model for the entire sample without controlling for occupational level. Following that, the model was tested for eight different occupational groups, and LISREL's multisample capacity was used to test for differences in the path coefficients across the eight samples.

Results

The proposed model was operationalized as an observed variable path analysis with parameters estimated using maximum likelihood estimation as implemented in LISREL VIII (Joreskog & Sorbom, 1993). All analyses were based on the covariance matrix with listwise deletion of missing data.

To examine the possibility that the model would vary across occupations, we computed eight different subsamples of homogeneous occupations. In addition to estimating the model on the full sample (N = 9,908), we estimated the model using data from laborers (n = 1,534), plant operators (n = 1,278), sales and service workers (n = 983), clerical workers (n = 1,497), tradespeople/apprentices (n = 1,044), paraprofessionals (n = 1,278), managers (n = 540), and professionals (n = 1,458).

Fit indices for the model in each sample are presented in Table 3. As shown, the model provided an acceptable fit to the data for each sample. Although the chi-square is significant in each case, this index is sensitive to sample size (Kelloway, 1998), and significant values are to be expected given the sample sizes used in this study. However, values of the goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normed fit index (NFI), and comparative fit index (CFI) all exceeded .90, suggesting a good fit to the data. Similarly, the root-mean-square error of approximation (RMSEA) approached .05 in each case, again indicating an acceptable level of model fit.

Using LISREL's capacity for multisampling analysis, we conducted a test of parameter invariance across the eight subsamples (see Table 4). First, all model parameters were freely estimated in each subsample simultaneously. The multisample model resulted in $\chi^2(64, N = 9{,}908) = 335.70$, $p < .01$. Second, the models were again reestimated simultaneously in all eight samples. In the second run, all estimates in the beta and gamma matrices (i.e., all substantive paths in the model) were constrained to equality. The constrained multisample model resulted in $\chi^2(113, N = 9{,}908) = 559.58$, $p < .01$. The resulting difference test is significant, $\chi^2_{\text{difference}}(49) = 223.88$, suggesting significant differences in parameters

[3] The decision to conduct the analyses at the occupational group level is justified by the differences in injury rate.

Table 2
Comparison of Respondents Included and Excluded From Study, Total Sample

Variable	Respondents included in analysis (N = 9,908)		Respondents excluded from analysis		
	M	*SD*	*M*	*SD*	*t* test
1. Accidents	0.26	0.62	0.14	0.46	14.28 (n = 9,910)
2. Lack of influence	2.51	0.79	2.70	0.81	16.03 (n = 9,077)
3. Mistrust	2.11	0.73	2.35	0.68	24.16 (n = 8,864)
4. Dissatisfaction	2.12	0.66	2.35	0.63	24.74 (n = 8,850)
5. Turnover intentions	2.23	0.70	2.40	0.67	16.08 (n = 8,848)
6. Voice	2.14	0.66	2.28	0.71	4.456 (n = 520)

Note. n for excluded respondents in parentheses. For all tests, $p < .01$.

across subsamples. Subsequent analyses suggested significant variance in both the paths from the exogenous to endogenous variables, $\chi^2_{\text{difference}}(14) = 25.02$, $p < .01$, and among the paths linking the endogenous variables, $\chi^2_{\text{difference}}(35) = 198.50$, $p < .01$.

Standardized parameter estimates for the proposed model in each sample are presented in Table 4. Inspection of the parameter estimates suggested differing patterns of significance among the paths linking injury occurrence to mistrust and perceived lack of influence. For plant operators, sales and service workers, clerical workers, and professionals, the path from workplace accidents to employees' perceived lack of influence was nonsignificant (βs = –.03, –.05, –.01, and –.04, respectively), whereas this path was significant for all other samples (βs range = –.08 through –.13). Similarly, the path from workplace accidents to trust was nonsignificant for paraprofessionals, managers, and professionals (βs = –.03, –.00, and –.01, respectively) but was significant for the other occupational groups (βs range = –.08 through –.13). For the paths linking endogenous to endogenous variables, similar patterns were observed in that all hypothesized paths were significant across subsamples. However, the magnitude of these paths varied across occupational groups.

Lastly, we tested a model in which injury severity, as measured by the number of days of work lost, resulted in a similar sequence of attitudinal outcomes. The model provided a good fit to the data, $\chi^2(8, N =$

Table 3
Goodness-of-Fit Statistics for Full Sample and Different Occupational Groups for Data on Accident Occurrence

Variable	χ^2	GFI	AGFI	RMSEA	NFI	CFI
Overall sample	262.50	.99	.98	.057	.99	.99
Laborers	83.07	.98	.95	.078	.96	.96
Plant operators	49.23	.99	.97	.064	.97	.98
Sales and service	42.83	.99	.96	.067	.97	.97
Clerical	24.45	.99	.99	.037	.99	.99
Trades/apprentice	40.94	.99	.97	.063	.97	.98
Paraprofessional	49.23	.99	.97	.064	.97	.98
Managers	33.56	.99	.98	.047	.98	.98
Professionals	12.39	.99	.98	.032	.98	.99

Note. GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index; RMSEA = root-mean-square error of approximation; NFI = normed fit index; CFI = comparative fit index.

Table 4
Path Coefficients for Full Sample and Different Ocupational Groups

Variable	Injury rate	Educational level	Accident → influence	Accident → trust	Influence → trust	Influence → job dissatisfaction	Trust → job dissatisfaction	Job dissatisfaction → exit	Job dissatisfaction → voice
Accident occurrence									
Full sample	.20	4.31	−.11	−.08	.28	.18	.61	.61	.16
Laborers	.33	2.71	−.10	−.11	.23	.14	.64	.63	.29
Plant operators	.42	2.76	−.03[a]	−.13	.32	.18	.64	.64	.21
Sales and service	.19	3.50	−.05[a]	−.13	.31	.16	.64	.64	.22
Clerical	.08	3.49	−.01[a]	−.10	.30	.24	.63	.63	.15
Trades/apprentice	.38	4.08	−.11	−.10	.35	.25	.65	.65	.18
Paraprofessional	.20	5.09	−.13	−.03[a]	.32	.18	.64	.64	.21
Managers	.09	5.50	−.08	−.05[a]	.230	.28	.62	.62	.12
Professionals	.06[b]	7.11	−.04	−.01[a]	.30	.32	.62	.62	.15
Accident severity									
Full sample		4.31	.00[a]	.00[a]	.32	.19	.59	.65	.19

[a] $p > .05$. [b] $F(8, 9875) = 59.97$, $p < .01$.

3,182) = 52.00, GFI = .99, AGFI = .98, NFI = .98, CFI = .98, RMSEA = .05. As can be seen from Table 4, however, neither the links between accident severity and distrust nor between injury severity and perceived lack of influence were significant. We concluded that the model only received support because of the substantial links between the endogenous variables, and hence did not proceed further with the multisample analyses based on the specific occupational groups.

Discussion

The first set of analyses tested the proposed outcomes of injury occurrence. Substantial support emerged for the model predicting attitudinal outcomes of the occurrence of workplace injuries. First, tests for the goodness of fit of the model for the entire sample were acceptable. Second, the tests for goodness of fit for the eight separate occupational groups were also acceptable. However, LISREL's multisampling analysis suggested that the path coefficients were not invariant across the eight occupational groups. Nonetheless, although not all the paths from injury occurrence to perceived lack of influence nor from injury occurrence to distrust in management were significant, the range of these path coefficients was smaller (–.01 to –.12 and –.01 to –.16, respectively) than those between distrust and job dissatisfaction (.40 and .62) and job dissatisfaction and voice (.11 to .30). We suggest that this apparent variance in parameter estimates is a reflection of the high levels of statistical power associated with these tests rather than any substantive differences in effects across samples.

In contrast, support for the model depicting the attitudinal outcomes of injury severity, as reflected by the number of days of work missed following an accident, was mixed. Although the model provided a good fit to these data as indicated by the fit indices, it is commonly recommended that the assessment of model fit go beyond these global measures to an assessment of parameters comprising the model (e.g., James, Mulaik, & Brett, 1982; Kelloway, 1995, 1998). In the present case, we suggest that the fit of the model occurred only because of the substantial links between the different aspects of employee morale (see Table 4): Injury severity in itself was related neither to perceived influence in the workplace nor to distrust in management. There may be both conceptual and methodological reasons that account for this.

First, just experiencing a workplace injury may well provide a sufficient signal to employees—the severity of the injury may be perceived as being a result of

chance. Second, the speed with which people return to work following an accident (i.e., the number of days of work lost after the injury) is a function not just of the severity of the injury but also, for example, of job satisfaction, breadwinner status, and the subjective experience of pain (Van der Giezen, Bouter, & Nijhuis, 2000), as well as satisfaction with the way safety is managed in the workplace (Kenny, 1998). Third, Liao, Arvey, Nutting, and Butler (2001) showed that work injury frequency and duration did not uniformly share the same predictors, and it is possible that injury frequency and duration reflect different aspects of occupational safety. Fourth, it is possible that alternative proxies for accident severity, such as the degree of injury suffered, might provide a better indicator of severity. Although our data do not support a link between injury severity and outcomes, it remains possible that alternative operationalizations of severity might result in different conclusions, and excluding injury severity from future research would be premature at this stage.

At best, our model provides a partial test of Hirschman's (1970) model in the context of workplace injuries. Although Hirschman's model includes the notion of loyalty, the constraints of archival data meant that we could not operationalize loyalty in this study. Hirschman initially conceptualized loyalty as an individual's decision to remain with the organization primarily as a function of economic considerations. This would be akin to Meyer and Allen's (1997) continuance commitment, that is, remaining with the organization either because of a lack of available opportunities or because the costs of leaving are perceived to be too high. However, none of the items in the archival database reflected this concept. Future research should expand the present findings by providing a more comprehensive test of Hirschman's model.

It is possible that the severity of the dissatisfaction might be important in the individual choice among exit, voice, and loyalty. Specifically, individuals may be more willing to use their voice to improve organizational conditions when job dissatisfaction is less serious but choose to exit when the dissatisfaction is seen as extreme. If this is indeed the case, those employees experiencing the most severe injuries may have already left the organization, and our data linking workplace injuries and their outcomes would provide a conservative estimate of the real effects

The results of this study suggest the potential importance of investigating the outcomes of experiencing an injury, and we offer some ideas for further research in this area. Nevertheless, we must be somewhat speculative given the cross-sectional nature of our data. First, it is likely that in many if not most workplace accidents, it is not only the injured person who is exposed to the actual incident. For example, coworkers may be the first to find the injured person or asked to assist with first aid or in evacuating the wounded. Given that employees in organizations are sensitive to and affected by the fate of their colleagues with respect to downsizing, especially when identification with the victims is high (Brockner, Grover, Reed, DeWitt, & O'Malley, 1987; Brockner et al., 1997), we suggest that they would be equally affected by witnessing workplace accidents. There are data to support this notion: Vicarious exposure to workplace accidents was significantly associated with the perception of risk to oneself and to others (Cree & Kelloway, 1997) and was as highly associated with the fear of future violence at work as direct exposure to physical violence or aggression in the workplace (Rogers & Kelloway, 1997; Schat & Kelloway, 2000). In addition, the subjective perception of risk of injury at work has a greater effect on subsequent work attitudes and behaviors (e.g., job dissatisfaction, work stress) than objective risk exposure (McLain, 1995). In this respect, therefore, employees do not need to be the direct victims of a workplace accident. Instead, their vicarious exposure may well be sufficient to trigger a negative response. Thus, future research might focus profitably on the secondary victims of workplace accidents and assess whether the nature and severity of the incident exert a moderating effect. In a similar vein, such research should assess whether workplace injuries are indeed perceived by the victims as chronic events.

The potential effects of the severity of the injury on the primary victim certainly warrant further attention. Our data suggest that being injured is the critical factor and that the severity of the injury may be of little consequence. However, we measured severity by the number of days of work missed because of the accident. Alternative indicators of severity, such as the degree of bodily injury, might exert differential effects and should be investigated in future research. At the same time, research should also assess whether involvement in a "near miss" (Hemingway & Smith, 1999) or a "microaccident" (i.e., an accident that requires first aid but no time off work; Zohar, 2000) has any consequences on employee morale.

One concern with the present findings is whether our results have practical as opposed to statistical significance. Our use of a large archival data set resulted in statistical tests with a very high likelihood of identifying small effects (i.e., power approaching

1), and we note that the relationships of central importance to the present study (i.e., the links between accident occurrence and attitudes) are relatively small in magnitude. Nonetheless, we suggest that our results have both theoretic and pragmatic value.

First, our data substantiate the suggestion that occupational accidents have associations that reach well beyond the immediate context and may lead to other undesirable outcomes such as employee turnover. Second, we note that the endogenous variables in our model (i.e., mistrust, lack of influence, job dissatisfaction, voice, and turnover intent) are multiply determined, and it is not reasonable to expect that a single variable would account for a substantial part of criterion variance. Finally, we note that the data available in the archive provide information on accidents and injuries that happened over a 12-month period. It may be that these data underestimate the effects of interest and that more recent exposure to occupational accidents would have stronger relationships than those observed in our data. This, of course, remains as a question for future research.

Like all research that makes use of archival data, our choice of items in constructing the different constructs was constrained by those available, resulting in several problems. First, in some instances (most noticeably, the measure of injury severity), we are left with one-item measures: Internal consistency cannot be calculated, and the full domain may not be reflected in these situations. We note that the use of one-item measures in other areas of research (e.g., absenteeism) is routine when the precise nature of the construct being assessed does not allow for multiple measures (Johns, 1994). We would suggest that the number and severity of injuries represent such cases. Similarly, some items were measured using two items (e.g., distrust of management). Even though the correlation between these items is high, the domain under investigation would still be assessed more faithfully with a greater number of items. As a result of these concerns, the reliability and construct validity of the measures remain in question. However, if our measures are unreliable (i.e., are contaminated with random measurement error), the effect of such error would be to reduce the magnitude of the observed correlations and, thus, bias our tests conservatively. Thus, we suggest that measurement concerns should be addressed in future research but do not, in and of themselves, invalidate our conclusions.

Second, injury occurrence is a low-base-rate phenomenon, and our measure is strongly skewed reflecting the nature of the construct. The use of skewed data violates the assumption of multivariate normality that underpins maximum likelihood estimation. There are two known effects of violating multivariate normality: Model tests (e.g., the chi-square index) are inflated, and standard errors are underestimated (Joreskog & Sorbom, 1993). Inflation of model tests actually provides a more conservative test of our hypothesized model (i.e., lower values of chi-squares are associated with better model fit). Underestimation of the standard errors leads to more lenient statistical tests. However, given the sample sizes used in the present analyses, the power of our tests to detect a small effect approaches 1.0, suggesting that any such leniency has a minimal effect on our results.

The ability to make causal inferences on the basis of the data is also limited. Even though the data in the present study reflected injuries that the respondents had experienced over the past year on the one hand and their current morale on the other, it behooves future research to use longitudinal data to tease out temporal order.

In conclusion, we set out to model and test the attitudinal outcomes of workplace injuries and injury severity. Although the results with respect to injury occurrence await replication with more comprehensive measures, the present findings suggest that the consequences of workplace injuries extend beyond both the physical harm caused to the employee and the direct financial costs to the organization. This represents a viable area of study for future research and an issue of considerable practical importance for organizations.

References

Alampay, R. H., & Beehr, T. A. (2001). Empowerment, span of control, and safety performance in work teams after workforce reduction. *Journal of Occupational Health Psychology, 6,* 275–282.

Asmundson, G. J., Norton, G. R., Allerdings, M. D., Norton, P. J., & Larsen, D. K. (1998). Posttraumatic, stress disorder and work-related injury. *Journal of Anxiety Disorders, 12,* 57–69.

Association of Workers' Compensation Boards of Canada. (2000). *Work injuries and diseases (1997–1999): National work injuries statistics program* (Cat. No. 01-102). Mississauga, Ontario, Canada: Author.

Barling, J., Bluen, S. D., & Fain, R. (1987). Psychological functioning following an acute disaster. *Journal of Applied Psychology, 72,* 683–690.

Barling, J., Fullagar, C., & Kelloway, E. K. (1992). *The union and its members: A psychological approach.* New York: Oxford University Press.

Barling, J., Loughlin, C., & Kelloway, E. K. (2002). Development and test of a model linking transformational leadership and occupational safety. *Journal of Applied Psychology, 87,* 488–496.

Baum, A., & Fleming, I. (1993). Implications of psycho-

logical research on stress and technological accidents. *American Psychologist, 48,* 665–672.

Baum, A., Fleming, R., & Davidson, L. M. (1983). Natural disasters and technological catastrophe. *Environment and Behavior, 15,* 333–354.

Baum, A., O'Keefe, M. K., & Davidson, L. M. (1990). Acute stressors and chronic response: The case of traumatic stress. *Journal of Applied Social Psychology, 20,* 1643–1654.

Brockner, J. (1990). Scope of justice in the workplace: How survivors react to co-worker layoffs. *Journal of Social Issues, 46,* 95–106.

Brockner, J., Grover, S., Reed, T., DeWitt, R., & O'Malley, M. (1987). Survivors' reactions to layoffs: We get by with a little help for our friends. *Administrative Science Quarterly, 32,* 526–541.

Brockner, J., Wiesenfeld, B., Stephan, J., Hurley, R., Grover, S., Reed, T., et al. (1997). The effects of layoff survivors of their fellow survivors' reactions. *Journal of Applied Social Psychology, 27,* 835–863.

Butler, M. C., & Jones, A. P. (1979). Perceived leader behavior, individual characteristics, and injury occurrence in hazardous work environments. *Journal of Applied Psychology, 64,* 299–304.

Campbell, J. P., Daft, R. L., & Hulin, C. L. (1982). *What to study: Generating and developing research questions.* Beverly Hills, CA: Sage.

Clarke, S. (1999). Perceptions of organizational safety: Implications for the development of safety culture. *Journal of Organizational Behavior, 20,* 185–198.

Conway, H., & Svenson, J. (1998). Occupational injury and illness rates, 1992–1996: Why they fell. *Monthly Labor Review, 121*(11), 36–58.

Cook, J., & Wall, T. (1980). New work attitude measures of trust, organizational commitment and personal need nonfulfillment. *Journal of Occupational Psychology, 53,* 39–52.

Cree, T., & Kelloway, E. K. (1997). Responses to occupational hazards: Exit and participation. *Journal of Occupational Health Psychology, 2,* 304–311.

Davidson, L. M., Baum, A., & Collins, D. L. (1982). Stress and control-related problems at Three Mile Island. *Journal of Applied Social Psychology, 12,* 349–359.

Davy, J. A., & Shipper, F. (1993). Voter behavior in union certification elections: A longitudinal study. *Academy of Management Journal, 36*(1), 187–199.

Deery, S. J., Erwin, P. J., & Iverson, R. D. (1999). Industrial relations climate, attendance behaviour and the role of trade unions. *British Journal of Industrial Relations, 37,* 533–558.

Dejoy, D. M. (1994). Managing safety in the workplace: An attribution theory analysis and model. *Journal of Safety Research, 25,* 3–17.

Dunbar, R. L. M. (1975). Managers' influence on subordinates' thinking about safety. *Academy of Management Journal 18,* 364–369.

Dupré, D. (2000). Accidents at work in the EU in 1996. *Statistics in Focus: Population and Social Conditions, 3*(4), 1–7

Freeman, R. B., & Medoff, J. L. (1984). *What do unions do?* New York: Basic Books.

Ganster, D. C., & Fusilier, M. R. (1989). Control in the workplace. In C. L. Cooper & I. T. Robertson (Eds.), *International review of industrial and organizational psychology* (pp. 235–280). London: Wiley.

Greenberger, L. T., & Strasser, S. (1986). Development and application of a model of personal control in organizations. *Academy of Management Review, 11,* 164–171.

Griffin, M. A., & Neal, A. (2000). Perceptions of safety at work: A framework for linking safety climate to safety performance, knowledge and motivation. *Journal of Occupational Health Psychology, 5,* 347–358.

Hammer, T. H., & Berman, M. (1981). The role of noneconomic factors in faculty union voting. *Journal of Applied Psychology, 66,* 415–421.

Hansen, C. P. (1989). A causal model of the relationship among accidents, biodata, personality, and cognitive factors. *Journal of Applied Psychology, 74,* 81–90.

Health and Safety Executive. (1997). *The cost of accidents at work.* Sudbury, England: HSE Books.

Hemingway, M., & Smith, C. S. (1999). Organizational climate and occupational stressors as predictors of withdrawal behaviors and injuries in nurses. *Journal of Occupational and Organizational Psychology, 72,* 285–299.

Hemmasi, M., & Graf, L. A. (1993). Determinants of faculty voting behavior in union representation elections: A multivariate model. *Journal of Management, 19,* 13–32.

Herbert, R., & Landrigan, P. J. (2000). Work-related death: A continuing epidemic. *American Journal of Public Health, 90,* 541–545.

Hirschman, A. O. (1970). *Exit, voice and loyalty: Responses to decline in firms, organizations and states.* Cambridge, MA: Harvard University Press.

Hofmann, D. A., & Morgeson, F. P. (1999). Safety-related behavior as a social-exchange: The role of perceived organizational support and leader–member exchange. *Journal of Applied Psychology, 84,* 286–296.

Hofmann, D. A., & Stetzer, A. (1996). A cross-level investigation of factors influencing unsafe behaviors and accidents. *Personnel Psychology, 49,* 307–339.

Hofmann, D. A., & Stetzer, A. (1998). The role of safety climate and communication in accident interpretation: Implications for learning from negative events. *Academy of Management Journal, 41,* 644–657.

Huselid, M. A. (1995). The impact of human resource management practices on turnover, productivity, and corporate financial performance. *Academy of Management Journal, 38,* 635–672.

Iverson, R. D., & Erwin, P. J. (1997). Predicting occupational injury: The role of affectivity. *Journal of Occupational and Organizational Psychology, 70,* 113–128.

James, L. R., Mulaik, S. A., & Brett, J. M. (1982). *Causal analysis: Assumptions, models and data.* Beverly Hills, CA: Sage.

Johns, G. (1994). Absenteeism estimates by employees and managers: Divergent perspectives and self-serving perceptions. *Journal of Applied Psychology, 79,* 229–239.

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL VIII user's guide.* Chicago: Scientific Software International.

Jung, D. I., & Avolio, B. J. (2000). Opening the black box: An experimental investigation of the mediating effects of trust and value congruence on transformational and transactional leadership. *Journal of Organizational Behavior, 21,* 949–964.

Kaminski, M. (2001). Unintended consequences: Organizational practices and their impact on workplace safety and

productivity. *Journal of Occupational Health Psychology, 6,* 127–138.

Kee, H. W., & Knox, R. E. (1970). Conceptual and methodological considerations in the study of trust. *Journal of Conflict Resolution, 14,* 357–366.

Kelloway, E. K. (1995). Structural equation modeling in perspective. *Journal of Organizational Behaviour, 16,* 215–224.

Kelloway, E. K. (1998). *Using LISREL for structural equation modeling: A researcher's guide.* Thousand Oaks, CA: Sage.

Kenny, D. T. (1998). Returning to work after workplace injury: Impact of worker and workplace factors. *Journal of Applied Rehabilitation Counseling, 29,* 13–19.

Leigh, J. P., Markowitz, S. B., Fahs, M., Shin, C., & Landrigan, P. J. (1997). Occupational injury and illness in the United States. *Archives of Internal Medicine, 157,* 1557–1568.

Liao, H., Arvey, R. D., Nutting, S. M., & Butler, R. (2001). Correlates of work injury frequency and duration among firefighters. *Journal of Occupational Health Psychology, 6,* 229–242.

Marshall, K. (1996, Summer). A job to die for. *Perspectives on Labour and Income,* 26–31.

Matthews, L. (1999). Road trauma, PTSD and occupational functioning: Implications for policy development, intervention and rehabilitation. *Australian and New Zealand Journal of Public Health, 23,* 325–327.

Mayer, R. C., & Davis, J. H. (1999). The effect of the performance appraisal system on trust for management: A field quasi-experiment. *Journal of Applied Psychology, 84,* 123–136.

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review, 20,* 709–734.

McKenna, F. P. (1983). Accident proneness: A conceptual analysis. *Accident Analysis and Prevention, 15,* 65–71

McLain, D. L. (1995). Responses to health and safety risk in the work environment. *Academy of Management Journal, 38,* 1726–1743.

Meyer, J. P., & Allen, N. J. (1997). *Commitment in the workplace: Theory, research and application.* Thousand Oaks, CA: Sage.

Morehead, A., Steele, M., Alexander, M., Stephen, K., & Duffin, L. (1997). *Changes at work: The 1995 Australian Industrial Relations Survey.* South Melbourne, Australia: Addison Wesley Longman.

National Occupational Health and Safety Commission. (2000). *Compendium of workers' compensation statistics, Australia, 1998–1999.* Canberra: Commonwealth of Australia.

Parker, S. K., Axtell, C. M., & Turner, N. (2001). Designing a safer workplace: Importance of job autonomy, communication quality and supportive supervisors. *Journal of Occupational Health Psychology, 6,* 211–218.

Pater, R. (1996). Breaking the chain of accident repetition. *Professional Safety, 41,* 20–23.

Perrow, C. (1984). *Normal accidents: Living with high-risk technologies.* New York: Basic Books.

Perrow, C. (1986). *Complex organizations: A critical essay.* New York: Random House.

Perrow, C. (1994). Accidents in high risk systems. *Technological Studies, 1,* 1–20.

Pratt, L. I., & Barling, J. (1987). Differentiating between daily events, acute and chronic stressors: A framework and its implications. In J. R. Hurrell, L. R. Murphy, S. L. Sauter, & C. L. Cooper (Eds.), *Occupational stress: Issues and developments in research* (pp. 41–53). London: Taylor & Francis.

Probst, T. M., & Brubaker, T. L. (2001). The effects of job insecurity on employee safety outcomes: Cross-sectional and longitudinal explorations. *Journal of Occupational Health Psychology, 6,* 139–159.

Reason, J., Parker, D., & Lawton, R. (1998). Organizational controls and safety: The varieties of rule-related behaviour. *Journal of Occupational and Organizational Psychology, 71,* 289–304.

Roberts, K. (1989). Some characteristics of high reliability organizations. *Organization Science, 2,* 160–176.

Rogers, K., & Kelloway, E. K. (1997). Violence at work: Personal and organizational outcomes. *Journal of Occupational Health Psychology, 2,* 63–71.

Schat, A., & Kelloway, E. K. (2000). Effects of perceived control on the outcomes of workplace aggression and violence. *Journal of Occupational Health Psychology, 5,* 386–402.

Shaw, L., & Sichel, H. S. (1971). *Accident proneness.* Oxford, England: Pergamon Press.

Tetrick, L. E., & LaRocco, J. M. (1987). Understanding, prediction and control as moderators of the relationships between perceived stress, satisfaction and well-being. *Journal of Applied Psychology, 72,* 538–543.

Thomas, L. T., & Ganster, D. C. (1995). Impact of family–supportive work variables on work–family conflict and strain: A control perspective. *Journal of Applied Psychology, 80,* 6–15.

U.S. Bureau of the Census. (1997). *Statistical abstracts of the United States: 1997.* Washington, DC: Author.

U.S. Bureau of the Census. (2000). *Statistical abstracts of the United States: 2000.* Washington, DC: Author.

Van der Guizen, A. M., Bouter, L. M., & Nijhuis, F. J. N. (2000). Prediction of return-to-work of low back pain patients sicklisted for 3–4 months. *Pain, 87,* 285–294.

Vroom, V. H. (1964). *Work and motivation.* New York: Wiley.

Wall, T. D., Corbett, M. J., Martin, R., Clegg, C. W., & Jackson, P. R. (1990). Advanced manufacturing technology, work design and job performance: A change study. *Journal of Applied Psychology, 75,* 691–697.

Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (1999). Organizing for high reliability: Processes of collective mindfulness. *Research in Organizational Behavior, 21,* 81–123.

Withey, M. J., & Cooper, W. H. (1989). Predicting exit, voice, loyalty and neglect. *Administrative Science Quarterly, 34,* 521–539.

Zacharatos, A., & Barling, J. (2002). *High performance work systems and occupational safety at the organizational and employee level.* Manuscript in preparation.

Zohar, D. (1980). Safety climate in industrial organizations: Theoretical and applied implications. *Journal of Applied Psychology, 65,* 96–102.

Zohar, D. (2000). A group-level model of safety climate: Testing the effects of group climate on microaccidents in manufacturing jobs. *Journal of Applied Psychology, 85,* 587–596.

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