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Safety climate and self-reported injury: Assessing the mediating role of employee safety control

Yueng-Hsiang Huang [a,*], Michael Ho [b], Gordon S. Smith [a], Peter Y. Chen [c]

[a] *Liberty Mutual Research Institute for Safety, 71 Frankland Road, Hopkinton, MA 01748, USA*
[b] *Johns Hopkins University, Bloomberg School of Public Health, Baltimore, MD, USA*
[c] *Department of Psychology, Colorado State University, Fort Collins, CO, USA*

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Abstract

To further reduce injuries in the workplace, companies have begun focusing on organizational factors which may contribute to workplace safety. Safety climate is an organizational factor commonly cited as a predictor of injury occurrence. Characterized by the shared perceptions of employees, safety climate can be viewed as a snapshot of the prevailing state of safety in the organization at a discrete point in time. However, few studies have elaborated plausible mechanisms through which safety climate likely influences injury occurrence.

A mediating model is proposed to link safety climate (i.e., management commitment to safety, return-to-work policies, post-injury administration, and safety training) with self-reported injury through employees' perceived control on safety. Factorial evidence substantiated that management commitment to safety, return-to-work policies, post-injury administration, and safety training are important dimensions of safety climate. In addition, the data support that safety climate is a critical factor predicting the history of a self-reported occupational injury, and that employee safety control mediates the relationship between safety climate and occupational injury. These findings highlight the importance of incorporating organizational factors and workers' characteristics in efforts to improve organizational safety performance.

Keywords: Safety climate; Employee safety control; Workplace injury

1. Introduction

The United States Department of Labor (2005) reported 4.4 million occupational injuries and related illnesses and 5043 occupational fatalities in private industries in the year 2003. These occupational injuries and illnesses result in estimated annual costs of US$ 512.4 billion (National Safety Council, 2002). Many of the more safety conscious companies seem to have reached a point where they have applied most of the standard engineering approaches to improving safety in the workplace (Saari, 1990), and thus industrial risk managers and safety program officers have begun turning their attention to explore human, organizational, and other non-physical safety factors in the workplace in the hopes of achieving further occupational injury reduction (Salminon et al., 1992).

As a part of this exploration, safety climate is an organizational factor commonly cited as a plausible antecedent of workplace safety. Characterized by the shared perceptions of employees, safety climate can be seen as an organization's temporal "state of safety," or, a snapshot of the prevailing state of safety in the organization at a discrete point in time (Cheyne et al., 1998). Specifically, safety climate is conceptualized as employees' perceptions pertaining to safety practices, policies, and procedures as well as the relative importance of safe conduct at work (Zohar, 1980, 2000, 2002, 2003). This general belief comprises dimensions including, but not limited to, how well safety-related policies, procedures, and rewards are implemented (Gillen et al., 2002; Glendon and Litherland, 2001). And yet, there is no consensus about what dimensions constitute the safety climate. Arguably, the choice of safety climate dimensions can partially be determined

* Corresponding author. Tel.: +1 508 497 0208; fax: +1 508 435 0482.
E-mail address: Yueng-hsiang.Huang@Libertymutual.com (Y.-H. Huang).

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by practical interest. For instance, a workers' compensation insurance company would assess the safety climate of their clients based on how well management of the insured companies commits to safety in general, and safety training specifically; and how proactive the insured companies are in assisting injured workers in returning to their posts safely by providing sound return-to-work policies and demonstrating quality post-injury administration. Proactive and constructive return-to-work policies and administration would likely send a strong message to employees that the companies are genuinely concerned about their physical and psychological well-being. Hence, the first purpose of the study is to explore the above aspects of safety climate: management commitment to safety, return-to-work policies, post-injury administration, and safety training, based on a confirmatory factor analysis approach. To provide further construct validity evidence, the study will investigate the relationship between safety climate and self-reported injury. Finally, this study builds on our earlier study (Huang et al., 2004a) which found that a plausible effect of implementing safety policies on safety outcomes is likely mediated by employees' perceived control on safety. In contrast to our earlier work, the present study focuses on the roles of safety climate and perceived safety control on safety outcomes across multiple industries.

1.1. Safety climate and its dimensions

Prior research has shown that safety climate predicted safety-related outcomes (e.g., accidents and injuries) in both Western and Eastern societies (e.g., Cooper and Phillips, 2004; Dedobbeleer and Beland, 1991; Felknor et al., 2000; Griffin and Neal, 2000; Siu et al., 2004; Zohar, 1980, 2000). As Zohar (2000) suggested, safety climate is a construct that reflects the true priority of safety within an organization. Thus, in hypothesizing dimensions of safety climate, dimensions should be included that could commonly be perceived by employees. Of course, these dimensions should also have a pertinent role in shaping the safety environment. The dimension that has been included most often is management commitment to safety, which has been measured in terms of management concern for employee well-being (Brown and Holmes, 1986) and management attitudes toward safety (Dedobbeleer and Beland, 1991; Niskanen, 1994; Zohar, 1980, 2000). Other studies characterize management commitment to safety in terms of whether workers perceive that safety is important to management (Diaz and Cabrera, 1997; Gershon et al., 2000). Continued from prior research, this study included management commitment to safety as one dimension of safety climate.

Although much prior research has examined the dimensions of safety climate (e.g., Donald and Canter, 1994; Hofmann and Stetzer, 1996, 1998; Siu et al., 2004), consensus on other dimensions is still lacking. Zohar (1980), for example, identified eight dimensions of safety climate, including dimensions such as management attitudes, effects of safety conduct on promotion, pace of work, and the status of safety officers. Brown and Holmes (1986), using a reduced version of Zohar's (1980) measure, identified only three: management concern, management action, and physical risk. Dedobbeleer and Beland (1991) identified two dimensions of safety climate: management commitment to safety and worker involvement in safety activities. Other studies have obtained a wide range of factor structures incorporating constructs such as individual attitudes towards safety, safety communication, safety equipment, and the safety of the workers' immediate physical environment (Felknor et al., 2000; Griffin and Neal, 2000; Niskanen, 1994; Siu et al., 2004).

From a practical viewpoint, the current study focuses on three aspects of safety climate in addition to management commitment to safety: return-to-work policies, post-injury administration, and safety training. Establishment and implementation of safety policies has been conceptualized as one dimension of safety climate in prior research (e.g., Griffin and Neal, 2000; Zohar, 2000), which reflects how organizations implement safety policies, monitor safety procedures, and encourage safety practices. This study extends this concept to the policies and the execution of the policies after an injury has occurred. To ensure that injured workers receive fair and optimal treatment while also minimizing associated medical and indemnity costs, many companies have established policies pertaining to the occurrence of injuries or accidents, and/or return to work. These policies provide for routine administration of workers' compensation insurance benefits (Wood, 1987), methods for ensuring prompt and appropriate medical treatment (Fitzler and Berger, 1982, 1983), increased involvement of supervisors (McLellan et al., 2001), and modified or temporary alternate work (Krause et al., 1998).

As indicated by Pransky et al. (2001), emphasis on return-to-work policies may not only reduce negative disability outcomes in the long run, but also serve as a good indicator to the employees that safety is a priority in the company. Employees may in turn be more safety conscious and, thereby, reduce the occurrences of injury at work. Therefore, this study proposed return-to-work policies and post-injury administration (the execution of the return-to-work policy) as part of the safety climate which may have direct and positive influence on work safety.

Another potential dimension of safety climate examined in the current study is safety training. This construct measures the effectiveness of formal orientation programs and later follow-up training pertaining to safety practices at work. Safety training has shown significant effects in increasing safety performance in prior research (Cohen and Jensen, 1984; Cooper and Phillips, 2004; Reber and Wallin, 1984).

Hypothesis 1. Positive safety climate, as represented by factors including management commitment to safety, return-to-work policies, post-injury administration, and safety training, will be negatively associated with injury incidences.

1.2. Employee safety control

Safety control is a person's perception of the ability or opportunity to manage work situations to avoid injuries and accidents (Anderson et al., 2004). A key determinant of successful coping in a workplace is an individual's perception of how much he or she can control the outcomes or the work environment itself (Karasek, 1979; Karasek and Theorell, 1990). In their job strain model, Karasek and Theorell contended that job strain results from demands at work in relation to the amount of perceived control or freedom of decision-making the individual has while facing the demands of the job, not the work environment per se.

Prior research has consistently shown that a high level of job control is positively associated with health and well-being (Glass and McKnight, 1996), and with job satisfaction and motivation (Spector, 1986). For example, Spector and colleagues have found that employees' perceptions of control play an important role in employees' occupational stress, health, and well-being (e.g., Liu et al., in press; Spector, 1987, 1998, 2002; Spector et al., 1988). Job control is also negatively correlated with work and family conflict (Thomas and Ganster, 1995), fear of future violence at work (Schat and Kelloway, 2000), somatic symptoms (Macan, 1994), and negative mood (Teuchmann et al., 1999).

With a few exceptions (Harris, 1998; Leiter and Robichaud, 1997; Pasmore and Friedlander, 1982), little research has evaluated the potential effects of employee safety control on safety behavior and accidents. Harris (1998) reported that safety control was negatively related to unsafe behaviors, but was ineffective in predicting injuries. Based on a modified causal model, Leiter and Robichaud (1997) argued that employees' perceived control in managing occupational hazards was associated with decreased feelings of safety risk, although their results were not significant. Furthermore, Pasmore and Friedlander explored the relationship between control and safety outcomes by soliciting input from employees on causes and solutions to the high injury rate. When these suggestions were implemented, the number of injuries dropped considerably. These findings suggest that an increase in control over safety-related elements in the work environment may lead to fewer injuries on the job. In the present study, the following hypothesis is proposed.

Hypothesis 2. Higher employee safety control will relate to lower injury incidence.

Some studies have investigated the role of mediators between safety climate and outcomes (e.g., Siu et al., 2004). Huang et al. (2004a) reported that, in addition to being a direct predictor, employee safety control mediated the relationships between corporate safety policies and safety outcomes and job satisfaction based on data of 13 shipping and transportation companies. The mediating role of personal control at work has also been suggested in prior empirical research (Adams and Jex, 1999; Bond and Bunce, 2001; Huang et al., 2004c; Thomas and Ganster, 1995). For example, Thomas and Ganster found that family supportive workplace policies, such as flexible schedules, were directly and indirectly (through perceived control) related to work-family conflict. Adam and Jex also reported that time management behaviors reduced strains indirectly through their influence on perceived control of time. On the basis of this review, in addition to the hypothesized main effects of employee safety control, it may also function as a potential mediator linking the relationship between safety climate and injury incidence. The following mediating hypothesis was proposed.

Hypothesis 3. Employee safety control is hypothesized to mediate the relationship between safety climate and the injury incidence.

2. Methods

2.1. Data and procedure

Data for the present study was obtained from the risk prevention unit of a large workers' compensation insurance company. Between August 1999 and June 2001, surveys were mailed to over 4000 employees from 18 companies across the United States. The companies ranged in size from 125 to 4500 employees, and sectors represented included manufacturing, construction, service, and transportation (see Table 1 for summary). The number of respondents from each of these companies ranged from 22 to 435. Completed surveys were returned by 2680 participants. Individual company responses ranged from 23% to 68%. Among the respondents, 36% reported having sustained a work-related injury over the course of their tenure with their current employer. A quarter of the participants (25%) had worked less than 1 year with the company and 22% of the participants had been employed with the company for more than 10 years but, because only categorical choices were used, it was not possible to evaluate time in the company more accurately. Among the respondents, 40% were between the ages of 20–30 and 32% were between the ages of 30–40. Approximately two-thirds (67.4%) of the respondents were male.

2.2. Measures

The survey questions were developed by risk prevention professionals in an insurance company as part of a broader

Table 1
Summary of study population by industrial sector

Type of industry	Number of organizations	Number of subjects
Manufacturing	7	1067
Construction	4	718
Service	5	616
Transportation	2	279
Total	18	2680

assessment of safety practices. This survey was developed as a tool for practitioners and as such represents dimensions of practical value to those in prevention practice. Similar versions of the survey were used in our earlier studies of different companies that examined issues ranging from safety polices and injury outcomes (Huang et al., 2004a), relationships between job satisfaction and employment status (Huang et al., 2003), and the associations among post-injury job satisfaction, worker perception of organizational support, and return-to-work policies (Huang et al., 2004b). Scales from the survey were validated and reported in the above research.[1] With the exception of the injury incidence item, responses were made using a six-point scale, ranging from strongly disagree (1) to strongly agree (6). These scales and their psychometric properties are described below.

2.2.1. Injury incidence

One item, “As an employee of this company, have you ever had a work-related injury [while working at the present company]?” was used to measure employees’ injury incidence. Respondents were asked to answer the question by choosing either yes or no.

2.2.2. Management commitment to safety (MC)

Five items (MC1–MC5) were used to measure job incumbents’ perceptions about the adequacy of the company to enable and empower workers to behave in safer ways. The coefficient alpha of the scale is 0.71 in the present study. An example of the items is “Employees believe the Company emphasizes safe behavior above all other activities.”

2.2.3. Return-to-work policies (RTW)

This two-item scale (RTW1, RTW2) measured the extent to which respondents believe their company is vested in their return to their jobs after an injury that results in leave. An example of the items is “Accommodations are made to help injured employees return to work.” The coefficient alpha is 0.79 in the present study. Higher scores indicate a greater sense of the company’s continued interest in workers despite the occurrence of an injury.

2.2.4. Post-injury administration (PIA)

Five items (PIA1–PIA5) represented this scale, which reflects the company’s willingness to engage its employees in dealing with injuries or possible injuries on the job. In addition to general safety policies, some companies have developed extensive policies pertaining to what should be done following the occurrence of injury. Information is provided to all employees about insurance and medical services as well as procedures for contacting the providers of compensation, treatment, or rehabilitation. An example item is “Employees are treated fairly when they have a work-related injury claim.” The coefficient alpha of this scale is 0.73 in the present study, and higher scores represent a stronger sense of a company’s engagement in post-injury administration.

2.2.5. Safety training (ST)

This two-item scale (ST1, ST2) measured the extent to which respondents believe their company provides the necessary training to perform their jobs in safe ways. This includes training for safety as well as training for specific work skills. An example of the items is “There is an effective training and orientation program for new employees.” The coefficient alpha of this scale is 0.83 in the present study, and higher scores indicate greater perceived training for safety.

2.2.6. Employee safety control (SC)

Seven items (SC1–SC7) capturing aspects of control (i.e., understanding, prediction, and influence) were used to measure the respondent’s belief that he or she is knowledgeable about safety and is capable of controlling his or her safety behavior. An example item is “I know exactly what is expected of me when it comes to safety at work.” The coefficient alpha of this scale is 0.71 in the present study. Higher scores indicate a stronger sense of control over safety behaviors.

2.3. Data analysis procedure

Descriptive statistics and correlations of the studied variables were first analyzed. Confirmatory factor analysis was used to verify the four hypothesized dimensions of safety climate (i.e., perceived quality of the companies’ management commitment to safety, return-to-work policies, post-injury administration, and safety training). Structural equation modeling techniques were then used to examine the four hypothesized safety climate factors in relation to both employee safety control and self-reported injury. AMOS 4.0 software was used to perform confirmatory factor analysis and structural equation models.

3. Results

3.1. Measurement model

Given that the measures employed in the current study were developed by the risk prevention field professionals, we first conducted a series of confirmatory factor analyses to evaluate the adequacy of the above scales (see Table 2). Our first step was to determine whether the four proposed factors of safety climate were conceptually distinct.

A hypothesized four-factor model composed of management commitment to safety, return-to-work policies, post-injury administration policies, and safety training was examined via confirmatory factor analysis. Ten additional alternative competing models were also evaluated. These

[1] A list of survey items used in the above scales will be provided by the first author upon request.

Table 2
Comparisons of the hypothesized four-factor model of safety climate with 11 alternative models

Model	χ^2	d.f.	χ^2_{diff}	d.f.$_{diff}$	GFI	AGFI	NFI	RFI	RMSEA
Hypothesized four-factor model of safety climate	693.0	84			0.96	0.95	0.94	0.92	0.05
Alternative model 1: one-factor (MC + RTW + PIA + ST)	2020.1	90	1327.2	6.0	0.89	0.85	0.82	0.79	0.09
Alternative model 2a: two-factors (MC + RTW + PIA)	1413.2	89	720.2	5.0	0.92	0.90	0.87	0.85	0.08
Alternative model 2b: two-factors (MC + RTW + ST)	1845.3	89	1152.4	5.0	0.90	0.87	0.83	0.80	0.09
Alternative model 2d: two-factors (MC + PIA + ST)	1843.5	89	1150.6	5.0	0.90	0.86	0.83	0.80	0.09
Alternative model 2c: two-factors (RTW + PIA + ST)	1881.4	89	1188.5	5.0	0.90	0.86	0.83	0.80	0.09
Alternative model 3a: three-factors (MC + RTW)	1228.5	87	535.5	3.0	0.93	0.91	0.89	0.87	0.07
Alternative model 3b: three-factors (MC + PIA)	1291.0	87	598.0	3.0	0.93	0.90	0.88	0.86	0.07
Alternative model 3c: three-factors (MC + ST)	940.5	87	247.5	3.0	0.95	0.93	0.92	0.90	0.06
Alternative model 3e: three-factors (RTW + PIA)	734.1	87	41.2	3.0	0.96	0.95	0.93	0.92	0.05
Alternative model 3f: three-factors (RTW + ST)	1753.3	87	1060.3	3.0	0.91	0.87	0.84	0.81	0.09
Alternative model 3d: three-factors (PIA + ST)	1707.1	87	1014.1	3.0	0.91	0.87	0.85	0.81	0.08

GFI: goodness of fit index; AGFI: adjusted goodness of fit index; NFI: normed fit index; RFI: relative fit index; RMSEA: root mean square error of approximation; MC: perceived management commitment to safety; RTW: perceived return-to-work policy; PIA: perceived quality of post-injury administration; and ST: perceived safety training. χ^2_{diff} and d.f.$_{diff}$ are derived by comparing the hypothesized four-factor model with one of the alternative models. In the hypothesized four-factor model, each factor (MC, RTW, PIA, and ST) is treated as distinct. In the alternative models, factors are pooled together in different combinations to test whether factors are distinct from one another. For example, all four hypothesized factors are combined into one single factor (MC + RTW + PIA + ST), and this one-factor model is tested against the four-factor model (as rated by the variety of indices of fit). Alternatively, in model 2a, the notation (MC + RTW + PIA) depicts MC, RTW, and PIA combined into one factor while ST stands alone to form a two-factor model.

alternative models included a one-factor model, four two-factor models, and six alternative three-factor models. The model combinations are presented in Table 2.

Because all the alternative competing models are nested in the proposed four-factor model, we compared the hypothesized four-factor model (see Table 2 header) with each of the competing models based on the difference (χ^2_{diff}) between the two χ^2 values associated with the models, which is also distributed as a χ^2 distribution. For example, the χ^2 values for the hypothesized four-factor model is 693.0 with a degree of freedom of 84 and the χ^2 values for the alternative model 1 is 2020.1 with a degree of freedom of 90; therefore, χ^2_{diff} is 1327.2 with a degree of freedom of 6 which is significant. A significant χ^2_{diff} suggests that the four-factor model is a better choice. Based on the χ^2_{diff} values shown in Table 2, the results suggest that the four-factor model outperforms the alternative models. These findings further provide evidence that these scales are conceptually different at the measurement level.

The present study used several fit indices to evaluate the hypothesized four-factor model, including an overall fit statistic χ^2; the goodness of fit index (GFI); the adjusted goodness of fit index (AGFI); the normed fit index (NFI); the relative fit index (RFI); and root mean square error of approximation (RMSEA). GFI and AGFI values of 0.9 or above are taken to indicate a good model fit to the sample data (Kelloway, 1998). Values of NFI and RFI indicate the degree to which the model fits better than a poorly fitting model (Bentler and Bonett, 1980). Values of RMSEA are unacceptable if they are greater than 0.10 (Steiger, 1990).

At first glance, according to the overall fit statistic, $\chi^2(84) = 693.0, p < 0.01$, the model does not fit the data. However, a significant χ^2 tends to be observed with a large sample size. In contrast to the χ^2 index, moreover, other indices do support the adequacy of the four-factor model (GFI = 0.96, AGFI = 0.95, NFI = 0.94, RFI = 0.92, and RMSEA = 0.05).

Following these steps, we further examined employee safety control in relation to the four proposed factors of safety climate. In our final measurement model (a total of five factors, MC, RTW, PIA, SE, and SC), $\chi^2(43) = 981.6$, $p < 0.01$. Again, due to the large sample size, we came to rely on other fit indices, where for our final measurement model, GFI = 0.93, AGFI = 0.90, NFI = 0.89, RFI = 0.85, and RMSEA = 0.09. Overall, the fit indices suggest that the final measurement model is a better fit.

In order to judge whether or not the path coefficients between scale items and factors were significant for the final measurement model, critical ratios (CR) around or greater than 2 were used. The CRs for all the scale items and study factors were greater than 8.08 as described in Table 3, indicating that all scale items loaded significantly on their expected factors. It also shows that these scale items also loaded in the predicted direction. The squared multiple correlations (SMC) for the scale items indicate the amount of variance in the scale items explained by the common factors. The SMCs for the scale items are presented in the first column of Table 3. Overall, the adequacy of the measurement model was supported.

3.2. Intercorrelations among the variables

Descriptive statistics and the intercorrelations among the studied variables are displayed in Table 4. It was generally found that management commitment to safety, return-to-work policies, post-injury administration policies, safety training, and employee safety control were negatively correlated with injury incidence and positively correlated with each other.

3.3. Mediating role of employee safety control

To examine the full mediation effect of employee safety control, a structural equation model was conducted based

Table 3
Measurement model: square multiple correlations (SMCs) and factor loadings

Scale item	SMCs	Management commitment to safety	Return-to-work policy	Post-injury administration	Safety training	Safety control
MC1	0.35	0.59				
MC2	0.27	0.52				
MC3	0.20	0.45				
MC4	0.36	0.60				
MC5	0.34	0.58				
RTW1	0.51		0.72			
RTW2	0.67		0.82			
PIA1	0.47			0.69		
PIA2	0.37			0.60		
PIA3	0.19			0.43		
PIA4	0.18			0.42		
PIA5	0.11			0.33		
ST1	0.61				0.78	
ST2	0.74				0.86	
SC1	0.32					0.56
SC2	0.33					0.57
SC3	0.19					0.43
SC4	0.30					0.54
SC5	0.12					0.35
SC6	0.10					0.31
SC7	0.43					0.66

Square multiple correlations (SMCs) for the scale items indicate the amount of variance in the scale item explained by the common factor.

Table 4
Descriptive statistics and intercorrelations

	M	S.D.	1	2	3	4	5	6
1. Self-reported injury	N/A	N/A	–	−0.16[a]	−0.05[a]	0.08	−0.19[a]	−0.21[a]
2. Management commitment to safety	4.2	1.32		–	0.51[a]	0.50[a]	0.62[a]	0.56[a]
3. Return-to-work policies	4.0	0.93			–	0.64[a]	0.48[a]	0.47[a]
4. Post-injury administration	3.9	1.51				–	0.43[a]	0.54[a]
5. Safety training	4.8	1.29					–	0.49[a]
6. Safety control	4.6	0.87						–

N/A: not applicable.
[a] Correlation is significant at alpha equals 0.05, two-tailed. Incomplete survey responses were eliminated, thus *n* was reduced from 2680 to 1856.

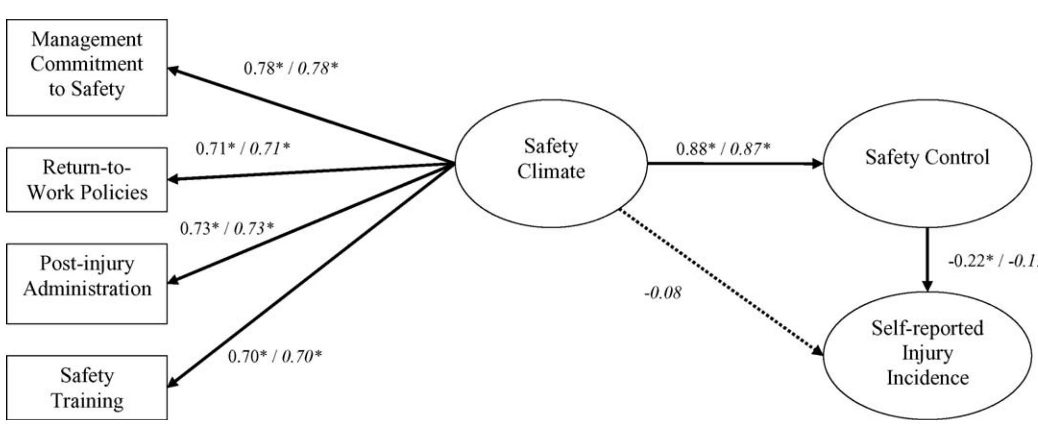

Fig. 1. Structural equation modeling results: mediation model. Full mediation model: $^*p<0.05$; $\chi^2(53)=1061.5$, $p<0.01$; GFI = 0.93; AGFI = 0.90; NFI = 0.88; RFI = 0.85; and RMESA = 0.084. R^2's were 0.61 for management commitment to safety, 0.52 for return-to-work policies, 0.53 for post-injury administration, 0.49 for safety training, 0.77 for safety control, and 0.05 for self-reported injury incidence. Partial mediation model (shown by dashed line and by italic numbers): $^*p<0.05$; $\chi^2(52)=1060.2$, $p<0.01$; GFI = 0.94; AGFI = 0.90; NFI = 0.88; RFI = 0.84; and RMESA = 0.085. R^2's were 0.58 for management commitment to safety, 0.54 for return-to-work policies, 0.56 for post-injury administration, 0.47 for safety training, 0.75 for safety control, and 0.03 for self-reported injury incidence.

on 1856 subjects who provided completed data for the variables of interest. The latent construct of safety climate was indicated by the four dimensions: management commitment to safety, return-to-work policies, post-injury administration, and safety training. The overall model fit was assessed by $\chi^2(53) = 1061.5$, $p < 0.01$. As mentioned earlier, χ^2 tends to be affected by a large sample size, thus it is advisable to utilize other fit indices. In our model, GFI = 0.93; AGFI = 0.90; NFI = 0.88; RFI = 0.85; and RMESA = 0.08. These fit measures all indicate that the hypothesized model fits the data well. Furthermore, all structural coefficients were significant and in the predicted directions as shown in Fig. 1. R^2's for the endogenous variables were 0.61 for management commitment to safety, 0.52 for return-to-work policies, 0.53 for post-injury administration policies, 0.49 for safety training, 0.77 for employee safety control, and 0.05 for self-reported injury incidence.

We also compared this full mediation model to a partial mediation model which included both direct and indirect paths in the same model. In the partial mediation model, safety climate was proposed to affect injury incidence directly as well as indirectly through safety control. As shown in Fig. 1, the path coefficient of safety climate on injury incidence was not significant. In addition, the differences (χ^2_{diff}) between the χ^2 values of these two models were not significant, which suggested that the parsimonious model (i.e., full mediation model) is the better choice.

4. Discussion

The goal of this study was to propose a possible mechanism through which safety climate influences occupational injury outcome. Four specific dimensions of safety climate were identified from survey questions derived from subject matter experts' field experience and were empirically substantiated. Each of these dimensions was found to be significant and to be important components of the latent construct of safety climate including return-to-work policies. However, we must reiterate that differences in factor structures are likely to be found based on different conceptualizations and survey questionnaires.

Our identification of management commitment to safety and safety training as significant factors is congruent with other studies (Brown and Holmes, 1986; Dedobbeleer and Beland, 1991; Diaz and Cabrera, 1997; Gershon et al., 2000; Niskanen, 1994; Zohar, 1980, 2000). However, it could be argued, conceptually, that effectiveness of all other safety climate factors is, at least, partially dependent on the degree of management commitment to safety. For example, while some organizations may espouse good return-to-work and post-injury administration policies and good worker safety training, expected outcomes might be drastically minimized without strong middle management commitment to safety. It should be emphasized that management commitment to safety is clearly and conceptually distinguishable from other factors such as worker safety training. For example, it is possible for workers to perceive their safety training as excellent without fully determining whether the management is committed to safety because other safety-related efforts might be insufficient elsewhere in the company. Such complexities offer the interesting prospect that perhaps safety climate should be measured globally instead of in its components or dimensions.

This study was the first one to include employees' perceptions of return-to-work policies and post-injury administration as dimensions of safety climate which may play critical roles in reducing injury incidence through safety control. The current findings seem to suggest that companies would experience injury reduction by paying attention to return-to-work policies and treating injured workers fairly. As indicated by Pransky et al. (2001), the emphasis on return-to-work policies may not only reduce negative disability outcomes in the long run, but also serves as a good indicator to the employees that safety is a priority in the company. Employees may in turn be more safety conscious and, thereby, reduce the occurrences of injury at work.

Our proposed mechanism, a model with employee safety control mediating the relationship between safety climate and self-reported injury, was also found significant. The findings confirm that safety climate is indeed a critical factor predicting the occurrence of self-reported occupational injury (Brown and Holmes, 1986; Dedobbeleer and Beland, 1991; Diaz and Cabrera, 1997; Gershon et al., 2000; Griffin and Neal, 2000; Niskanen, 1994; Zohar, 2000), which extends our earlier study in examining the relationship between safety policies and safety outcomes.

Given the mediating role of safety control between safety climate and injury incidence, safety practitioners and researchers should further explore ways to increase employees' control over safety. For example, management may solicit input from employees about a variety of safety equipment options (e.g., safety committees or use of different safety gloves or safety shoes) or give employees the flexibility over their work time of taking a break when feeling fatigued. Furthermore, in order to strengthen decision latitude over safety, companies should impress upon employees the serious consequences of ignoring safety policies and the undesirable impact on their colleagues, their families, and themselves.

There are several limitations in the current study. First, the results of this study were derived from a cross-sectional survey. Respondents may not be able to correctly report the occurrence of an injury, which may result in the underreporting of injury experiences (Landen and Hendricks, 1995) due to the length of time between the injury experience and the survey administration, the severity of injury, and other recall biases. Furthermore, the nature of the cross-sectional data prevents us from making definitive causal conclusions. To further clarify the utility of safety climate and employee safety control, we recommend a longitudinal design as a next step in future studies.

Second, by asking the respondent only whether he or she ever had an injury on the job, the survey could not distinguish those injuries that had occurred long ago from those that had occurred more recently. Thus, it was not possible to discern whether the respondents' injury experience had any impact on their current safety climate perceptions.

Due to the practical constraints, we were only able to assess injury incidence with a single dichotomous item. Hence, the frequency and the severity of the injury cannot be identified. Should it be permitted in practice, it would also be fruitful to examine various forms of injuries or use a specific time frame as a context. Future research should also try to include objective records of injury incidence or link to workers' compensation claim records when examining safety outcomes.

Compared to most of the factor loadings reported in Table 3, there are a few around 0.3–0.4. Although all the factor loadings are significant, and fit indexes of the hypothesized measurement model are satisfactory, we believe that the scales can further be improved for the future services. In addition, because of the voluntary nature of participation, researchers were not able to choose participants, and could not compare any differences between respondents and non-respondents. Caution should be taken when generating the results to these industries.

Finally, the study was conducted prior to 11 September 2001. Perhaps workers' perception of safety or priority of safety concerns is a bit different today. Employees' perceived control on safety might be affected by the event as well. Further studies are needed to see if the differences have appeared.

5. Conclusion

This study demonstrated that safety climate, as captured through its various dimensions, was related to self-reported injuries. Results also suggest that employee safety control plays a critical role in the mediation between safety climate and self-reported injury. These findings highlight the importance of incorporating organizational factors and relevant organizational constructs when attempting to improve organizational safety performance.

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