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Creating safer workplaces: assessing the determinants and role of safety climate

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Abstract

Problem: Although there has been considerable interest in safety climate, relatively little attention has been given to the factors that determine safety climate or to testing the hypothesized mediating role of safety climate with respect to safety-related outcomes. *Method:* Questionnaire responses were obtained from 2,208 employees of a large national retail chain in 21 different locations. *Results:* After controlling for demographic variables, three factors: environmental conditions, safety-related policies and programs, and general organizational climate, accounted for 55% of the variance in perceived safety climate. Interestingly, organizational climate made a significant contribution to safety climate, even after controlling for the other more safety-relevant variables. Partial correlations showed that safety policies and programs had the largest observed correlation with safety climate, followed by two of the dimensions of organizational climate (communication and organizational support). Using Baron and Kenny's (J. Pers. Soc. Psychol. 51 (1986) 1173) procedures, the principal effects of the various work situation factors on perceived safety at work were found to be direct rather than mediated by safety climate. Safety climate influenced perceived safety at work, but its role as a mediator was limited. *Impact on industry:* These results are discussed in terms of other recent findings on safety climate and the growing interest in understanding management and organizational factors in the context of workplace safety.

Keywords: Safety climate; Organizational climate; Safety management; Safety performance; Safety attitudes

1. Introduction

During the past decade, there has been increased interest in trying to understand how management practices and other organizational factors impact workplace safety. Indeed, the attention given to organizational factors has expanded to the extent that Hale and Hovden (1998) refer to it as the third age of safety. Much of this activity has focused on the constructs of safety culture and safety climate (e.g., Glenden & Stanton, 2000; Guldenmund, 2000; Hale & Hovden, 1998; Hofmann, Jacobs, & Landy, 1995; Shannon, Mayr, & Haines, 1997). The distinction between culture and climate remains a source of some debate and confusion in the safety field (Guldenmund, 2000; Mearns & Flin, 1999; Moran & Volkwein, 1992), but, for the most part, safety climate emphasizes the perceptions held by employees regarding the importance of safety in their organization (Schneider, 1975; Zohar, 1980). Safety culture tends to focus on the deeper and less readily accessible core values and assumptions of the organization regarding safety and human resources (Mearns & Flin, 1999; Schein, 1985). The majority of research specific to workplace safety falls more within the preview of safety climate, in that the main focus is usually on employee perceptions regarding safety. Moreover, the widespread use of questionnaire methodologies to study safety climate, as opposed to more qualitative or ethnographic methods, adds further credence to this categorization (Guldenmund, 2000; Mearns & Flin, 1999).

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While there is no single, universally accepted definition of safety climate, fairly broad agreement exists that management support for safety and the overall importance assigned to safety within the organization are key aspects of safety climate (e.g., Dedobbeleer & Beland, 1998; Flin, Mearns, O'Connor, & Bryden, 2000; Glendon & Stanton, 2000; Mattila, Rantanen, & Hyttinen, 1994; Thompson, Hilton, & Witt, 1998; Zohar, 1980). In its various forms, safety climate has been linked to a number of different safety-related outcomes, including performance of safe work practices (e.g., DeJoy, Murphy, & Gershon, 1995; Griffin & Neal, 2000), safety-related activities/program effectiveness (e.g., Cheyne, Cox, Oliver, & Tomas, 1998; Zohar, 1980), interpretations of accidents (e.g., Hofmann & Stetzer, 1998), and accidents and other safety-related incidents or events (Dedobbeleer & Beland, 1998; Hofmann & Stetzer, 1996; Oliver, Cheyne, Tomas, & Cox, 2002).

Considerably less is known about the determinants of safety climate, and such knowledge is critical to efforts aimed at creating and maintaining positive or supportive safety climates within organizations. With this as the starting point, the present study had two purposes. The first purpose was to examine the determinants of safety climate, with specific reference to three sets of factors: environmental conditions, safety-related policies and programs, and general organizational climate. These three factors were selected to represent both the conventional antecedents of safety performance (e.g., environmental conditions) as well as factors not specific to safety but which are thought to broadly influence employee behavior and expectations within organizations (e.g., organizational climate). The second purpose was to explore the extent to which safety climate intervenes between these work situation factors and safety-related outcomes. Although seldom specifically tested, many models of safety climate assume that safety climate mediates the linkages between various organizational system factors and safety-related behaviors and outcomes (Neal, Griffin, & Hart, 2000; Thompson, Hilton, & Witt, 1998). Confirmation of this intervening role would provide further support for using safety climate as a leading indicator of the safety level of the organization or workplace (Diaz & Diaz-Cabrera, 1997; Mearns & Flin, 1999).

1.1. Environmental conditions and safety climate

A long list of environmental and workplace conditions or exposures, such as noise, heat, dust, chemicals, physical workload, and hazardous tools and equipment, have been linked directly to workplace injuries and illnesses (Baker, O'Neill, Ginsberg, & Li, 1992; Levy & Wegman, 1995). To a large extent, existing approaches to occupational safety emphasize hazard identification and control as the primary and most effective means for improving safety within the workplace. Employee perceptions regarding the level of risk faced in the work environment have also been prominently featured in studies of safety climate (Dedobbeleer & Beland, 1998; Flin et al., 2000; Cheyne et al., 1998). In the final analysis, there is little disagreement about the ultimate benefits of controlling or eliminating workplace hazards in terms of employee health and well-being. On this basis, we expected that environmental conditions or exposures should contribute to employee perceptions of safety climate. Therefore:

Hypothesis 1a. Perceived exposure to hazardous environmental conditions will be negatively related to safety climate.

1.2. Safety policies and programs and safety climate

The safety-related policies and programs of the organization can be viewed as the surface manifestations of the basic values and beliefs of the organization concerning workplace safety. Diaz and Diaz-Cabrera (1997) found that the safety-related policies of the organization were the strongest predictor of safety climate. Safety-related policies included polices related to compliance with safety standards, safety training, the availability of resources for safety, and safety performance feedback. Studies of occupational safety program effectiveness have also highlighted safety policies and programs as important ingredients of effective programs (Cohen, 1977; Shannon, Mayr, & Haines, 1997). Safety-related polices and programs should comprise an important ingredient of employee perceptions about the importance ascribed to safety at their workplace, and perhaps the extent to which management can be trusted to do their best to provide safe working conditions and facilitate safe work practices (Barling & Hutchinison, 2000). It follows that the safety policies and programs of the organization should be an important contributor to safety climate.

Hypothesis 1b. Safety-related policies and programs will be positively related to safety climate.

1.3. Organizational climate and safety climate

Organizational climate typically includes a number of different individual evaluations of the work environment (James & James, 1989). These evaluations consist of assessments or cognitive appraisals of multiple core dimensions or characteristics of the workplace, for example, leadership, communication, participation, and innovation. When taken together, these assessments are thought to be highly influential in shaping a wide variety of employee behaviors and expectations within the organization (Schneider, 1975).

Safety climate is largely an outgrowth of organizational climate, and follows from the idea that organizations can be viewed as having a number of specific climates, such as the climate for customer service, the climate for safety, and so forth. Some authors have argued that it is meaningless to speak about organizational climate without attaching some type of specific referent (Schneider & Reichers, 1983). Consistent with Neal and colleagues (Neal et al., 2000), we

argue that general organizational climate is an important part of the matrix from which specific evaluations about safety originate. A generally positive and supportive organizational climate should influence the extent to which employees perceive that safety is important within their organization. Neal and colleagues found support for this basic hypothesis in a recent study of hospital workers. The present study sought to extend this finding to another employment sector and to assess the contribution of specific organizational climate dimensions to perceptions of safety climate. In particular, three general climate dimensions have been implicated in the safety literature: environmental/organizational support (Hofmann & Stetzer, 1998; Alexander, Cox, & Cheyne, 1995), communication (Cheyne et al., 1998; Griffin & Neal, 2000; Hofmann & Stetzer, 1996), and participation or worker involvement (Mattila et al., 1994; Simard & Marchand, 1997). To the extent that these general climate dimensions contribute to shaping safety climate, actions taken to enhance the overall climate of the organization should also enhance the climate for safety. Assessment of the role of these general climate dimensions should ultimately provide a richer basis for designing interventions and provide additional evidence for concluding that efforts to manage safety are not necessarily different from actions needed to manage other core functions of the organization. Therefore:

Hypothesis 1c. Organizational climate will be positively related to safety climate.

Perhaps the ultimate value of focusing on organizational climate and safety climate is that these constructs add to our understanding of safety performance and workplace injuries beyond what can be achieved through traditional occupational safety approaches such as hazard control technologies and safe work practices. Organizational climate, as conceptualized in the present study, focuses on three aspects of the general organizational context: the extent to which the organization and the immediate work group are supportive, the opportunities that exist to participate in and contribute to work-related decision-making, and the existence of open lines of communication and the sharing of relevant information. As such, the overall climate of the organization should contribute to employee perceptions of the importance of safety beyond what is contributed by traditional safety programs elements.

Hypothesis 1d. Organizational climate will be related to safety climate, even after environmental conditions and safety-related policies and programs have been taken into account.

1.4. Relative importance of safety climate determinants

In trying to determine the most important determinants of safety climate, it seems logical to argue that those factors that are most directly pertinent to safety should contribute the most to the safety climate of the organization. Of the variables in this study, environmental conditions and safety-related policies and programs should both influence how employees assess the safety climate of their organization. Arguably, policies and programs may be most important because they represent the overt actions of management to manage and enhance workplace safety. In some respects, environmental conditions are a function of the specific work operations that take place in an organization and may not be as indicative of the importance assigned to safety or worker protection.

Turning to the organizational climate variables, organizational support may also be an important determinant of safety climate. Management support and commitment are prominently featured in most definitions and conceptualizations of safety climate (Dedobbeleer & Beland, 1998; Flin et al., 2000; Glenden & Stanton, 2000; Mattila et al., 1994; Thompson et al., 1998; Zohar, 1980). Attempts to measure organizational support typically emphasize the extent to which the organization supports and values its employees.

Hypothesis 2. Environmental conditions, safety-related policies and programs, and organizational support will be most closely related to safety climate.

1.5. Mediating role of safety climate

Inherent in most discussions of safety climate is the view that safety climate plays an important intervening role between various work factors and safety-related outcomes (Guldenmund, 2000; Neal, Griffin, & Hart, 2000; Zohar, 1980). Moreover, in this role, safety climate becomes a potentially useful intermediate indicator of safety performance within the organization. However, relatively few attempts have been made to formally assess the hypothesized mediating function of safety climate. In the present study, perceived safety at work was selected as the safety outcome of interest. Accident and injury measures are notably unstable (Hopkins, 1995), and given the diversity of jobs in retail, it was difficult to construct a set of safety-related activities or behaviors that would be relevant to all of the workers sampled in this study. Feeling safe at work should be a logical and immediate outcome of a positive and supportive climate, and a reasonable precursor of good safety performance.

Hypothesis 3. Safety climate will mediate the relationship between the three categories of work situation factors (i.e., environmental conditions, safety-related policies and programs, and organizational climate) and perceived safety at work.

2. Methods

2.1. Study context

This study took place within a larger study of work organization conducted in cooperation with a large national

retailer in the United States. Retail operations such as the one in this study are sometimes referred to as "big box" or "warehouse" merchants, in that, the stores feature large, open, and unadorned floor plans, with no physical separation of the warehousing and selling functions. Customers move freely throughout the space, and, for the most part, access the items they intend to purchase and bring them to the front of the store for payment. Data for the current study were collected from employees in 21 retail units located in the Southeastern United States. The stores varied in size from approximately 150 employees to 375 employees. The measures used in this study were administered as part of baseline data collection for the larger study. Participation was entirely voluntary and anonymous, and questionnaires were administered onsite during regular business hours. Data collection occurred over two consecutive days at each store, and employees in all job categories and departments were eligible to participate. Questionnaires were completed on company time in a relatively quiet room off the main floor. No monetary or other incentives were provided. Completed questionnaires were deposited in locked storage boxes by the respondents to reinforce the confidentiality of the information.

2.2. Sample

Completed questionnaires were received from 2,208 employees, and this represented an overall response rate of 50%. The mean age of the sample was 38; 64% were male; and 54% were married or living with a partner. The sample was predominantly Caucasian (80%), and almost all of the employees (97%) had at least a high school education. Approximately one-half (52%) of the sample had worked for the organization for two years or more, and 25% had some type of supervisory responsibilities. Most of the sample (89%) indicated that they normally work a 40-hour work week. Based on data provided by the company, the sample was quite representative of the total workforce.

2.3. Measures

All of the measures used in this study were included within a single, self-administered questionnaire. All of the scales used five-point response formats (e.g., "strongly disagree" to "strongly agree").

2.3.1. Organizational climate

This component emphasized the perceptions of employees about their overall work environment, particularly in terms of the climate for support, communication, and involvement. Five dimensions were included.

2.3.1.1. Organizational support. Organizational support involved the actions undertaken at the organizational level that encourage, bolster, or assist the employees in performing their tasks and responsibilities. Eisenberger, Huntington, Hutchison, and Sowa's (1986) nine-item global measure was used in this study (e.g., "the organization really cares about my well-being").

2.3.1.2. Coworker support. This dimension focused on the informal social/interpersonal relationships that develop among peers. Ribisl and Reischl's scale (1993) was used to measure this construct (e.g., "my coworkers care about me as a person").

2.3.1.3. Participation with others and with supervisors. Participation, in general, refers to a climate in which employees are encouraged to involve themselves in some meaningful way with others in the organization. The three-item involvement-with-supervisors scale (Vroom, 1959) included items such as "do you feel you can influence decisions of your immediate supervisor regarding things about which you are concerned?" The three-item involvement with others scale (Caplan, Cobb, French, Harrison, & Pinneau, 1975) included items such as "I take part with others at my workplace in making decisions that affect me."

2.3.1.4. Communication. This dimension focused on the extent to which employees see an effective information exchange within the organization. The eight-item communication climate scale was adapted from Vandenberg and colleagues (Vandenberg, Richardson, & Eastman, 1999), and included items such as "management gives enough notice to employees before making changes in policies and procedures."

2.3.2. Environmental conditions

Items from the scale used by Johansson, Johnson, and Hall (1991), and "walk throughs" of the stores provided the basis for a seven-item scale that encompassed employee perceptions of the potential hazards found in their immediate work areas such as excessive heat, noise, and poor lighting.

2.3.3. Safety policies and programs

A five-item scale was developed to assess safety-related policies and programs. This scale was derived from prior research on safety program effectiveness (e.g., Cohen, 1977) and the core elements and functions that are typically considered to be part of good occupational safety programming (e.g., National Safety Council, 2001). Employees were asked about the extent to which their organization has specific policies and programs related to such matters as safety training, hazard communication, and personal protective equipment.

2.3.4. Safety climate

The scale used in the current study was the seven-item version of the NIOSH Safety Climate Scale (DeJoy, Murphy & Geshon, 1995). This scale emphasizes employee perceptions of management support for safety and the importance

of safety issues within the organization (e.g., "there are no significant shortcuts taken when workplace safety and health are at stake").

2.3.5. Perceived safety at work

Employee perceptions about the level of safety on the job were assessed using a single global question: "All in all, how would you rate your current work situation in terms of your personal exposure to safety and health hazards?" Response options along the 5-point scale ranged from "very unsafe" to "very safe."

2.3.6. Control variables

Four variables were used as controls in the analyses. For *age*, respondents simply indicated, in number of years, how old they were. *Tenure* was assessed with a single question that asked employees how long they had been employed by this organization (1 = less than 3 months to 5 = more than 5 years). *Gender* was a dichotomous measure (1 = female, 2 = male). Finally, for *number of hours worked*, respondents were asked to indicate their total work hours (number of hours) for a typical work week.

2.4. Data analysis

Hierarchical, multiple regression analysis was used to determine the relative influence of demographics, environmental conditions, safety-related policies and programs, and organizational climate on safety climate. The hierarchical procedure was designed to reflect a progression from conventional safety determinants (e.g., environmental conditions) through organization-level factors. The variables were entered as sets at each step. All variables entered in earlier steps were automatically included in succeeding steps. Demographics (age, gender, tenure, and hours worked per week) were entered as a group in Step 1; environmental conditions were added in Step 2; safety policies and programs were entered in Step 3; and the five organizational climate variables were added in Step 4. Variables were added incrementally to provide information as to how much additional variance was explained when new predictors were introduced into the model. At each step, the significance of the overall or full model was assessed, as well as the total amount of variance explained (R^2).

An essentially similar procedure was followed using perceived safety at work as the outcome variable. In this analysis, safety climate was entered in the final step to assess its hypothesized role as a mediating variable. The recommendations of Baron and Kenny (1986) were used to test for mediating effects. This involves four steps: (a) demonstrating that the work factors in question are correlated with perceived safety at work, (b) demonstrating that the work factors were correlated with safety climate, (c) showing that safety climate is correlated with perceived safety at work, and (d) assessing mediation by controlling for safety climate and assessing the linkages between the work factors and perceived safety at work.

3. Results

Table 1 contains the means, standard deviations, and correlations for all measures. Reliability coefficients (alphas) appear in the diagonal of the table. Coefficients of .70 or better were obtained for each scale, suggesting that the survey items were appropriate indicators of their respective constructs.

3.1. Tests of the hypotheses

Hypothesis 1a addressed the relationship between environmental exposures and safety climate. Table 2 shows that after controlling for the four demographic variables, there was a significant negative relationship between environmental exposures and safety climate ($\beta = -.30$, $p < .001$). Thus, Hypothesis 1a was supported. Hypothesis 1b was also

Table 1
Means, standard deviations and correlations

Variable	N	Mean	S.D.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Age	2206	3.74	1.58	(—)												
2. Gender	2067	1.65	0.48	.032	(—)											
3. Tenure	2207	1.91	0.70	.135	−.032	(—)										
4. Hours worked per week	2207	38.34	7.06	−.020	.047	.233	(—)									
5. Environmental conditions	2188	2.55	0.97	−.093	.008	.120	.078	(.84)								
6. Safety policies and programs	2132	3.91	0.82	.096	.014	−.095	−.032	−.342	(.91)							
7. Organizational support	2191	3.40	0.80	.023	.049	−.141	−.012	−.422	.540	(.93)						
8. Coworker Support	2189	3.35	0.81	.053	.026	−.111	−.026	−.326	.417	.582	(.92)					
9. Involvement w/Others	2182	3.14	1.08	−.089	.037	.030	.085	−.191	.317	.483	.402	(.87)				
10. Involvement w/Superv.	2193	3.25	0.89	−.068	.038	.034	.074	−.277	.336	.525	.417	.486	(.76)			
11. Communication	2190	3.31	0.72	−.024	.043	−.082	−.016	−.386	.523	.671	.487	.432	.474	(.87)		
12. Safety Climate	2190	3.92	0.74	.049	.016	−.092	.001	−.412	.643	.605	.469	.346	.399	.608	(.90)	
13. Safety at work	2120	3.91	0.92	.101	−.018	−.049	−.015	−.458	.359	.383	.266	.230	.228	.339	.435	(—)

Absolute correlations of .045 or higher are significant at $p \leq .05$ level; parenthetical values represent internal consistency reliability coefficients; (—) = no reliability value due to single-item status.

Table 2
Hierarchical regression analyses – predicting safety climate

Step and predictor	Step 1	Step 2	Step 3	Step 4
Step 1				
Age	.031**	.010	−.010	.004
Gender	.023	.029	.018	−.010
Tenure	−.105***	−.053*	−.015	−.003
Hours worked	.002	.004†	.004*	.003
R^2	**.013**			
Step 2				
Environmental conditions		−.304***	−.165***	−.074***
R^2		**.169**		
ΔR^2		**.156**		
Step 3				
Safety polices and programs			.516***	.328***
R^2			**.448**	
ΔR^2			**.280**	
Step 4				
Organizational support				.150***
Coworker support				.069***
Participation – others				−.008
Participation – supervisor				.024
Communication				.241***
R^2				**.551**
ΔR^2				**.103**

Reported coefficients are unstandardized. Constants (intercepts) have been omitted.
* $p < .05$.
** $p < .01$.
*** $p < .001$.
† $p < .10$.

supported. After entering the control variables and environmental exposures, safety policies and programs made a significant positive contribution to safety climate (β=.52, $p < .001$).

Hypothesis 1c predicted that organizational climate would be positively related to safety climate. As indicated by the bivariate correlations in Table 1, each organizational climate factor had a significant positive relationship with safety climate (organizational support, r=.61; coworker support, r=.47; involvement-others, r=.35; involvement-supervisor, r=.40; and, communication, r=.61). Thus, Hypothesis 1c was supported.

Hypothesis 1d addressed the relationship between organizational climate and safety climate, after the other more traditional safety factors have been taken into account. This hypothesis received partial support. As shown in Table 4, after entering the control variables, environmental exposures, and safety policies and programs, there were significant positive relationships for three of the organizational climate variables: organizational support (β=.15, $p < .001$), coworker support (β=.07, $p < .001$), and communication (β=.24, $p < .001$). The relationships for the two participation measures (participation with others, and participation with supervisor) were not significant.

Hypothesis 2 dealt with the relative strengths of the various predictors of safety climate. This analysis was conducted by correlating each predictor with safety climate, while at the same time controlling for each of the other predictors. Thus, 11 separate partial correlations were conducted, and the variables were ranked according to the absolute values of these correlations. The variables with the largest observed correlations were thought to be most closely related to safety climate. The partial correlations appear in Table 3. Safety policies and programs had the strongest correlation with safety climate, when the other variables were controlled. The next strongest variable was communication, followed by organizational support and environmental conditions. Thus, Hypothesis 2b was supported in the sense that the three variables thought to be most closely related to safety climate (environmental exposures, policies and programs, and organizational support) were among the group of four variables with the highest partial correlations.

Hypothesis 3 addressed the mediating role of safety climate, using safety at work as a dependent variable. As mentioned earlier, Baron and Kenny's (1986) four step procedure was followed for conducting the mediation test.

Tables 2 and 4 present the regression analyses relevant to assessing mediation. The results for Step 1 (predictor variables correlated with safety at work) appear in Table 4. Environmental exposures ($\beta = -.42$, $p < .001$) and safety policies and programs (β=.25, $p < .001$) were each significantly related to safety at work. In addition, both organizational support (β=.15, $p < .001$) and participation-others (β=.05, $p < .05$) were significantly related to safety at work.

The analyses for Step 2 (predictors correlated with safety climate) are the same analyses that were conducted for Hypotheses 1 through 2a. Environmental exposures, safety policies and programs, organizational support, coworker support, and communication, were each significant predictors of safety climate (see Table 2). Because participation-others was not a significant predictor of safety climate in Step 2, safety climate cannot act as a mediator between participation-others and safety at work (even though participation-others is a significant predictor of safety at work).

For Step 3, Table 4 shows that safety climate was positively related to safety at work (β=.25, $p < .001$). Finally, for the final test for mediation, the regression coefficients for

Table 3
Partial correlations with safety climate

Variable	Partial correlation
Safety policies and programs	.395
Communication	.236
Organizational support	.148
Environmental conditions	−.127
Coworker support	.088
Hours worked	.035
Participation – supervisor	.034
Participation – others	−.014
Age	.011
Gender	−.010
Tenure	−.004

Table 4
Hierarchical regression analyses – predicting safety at work

Step and predictor	Step 1	Step 2	Step 3	Step 4	Step 5
Step 1					
Age	.071***	.042***	.033**	.041***	.040***
Gender	−.035	−.029	−.035	−.050	−.047
Tenure	−.084**	−.008	.010	.017	.019
Hours worked	.001	.003	.003	.002	.001
R^2	**.018**				
Step 2					
Environmental conditions		−.424***	−.357***	−.315***	−.296***
R^2		**.214**			
ΔR^2		**.196**			
Step 3					
Safety polices and programs			.246***	.149***	.067*
R^2			**.255**		
ΔR^2			**.041**		
Step 4					
Organizational support				.154***	.115**
Coworker support				−.005	−.021
Participation – others				.051*	.053**
Participation – supervisor				−.026	−.031
Communication				.049	−.009
R^2				**.276**	
ΔR^2				**.021**	
Step 5					
Safety climate					.251***
R^2					**.294**
ΔR^2					**.018**

Reported coefficients are unstandardized. Constants (intercepts) have been omitted.
*$p < .05$.
**$p < .01$.
***$p < .001$.

each predictor, before and after safety climate was controlled for, were compared. Full mediation is said to exist when a previously significant effect is rendered non-significant. A reduction in the level of significance typically suggests partial mediation. For environmental exposures, the regression coefficient remained significant (−.31, $p < .001$; −.296, $p < .001$) when safety climate was introduced, suggesting that no mediation was present. For safety policies and programs, the regression coefficient was reduced (.15, $p < .001$; .07, $p < .05$) to a lower level of significance after safety climate was introduced, suggesting partial mediation. For organizational support, the regression coefficient remained at a constant level of significance (.15, $p < .001$; .11, $p < .001$), indicating no mediation. In summary, Hypothesis 3 received only limited support. The only evidence of mediation was the partial mediation for safety policies and programs. For most of the predictors, the relationship with perceived safety at work was direct, rather than mediated by safety climate.

3.2. Additional analyses

The above results indicate that both organizational support and communication contributed significantly to safety climate, but only organizational support contributed to perceived safety at work. In view of the high bivariate correlation between organizational support and communication (r=.67), two additional analyses were conducted. First, the analyses for Hypothesis 3 (mediation) were repeated, but this time both safety climate and organizational support were entered in Step five as potential mediator variables. The results of these analyses showed complete mediation for communication (β=.10, $p < .01$; β=.001, ns). For the second set of analyses, both communication and safety climate were introduced in Step five. These results showed no mediation for organizational support (β=.17, $p < .001$; $\beta = 11$, $p < .001$). On the basis of these analyses, it appears that organizational support, along with safety climate, may mediate the relationship between communication and perceived safety at work.

4. Discussion

The first purpose of this study was to explore the determinants of safety climate. The results indicated that environmental conditions, safety policies and programs, and organizational climate each made significant contributions to safety climate. Together, these three factors accounted for about 55% of the variance in safety climate. In addition, the hierarchical regression procedure revealed that organizational climate contributed to safety climate, even after controlling for the demographic factors, environmental conditions, and safety policies and programs. In terms of the relative importance of these different factors and constituent variables, the partial correlations showed that safety policies and programs, communication, and organizational support, respectively, were the three strongest contributors to employee perceptions of safety climate. Similar to results reported by Diaz and Diaz-Caberra (1997), policies and programs made the largest, single contribution to safety climate. However, it is interesting to note that the other two variables are dimensions of general organizational climate and not specific to safety per se.

These findings are quite consistent with previous studies of safety program effectiveness and with the safety climate literature. Studies of program effectiveness (e.g., Cohen, 1977) show that clear safety policies and integrated and multi-faceted actions at the organizational level are linked to safety performance and serve as important reflections of the importance assigned to safety and the extent of management support for safety and worker protection. A growing number of safety climate studies show that employee perceptions regarding the organization's commitment to safety are a core ingredient in shaping a positive safety climate (e.g., Dedobbeleer & Beland, 1998; Flin et al., 2000; Zohar, 1980).

The importance of organizational support and communication, as elements of overall organizational climate, fit nicely with idea that a positive safety climate is more likely to exist in an environment that generally supports and values its employees and where there is open and effective exchange of information. In the organizational science literature, organizational support is often viewed from the perspective of social exchange theory (Blau, 1964; Eisenberger, Fasolo, & Davis-LaMastro, 1990). In social exchange terms, when employees perceive that their employer values and supports them, this engenders an implied obligation, on the part of employees, for future reciprocity that will benefit the organization in some way. Such reciprocity may represent an important linkage between safety climate and safety performance. This line of reasoning is also well-aligned with the suggestion that organizational commitment may play an important role in enhancing workplace safety (Parker, Axtell, & Turner, 2001). In most instances, organizational commitment refers to the psychological attachment of employees to the organization, the value placed on affiliation with the organization, and the extent that employees are willing to extend themselves on behalf the organization.

Neal et al. (2000) also found a relationship between general organizational climate and safety climate. Their organizational climate measure consisted of seven dimensions, but in their latent model approach, they did not report differential effects for the individual dimensions. The conceptualization of organizational climate in their study did include dimensions related to supportive leadership and communication, as well as other general aspects such as participation, goal congruency, and role clarity. The present results build on those of Neal and colleagues and serve to highlight organizational support and communication as focal elements related to safety climate. Hofmann and Stetzer (1998) hypothesized that communication should mediate the relationship between safety climate and accident interpretations (causal attributions). However, they failed to find support for this hypothesis, and their results actually suggested that safety climate may mediate the relationship between communication and attributions. Our findings support this alterative explanation, in that, communication was an important contributing factor to safety climate in this fairly large sample of retail workers.

Organizational support and communication appear to be closely related to each other, at least in the context of safety. The present results, however, differ from those reported by Hofmann and Morgeson (1999). In their study, safety-related communication and safety commitment were found to mediate the relationship between general organizational support and workplace accidents. They concluded that a supportive work environment is one in which employees will feel more comfortable in raising concerns about safety issues. Our findings, in contrast, suggest that open and effective communication is a key feature of a positive safety climate and indicative of a work climate that is supportive of its members. When combined with safety climate, organizational support mediated the relationship between communication and perceived safety at work. But when safety climate and communication were combined, there was no evidence of mediation for organizational support. Although certainly not definitive, our results support the conclusion that communication may be an important mechanism through which employees come to believe that the organization is supportive of their needs and values their input.

The second purpose of the current study was to test the hypothesized role of safety climate as a mediator of safety-related outcomes in the workplace. Environmental conditions, safety policies and programs, organizational climate, and safety climate, each, in turn, made significant contributions to perceived safety at work. But when safety climate was introduced into the model (see Table 4), there was only limited evidence of mediation. Following accepted procedures for assessing mediation, there was no evidence of full mediation, and partial mediation was present only for safety policies and programs, which had been the strongest contributor to safety climate. Although future, and more definitive, research on the mediator hypothesis is clearly needed, our results suggest that organizations should exercise caution in using safety climate as the overall or key indicator of the adequacy or quality of the safety effort. The present findings show that several other relevant factors, such as environmental conditions and safety policies and programs, are related to safety climate, but the relationships between these same factors and perceived safety at work were not explained by safety climate to any great extent. Employee safety climate perceptions provide important information pertinent to safety, but in many respects, there is still a need for comprehensive programming and detailed assessment or auditing of safety program effectiveness. It also appears that taking action to strengthen overall social support and communication within the organization will also enhance safety climate, but the fact remains that employee perceptions of how safe they are at work extends beyond their perceptions of safety climate.

4.1. Limitations, strengths, and future directions

The findings of this study should be viewed with consideration to the limitations that are shared by most correlational studies that rely on self-report data obtained from questionnaires. First, the design of this study was cross-sectional, and all measures were collected during the same time period. In this sense, establishing sequential relationships between predictors and outcomes is admittedly difficult. Therefore, a useful avenue for future research would be to replicate the findings in this study with longitudinal data.

A second limitation is that the assessment of relationships was done at the individual level of analysis, when in fact some of the theoretical questions at hand may be more appropriate for organizational or multi-level analyses. For

example, the very definitions of climate suggest a collective or a consensus of individual perceptions that operationalize a store or organizational climate. An additional area for future research would be to examine multiple units or organizations, and establish within and between unit variances on measures to see if higher order analyses would be appropriate. Such research would provide confirmation of the initial conclusions presented here.

A third limitation is that all of our measures were self-reported, thus introducing the possibility of common method bias. Particularly with the outcome variable of "safety at work," more objective, as opposed to perceptual, measures of safety might have strengthened the results. However, as mentioned earlier, the setting for this study (retail), made it difficult to identify safety activities and behaviors that would apply to all employees throughout the organization. Also, injury and accident measures tend to be notoriously unstable, and researchers often resort to surrogate measures to assess safety-related outcomes. Perceived safety at work was thought to be a proximal indicator of safety performance, as well as a logical outcome of a positive and supportive safety climate.

Despite these limitations, this study revealed findings that have both theoretical and practical significance. Of particular importance are the implications that these findings have for both safety climate and organizational science research. The results suggest that the determinants of good safety performance extend beyond safe working conditions, specific safety policies, and hazard controls. In addition to these factors, it appears that organizational climate factors, particularly the support and communication provided by management to employees, make important contributions. In this sense, the continued integration of organizational and safety climate research seems a promising avenue for future research. From a more practical standpoint, it is likely that managers can benefit from a balanced approach to safety that includes both traditional mechanisms for hazard identification and control, along with specific actions directed at fostering a general work climate that is open, positive, and supportive. These broad climate characteristics have typically been investigated in terms of employee morale and productivity outcomes, but they are also important with respect to workplace safety. The implication here is that "good management" produces benefits throughout the organization, including safety.

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