Journal of Management & Organization, 22:1 (2016), pp. 19–31

doi:10.1017/jmo.2015.45

Safety climate, strain and safety outcomes

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Abstract

The purpose of this study is to employ Koeske and Koeske's stressor-strain-outcome model of stress to examine the extent to which strain, a central component of occupational stress, mediates the relationship between safety climate and safety-related outcomes. The relationship between safety climate, strain and safety outcomes has been relatively under tested where strain is a mediating variable. This study makes a contribution to the literature by examining the dynamics of these relationships. Questionnaires were sent to 1,800 employees of an electricity provider, with a 41.4% response rate. The hypothesized model was tested using structural equation modeling. Analysis of the hypothesized model indicated that, while safety climate had a significant direct relationship with safety-related behaviors, the model was also partially mediated by the experience of strain. Understanding the relationship between safety climate, strain and safety outcomes is important. Support for the model verifies that safety climate is mediated by strain in terms of safety outcomes. Practical implications include the need to manage safety climate through management attitudes to safety, maintaining high safety standards and communication to reduce ambiguity on safety norms.

Keywords: safety climate, emotional exhaustion, occupational safety, occupational stress, strain

INTRODUCTION

The significance of occupational safety for individuals, employers and policy-makers is widely recognized with thousands of deaths in countries such as the United States occurring every year (Probst, Brubaker, & Barsotti, 2008; Christian, Bradley, Wallace, & Burke, 2009 The current emphasis within occupational safety research is on the relationship between the individual or the human factor and the characteristics of the organization and organizational systems (Reason, Parker, & Lawton, 1998). Within the scope of this research there is also considerable focus on human error and on understanding unsafe individual behavior within the broader organizational context (Lee, 1998; Weyman, Clarke, & Cox, 2003).

While safety culture and safety climate have been extensively analyzed in their capacity to predict safe and unsafe behaviors (Zohar, 1980; Neal, Griffin, & Hart, 2000; Cheyne, Oliver, Tomás, & Cox, 2002) we argue that other influences have been overlooked in previous research. Hence, it is necessary to broaden the scope of predictive variables. In this research, we propose that occupational stress, and specifically the experience of strain, will contribute to unsafe behavior. Koeske and Koeske's (1993)

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stressor-strain-outcome model of stress has been employed in this paper to explain the nature of the relationship between the stressor (i.e., safety climate), the strain (i.e., emotional exhaustion), and the outcome (i.e., safety-related behavior).

Based on this analysis of previous research our broad research question is whether the experience of strain will mediate the relationship between safety climate and safety-related behavior in accordance with Koeske and Koeske's (1993) stressor-strain-outcome model of stress. First, we examine the literature and formulate hypotheses. Second, we test this framework using a survey of employees in a large organization. Finally, we discuss the findings, which have several implications for theory, research, and practice with regard to safety-related behavior.

OCCUPATIONAL STRESS AND THE EXPERIENCE OF STRAIN

The literature associated with occupational stress is expansive and so will not be reviewed here in its entirety. At the most basic level, the stress process comprises the relationship between the stressor and the experience of strain (Jex & Beehr, 1991). Occupational stress theories are numerous; however, each is built on the foundation that organizational stressors (e.g., role overload) impact on indicators of strain (e.g., burnout). The stressor-strain-outcome model developed by Koeske and Koeske (1993) stems from a conceptualization of the burnout concept. In its original form the burnout scale encompasses three components: (a) emotional exhaustion, (b) sense of failure versus accomplishment, and (c) depersonalization (Koeske & Koeske, 1993). Koeske and Koeske (1993) argued that when separated out, burnout is indicated by emotional exhaustion, while depersonalization can be seen as contingent on continuing emotional exhaustion. Personal accomplishment is viewed as impacting outcomes such as depersonalization.

The stressor-strain-outcome model represents a relationship between stressors and behavioral, psychological, or physiological outcomes, which is mediated by strain (Koeske & Koeske, 1993). Therefore, the extent to which a stressor causes an outcome is explained by the level of emotional exhaustion experienced. The model proposed by Koeske and Koeske (1993) has been tested empirically and confirmed (see Koeske & Koeske, 1993; Tetrick, Slack, da Silva, & Sinclair, 2000).

Having adopted the Koeske and Koeske (1993) stressor-strain-outcome model negative safety climate is conceptualized as a stressor while the dependent variables, safety-specific behavior and safety involvement, have been conceptualized as behavioral outcomes. We adopt the definition of safety climate as being the set of perceptions held by individuals about aspects of organizational safety, for example safety management, safety communication, risk, and safety systems (Guldenmund, 2000). In line with the model developed by Koeske and Koeske, emotional exhaustion is operationalized as a mediating variable.

Our conceptualization of poor safety climate as a stressor is supported by the taxonomy of stressors outlined by O'Driscoll and Cooper (2002), which includes task or job content (e.g., monotony and control), organizational roles (e.g., role conflict and role ambiguity), work relationships (e.g., with supervisors and colleagues), career development (e.g., promotion and skill development opportunities), and organizational structure or climate (e.g., bureaucratic, organizational culture, or climate). Safety climate is one aspect of the wider organizational climate (Schneider, 1975) and as such can be conceptualized as a stressor. Safety climate has been conceptualized in this paper as consisting of *management's commitment to safety, safety communication, safety standards and goals, environmental risk, safety systems,* and *safety knowledge and training*. Where there is poor training and knowledge, insufficient goals and standards and poor communication, for example, this leads to ambiguity, which is a significant cause of strain (Ralston et al., 2010).

Poor safety climate was also conceptualized as a stressor in research conducted by Goldenhar, Williams, and Swanson (2003). Based on this literature, the following hypothesis is proposed:

Hypothesis 1: Positive safety climate will negatively predict emotional exhaustion.

While the literature exploring strain and safety outcomes is limited, there is a considerable amount of empirical support for the impact of strain on behavior more generally. Job performance is widely studied in occupational stress research and commonly encompasses measures such as productivity, sales performance, and creativity. These variables predict that the more strain is experienced, the lower the levels of performance (Varca, 1999; Beehr, Jex, Stacy, & Murray, 2000; Fisher, 2001; Baruch-Feldman, Brondolo, Ben-Dayan, & Schwartz, 2002; Van Dyne, Jehn, & Cummings, 2002). Further, there is some support for the relationship between stress and safety outcomes (Sutherland & Cooper, 1991; Glasscock, Ramussen, Carstensen, & Hansen, 2006; Strahan, Watson, & Lennonb, 2008). Considering the various types of behavioral indicators of strain and the relationship between such outcomes and *emotional exhaustion* the following hypotheses are made:

Hypothesis 2: Emotional exhaustion will negatively predict safety involvement.

Hypothesis 3: Emotional exhaustion will negatively predict safety-specific behavior.

Although there is little extant literature to conceptualize strain as a mediator between safety climate and safety outcomes we propose this to be the case based on theoretical grounds. It is argued that when an individual perceives a poor safety climate, the perception acts as a stressor, leading to strain and specifically emotional exhaustion. Climates provide the individual with a context in which they can gauge the appropriateness of their behavior and possible consequences of such behavior (Moran & Volkwein, 1992). Where there is a poor safety climate, individuals will not have a sufficiently clear understanding of their roles, responsibilities, and behavioral expectations to maintain individual safety and safety of colleagues. When a work environment is perceived to be risky, an individual in a given situation suffers stress if she or he is uncertain of appropriate behavior and consequences of such behavior.

Goldenhar, Williams, and Swanson (2003) hypothesized that psychological and physical strain factors mediate the relationship between safety climate and injuries and near misses. Support for this mediated relationship was not found. Such problems, however, may be associated with low reliabilities for both of the strain factors. Another study by Siu, Phillips, and Leung (2004) found that psychological distress mediated the relationship between safety climate and safety performance. They put forward the argument that the focus in a workplace with low safety climate is on performance. The pressure for high performance means that individuals do not focus on safety leading them to violate rules and therefore higher accident rates.

Following from the literature the following hypothesis is made:

Hypothesis 4: Emotional exhaustion will mediate the relationship between the psychological climate dimensions and the two dependent variables, safety involvement, and safety-specific behavior.

SAFETY CLIMATE AND SAFETY-RELATED BEHAVIOR

Safety climate has been studied extensively in relation to safety-related behaviors and outcomes (e.g., injuries). Safety climate has been used to successfully predict accidents (Mearns, Whitaker, & Flin, 2003), injury rates (Zohar, 2002), safety activities, safety involvement (Cheyne et al., 2002), and safety-specific behaviors (Neal et al., 2000). Zohar (1980) and Díaz and Cabrera (1997) found that safety climate differentiated between organizations with different levels of safety, and that a more positive safety climate predicted more positive safety outcomes. Garavan and O'Brien (2001) found significant positive relationships between the safety climate and a range

https://doi.org/10.1017/jmo.2015.45 Published online by Cambridge University Press

of positive safety behavior while Varonen and Mattila (2000) found a negative relationship between safety climate and accidents and a positive relationship with workplace safety. A study by Strahan et al. (2008) found that safety climate predicted fatigue related behavior and near misses of vehicle accidents. Research conducted by Mearns et al. (2003) produced similar results.

Previous research investigating safety-related behavior has identified two major forms, or indicators, namely *safety-specific behavior* and *safety involvement* (Neal et al., 2000; Cheyne et al., 2002). Our measures are consistent with Christian et al.'s (2009) definition of safety compliance and participation. Safety behavior is similar to that of compliance in that it involves safety behavior required by the organization. Safety involvement is similar to safety participation in that it involves voluntary behaviors that are supportive of safety. These measures have been selected for two main reasons. The first is that accidents occur rarely, thus allowing limited applicability to cross-sectional data. The second reason is that the purpose of safety climate research is predictive, while accident and injury statistics are reactive. Safety-specific behavior and safety involvement are proactive in nature (Flin et al., 2000) and represent effective predictors of accidents and injuries (Mearns et al., 2003). Based on the empirical evidence provided by past research the following hypotheses have been made:

Hypothesis 5: Positive safety climate will positively predict safety-specific behavior.

Hypothesis 6: Safety climate will positively predict safety involvement.

In addition, there are a number of control variables. It is expected that women, those working in an office environment and those working in full-time status are expected to have higher safety climate and higher safety behavior and involvement. Further, younger workers are expected to engage in safety behavior and involvement. Women are said to be risk averse and have lower occupational injuries (Hoskins, 2005) and those in an office environment are exposed to less risk than those out on the field. Supervisors are more likely to be receptive to safety issues due to the problems of exposure to risks and greater likelihood of an office environment. Further, transformational leadership has been found to have a positive impact on safety behavior (Inness, Turner, Barling, & Stride, 2010). Older workers have been found in the literature to be related to higher levels of injuries (Rogers & Wiatrowski, 2005). Another control variable included is geography, although no formal hypotheses have been formulated here.

Sample

This research is quantitative and uses a cross-sectional survey. A total of 1,800 questionnaires were randomly distributed throughout the research site, an electricity provider in Australia. The response rate was 41.4% (739 useable responses).

The average age of the respondents was 40.93 years (SD = 15.57) and length of employment was 10.23 years (SD = 8.83). Of the sample 74.7% were male, while 25.3% were female. In all, 43.7% worked predominantly in a field or workshop environment, while the remainder worked predominantly in an office environment. The majority of the sample was classified in the role of employee (74.3%), as opposed to being classified in supervisory or management roles. In all, 88.8% were full-time employees, while the remainder were part-time or casual. The research sample was spread across seven locations within Australia, which have been labeled 1–7 to maintain the anonymity of the organization. Of the sample, 10% of the respondents were based in location 1, 16.4% in location 2, 6.9% in location 3, 30% in location 4, 8.8% in location 5, 17.6% in location 6, and 8.5% in location 7. Most individuals in the field were male (97%).

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Level of analysis

In climate research, it is important to consider the appropriate level of analysis. The level of analysis of climate constructs is an issue subject to much debate. It is argued by some that climate should be aggregated to the level of the group or team (Zohar & Luria, 2005) while others argue it is an individual difference (Zacharatos, Barling, & Iverson, 2005). Within this paper the dependent variables are safety-related behavior, which is an individual attribute and therefore, the level of analysis in this research is the individual. In order to affirm that the individual is the appropriate level of analysis, a test of homogeneity was conducted that examines the within- and between-groups variance (Peugh & Enders, 2005). The purpose of this analysis is to determine whether the variance within the groups was greater than the variance between. The intraclass correlation coefficient is calculated to confirm the level of analysis (Peugh & Enders, 2005). The difference between two groups is analyzed where, it could be argued, different climates could evolve based on the differences in work environment. These two groups are based on work environment (field or workshop environment vs. office environment) and geographical location. Our results support the individual as the unit of analysis, with the variance within the groups being greater than the variance and the intraclass correlation coefficient being very small to moderate (intraclass correlation coefficient values between 0 and 5%) (Peugh & Enders, 2005). In order to be sure that this was controlled for we included variables in the model for work environment and geographical location.

Measures

A 6-point Likert scale ranging from *strongly agree* (1) to *strongly disagree* (6), was used to measure the participants' perceptions on each item. The items used to represent each variable were adapted from existing measures. Cronbach's α was calculated for each of the scales (Cronbach, 1951). During exploratory factor analysis, items that cross loaded were deleted from further analysis and measures with factor loadings >0.4 were retained.

Safety climate

The safety climate items were adapted from the work of Neal, Griffin, and Hart (2000) and Cheyne et al. (2002). Following exploratory factor analysis, three safety climate factors remained; *safety management* (α = 0.88), *safety standards* (α = 0.75), and *safety communication* (α = 0.67). *Safety management* is defined as relating to employee perceptions of management's attitudes and behaviors in relation to safety. An example of a *safety management* item includes 'I feel that all levels of management at XX always make sure that my workmates and I continually focus on improving safety.' *Safety standards* are defined as being the expected standards of performance and behavior with regard to safety and include items such as 'I feel that as long as no incidents occur and nobody is injured at work, it is OK not to follow the organization's safety rules.' *Safety communication* relates to the extent to which safety issues are openly discussed and communicated within the organization. An example of a *safety communication* question included 'I am not consulted on how to fix safety problems within my workplace.' To maintain parsimony in the hypothesized model a *safety climate* score was summated from the constructs that displayed sufficient reliability. The practice of creating a summation of the climate factors has been undertaken in other recent research (Neal et al., 2000; Zacharatos et al., 2005). The summation to an index is consistent with the notion that safety climate is a system-based variable (Becker & Huselid, 1998). The reliability coefficient for the *safety climate* aggregate is 0.88.

Emotional exhaustion

The Human Services version of the Maslach Burnout Inventory was applied in this research (Maslach, Jackson, & Leiter, 1996). Maslach et al. (1996: 4) define *emotional exhaustion* as feelings of 'being

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emotionally overextended and exhausted by one's work.' As recommended by Maslach et al. (1996) *emotional exhaustion* was measured in terms of both intensity and frequency. An example of an *emotional exhaustion* item was 'I feel emotionally drained from my work.' Following exploratory factor analysis, all items from both the *emotional exhaustion* frequency and intensity scales loaded onto one construct that was labeled *emotional exhaustion* (18 items, $\alpha = 0.94$).

Safety-related behavior

The safety performance items were adapted from the work of Neal et al. (2000) and Cheyne et al. (2002). Eleven items were adapted from Neal et al.'s safety compliance scale to measure *safety-specific behavior*. Neal et al. (2000) defined compliance as being an adherence to safety procedures and carrying out work in a manner prescribed by the organization as being safe. An example item of *safety-specific behavior* is 'I only use machinery and equipment that I am licensed to operate'.

Safety involvement

Seven items were adapted from Cheyne et al. (2002) to represent *safety involvement*, which is defined as being the extent to which the individual is involved in, take responsibility for, and engages in issues associated with organizational safety. An example of *safety involvement* is 'I endeavor to play an active role in safety-related decisions within my work environment.' Two safety performance factors emerged from the exploratory factor analysis, *safety-specific behavior* ($\alpha = 0.76$) and *safety involvement* ($\alpha = 0.81$).

Confirmatory factor analysis

To ensure the scales resulting from the exploratory factor analysis could be used in the SEM confirmatory factor analysis was undertaken (Hair, Anderson, Tatham, & Black, 1998). The hypothesized model produced fit indices that were significantly better than the one factor model. A confirmatory factor analysis of the one factor model yielded the following results: $\chi^2 = 773.91$ ($df = 77$, $p < .001$), GFI = 0.82, AGFI = 0.75, RMSEA = 0.11, CFI = 0.69, and NFI = 0.67. This compares to the hypothesized model where $\chi^2 = 470.04$ ($df = 175$, $p < .001$), GFI = 0.95, AGFI = 0.91, RMSEA = 0.05, CFI = 0.91, and NFI = 0.87.

Control variables

Several control variables were included in the analysis. These variables included *Gender* (1 = male, 2 = female), *Age* (years), *Role status* (1 = employee, 2 = supervisor, manager, or higher), *Work environment* (1 = predominantly in an office, 2 = predominantly in the field or workshop) *Employment status* (1 = full time, 2 = casual, part-time), and *Geographical location* (1–7). *Geographical location* was coded as dummy variables for the purposes of the regression analysis.

RESULTS

Descriptives

Table 1 shows the mean, standard deviation, and correlations for each of the constructs.

Structural equation model

One modification has been made to the model which improved the model fit overall. The modification made to the hypothesized model involved regressing the dependent variables, such that *safety involvement* predicted *safety-specific behavior*. Based on the concepts encompassed within the two

Table 1. Correlation matrix

	Mean	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
1. Safety climate	4.12	0.60	*0.88*													
Mediating variable																
2. Emotional exhaustion	4.07	0.90	− 0.33**	*0.94*												
Dependent variables																
3. Safety-specific behavior	4.72	0.58	0.61**	0.25**	*0.74*											
4. Safety involvement	4.49	0.83	0.30**	−0.10**	0.33**	*0.73*										
Control variables																
5. Gender			0.30**	−0.13**	0.26**	−0.19**										
6. Age			0.06	0.02	0.08*	0.24**	−0.18**									
7. Role status			0.16**	0.11**	0.18**	0.11**	−0.14**	0.16**								
8. Employment status			0.07*	−0.12**	0.09**	−0.13**	0.31**	−0.17**	−0.13**							
9. Work environment			−0.42**	0.05	−0.43**	0.17**	−0.50	−0.07	−0.22**	−0.15**						
10. Region 1			0.03	−0.07	0.04	0.04	−0.01	0.02	0.06	0.01	−0.05					
11. Region 2			−0.05	−0.07*	0.03	0.03	−0.02	0.07*	−0.03	0.01	0.04	−0.15**				
12. Region 3			−0.09*	.04	−0.05	−0.05	−0.08*	−0.02	0.00	0.02	0.04	−0.09*	−0.12**			
13. Region 5			−0.08*	0.06	−0.07	0.02	−0.06	0.09	−0.03	−0.06	0.10**	−0.10**	−0.14**	−0.09*		
14. Region 6			−0.02	−0.11**	−0.09*	0.06	−0.13**	0.04	−0.04	−0.07	0.18**	−0.15**	−0.20**	−0.13**	−0.14	
15. Region 7			0.18**	0.03	0.15**	−0.04	0.13*	−0.04	0.16	−0.03	−0.26**	−0.10	−0.14**	−0.08*	−0.10**	−0.14**

Note. *$p \leq .05$; **$p \leq .01$; Numbers in italics are alpha values.

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dependent variables, it is logical to assume that if individuals were involved in safety activities, attended meetings and considered high standards in safety performance a goal, then they would be more likely to engage in compliant behaviors.

The results of the SEM indicate that the modified model is better fitting across the majority of statistics. The χ^2 value for both the hypothesized (χ^2 (184) = 575.69, $p < .001$) and modified models (χ^2 (183) = 486.57, $p < .001$), does not indicate a good fitting model (χ^2 (183) = 486.57, $p < .001$), which is likely to be a result of sample size as opposed to being a true indication of fit (Hair et al., 1998). The GFI and the range of incremental fit indices for the hypothesized model are as follows; GFI = 0.94, TLI = 0.83, NFI = 0.86, RFI = 0.76, IFI = 0.90, CFI = 0.89, PNFI = 0.53, and AIC = 857.69. The GFI and the range of incremental fit indices for the modified model indicate a moderate improvement; GFI = 0.95, TLI = 0.87, NFI = 0.88, RFI = 0.80, IFI = 0.87, CFI =0.92, PNFI = 0.54, and AIC = 770.57. The RMSEA for the hypothesized model (0.05) and the modified model (0.04) were both within the acceptable range (Browne & Cudeck, 1993). While the PNFI does not support the presence of a significant difference between the two models with the required difference in value being 0.06–0.09 (Ho, 2000). On the other hand the AIC for the modified model is substantially lower than for the hypothesized model. As such, the majority of the statistics indicate that the modified model is the better fitting model.

In order to ensure that common method variance was not an issue the model was run with unmeasured latent method construct (ULMC). There were no differences so we are reporting the results of the original model. Table 2 presents all significant regression paths in the latent measurement model. Both dependent variables, *safety-specific behavior* (β = 0.34; $p < .001$) and *safety involvement* (β = 0.49; $p < .001$), were significantly and positively predicted by safety climate supporting Hypotheses 5 and 6. Hypothesis 1, that *safety climate* would negatively predict *emotional exhaustion*, was also supported (β = − 0.38; $p < .001$). Hypothesis 2, outlining the relationship between *emotional exhaustion* and *safety involvement* (β = 0.01; $p > .05$) was rejected. While Hypothesis 3 was significant (β = − 0.11; $p < .001$) indicating that in instances where people experience greater levels of *emotional*

Table 2. Significant standardized regression weights for the modified model

	Safety climate	*Emotional exhaustion*	*Safety-specific behavior*	*Safety involvement*
Safety climate		−0.38**	0.34***	0.49***
Emotional exhaustion			−0.11**	
Safety involvement			0.46***	
Control variables				
Gender	0.18***			−0.12*
Age			−0.07*	0.23***
Role status	0.11**	0.13***		
Work environment	−0.29***		−0.37***	0.38***
Employment status		−0.09*		
Geographical location 1		−0.12**		
Geographical location 2		−0.15***		
Geographical location 3				
Geographical location 5				
Geographical location 6		−0.17***		
Geographical location 7				
R^2	0.22	0.19	0.68	0.33

Note. ***$p < .001$; **$p < .01$; *$p < .05$.

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exhaustion, they will be less likely to behave safely. Hypothesis 4, that *emotional exhaustion* would mediate the relationship between *safety climate* and both *safety involvement* and *safety-specific behavior,* was partially supported. In order to test for mediation, Sobel tests were undertaken. We found that emotional exhaustion significantly mediated safety behavior (Sobel test = 2.95, $p < .01$) but did not mediate the relationship with safety involvement (Sobel test = 0.33, $p > -.10$).

DISCUSSION

In this study, we sought to address the broad research question of whether the experience of strain mediates the relationship between safety climate and safety outcomes. We found partial support for a mediating relationship, as the modified model, which presented a partially mediated explanation of the dependent variables, provided the best fit to the data. This relationship has been under tested in the literature and this paper makes a significant contribution by examining this relationship. Poor safety climate is a stressor, probably due to performance expectations of organizations with poor climates (Siu et al., 2004) but also because of the ambiguity that arises in terms of expectations in these organizations. Poor training and insufficient goals and standards, as well as poor communication contribute to this ambiguity, which leads to strain.

This research provides further support for the relationship between safety climate and safety performance indicators. While this research is not new, it does reconfirm the importance of attitudes and perceptions on individual safety performance. This research also reconfirms the importance of understanding the 'state' of organizational safety in improving safety performance (Williamson, Feyer, Cairns, & Biancotti, 1997). The safety climate measure provides a useful management tool that has the capacity to diagnose, record, and intervene in the weaker components of organizational safety systems (Coyle, Sleeman, & Adams, 1995; Lee, 1998; Reason, 1998). Safety climate also has the capacity to facilitate dialogue and discussion based on the attitudes and perceptions of individuals toward occupational safety (Carroll, 1998) and as such highlights the critical nature of these attitudes and perceptions in commitment oriented safety management (Lee, 1998; Barling & Hutchinson, 2000).

Strain impacted on safety behavior but not safety involvement. This might reflect the fact that the later is a more objective measure of safety outcome dealing with actual behavior (although it is self report) and involvement is more of an attitudinal measure examining workplace priorities in relation to safety. The *safety-specific behavior* variable was also significantly predicted by *safety involvement*. This relationship reflects similar hypotheses made by Cheyne, Cox, Oliver, and Tomás (1998) and Cheyne et al. (2002) based on a model in which organizational variables impacted group variables, which in turn impacted individual variables. In Cheyne et al.'s (1998, 2002) research group variables included individual involvement, which they found impacted safety activities indirectly through individual responsibility. The importance of involvement has also been noted in both research (Barling & Hutchinson, 2000; Vredenburgh, 2002; DeJoy, 2005; Zacharatos et al., 2005) and policy (Safe Work Australia, 2002) as being critical to the success of safety initiatives, safe behavior and the improvement of accident and injury statistics at the enterprise and Australian national level.

In addition, there are a number of practical implications for organizations. First, safety climate must be managed by organizations such that it remains positive. This involves management maintaining a good attitude towards safety, establishing high safety standards, and communicating widely and extensively about safety issues (Christian et al., 2009). Ambiguity needs to be reduced regarding safety climate norms and performance needs to focus on issues beyond quantity (Siu, Phillips, & Leung, 2004; Ralston et al., 2010).

LIMITATIONS OF THE STUDY

The results of this research should be interpreted with respect to a number of limitations. First, cross-sectional research is criticized broadly because, by its very nature, it records data from only one point in time. Therefore, while it is possible to test the nature of relationships and correlations, it is not possible to explain unequivocally why such relationships exist (Collis & Hussey, 2003). The intention of this research was to test the hypothesized relationships, and, while longitudinal data would be ideal in testing causality, it is not always practical. Longitudinal research designs are costly and require a time frame that often exceeds the confines of practical research. Further, longitudinal research requires extensive commitment and support from the participating organization. These concerns imposed limitations on this research and have resulted in a cross-sectional research design. We suggest that, for future research, where feasible, longitudinal research would be the preferred research design as it allows the researcher to measure the nature of relationships over time, as well as their degree of stability records data from one point in time (Collis & Hussey, 2003).

Further, common method variance is a limitation of research conducted using designs such as this study, particularly because both the independent and dependent variables were self-reported (Podsakoff & Organ, 1986). However, error has been mitigated through the process of testing for discriminant and convergent validity (Podsakoff & Organ, 1986) and undertaking the analysis using ULMC. Although not possible in this study, one recommended strategy for controlling common method biases is to obtain measures of the independent and dependent variables from different sources (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Although Spector (2006) has argued that it is incorrect to assume that the use of a single method automatically introduces systematic bias, it is recommended that future research should replicate the present findings using data gathered from multiple sources. For example, data on safety-related behaviors could be gathered using objective organizational records, rather than self-reports from individuals.

In terms of causality there may be other issues. In this paper it was argued that strain mediates the relationship between safety climate and safety outcomes but conceivably safety climate could moderate this relationship (Chowdhury & Endres, 2010). Those in work situations with poor safety climate might have poorer outcomes given that there is strain. Further, it is feasible that the relationship between safety climate and strain is spuriously due to an association between a poor safety climate and a stressful work environment. One variable that might be relevant is negative affectivity. Negative affective people might be more inclined to indicate a poor safety climate and experience greater strain. Future research should test this hypothesis.

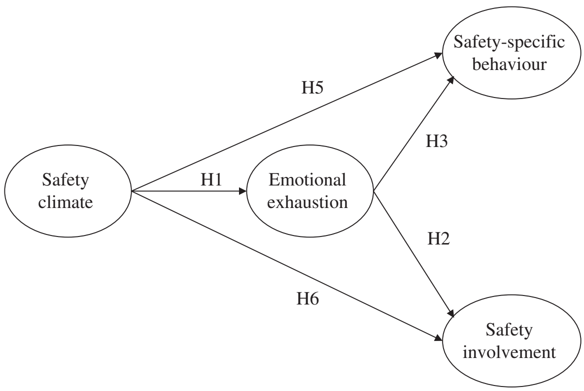

Figure 1. Hypothesized model

https://doi.org/10.1017/jmo.2015.45 Published online by Cambridge University Press

CONCLUSION

This research explored the role of strain and specifically emotional exhaustion as a mediator of the relationship between safety climate and safety-related outcomes. The results of the data analysis indicated that strain, and specifically emotional exhaustion, did mediate the relationship between safety climate and the dependent variable, safety-specific behavior. This relationship indicates that when positive, safety climate reduces the experience of emotional exhaustion for the individual. Further, the experience of emotional exhaustion mediates the extent to which the individual engages in safety-specific behaviors. The research also reaffirms the positive relationship between safety climate and safety-related behaviors and specifically safety involvement and safety-specific behavior.

In a more general sense this research contributes to the growing body of research that is aimed at developing a greater understanding of the role played by more general characteristics of the organization and occupational safety outcomes. In order to be effectively managed and as such contribute to improving organizational accident and injury rates issues of occupational safety must be integrated into the way organizes are managed. Occupational safety cannot be disassociated from the broader management systems and must be considered on par with the priority given to production and quality, not only because it is good for business but because it is an essential for effective overall organizational performance and as a duty of social responsibility (Figure 1).

References

Barling, J., & Hutchinson, I. (2000). Commitment vs. control-based safety practices, safety reputation, and perceived safety climate. *Canadian Journal of Administrative Sciences*, *17*, 76–84.

Baruch-Feldman, C., Brondolo, E., Ben-Dayan, D., & Schwartz, J. (2002). Sources of social support and burnout, job satisfaction and productivity. *Journal of Occupational Health Psychology*, *7*, 84–93.

Becker, B. E., & Huselid, M. A. (1998). High performance work systems and firm performance: A synthesis of research and managerial implications. *Research in Personnel and Human Resources Management*, *16*, 53–102.

Beehr, T. A., Jex, S. M., Stacy, B. A., & Murray, M. A. (2000). Work stressors and coworker support as predictors of individual strain and job performance. *Journal of Organizational Behavior*, *21*, 391–405.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen, & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Newbury Park, CA: Sage.

Carroll, J. S. (1998). Safety culture as an ongoing process: Culture surveys as opportunities for enquiry and change. *Work and Stress*, *12*, 272–284.

Cheyne, A., Cox, S., Oliver, A., & Tomás, J. M. (1998). Modelling safety climate in the prediction of levels of safety activity. *Work and Stress*, *12*, 255–271.

Cheyne, A., Oliver, A., Tomás, J. M., & Cox, S. (2002). The architecture of employee attitudes to safety in the manufacturing sector. *Personnel Review*, *31*, 649–670.

Chowdhury, S. K., & Endres, M. L. (2010). The impact of client variability on nurses' occupational strain and injury: Cross-level moderation by safety climate. *Academy of Management Journal*, *53*, 182–198.

Christian, M. S., Bradley, J. C., Wallace, J. C., & Burke, M. J. (2009). Workplace safety: a meta-analysis of the roles of person and situation factors. *Journal of Applied Psychology*, *94*, 1103–1127.

Collis, J., & Hussey, R. (2003). *Business research: A practical guide for undergraduate and postgraduate students* (2nd ed.). New York, NY: Palgrave.

Coyle, I. R., Sleeman, S. D., & Adams, N. (1995). Safety climate. *Journal of Safety Research*, *26*, 247–254.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*, 297–334.

DeJoy, D. M. (2005). Behavior change versus culture change: Divergent approaches to managing workplace safety. *Safety Science*, *43*, 105–129.

Díaz, R. I., & Cabrera, D. D. (1997). Safety climate and attitudes as evaluation measures of organizational safety. *Accident Analysis and Prevention*, *29*, 643–650.

Fisher, R. T. (2001). Role stress, the Type A behaviour pattern, and external auditor job satisfaction and performance. *Behavioural Research in Accounting*, *13*, 143–170.

https://doi.org/10.1017/jmo.2015.45 Published online by Cambridge University Press

Flin, R., Mearns, K., O'Connor, P., & Bryden, R. (2000). Measuring safety climate: identifying the common features. *Safety Science*, *34*, 177–192.

Garavan, T. N., & O'Brien, F. (2001). An investigation into the relationship between safety climate and safety behaviours in Irish organisations. *Irish Journal of Management*, *22*, 141–170.

Glasscock, D. J., Rasmussen, K., Carstensen, O., & Hansen, O. N. (2006). Psychosocial factors and safety behaviour as predictors of accidental work injuries in farming. *Work and Stress*, *20*, 173–189.

Goldenhar, L. M., Williams, L. J., & Swanson, N. G. (2003). Modelling relationships between job stressors and injury and near-miss outcomes for construction labourers. *Work and Stress*, *17*, 218–240.

Guldenmund, F. W. (2000). The nature of safety culture: A review of theory and research. *Safety Science*, *34*, 215–257.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Ho, R. (2000). *Handbook of univariate and multivariate data analysis and interpretation: SPSS approach*. Rockhampton, QLD: Central Queensland University Publishing Unit.

Hoskins, A. B. (2005). Occupational injuries, illnesses and fatalities among women. *Monthly Labor Review*, *128*(10), 31–37.

Inness, M., Turner, N., Barling, J., & Stride, C. B. (2010). Transformational leadership and employee safety performance: A within-person, between-jobs design. *Journal of Occupational Health Psychology*, *15*, 279.

Jex, S. M., & Beehr, T. A. (1991). Emerging theoretical and methodological issues in the study of work-related stress. *Research in Personnel and Human Resource Management*, *9*, 311–365.

Koeske, G. F., & Koeske, R. D. (1993). A preliminary test of a stress-strain-outcome model for reconceptualizing the burnout phenomenon. *Journal of Social Service Research*, *17*(3/4), 107–133.

Lee, T. (1998). Assessment of safety culture at a nuclear reprocessing plant. *Work and Stress*, *12*, 217–237.

Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *The Maslach burnout inventory manual research edition*. Palo Alto, CA: Consulting Psychologists Press.

Mearns, K., Whitaker, S. M., & Flin, R. (2003). Safety climate, safety management practice and safety performance in offshore environments. *Safety Science*, *41*, 641–680.

Moran, E. T., & Volkwein, J. F. (1992). The cultural approach to the formation of organizational climate. *Human Relations*, *45*, 19–47.

Neal, A., Griffin, M. A., & Hart, P. M. (2000). The impact of organizational climate on safety climate and individual behavior. *Safety Science*, *34*, 99–109.

O'Driscoll, M. P., & Cooper, C. L. (2002). Job-related stress and burnout. In P. Warr (Ed.), *Psychology at work* (5th ed.), pp. 203–228. London: Penguin.

Peugh, J. L., & Enders, C. K. (2005). Using the SPSS mixed procedure to fit cross-sectional and longitudinal multilevel models. *Educational and Psychological Measurement*, *65*(5), 717–741.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*, 879–903.

Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. *Journal of Management*, *12*, 531–544.

Probst, T. M., Brubaker, T. L., & Barsotti, A. (2008). Organizational injury rate underreporting: The moderating effect of organizational safety climate. *Journal of Applied Psychology*, *93*, 1147–1154.

Ralston, D. A., Lee, C. H., Perrewe, P. L., Van Deusen, C., Vollmer, G. R., Maignan, I., Tang, M., Wan, P., & Rossi, A. M. (2010). A multi-society examination of the impact of psychological resources on stressor-strain relationships. *Journal of International Business Studies*, *41*(4), 652–670.

Reason, J. (1998). Achieving a safe culture: Theory and practice. *Work and Stress*, *12*, 293–306.

Reason, J., Parker, D., & Lawton, R. (1998). Organizational controls and safety: The varieties of rule-related behavior. *Journal of Occupational and Organizational Psychology*, *71*, 289–299.

Rogers, E., & Wiatrowski, W. J. (2005). Injuries, illnesses, and fatalities among older workers. *Monthly Labor Review*, *128*(10), 24–30.

Safe Work Australia. (2002). The National OHS Strategy 2002–2012. Retrieved from http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/sp200208nationalohsstrategy2002to2012.

Schneider, B. (1975). Organizational climates: An essay. *Personnel Psychology*, *28*, 447–479.

https://doi.org/10.1017/jmo.2015.45 Published online by Cambridge University Press

Siu, O. L., Phillips, D. R., & Leung, T. W. (2004). Safety climate and safety performance among construction workers in Hong Kong: The role of psychological strains as mediators. *Accident Analysis and Prevention*, *36*, 359–366.

Spector, P. E. (2006). Method variance in organizational research truth or urban legend? *Organizational Research Methods*, *9*, 221–232.

Strahan, C., Watson, B., & Lennonb, A. (2008). Can organisational safety climate and occupational stress predict work-related driver fatigue? *Transportation Research Part F: Traffic Psychology and Behaviour*, *11*, 418–426.

Sutherland, V. J., & Cooper, C. L. (1991). Personality, stress and accident involvement in the offshore oil and gas industry. *Personality and Individual Differences*, *12*, 195–204.

Tetrick, L. E., Slack, K. J., da Silva, N., & Sinclair, R. R. (2000). A comparison of the stress-strain process for business owners and nonowners: Differences in job demands, emotional exhaustion, satisfaction and social support. *Journal of Occupational Health Psychology*, *5*, 464–476.

Van Dyne, L., Jehn, K. A., & Cummings, A. (2002). Differential effects of strain on two forms of work performance: Individual employee sales and creativity. *Journal of Organizational Behavior*, *23*, 57–74.

Varca, P. E. (1999). Work stress and customer service delivery. *Journal of Services Marketing*, *13*, 229–239.

Varonen, U., & Mattila, M. (2000). The safety climate and its relationship to safety practices, safety of the work environment and occupational accidents in eight wood-processing companies. *Accident Analysis and Prevention*, *32*, 761–769.

Vredenburgh, A. G. (2002). Organizational safety: Which management practices are most effective in reducing employee injury rates. *Journal of Safety Research*, *33*, 259–276.

Weyman, A., Clarke, D. D., & Cox, T. (2003). Developing a factor model of coal miners' attributions on risk-taking at work. *Work and Stress*, *17*, 306–320.

Williamson, A. M., Feyer, A.-M., Cairns, D., & Biancotti, D. (1997). The development of a safety climate: The role of safety perceptions and attitudes. *Safety Science*, *25*, 15–27.

Zacharatos, A., Barling, J., & Iverson, R. D. (2005). High-performance work systems and occupational safety. *Journal of Applied Psychology*, *90*, 77–93.

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

Zohar, D. (2002). The effects of leadership dimensions, safety climate, and assigned priorities on minor injuries in work groups. *Journal of Organizational Behavior*, *23*, 75–92.

Zohar, D., & Luria, G. (2005). A multilevel model of safety climate: Cross-level relationships between organizational and group-level climates. *Journal of Applied Psychology*, *90*, 616–628.