THE EFFECTS OF SAFETY CLIMATE AND OCBs ON OPERATIONAL PERFORMANCE

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ABSTRACT

Safety climate has been studied across many industries to better understand safety performance of employees and to develop methods to reduce workplace accidents. However, the relationship between safety and operational performance is still not understood. Although the literature investigating the links between safety and productivity are minimal, evidence shows a positive relationship may exist. This study investigates the effects of safety climate on OCBs and operational performance of air transportation operations personnel. Results provide evidence that safety climate may enhance operational performance through the mediating effect of OCBs, thus contradicting earlier views that safety climate competes with operational performance.

Introduction

Safety climate has been studied extensively across many different industries to better understand safety performance of employees and to help develop methods to reduce workplace accidents. However, the relationship between safety and operational performance is still not fully understood. Researchers believe that safety climate, the perceptions employees have of the importance their organization places on safety, often competes with rules and procedures of other domains such as productivity and efficiency (Neal & Griffin, 2006; Zohar, 2010; Zohar & Luria, 2005); however, this idea has rarely been investigated. Although the literature investigating the links between safety and productivity are minimal, theoretical and empirical evidence does exist that shows a positive relationship may exist. For instance, OCBs have been shown to be influenced by work environmental factors such as safety (Somech & Drach-Zahavy, 2004). And in turn, OCBs have been shown to contribute to organizational success (Organ, 1988). Lee et al. (2007), through the lens of organizational support theory, linked safety climate to work attitudes whereas Michael et al. (2005) and Podsakoff et al. (2000) used organizational support theory to link OCBs to performance outcomes. While the aforementioned studies link safety climate to OCBs and OCBs to operational performance, no such studies exist that tie these three concepts together in one consolidated effort. The purpose of this research is to investigate the effects of safety climate on OCBs and operational performance of air transportation operations personnel.

Conceptual Background

Safety Climate and Organizational Citizenship Behaviors

Safety climate has been shown to be shaped by the safety policies, practices, and supported behaviors of the organization (Huang et al., 2013; Zohar, 2010). Safety climate exists at both the organization and group level, with organization-level safety climate being shaped by perceptions of enforced company policies and procedures, while group-level safety climate is shaped by perceptions of supervisory safety practices (Zohar, 2000; Zohar, 2003). Although safety climate is a robust predictor of safety behaviors, there is increasing evidence that safety climate may influence non-safety related behaviors as well. Recently safety climate has been found to be positively related to job satisfaction, organizational commitment, and intent to stay (Huang et al., 2015; Kath et al., 2010; Mearns et al., 2010; Nahrgang et al., 2011; Swartz et al., 2017).

Another type of behavior that safety climate may influence is called OCB. OCBs are discretionary, extra-role behaviors that promote the effective functioning of the organization (Organ, 1988). OCBs have been found to be multi-dimensional in nature, and include sub-dimensions such as helping behavior, sportsmanship, and civic virtue (Podsakoff, 2000). OCBs have been shown to contribute to organizational success by enhancing coworker and managerial productivity, freeing up resources, and by helping coordinate activities within and across work groups (Organ, 1988).

Organizational support theory offers insight into how safety climate may influence OCBs. Organizational support theory is an extension of social exchange theory and contends that employees use social exchanges to form opinions on how much the employer values their contributions and well-being (Michael et al., 2005). Michael et al. (2005) further state that these opinions are used to form an employee attitude called perceived organizational support (POS), which corresponds to how employees feel about their employer fairly compensating them, whether their employer helps them when in need, and whether or not they are provided good working conditions (Eisenberger et al., 1986). When an employee works in a high-risk environment where safety mishaps can have catastrophic effects on themselves or others, providing safe working conditions may take on even more importance when it comes to increasing POS. Thus, increases in perceived safety climate in high-risk industries may increase an employee's POS. Hence, the following relationship is hypothesized between organization-level safety climate and OCBs:

H1a. *Organization-level safety climate is positively related to organizational citizenship behaviors.*

In addition to employees forming opinions on how much the organization values their contributions, they also form opinions on how much their supervisors value their contributions and well-being (Rhoades & Eisenberger, 2002). Rhoades and Eisenberger (2002) go on to state that supervisors act as agents of the organization, and therefore employees use the actions of supervisors as indicators of organizational support. Therefore, the following relationship is hypothesized between group-level safety climate and OCBs:

H1b. *Group-level safety climate is positively related to organizational citizenship behaviors.*

Furthermore, safety policies and procedures are created by organizational leadership to help achieve strategic objectives. First line supervisors must interpret, implement, and execute these safety policies and procedures. Since these group-level supervisors are bounded by the organization-level safety policies and procedures, it is expected that organization-level safety climate will be positively related to group-level safety climate (Zohar & Luria, 2005), and that group-level safety climate will mediate the relationship between organization-level safety climate and organizational citizenship behaviors.

H1c. *Organization-level safety is positively related to group-level safety climate.*

H1d*. Group-level safety climate mediates the positive relationship between organization-level safety climate and organizational citizenship behaviors.*

Organizational Citizenship Behaviors and Operational Performance

Organizational support theory offers a valuable lens when understanding how OCBs and its dimensions of helping behavior, sportsmanship, and civic virtue may impact operational performance. Rhoades and Eisenberger (2002) explain that perceived organizational support should increase an employee's job performance and lead to extra-role activities such as helping other employees and offering suggestions for the organization to be more effective. These benefits coincide with Organ's (1988) explanation of OCBs contributing to organizational success by enhancing coworker and managerial productivity, freeing up resources, and helping coordinate activities within and across work groups.

Multiple studies empirically link OCBs to operational performance. Podsakoff et al. (1997) studied the effects of OCBs on the quantity and quality of the performance of 218 people in 40 work groups in the paper mill industry. They found that helping behavior and sportsmanship had significant effects on performance quantity and that helping behavior had a significant impact on performance quality. Additionally, Wang et al. (2005) surveyed supervisors and subordinates from multiple organizations in China to analyze the effects of transformational leadership, leader-member exchange, OCBs and task performance. They found that employee OCBs were positively related to supervisory ratings of employee task performance. Based on the above, the following hypothesis is proposed:

H2. *Organizational citizenship behaviors are positively related to perceptions of individual operational performance.*

Indirect Effects of Safety Climate on Operational Performance

OCBs may not be able to fully explain safety climate's relationship with operational performance. There may be other factors to consider when explaining the expected relationship between safety climate and operational performance such as safety disconnects, perceptions of management commitment to safety, and the presence of a joint management system for safety and production (Das et al., 2008; Michael et al., 2005; Pagell et al., 2014; Pagell et al., 2015). Therefore, the following hypotheses are proposed for the relationship between safety climate and perceptions of individual operational performance.

H3a. *Organizational citizenship behaviors will partially mediate the relationship between organization-level safety climate and perceptions of individual operational performance.*

H3b. *Organizational citizenship behaviors will partially mediate the relationship between group-level safety climate and perceptions of individual operational performance.*

Methodology

Data Collection

The study was conducted using survey data collected from air transportation specialists assigned to 22 United States Air Force (USAF) organizations. Each of the organization's commanders was contacted via telephone and email to gain approval for their personnel to participate in the research, and all commanders agreed to let their personnel participate. All 2,456 air transportation specialists assigned to the 22 USAF organizations were invited to participate in this survey on a voluntary and confidential basis. Completed surveys were received from 340 air transportation specialists for a response rate of 13.8%; however, 22 responses were deleted due to unengaged respondents. This resulted in a final sample of 318 responses (13% response rate).

Variables

The key constructs included in this research are organization-level safety climate (OSC), group-level safety climate (GSC), OCB, and self-reported operational performance. The OSC and GSC measurement scales were recently developed and validated by the primary researcher and are specific to the air transportation operations industry. OSC was measured by a four-factor, 15-item scale asking respondents to assess the extent to which they agree or disagree with statements concerning the OSC dimensions of management commitment to safety, safety policies and procedures, safety training, and vehicles and equipment. GSC was measured by a three-factor, 10-item scale asking respondents to assess the extent to which they agree or disagree with statements concerning the GSC dimensions of commitment and support, work pressure, and safety briefings. OCB was measured using a three-factor, 13-item scale developed by Podsakoff et al. (1997). This scale has been found reliable across a variety of industries with Cronbach α's ranging from .67 to .96 (Deckop et al., 2003; Podsakoff et al., 1997; Robinson & Morrison, 1995). Finally, self-reported operational performance was measured with a 7-item in-role performance scale developed by Williams and Anderson (1991) that has been found reliable across a variety of industries with Cronbach α's ranging from .72 to .93 (Deckop et al., 2003; Hui et al., 1999; Meyerson & Kline, 2008; Williams & Anderson, 1991). The operational performance scale asked respondents to assess the extent to which they agree or disagree with statements concerning how well they perform their assigned duties.

Analysis and Results

SPSS and AMOS 18.0, using the maximum likelihood estimation method, was used for the analysis. A two-step procedure was used to test the proposed model, as recommended by Anderson and Gerbing (1988). First, a confirmatory factor analysis (CFA) was conducted using the measurement model to assess construct and discriminant validity. Next, the structural model was used to test the proposed hypotheses

Measurement Model Results

To assess construct and discriminant validity, a CFA was performed using AMOS 18.0. The measurement model resulted in the following fit indices: χ^2 (1001.57, df = 642, p-value < .001); comparative fit index (CFI) (.95); incremental fit index (IFI) (.95); standardized root mean residual (SRMR) (.048); and root mean square error of approximation (RMSEA) (.042, 90% CI (.037, .047)). The fit indices indicate an adequate model fit with the exception of the χ^2 statistic (Hu & Bentler, 1999). Although a significant χ^2

statistic was obtained, the normed χ^2 statistic was 1.56 which fell well below the recommended maximum of 3.0 (Kline, 2011).

To test for convergent validity, factor loadings were assessed along with the average variance extracted (AVE) for each construct. All items loaded onto their corresponding constructs with $p < .001$, and all but three variables had factor loadings exceeding the recommended 0.6 threshold recommended by Hair et al. (2010). All constructs had AVEs above the 0.50 threshold. These results provide evidence of convergent validity (Hair et al., 2010). Discriminant validity was assessed by performing the Fornell and Larcker (1981) test. According to this test, discriminant validity is supported if the square root of a construct's AVE is greater than the correlations between that construct and other constructs used in the model. As shown in Table 1, all constructs passed this test, which provides evidence of discriminant validity. Internal consistency was examined using Cronbach's α. All constructs with the exception of civic virtue had alpha levels above the recommended level of 0.70 (Nunnally & Bernstein, 1994).

Table 1: Means, standard deviations, reliability, AVE, and correlations

Construct	Mean	SD	CA	AVE	OMC	OSP	OT	OVE	GMCS	GWP	GSB	OCBHB	OCBCV	OCBS	OP
OMC	5.77	1.14	0.81	0.60	**0.77**										
OSP	5.63	1.17	0.79	0.57	0.53†	**0.75**									
OT	5.29	1.28	0.92	0.64	0.48†	0.60†	**0.80**								
OVE	5.14	1.45	0.84	0.60	0.48†	0.48†	0.60†	**0.77**							
GMCS	6.04	0.90	0.88	0.60	0.40†	0.47†	0.59†	0.48†	**0.77**						
GWP	4.75	1.45	0.78	0.56	0.50†	0.31†	0.36†	0.30†	0.39†	**0.75**					
GSB	5.56	1.13	0.76	0.53	0.41†	0.44†	0.59†	0.39†	0.62†	0.29†	**0.73**				
OCBHB	6.20	0.64	0.85	0.55	0.34†	0.32†	0.39†	0.30†	0.44†	0.32†	0.41†	**0.74**			
OCBCV	5.87	0.91	0.65	0.54	0.27†	0.20†	0.30†	0.14*	0.26†	0.27†	0.35†	0.61†	**0.73**		
OCBS	4.89	1.20	0.76	0.61	0.20†	0.13*	0.24†	0.20†	0.21†	0.35†	0.10^{ns}	0.25†	0.11*	**0.78**	
OP	6.25	0.62	0.73	0.54	0.25†	0.23†	0.25†	0.22†	0.19†	0.20†	0.15**	0.40†	0.36†	0.17**	**0.73**

Notes: † $p < .001$; ** $p < .01$; * $p < .05$; Square root of AVE shown on diagonal

Structural Model Results

Next, all hypotheses were tested via structural equation modeling using the maximum likelihood method in Amos 18. Mediation hypotheses were evaluated using the bootstrap test of indirect effects as suggested by Zhao et al. (2010). This was accomplished using 5,000 re-samples with replacement using Shrout and Bolger's (2002) bias-corrected bootstrap method to determine the product of the mediation pathway with a 95% confidence interval. The structural model provided acceptable fit (χ^2 = 1158.319; df = 682; normed χ^2 = 1.70; $p < .001$; CFI = 0.93; IFI = 0.93; SRMR = .061; RMSEA = .047 with a 90% CI of (0.42, 0.52)) and was deemed acceptable for hypothesis testing. Both direct and mediated effects were predicted and tested between exogenous and endogenous variables. Results are presented in Table 2 and Figure 1.

Table 2: Structural Equation Model Results

Structural path	Hypothesis	Effect	SE	t-value	*p*-value	LCL	UCL	Supported
OSC → OCB	H1a	-0.035	0.14	-0.3	0.77	---	---	No
GSC → OCB	H1b	0.453	0.14	3.18	0.001	---	---	Yes
OSC → GSC	H1c	0.761	0.08	9.48	0.001	---	---	Yes
OSC → GSC → OCB	H1d	0.345	0.241	---	0.02	0.105	0.779	Yes
OCB → OP	H2	0.386	0.07	5.76	0.001	---	---	Yes
OSC → OCB → OP	H3a	-0.019	0.186	---	0.859	-0.268	0.116	No
GSC → OCB → OP	H3b	0.175	0.225	---	0.017	0.052	0.486	Yes

Note: *Bootstrap upper and lower confidence intervals for the indirect effects

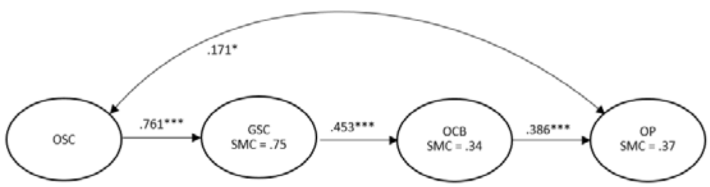

Figure 1. Final SEM model based on significant direct paths
*** $p < .001$; $p < .05$; SMC = squared multiple correlation

Discussion

Typically, safety climate is studied solely in the realm of safety and safety outcomes. However, the purpose of this research was to expand the safety climate research horizons and investigate its effects on organizational citizenship behaviors and operational performance of air transportation operations personnel. Although researchers believe safety climate may compete with productivity and efficiency (Neal & Griffin, 2006; Zohar, 2010; Zohar & Luria, 2005), results of this study provide evidence that safety climate may be able to enhance operational performance of air transportation operations personnel. Organization-level safety climate was found to positively influence group-level safety climate, which in turn, positively influenced organizational citizenship behaviors. As expected, organizational citizenship behaviors positively influenced self-reported operational performance. And although no direct link was found between group-level safety climate and operational performance, a significant and positive indirect link was found between group safety climate and operational performance, which was mediated by organizational citizenship behaviors. Results of this study show how organizational support theory can be used to explain the relationship between safety climate, organizational citizenship behaviors, and operational performance. Additionally, this research helps leaders and first-line supervisors understand how their actions with regard to creating a climate of safety can enhance employee operational performance. In conclusion, these promising results may help debunk the often-viewed idea that safety climate is in competition with productivity and provide the impetus for more research in this area.

References

References available upon request from Matthew Roberts at matthew.roberts@afit.edu.