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Work-safety tension, perceived risk, and worker injuries: A meso-mediational model

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ABSTRACT

Introduction: Work-safety tension arises when workers perceive that working safely is at odds with effectively doing their jobs. We proposed that workers' perceptions of work-safety tension would be associated with higher levels of perceived risk, which would, in turn, relate to worker injuries on the job. *Method:* Grocery store workers ($n = 600$) completed an online survey and organizational worker injury reports were obtained for a two-year period following the survey. Survey results were linked to subsequent worker injuries using hierarchical generalized linear modeling. *Results:* We found support for the proposed meso-mediation model: department work-safety tension predicted subsequent worker injuries, partially through an association with workers' risk perceptions. *Conclusions:* Safety researchers and consultants and organizational leaders should look beyond typically-examined safety climate constructs, such as management commitment to safety, and pay particular attention to workers' perceptions of work-safety tension.

1. Introduction

Workplace safety has many stakeholders—it is important to workers, organizational leaders, and policy makers. Worker injuries are costly to organizations and can be devastating to workers and their families. Workplace safety research suggests that worker accidents and injuries are generally not traceable to a single factor; instead multiple, interrelated factors (including those related to the physical and psychosocial working environment, aspects of the job, and individual differences) affect worker safety. The current study examines two interrelated factors, (a) work-safety tension (or an incompatibility of work and safety) and (b) risk perceptions, as they relate to workers' on-the-job injuries.

Researchers have been studying occupational safety since the 1930's. Yet at least two clear trends have emerged in safety research in the past 20 years. First, there is a greater emphasis on psychosocial factors that impact safety: for instance social exchange (Hofmann & Morgeson, 1999), communication (Hofmann & Stetzer, 1998), and safety climate (e.g., Zohar, 1980). Second, a proliferation of statistical methods to model multilevel organizational data has spurred an integration of contextual (organization and group-level) safety factors such as safety climate with individual-level safety factors such as employee knowledge, skill, cognition, and motivation to help understand worker safety (e.g., Hofmann, Morgeson, & Gerras, 2003; Hofmann & Stetzer, 1996; Neal & Griffin, 2006; Neal, Griffin, & Hart, 2000; Zohar & Luria, 2005). Examining multiple, interrelated factors simultaneously has contributed much to our understanding of worker safety in recent years.

1.1. Safety Climate

Research has demonstrated that safety climate relates to workers' safety behaviors and accidents/injuries (Christian, Bradley, Wallace, & Burke, 2009; Clarke, 2006). Safety climate refers to workers' perceptions of the priority or value of safety at work in light of competing behaviors and demands. Safety climate includes, but also goes beyond, formal safety rules and procedures — which may not be supported by management, other workers, or even the nature of the job itself.

Safety climate is a complex construct. It may be thought of as an individual's perception of how safety is prioritized at work (i.e., psychological climate; cf. James & James, 1989); it may also be conceptualized in terms of shared perceptions (i.e., group climate; cf. James, James, & Ashe, 1990). Additionally, safety climate has different facets or dimensions (i.e., management safety climate, coworker safety climate). Researchers disagree on the number and nature of safety climate dimensions. In a review of the safety climate literature, Flin, Mearns, O'Connor, and Bryden (2000) found 100 different dimensions of safety climate in 18 safety climate scales; the most common themes were management/supervision, safety system, risk, work pressure, and competence. In a recent meta-analysis of person and situation-based predictors of safety behaviors and injuries, Christian et al. (2009) examine seven safety climate dimensions adapted from Neal and Griffin (2004), including management commitment, human resource management practices, safety systems, supervisor support, internal group processes, risk, and work pressure. Yet, these seven dimensions have not been tested as adequately representing the

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construct of safety climate. Little consensus has been reached in the 10 years following Flin et al.'s (2000) study; indeed the number and nature of safety climate dimensions will be subject to ongoing debate.

1.2. Work-Safety Tension

In the current study, we focus on work-safety tension, or workers' perceptions that working safely is at odds with performing their day-to-day job duties and processes. High levels of work-safety tension do not lend to injury prevention in a practical sense; when workers feel they must compromise safety in order to effectively do their jobs, injuries may be more likely. Despite this construct's intuitive appeal and some research supporting its importance (e.g., McLain & Jarrell, 2007), it is not often studied. Researchers tend to focus most often on management's commitment to safety[1]. Work-safety tension may be considered conceptually similar to the previously-studied safety climate facets of "job safety" (Hayes, Perander, Smecko, & Trask, 1998), "safety-production compatibility" (McLain & Jarrell, 2007), "perceived effects of required work pace on safety" (Zohar, 1980), and "workers' involvement in safety" (Dedobbeleer & Béland, 1991).

Studies of concepts similar to work-safety tension that do exist underscore its importance to safety (e.g., Brown & Holmes, 1986; Dedobbeleer & Béland, 1991). More recently, McLain and Jarrell (2007) found that perceived compatibility of safety and production demands positively influenced safe behavior in a sample of workers in various hazardous occupations. Additionally, a recent study of the relative importance of three safety climate facets (management safety, coworker safety, and work-safety tension) found that, of the three facets, work-safety tension was the most strongly related to unsafe behaviors in a railroad worker sample (Morrow et al., 2010). The current study expands on this previous work by moving beyond safety behaviors and examining a relationship between work-safety tension and actual worker injuries.

Our first hypothesis proposes that work-safety tension will impact worker injuries. We expect to see a strong positive relationship between work-safety tension perceptions and worker injuries.

Hypothesis 1. *Work-safety tension will positively impact worker injuries.*

1.3. Perceived Risk

Perceived risk refers to workers' perceptions of the work environment as risky or dangerous. At first glance, workers' perceptions of risk may appear to be unavoidable or inherent in some work environments (e.g., nuclear power plants, coal mines). Yet, risk may be managed by organizational leaders through, for instance, giving workers appropriate equipment, upholding effective safety regulations, and promoting a positive safety climate. In these cases, workers may still feel relatively safe.

If workers are unable to adhere to safety regulations or work as safely as desired, as indicated by high levels of work-safety tension, it may follow that they will also feel that the working environment is more risky or hazardous. A few studies have found support for this link: Huang, Chen, DeArmond, Cigularov, and Chen (2007) found a relationship between safety climate and risk perceptions for night shift workers in six different industries, and Seo (2005) found that safety climate was associated with perceived threat of injury in a sample of U.S. grain industry workers. In line with these results, we expect to see a positive relationship between work-safety tension and perceived risk.

Hypothesis 2. *Work-safety tension will be positively related to perceived risk.*

[1] A search of the academic database Scopus revealed 268 articles published with keywords "safety climate" and "management;" 25 with keywords "safety climate" and "production;" 13 with keywords "safety climate" and "job demands;" 2 with keywords "safety climate" and "pace."

Perceived risk has been found to relate to job satisfaction, stress-related symptoms, and distraction from work tasks (McLain, 1995). Yet, no studies to date have linked perceived risk to incidence of workplace injuries. We propose that risk perceptions will be positively associated with worker injuries.

Hypothesis 3. *Perceived risk will be positively related to worker injuries.*

1.4. Conceptualization of Levels

We now turn our discussion to the "levels" at which our variables are conceptualized. As mentioned, climate may be conceptualized and measured at either an individual level (psychological climate) or at a group level (shared perceptions). Workers in our organizational sample are organized in departments, which exist within stores. Workers within departments in the same store share managers, overlap in their job duties, and share the same physical environment. Therefore, we conceptualized work-safety tension at the department level (i.e., shared perceptions of work-safety tension within departments within stores).

To the contrary, risk perceptions are likely more individual. As McLain (1995) and Mueller, DaSilva, Townsend, and Tetrick (1999) assert, risk perceptions are multifaceted, individually subjective, and potentially influenced by such diverse factors as hazard exposure and work experience. The workers in our sample bring a diversity of previous experiences and individual differences that may influence their perceptions of risk. Therefore, we examined individual-level risk perceptions.

Overall, a cross-level mediation or "meso-mediation[2]" model is proposed in which shared perceptions of work-safety tension relate both directly to worker injuries, and indirectly to worker injuries through an association with individuals' risk perceptions. See Fig. 1 for an illustration of the proposed mediation model.

Hypothesis 4. *Department-level work-safety tension will relate indirectly to individual worker injuries through an association with individual workers' risk perceptions.*

2. Method

2.1. Participants and Procedure

This study was carried out in a U.S. grocery store chain. Non-supervisory employees ($N = 1{,}995$) were invited to participate in a confidential online survey regarding workplace safety. Of the 1,995 employees invited to complete the survey, 1,069 participated, resulting in an initial response rate of 54%. After eliminating responses from individuals who were ineligible to complete the survey due to management status or who had excessive missing data, and deleting individuals within groups with less than three respondents per group for multilevel analysis, 600 respondents from 104 departments within stores were included. Most of these respondents (67%) were female and were of part-time employment status (85%). The average age of respondents was 37 and the average number of hours respondents reported working per week was 27 hours.

2.2. Measures

2.2.1. Number of Injuries Post-Survey

We defined "injury" as any reported workplace incident that involved physical harm to an employee. Organizational records of every documented work-related employee injury were obtained for a two-year time period following the survey administration. The number of survey respondents with any number of recorded injuries

[2] See House, Rousseau, and Thomas-Hunt (1995) and Mathieu and Taylor (2007).