



A mediation model linking dispatcher leadership and work ownership with safety climate as predictors of truck driver safety performance



Dov Zohar^{a,b,*}, Yueng-hsiang Huang^a, Jin Lee^{a,c}, Michelle Robertson^a

^a Liberty Mutual Research Institute for Safety, Hopkinton, MA, USA

^b Technion – Israel Institute of Technology, Haifa, Israel

^c University of Connecticut, Storrs, CT, USA

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ABSTRACT

The study was designed to test the effect of safety climate on safety behavior among lone employees whose work environment promotes individual rather than consensual or shared climate perceptions. The paper presents a mediation path model linking psychological (individual-level) safety climate antecedents and consequences as predictors of driving safety of long-haul truck drivers. Climate antecedents included dispatcher (distant) leadership and driver work ownership, two contextual attributes of lone work, whereas its proximal consequence included driving safety. Using a prospective design, safety outcomes, consisting of hard-braking frequency (i.e. traffic near-miss events) were collected six months after survey completion, using GPS-based truck deceleration data. Results supported the hypothesized model, indicating that distant leadership style and work ownership promote psychological safety climate perceptions, with subsequent prediction of hard-braking events mediated by driving safety. Theoretical and practical implications for studying safety climate among lone workers in general and professional drivers in particular are discussed.

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1. Introduction

Safety climate research has offered consistent empirical support for its effect on diverse safety performance outcomes, ranging from self-reported to externally-observed safety behavior to objective injury data collected months or even years after climate measurement. This evidence was recently subjected to several meta-analytic studies, covering some two hundred published studies (Beus et al., 2010; Christian et al., 2009; Clarke, 2010; Nahrgang et al., 2011). Reported effect sizes for the climate-accidents/injuries relationship qualify safety climate and its proximal consequence, safety behavior, as the strongest predictors of organizational safety performance. For example, the largest meta-analytic study, covering 203 independent studies, estimated that safety climate accounts for 15.5% of accident/injury variance and 49.8% of unsafe behavior variance (Nahrgang et al., 2011). By comparison, whereas the mean corrected correlation between physical risks/hazards and accidents/injuries in that meta-analysis was estimated at 0.13, the corrected correlation between safety climate and accidents/injuries was nearly double, estimated at 0.24.

An examination of the studies included in these meta-analyses reveals that most studies were conducted in the manufacturing, construction and health-care industries. A common characteristic of companies in these industries is that their employees work in physical proximity, allowing frequent opportunities for experiencing and observing the effect of formal and informal policies and practices in addition to having daily opportunities for social interaction with co-workers, supervisors and higher-level leaders. As will be noted below, social interaction and personally experienced policies are known climate antecedents. By default, little is known about climate emergence in companies whose employees are geographically dispersed, spending their workdays away from home base. Given that lone working is becoming increasingly prevalent and that geographic dispersion is likely to restrict opportunities for social interaction and policy-related experiences, the purpose of this study is to test a conceptually adjusted model for safety climate and safety performance among lone workers, using long-haul truck drivers as exemplar.

One reason for choosing truck drivers relates to their exposure to high levels of physical risk, leading to elevated likelihood of road accidents. The U.S. Bureau of Labor Statistics' Census of Fatal Occupational Injuries (BLS, 2012) reported 396 fatalities in truck transportation in 2010 with a rate of 31.8 per 100,000 workers. This rate is ten times higher than the overall rate of 3.6 per 100,000 in-house workers, accounting for nearly 8.7% of all work-related fatalities in the U.S. The statistics of non-fatal injuries for truck

* Corresponding author at: Technion – Israel Institute of Technology, Haifa, Israel, Tel.: +972 4 829 4440; fax: +972 4 829 5688.

E-mail address: dzohar@tx.technion.ac.il (D. Zohar).

drivers is similarly alarming, making this industry highly appropriate for studying safety climate emergence and its consequences among lone employees.

Despite the extensive evidence concerning predictive validity of safety climate and the need for improving traffic safety, there have been only a limited number of published studies addressing this issue among professional drivers. An examination of the available studies reveals, first, that they used (slightly modified) generic safety climate scales, designed largely for in-house employees and, second, that driving safety outcomes were measured mostly with self-reports collected concurrently with the climate surveys, resulting in weak research design.

The most recent study, offering an exception to the above qualifications, tested a model in which safety climate mediated the relationship between two generic climate dimensions (i.e. organizational-employee support and leader-employee relations) and road accident data collected after the climate survey (Wallace et al., 2006). The study was conducted with short-haul truck drivers whose work allows daily contact with both supervisor and co-workers located at the same local distribution or delivery center. Safety climate, measured with a scale developed for in-house employees (Zohar, 2000), mediated the effect of the generic climate dimensions on post-survey road accidents.

An earlier study used available data collected for a project focusing on truck delivery scheduling practices (Arboleda et al., 2003; Morrow and Crum, 2004). The authors used a new 4-item safety climate scale developed for this study, offering no psychometric data. Climate data were obtained from three drivers and dispatchers in each participating company, selected by its fleet safety manager. Climate scores were related to current self-reported fatigue, but not self-reported near-misses or accidents during the previous two years. These scores were also related to reported company policies and practices involving driver safety training, autonomy and participation.

A set of studies was conducted in Australia, using in-house government employees whose work includes occasional driving activities. One study, by Wills et al. (2005, 2006, 2009) used a generic safety climate scale, adding a number of items related to driving. Using self-reported driving behavior as outcome criterion, the climate factors of safety rules, safety communication and management commitment were related to self-reported distraction and traffic violations. Another study, using the same scale and a similar sample, reported a relationship between safety climate and self-reported fatigue and near misses experienced during the previous six months (Strahan et al., 2008). A third study used three items taken from a generic safety climate scale after being reworded to suit the driving context (Newman et al., 2008). Safety climate was related to self-reported safety motivation (i.e. investment of effort for driving safely), which was negatively related, in turn, to self-reported accidents in the previous six months. Given the scarcity of safety climate research in transportation, let alone its adjustment to the context of lone work, the current study was designed to test a conceptual model taking into account both lone working in general and truck driving in particular.

1.1. Conceptualization of climate in the context of lone working

Currently, most climate scholars consider climate an emergent, group-level construct representing socially shared climate perceptions among members of organic work units. Organizational climate scores are, therefore, derived by aggregation of individual climate perceptions of group members, turning workgroups into the unit of analysis. At the same time, level of analysis issues pervaded climate research, starting with three essays distinguishing between individual- and unit-level climates, labeled as psychological and organizational climates (Glick, 1985; Hellriegel and Slocum,

1974; James and Jones, 1974). Subsequent literature reviews and meta-analytic studies concerning this distinction include those published by Carr et al. (2003), James et al. (2008) and Parker et al. (2003).

Decisions for aggregation of individual climate perceptions are typically made on the basis of two criteria: (a) theoretical justification for considering climate a group-level construct; and (b) statistical justification based on homogeneity or agreement statistics justifying aggregation of individual climate perceptions (Bliese, 2000; James et al., 1984; Kozlowski and Hattrup, 1992; Kozlowski and Klein, 2000). When these criteria are not met, climate ought to be operationalized at the individual level of analysis and labeled as psychological climate (see relevant literature reviews and meta-analytic studies by Carr et al., 2003; Clarke, 2010; Glick, 1985; Hellriegel and Slocum, 1974; James and Jones, 1974; James et al., 2008; Parker et al., 2003). Our contention is that this is the case for lone workers due to the fact that, by definition, they work on their own rather than being members of work teams or any other social collective. Practically speaking, although psychological and organizational climates include the same set of perception items, each referring to organization- and group-level safety practices as subscales, item aggregation determines whether the resultant climate score is considered an individual- or group-level variable, affecting the choice of requisite statistical models.

The argument that organizational climate is a theoretically meaningful construct only in the context of membership in natural (formal or informal) groups is based on a long-held proposition concerning climate etiology or emergence. This proposition states that similarity in climate perceptions emerges from symbolic social interaction among group members (Schneider and Reichers, 1983). Symbolic interaction or sense-making involves comparing bits of information and cues, discussing possible interpretations, and attempting to reach consensual interpretation of the meaning of events and practices at the workplace. As a result of such a process, over time, employee perceptions tend to converge, resulting in shared climate perceptions (Ashforth, 1985; Brown, 2000; Schneider and Reichers, 1983; Stryker, 2008; Weick, 1995, 2005).

Given symbolic social interaction as a proximal antecedent of organizational climate, an examination of the contextual attributes of lone working suggests they diminish or severely limit opportunities for such interaction. Lone working often entails performing the work at geographically remote locations coupled with high autonomy and job control (Bailey and Kurland, 2002; Gajendran and Harrison, 2007; Pinsonneault and Boisvert, 2001). Such attributes result in increasing job independence and, consequently, declining inter-dependence with other remote co-workers. Given that teams are defined by inter-dependence among individuals working toward a common goal (Kozlowski and Ilgen, 2006), this implies that, despite availability of electronic means for communication, many lone workers are literally working on their own. By default, therefore, they do not engage in social symbolic interaction.

Considering long-haul truck drivers as exemplar, drivers whose work is coordinated by the same dispatcher have little, if any, idea who their co-workers are, having had few opportunities for interacting with them. Given absence of symbolic interaction, the primary mechanism for emergence of shared climate perceptions, there is no theoretical justification for supposing within-group homogeneity or consensus in climate perceptions. Running alongside these arguments is the case of collective climate (Joyce and Slocum, 1984), a construct referring to the aggregation of individual climate perceptions based exclusively on its statistically demonstrated agreement, disregarding membership in natural groups such as work teams. Although this collective approach meets the second criterion (statistical justification) listed above, it fails to meet the first one (theoretical justification), leading critics to argue that “collective climates are meaningless unless climate

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