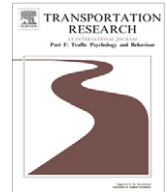




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Development and validation of safety climate scales for lone workers using truck drivers as exemplar

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ABSTRACT

The purpose of this study was to develop and test the reliability and validity of a new scale designed for measuring safety climate among lone workers, using truck drivers as exemplar. The new scale employs perceived safety priority as the metric of safety climate and a multilevel framework, separating the measurement of organization- and group-level safety climate. The second purpose of this study was to compare the predictive power of generic items with trucking industry-specific ones. Three dimensions for each of the two levels of safety climate were drawn from the results. The organization-level safety climate dimensions were proactive practices, driver safety priority, and supervisory care promotion. The group-level safety climate dimensions were safety promotion, delivery limits, and cell phone disapproval. Predictive validity of both generic and industry-specific items was supported, but the industry-specific items provided a stronger predictive value. Results showed that the scale is a reliable and valid instrument to measure the essential elements of safety climate for truck drivers in the lone working situation.

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1. Introduction

1.1. Safety climate

Safety climate refers to workers' shared perception of their organization's policies, procedures, and practices as they relate to the value and importance of safety within the organization (Griffin & Neal, 2000; Zohar, 1980, 2000, 2011, *in press*). Characterized by shared perceptions of employees, safety climate can be seen as an organization's temporal "state of safety" at a discrete point in time (Cheyne, Cox, Oliver, & Tomas, 1998). Safety climate is often confused with safety culture and, while they are similar concepts, they are distinguished in the literature. Safety culture has been described as shared values and beliefs that interact with an organization's structures and control systems to produce behavioral norms (Reason, 1998; Thompson et al., 1996; Utall, 1983). As just stated, safety climate refers to the workers' shared perceptions of the organization's policies, procedures, and practices as they relate to the value and importance of safety within the organization. In short, safety climate is the measurable aspect of safety culture. The practical and theoretical significance of safety climate as a construct stems from its ability to predict safety behavior and safety-related outcomes (e.g., accidents and injuries).

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in a wide variety of settings, as evidenced by diverse samples, in both Western and Eastern cultures (e.g., Cooper & Phillips, 2004; Dedobbeleer & Beland, 1991; Griffin & Neal, 2000; Hofmann & Stetzer, 1996; Mearns, Whitaker, & Flin, 2003; Niskanen, 1994; Oliver, Cheyne, Tomas, & Cox, 2002; Siu, Phillips, & Leung, 2004; Zohar, 1980, 2000). The results of several recent meta-analysis studies covering up to 202 published studies (Beus, Payne, Bergman, & Arthur, 2010; Christian, Bradley, Wallace, & Burke, 2009; Nahrgang, Morgeson, & Hofmann, 2011) indicate that safety climate is among the strongest predictors of safety behaviors and injury data in both workgroups and entire companies.

1.2. The need for studying safety climate for lone workers using truck drivers as exemplar

1.2.1. Lone workers

A lone worker is an employee who works alone and who performs an activity that is intended to be carried out in isolation from other workers, without close or direct supervision (BSIA, 2010, Hughes & Ferrett, 2009). There is no single definition that encompasses those who may face lone working situations. The National Health Service in the United Kingdom (NHS, 2005) defines lone working as: “any situation or location in which someone works without a colleague nearby; or when someone is working out of sight or earshot of another colleague.” The term “lone worker” can describe a wide variety of staff who work, either regularly or occasionally, on their own, without access to immediate support from work colleagues, managers, or others (e.g., telecommuters, truck drivers, travelling salesmen, health visitors; NHS, 2005).

While the number of studies on safety climate has increased dramatically in recent years (Huang, Chen, & Grosch, 2010), most have focused on traditional work environments, in which supervisors and workers interact under the same roof throughout the day. Little research has been done to examine how a company’s safety climate influences lone workers. Given that lone working is becoming more and more prevalent across a variety of industries (e.g., truck drivers, utility workers, teleworkers), it is important to conceptualize the effect of this work environment on organizational climate emergence.

1.2.2. High accident rate in trucking industry

The truck accident/crash rate is high. The 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 accounts for nearly 8.7% of all work-related fatalities and occurs at an incidence rate much higher than the 3.6 per 100,000 workers seen for all industries. The non-fatal injury rate in 2010 was 5.3 per 100 full-time workers for truck transportation, compared to a rate of 2.9 for all private industries (BLS, 2012). The workers in the transportation industry in the US experience some of the highest numbers and rates of fatal and non-fatal injuries. Moreover, the accidents or crashes not only involve trucks but also passenger or other commercial vehicles. The National Highway Traffic Safety Administration (NHTSA) of the United States Department of Transportation reported a total of 3380 fatalities and 74,000 injuries involving large trucks in 2009 (NHTSA, 2010). This study conducted research with lone workers using truck drivers as exemplar.

1.2.3. Safety climate issues in trucking industry

Individual workers and their supervisors must make daily decisions about safety at work because it influences or competes with other performance facets of the job. These can be related to the task itself (e.g., safety vs. on-time delivery or productivity), or to the worker performing the task (e.g., safety vs. personal discomfort or extra effort). This situation is especially evident in industries like transportation/trucking in which employees spend much of their time away from home base. Truck drivers, who drive alone for long periods on the road, often face competing demands on safe driving, such as on-time demands vs. taking time to address fatigue, challenging weather conditions, hours of service regulations, proper vehicle maintenance, and speed limits and other traffic rules. This type of worker rarely has contact with other company drivers and often lacks direct supervisory interaction, other than through electronic technology. This would seem to make shared perspectives on company safety climate difficult to achieve and its existence worth studying.

From the safety climate literature, research shows that individuals are able to form relatively homogenous perceptions from the vast array of stimuli present in the work environment. Schneider and Reichers (1983) described three approaches in terms of the etiology of climates (*structural approach*, *attraction–selection–attrition approach*, and *symbolic interactionist approach*), which could find application in the lone-worker situation.

The structural approach to the etiology of climates (Payne & Pugh, 1976) focuses on objective aspects of the work context affecting workers’ attitudes, values, and perceptions of safety. Examples of objective aspects related to safety include a company’s training programs, the power/authority of safety managers, types of technology (in-vehicle computers, equipment, and maintenance) used, and the degree to which safety rules and policies constrain individual behavior. Considering this approach, the work context may influence individuals’ safety climate perceptions. In a lone-worker situation, truck drivers in this case may form their safety climate perception based on objective aspects of the company (e.g., whether good safety training is provided, how well the truck is maintained).

From the perspective of the “attraction–selection–attrition” approach (Schneider, 1987), workers are similar to each other and therefore share similar perceptions and interpretations regarding safety (Schneider, 1975). Members of one organization are relatively homogeneous as a result of organizational processes (e.g., selection into the organization) and individual processes (e.g., attraction to and attrition from the organization). Although workers may not be involved in the selection process (i.e., how trucking companies recruit drivers), it is expected that when a company really cares about and promotes safety, it will attract and retain workers who really care about safety and who will follow safety rules. Lone workers who care about

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