The impact of human performance focused safety and health management practices on injury and illness rates: Do size and industry matter?

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A R T I C L E   I N F O

A B S T R A C T

To date, research on the nature of human performance focused safety and health (S&H) management practices and their impact on occupational injuries and illnesses has been sparse within the safety literature. We addressed this research gap through a large-scale empirical study that explored the impact of S&H management practices on establishment level injuries and illnesses. Based on a sample of 364 establishments, we found that each of the individual practices identified, as well as the unitary system of S&H management practices, significantly predicted objective establishment-level safety performance. We also found that the effect of these practices on accident rates was stable across major industrial sector types but varied with establishment size.

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1. Introduction

Management and organizational factors which influence workers' attitudes, perceptions, decision-making, and behavior are often the source of failures in complex systems and processes. Human actions and errors can lead directly to incidents and system failures resulting in significant organizational, social, and environmental loss (Leigh et al., 2000; Petersen, 1996; Reason, 1990). A specialized set of safety and health (S&H) management practices focusing on human performance (which we title "human performance focused S&H management practices") are tools that organizations can use to increase the probability that workers will make safe choices within their work systems and processes and, in turn, decrease the probability of incidents that can lead to loss (Makin and Winder, 2008). Thus, there is a conceptual link between these specific types of S&H management practices and various forms of organizational safety performance. Therefore, the study of these practices and their impact on safety performance is an increasingly important topic in organizations.

Although empirical research on human performance focused S&H management practices can be found in the literature, an articulated theoretical definition and an accepted understanding of their effect on occupational injuries and illnesses is missing. For example, in a meta-analysis Smallman (2001) found that the effect of S&H management practices on safety performance was "indeterminate." This conclusion may stem from a lack of theoretical and generalizable empirical work exploring the nature and effect of human performance focused S&H management practices across various organizational contexts. Specifically, many existing studies which empirically examine the effect of these practices on relevant organizational outcomes do so within a single establishment or one industry (e.g. Arboleda et al., 2003; Vassie and Lucas, 2001; Vredenburgh, 2002).

In the current study, our main purpose was to provide a theoretical representation of human performance focused S&H management practices and, in turn, test their effect on injury and illness rates across establishments of various sizes and distinct industries. We start by defining and discussing the theoretical foundation of human performance focused S&H management practices. In order to develop an argument for the value of human performance focused S&H management practices, we relied heavily on strategic human management literature and explored the potential parallels between these two areas. Next, we discuss the development of a human performance focused S&H management practice measurement device. This measurement device was subsequently used in a large-scale empirical study designed to test the effect of each of the practices (as well as the unitary system of practices) on injury and illness rates. In the large-scale study we approached both establishment size and industry as moderators and not as control variables. Because there is insufficient empirical support to draw conclusive hypotheses regarding the

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effects of these potential moderator variables, their inclusion was for the purpose of exploration.

2. Theoretical background

A comprehensive S&H management system is comprised of purposefully distinct but complimentary S&H management practices categorized into overarching elements (International Labor Organization ILO, 2001). A specialized subset of practices are designed to influence human perception, attitudes, motivation, decision-making, and behavior (Makin and Winder, 2008; Vredenburgh, 2002). Makin and Winder (2008) conceptualized these practices as a subset of the comprehensive S&H management system which influence the *people* part of the organizational risk. In this way human performance focused S&H management practices share theoretical similarities with the broader strategic human resource management practice literature. Insight can be gained into how these safety-specific management practices work as well as research techniques that can be used to study their effectiveness from this broader management literature base.

Within the management literature, strategic human resource practices have been identified as key drivers of sustainable organizational performance (e.g. Guthrie, 2001; Huselid, 1995; Way, 2002) including safety performance (Parker et al., 2001; Zacharatos et al., 2005). One of the novel premises in this literature is that the system of interrelated, complimentary, and mutually reinforcing practices is a source of competitive advantage for organizations. The practices work interactively by maximizing human performance through the primary mechanisms of increased employee knowledge, skills, ability, motivation, and enhanced social relationships (Evans and Davis, 2005).

Within the S&H management practice literature, however, there has been difficulty reaching a consensus on which practices meet these criteria. Arboleda et al. (2003) studied S&H management practices as antecedents of safety culture in a transportation environment and determined that training, worker autonomy, employee involvement, and management commitment are important practices. Vassie and Lucas (2001) found that communication, measurement of safety metrics, employee participation and empowerment, and risk assessment are important practices. Vredenburgh (2002) empirically explored rewards and incentives, training, hiring, communication, employee participation, and management commitment within a healthcare setting. McDonald et al. (2000) assessed the relationship between S&H management practices such as training, audits, incident investigation, feedback, task procedures and communication worker safety responses in a sample of aircraft maintenance workers. Finally, Makin and Winder (2008) provided a list of fourteen distinct S&H management practices designed to equip individuals with health and safety knowledge, skills, abilities, and motivation in an occupational setting.

Although there is overlap and similarity among the practices identified in these studies, two things are apparent: (1) multiple distinct "practices" have been identified as important, and (2) the concept of human performance focused S&H management practices has been seen to encompass elements of both administration and leadership. Consistent with the conceptualization provided by Mearns et al. (2003), we conceptualize human performance focused S&H management practices to represent primarily administrative functions of the overarching safety and health management system. Although there is no question that leadership matters in terms of safety management and accident prevention through human performance (Zohar, 2002a; Zohar, 2002b; Barling et al., 2002; Hofmann and Morgeson, 1999), it represents an organizational phenomena that is difficult to disembody from the perceptions of workers who are subject to a leader (Kouzes and Posner, 2002). A focus on the administrative portion of safety and health management (i.e. the administrative practices) represents what we believe to be a pragmatic approach that is practitioner-focused, more understandable, and more efficiently managed or controlled.

Thus, human performance focused S&H management practices consist of programs, processes, policies, and procedures for which there is a formal function overseeing their development, implementation, and ongoing administration. They are usually, but do not have to be, codified in written documents specifying functions, roles, responsibilities, and authorities (Mearns et al., 2003). Also consistent with previous research, these practices represent global data points (Kozlowski and Klein, 2000) and act by creating a context in which employees carry out their work-related tasks. In that way, human performance focused S&H management practices do not represent a form of emergent context comprised through employees' perceptual processes, such as safety climate or culture (e.g. Guldenmund, 2010; Mearns et al., 2003).

We identified a list of human performance focused S&H management practices based on the review of the literature highlighted above and results from a qualitative study with content experts. Using a list of practices compiled by Makin and Winder (2008) as a starting point, we conducted interviews and focus groups with six content experts. Participants (i.e., content experts) consisted of safety practitioners and managers, a human performance consultant, and corporate strategic representatives from the manufacturing, construction, nuclear research and production and mining industries. Representatives across a variety of industries were chosen to enable the development of a generalized list of practices.

First, focus groups occurred with content experts. The goals of these discussions were to identify the most effective and generally used human performance focused S&H management practices, develop an operational definition for each practice, and determine which items could best internally configure (characterize) each practice. To that end we assembled and distributed a list of practices and proposed operational definitions. The participants (i.e., content experts) were asked to critically consider the operational definitions, the importance of each practice in terms of its human performance contribution to a comprehensive S&H management system, and offer guidance about the most efficient internal configuration/characterization of each practice. All comments provided by participants were noted and incorporated into a condensed list of practices, revised operational definitions, and a list of the practice attributes (i.e., the measurement items) for each practice that would become part of the human performance focused S&H management practice survey. A draft survey (which consisted of the condensed list of important practices, their corresponding operational definitions, and the items that reflected their optimum internal configuration) was then generated and reissued to the same participants. Each participant offered additional comments in regard to the wording of each item. These comments were incorporated into the final version of the survey which was used for the current study.

This iterative process revealed the following practices as being potentially important for improving human safety performance: pre- and post-task safety reviews, safe work procedures, hiring for safety and health, cooperation facilitation, employee involvement in implementing specific safety and health related processes, safety and health training, communication and information sharing, accident investigation, detection and monitoring of performance deviation, and safe task assignment. We recognize that this list is not comprehensive and that additional practices may be used. We also recognize that some of these practices have a strong tie to creating a safer working environment (e.g. corrective actions stemming from accident investigations). However, the practices in this list were consistently identified as important by participants from various industries and embody observable functions that