Hazard Recognition, Risk Perceptions and Safety Climate Among Steel Manufacturing Workers

Authors
Luz S. Marin, Associate Professor, Department of Safety Sciences, Indiana University of Pennsylvania, Indiana, Pa., USA luz.marin@iup.edu
Majed Zreiqat, Professor, Department of Safety Sciences, Indiana University of Pennsylvania, Indiana, Pa., USA zreiqat@iup.edu
Wanda Minnick, Professor, Department of Safety Sciences, Indiana University of Pennsylvania, Indiana, Pa., USA minnickw@iup.edu
Gabriella Green, Undergraduate Student, Department of Safety Sciences, Indiana University of Pennsylvania, Indiana, Pa., USA
Chloe Croft, Undergraduate Student, Department of Safety Sciences, Indiana University of Pennsylvania, Indiana, Pa., USA
Sydney Sheredy, Undergraduate Student, Department of Safety Sciences, Indiana University of Pennsylvania, Indiana, Pa., USA
Brandon Wiggins, Graduate Student, Department of Safety Sciences, Indiana University of Pennsylvania, Indiana, Pa., USA

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Risk perception influences workers’ behaviors. This study assessed the association between hazard recognition, risk perception and safety climate among steel manufacturing workers. The survey instrument measured steelworkers’ perceptions regarding their safety climate, risk perception and hazard recognition. Participants were from a large steel manufacturing organization in the northeastern United States. Study results showed that open moving parts and crane movement were the most identified safety-related hazards, while noise and heat stress were the most identified health-related hazards. However, several participants reported that no hazards were present in some of the scenarios evaluated. Risk perception showed high scores in knowledge, avoidability and controllability while dread and vulnerability scores were low. Safety climate scores were positive and moderately correlated with several risk perception dimensions. Findings can be used to improve practices regarding risk perception and hazard recognition.

In 2021, the metal manufacturing industry (NAICS 331) reported 24 fatal injuries (eight events due to contact with objects and equipment and eight falls, slips and trips) with a total recordable injury and illness incidence rate of 4.1 per full-time equivalent workers. Although there are some slight reductions in these trends, the steel manufacturing industry still experiences high fatal and non-fatal injury rates when compared to other industries. Work-related injuries and illnesses represent a significant economic burden for the individual, families, business and society.5,6 Steering trends downward requires an in-depth understanding of the injury pathway to address causal factors through systematic prevention strategies to minimize risk levels. Research studies in other industry sectors such as construction and manufacturing have shown that work-related injuries can be explained by the presence of immediate causal factors such as uncontrolled hazardous conditions along with unintentional safety violations which are merely outcomes resulting from poor hazard recognition, safety risk perception and management deficiencies.4–7

Hazard recognition is a basic step to the success of any Occupational Safety and Health Management System (OSHMS) since it encourages implementation of the required control to minimize workers’ exposure. While hazard identification is important, being able to recognize all relevant hazards is fundamental to accomplishing the OSHMS’s goal of minimizing the likelihood of negative safety outcomes.8–10 Rundmo (2000) stated that people successfully manage to avoid accidents and health injuries because they perceive risk well enough to avoid accidents.11 Several of the elements described by Rundmo in the definition are considered as dimensions of risk perception (e.g., avoidability, knowledge, control). Risk perception refers to a subjective assessment to estimate the likelihood of experiencing an injury or illness caused by the exposure to a source of risk.11–13 Risk perception is not homogenous and basically depends on the type of risk factor to which the worker is exposed. Therefore, it is important to study employees’ perceptions of