



The influence of risk perception on safety: A laboratory study



William D. Taylor^{a,*}, Lori A. Snyder^b

^a Human Resources Research Organization, 66 Canal Center Plaza, Suite 700, Alexandria, VA 22314, United States

^b University of Oklahoma, Department of Psychology, 455 W. Lindsey St., Norman, OK 73072, United States

ARTICLE INFO

Article history:

Received 18 May 2015

Received in revised form 31 January 2017

Accepted 17 February 2017

Keywords:

Safety
Leadership
Risk perception
Laboratory study
Affect

ABSTRACT

Although it may be expected that employee perception of risk impacts engagement in safety behavior, previous research has been equivocal. The purpose of the present study was to clarify this relationship via a more thorough measurement of risk perception. Specifically, this study investigated the value of using a risk perception measure that makes risk perception conditional on behavior, in addition to investigating cognitive and affective risk perception. Another purpose of this study was to investigate how a lack of supervisor commitment to safety affects employees' safety behaviors. Eighty individuals participated in a laboratory study in which they performed two seemingly dangerous tasks. Supervisor commitment to safety was manipulated and safety behavior was assessed using video data. Results suggest that risk perception, when framed with regard to the risk of not performing the safety procedures, is related to safety behavior, as is supervisor commitment to safety. Implications for the findings are discussed, including the need for measures that make risk perception conditional on behavior.

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1. Introduction

In the year 2015, there were 4836 fatal injuries in the United States (United States Department of Labor, 2015)—roughly the equivalent of one death every two hours. Such injuries are very costly, with workers' compensation benefits reaching past \$62 billion in 2014 (Baldwin and McLaren, 2016). Although there are governmental regulations mandating the use of safe equipment and procedures and possibly additional organization-specific policies, workers still face the stark reality each day that they may not come home at the end of their shift, or will come home injured. Thus, many workers perceive some level of risk associated with their job duties. Unfortunately, the examination of risk perception in the occupational safety literature has not received the attention it deserves, which is a gap this study aims to fill.

1.1. Risk perception overview

Risk is a part of life, with both its underestimation and overestimation having the potential for unfortunate consequences (Burns and Slovic, 2012; Slovic, 1987). Past research suggests that various factors influence the risk individuals assign to certain hazards. For example, when assessing the riskiness of various hazards, risk assessment experts seem to base their ratings on annual fatality

rates while laypersons use additional criteria, at times rating certain hazards to have a high risk while being aware that the actual fatality rates are low (Slovic et al., 2000). Slovic (1987) suggests that individuals make assessments of risk based on a “dread factor” as well as an “unknown risk” factor, with both factors including subjective assessments of a risk that are not necessarily directly tied to past fatality rates. Indeed, Slovic et al. (2000) found that when judging frequency of death due to various hazards, overestimation occurred for some hazards while underestimation occurred for others. They suggested the availability heuristic (Tversky and Kahneman, 1974) as one potential source of bias that could influence incorrect perceptions, in that certain hazards—which are not necessarily the most lethal hazards in terms of annual death rates—receive an inordinate amount of attention in the media.

Although much of the research that has been done on risk perception and fatality rates has been conducted based on general hazards, similar phenomena are seen in the occupational health literature. For example, just as exposure to hazards in the media may influence perceptions of lethality (Lichtenstein et al., 1978), so too may exposure to injuries influence perception of risk within the workplace. That is, individuals that have experienced more injuries or accidents perceive higher levels of risk (Bonafede et al., 2016; Cree and Kelloway, 1997; Leiter et al., 2009; Mueller and Tschan, 2011; Rundmo, 1995). However, although risk perception has been studied extensively within the context of occupational health, the nature of the relationship between risk perception and safety behavior remains somewhat unclear.

* Corresponding author.

E-mail addresses: wtaylor@humrro.org (W.D. Taylor), lsnyder@ou.edu (L.A. Snyder).

The importance of risk perception as a variable in occupational safety research is underscored by the importance of risk perception in public health theory. For example, the Health Belief Model (Rosenstock, 1974) suggests that in deciding whether to engage in protective behavior, one factor that individuals take into account is their perceived susceptibility to the danger, in addition to the perceived efficacy of the behavior, perceived barriers to the behavior and perceived severity of the risk. Thus, a key premise of the model is that “anticipation of a negative health outcome and the desire to avoid this outcome or reduce its impact creates motivation for self-protection” (Weinstein, 1993, p. 325). Additionally, Protection Motivation Theory suggests that fear appeals create attitude change through three mechanisms. Specifically, according to the theory, the severity of a hazard, the likelihood that harm will occur, and the effectiveness of the protective mechanism influence the likelihood that a person will engage in a protective behavior (Rogers, 1975). Thus, central to both of these theories is the premise that a higher perception of risk will be related to a greater likelihood of behaving safely (or at least a greater intent to).

Although there is theoretical support for risk perception influencing safety behavior, the relationship between risk perception and safety behavior is likely to be attenuated by other factors. For example, in a qualitative study in which participants were asked about their reasons for behaving unsafely, participants noted organizational pressures that essentially coerced them into behaving unsafely in spite of the high risk that they perceived from the behavior (Mullen, 2004). Thus, although risk perception may create a desire to behave safely, other variables may moderate the relationship between employee motivation and actual behavior.

Some support exists in the occupational health literature for the premise that increased risk perception should be related to safe behavior. For example, in a sample of health care workers, the choice to get vaccinated was shown to be related to the concern that the workers had about contracting influenza, with those abstaining from vaccination having less concern about coming down with the illness (Kraut et al., 2011). It has also been shown that risk perception is associated with safety-related intentions (Cree and Kelloway, 1997; Goldberg et al., 1991), the use of hearing protection (Arezes and Miguel, 2008), and hand-to-face contact in labs requiring biosafety containment procedures (Johnston et al., 2014). These studies suggest that the risk one perceives may influence how likely a person is to perform safely, with higher levels of risk being related to higher safety-related intentions and behaviors. However, meta-analytic research has shown the opposite—that risk perception is negatively related to safety behavior (Christian et al., 2009). Furthermore, one prominent risk perception researcher has gone so far as to say, regarding his findings, “Risk perception was not found to predict risk behavior. Thus, safety cannot be improved by changing individual risk perception” (Rundmo, 1996, p. 207). Others have suggested the opposite, proposing that “risk perception is of paramount importance” for promoting safety behavior (Arezes and Miguel, 2008, p. 907). Given these discrepant findings and conclusions, there is a need to further clarify the relationship between risk perception and safety behavior.

1.2. Measurement issues

The measurement of risk perception represents one potential reason for the equivocal relationship between risk perception and safety behaviors. Ronis (1992) and van der Pligt (1998) suggest that in order for risk perception to be a useful predictor of preventative behavior, as models such as the Health Belief Model suggest, its assessment must be made conditional on behavior. In other words, the person’s level of perceived risk must be assessed with regard to engaging (or failing to engage) in a specific behavior. Unfortunately, despite the call for better measures, many risk per-

ception measures used in research fail to make such a distinction. For example, consider the use of a question asking participants to rate their agreement with the statement, “The risk level of this job concerns me quite a bit” (Real, 2008, p. 346). According to the previously mentioned models, a higher level of agreement with this statement should contribute positively to engagement in the safety behavior. However, if the individual answering the question is a window washer who follows every precaution regarding fall protection due to her fear of heights, the worker might indicate low perception of risk because she is protected by behaving safely. Consequently, this worker’s responses would indicate that a low level of risk perception could be associated with a high level of safety behavior.

Although the importance of making risk perception conditional on behavior is not frequently discussed in the occupational health literature, it has been highlighted in the health psychology literature. Specifically, Brewer et al. (2007) suggest that mixed results in studies assessing the link between risk perception and vaccination behavior may in part be due to studies that fail to clarify whether participants are to assess their risk of illness if they are vaccinated or if they fail to be vaccinated. Brewer and colleagues conducted a meta-analysis on vaccination behavior and specifically excluded studies that failed to make risk perception conditional on behavior and subsequently found that perception of risk if not vaccinated was in fact positively related to vaccination behavior (Brewer et al., 2007). Unfortunately, to our knowledge, such a meta-analysis is impossible in the occupational safety literature due to the lack of studies which make risk perception conditional on behavior. Thus, there is great need for risk perception researchers to, for example, separate perceived risk of injury while failing to follow safety protocol and perceived risk of injury while adhering to safety protocol. Consequently, one of the key ways that the risk perception measure used in this study differs from those used in other studies is that it specifically asks participants to consider how much risk they are under if they adhere to the safety procedures and how much risk they are under if they do not adhere to the safety procedures. Due to the fact that safety policies and procedures are designed to mitigate risk, the following is proposed:

Hypothesis 1. Participants will perceive there to be more risk from performing the tasks without the safety procedures than performing the tasks with the safety procedures.

1.3. The relationship between risk perception and safety behaviors

As described above, the Health Belief Model suggests that as individuals perceive higher risk, they are more likely to engage in protective behaviors. However, the model also posits that the likelihood of an individual participating in protective behaviors is influenced by the perceived effectiveness of the protective behavior, with higher perceived effectiveness resulting in a higher likelihood of behaving safely. As previously mentioned, in the present study individuals will rate both their risk of harm while performing the safety procedures (compliance-framed risk perception) as well as their risk of harm if they fail to perform the safety procedures (non-compliance-framed risk perception). The degree to which an individual views him or herself as free from harm while participating in the safety procedures can therefore be considered a measure of the effectiveness of the safety procedures, which is predicted to be positively associated with safety behaviors as well as having an impact on safety behaviors beyond non-compliance-framed risk perception. Accordingly, we make the following hypotheses:

Hypothesis 2a. Compliance-framed risk perception will be positively related to compliance with safety procedures.

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