Safety Science 104 (2018) 135–143

Contents lists available at ScienceDirect

Safety Science

journal homepage: www.elsevier.com/locate/safety

Understanding risky behaviours in nuclear facilities: The impact of role stressors☆

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ARTICLE INFO

Keywords:
Role ambiguity
Role overload
Risky behaviours
Job dissatisfaction
Safety dissatisfaction

ABSTRACT

Risky behaviours have received little attention in the safety literature in recent years, compared to safety behaviours such as safety compliance or safety participation. However, it is important to focus on risky behaviours and their predictors in order to prevent accidents. The aim of this study is to explore the impact of role stressors (role ambiguity and role overload) on risky behaviours, and the mediating role of dissatisfaction (both job and safety dissatisfaction). The sample consists of 566 employees from two nuclear power plants in Spain. Structural equation modelling is used to determine the effects of role ambiguity and role overload on risky behaviours. Role stressors (role ambiguity and role overload) predict risky behaviours. On the one hand, role ambiguity predicts risky behaviours through dissatisfaction with both the job and safety. On the other hand, role overload positively and directly influences risky behaviours. Assessing and reducing workers' role ambiguity and role overload levels is vital to avoid risky behaviours among employees.

1. Introduction

Safety performance is critical in High-Reliability Organizations (HROs), which are "systems operating in hazardous conditions that have fewer than their share of adverse events" (Singer et al., 2009, p. 400). HROs include industrial sectors that deal with a variety of risks with potential catastrophic consequences, such as the aircraft industry, chemical processing plants, or the nuclear power industry. The impact of any consequences of unsafe behaviour can affect entire societies and cross national boundaries for many decades. Nuclear power plants present a particularly important risk that can extend far beyond the immediate locality and even "have adverse effects upon whole continents over several generations" (Wiegmann et al., 2004, p. 118). Knowing which factors predict safe (and unsafe) performance can help the nuclear industry to create environments, policies, practices, and procedures that are conducive to excellent safety performance.

Most studies on safety research have focused on safe performance and the factors that positively influence it. However, although it is equally important to understand risky performance and the factors that promote it in order to minimize risks, empirical evidence on this topic is scarce. For example, the impact of negative variables such as role stressors or dissatisfaction on performance has been practically unexplored empirically (Siu et al., 2004). Therefore, the present study aims to examine the effect of role stressors on risky behaviours. More specifically, a model is proposed to understand the impact of role stressors (role ambiguity and role overload) on risky behaviours through both job dissatisfaction and safety dissatisfaction (see Fig. 1). Whereas employees' dissatisfaction is expected to partially mediate the relationship between role ambiguity and risky behaviours, a direct effect is expected from role overload. This model will be tested through a structural equation model (SEM) analysis.

1.1. Safety performance and risky behaviours

As far as the safety performance construct is concerned, the most widely studied model was created by Neal and Griffin (2006). These authors differentiated between two types of safety performance behaviours: Safety compliance and safety participation. Safety compliance has to do with the core activities that each person needs to carry out in order to keep the workplace safe. These behaviours are found in situations where followers engage in established job practices and bring with them all the necessary protective equipment. Safety compliance is also related to adherence to rules and procedures developed by the organization and/or regulatory bodies (Martínez-Córcoles et al., 2014).

☆ This investigation was supported by Research Grants CONSOLIDER-C (SEJ2006-14086/PSIC) and FEDER from the Spanish Ministry of Education and Science
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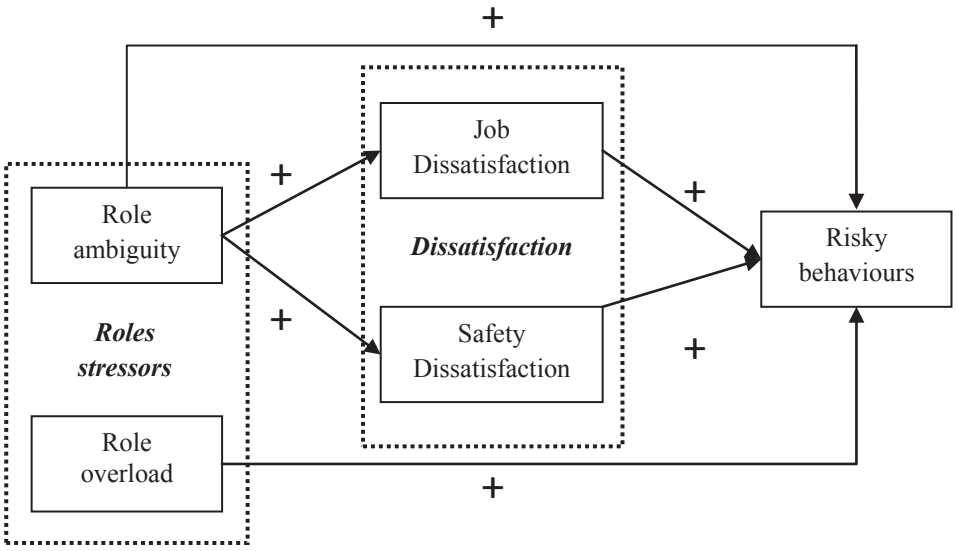
https://doi.org/10.1016/j.ssci.2018.01.006
Received 14 September 2017; Received in revised form 27 November 2017; Accepted 14 January 2018

Fig. 1. Hypothesized integrated structural model.



Safety participation refers to behaviours that do not directly contribute to an individual's personal safety, but help to develop an environment that supports safety. They involve discretionary, extra-role, and self-directed behaviours that go beyond prescribed safety precautions and make the workplace more secure (Parker et al., 2003). Safety participation describes voluntary activities that contribute to strengthening safety in the organization, such as participating in voluntary safety tasks, helping co-workers with safety-related issues, or attending safety meetings (Neal and Griffin, 2006). This bidimensional model of safety performance is based on a traditional model of job performance that differentiates between task performance and contextual performance (Borman and Motowidlo, 1993; Motowidlo and Van Scotter, 1994), which, in turn, has its origin in the classic distinction between intra and extra-role behaviours (Katz and Kahn, 1966). Task performance is defined as work activities that contribute to an organization's primary task and are prescribed by formal job descriptions. Contextual performance is defined as behaviours that support the broad organizational, social, and psychological environment of the organization, in contrast to behaviours that support the organization's technical core. Contextual performance is further distinguished from task performance in that it typically has a more discretionary nature, as opposed to being role prescribed. Neal and Griffin (2006) showed that safety compliance is analogous to task performance, whereas safety participation is analogous to contextual performance.

Although Borman and Motowidlow's model of job performance has been highly influential in recent decades, new upgraded models have emerged that approach performance more holistically. In this sense, Rotundo and Sackett (2002) proposed adding a new dimension called "counterproductive behaviours" to the two existing dimensions. Therefore, this job performance model encompassed three dimensions of performance: task, contextual, and counterproductive behaviours. According to Robinson and Bennett's (1995) definition, counterproductive behaviours are voluntary behaviours that could harm the well-being of the organization. This model has gained widespread acceptance by the scientific community in a relatively short time, and counterproductive work behaviours, or CWB, are being extensively studied (Balducci et al., 2011; Bowling and Burns, 2015; Czarnota-Bojarska, 2017; Dalal, 2005; Fida et al., 2015; Fox et al., 2001; Gruys and Sackett, 2003; Penney and Spector, 2005; Spector et al., 2006).

In the safety arena, Martínez-Córcoles et al. (2013) compared the bidimensional model and the three dimensional model of safety performance by means of several CFA's in a sample of 479 employees from two nuclear power plants. They obtained empirical evidence that the safety performance construct is shaped by three dimensions, equivalent to the dimensions in Rotundo and Sackett's model. These three dimensions are safety compliance (equal to task performance), safety participation (equal to contextual performance), and risky behaviours (equal to safety-related CWB).

Generally, in recent years, counterproductive behaviours for safety, and specifically risky behaviours, have received little attention in the safety literature, compared to positive behaviours for safety, such as safety compliance, safety participation, or safety behaviours in general. However, it is of paramount importance to explore the predictors of risky behaviours in order to create prevention programs designed to avoid unsafe acts and reduce risks. For these reasons, in this paper we are particularly interested in exploring predictors of risky behaviours. In the following sections, we will elaborate on theoretical models for predictors of CWB and formulate our hypotheses. Stressors and satisfaction are expected to play an important role in the prediction and prevention of risky behaviours.

1.2. Predictors of CWB: Work stressors and job attitudes

Work stressors and job attitudes (e.g., job satisfaction) are among the most frequently studied predictors of CWB (Bowling and Burns, 2015).

1.2.1. Work stressors and CWB

The frequently-cited stressor-emotion model of CWB (Spector, 1998; Spector and Fox, 2005) helps to understand why workers in stressful conditions may enact CWB. Based on the classic frustration-aggression theory (Dollard et al., 1939) and stress theories, the authors propose that CWB would be one of the possible consequences of stress at work and a response to frustrating working conditions. When perceiving a job stressor, employees would experience negative emotions or feelings that, at the same time, might lead them to enact CWB as a strategy to reduce the emotionally unpleasant conditions stemming from organizational frustrations. Therefore, in this model, CWB represents a behavioural response to strain aimed at managing a stressful situation and reducing the resulting unpleasant negative emotions (Fida et al., 2015).

Previous research has provided strong support for this model (e.g., Fox et al., 2001; Penney and Spector, 2005, 2002; Spector, 1998). However, much of this research has focused on two specific work stressors: interpersonal conflict and organizational constraints (Bowling and Burns, 2015). In this paper, we will extend this literature by focusing on role stress, and particularly two role stressors, role ambiguity and role overload. We chose these two stressors because of their relevance in the nuclear industry (Leis et al., 2015; Martínez-Córcoles