



Causal relations between psychosocial conditions, safety climate and safety behaviour – A multi-level investigation

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ABSTRACT

Rather little is known about the role of occupational safety climate in a broader organisational context, its antecedents and the mechanisms for how it may impact safety outcomes. This study used a prospective longitudinal multi-level design to examine the cause and effect relationships between psychosocial conditions, safety climate, and safety behaviour. Data were collected by means of questionnaires from 289 employees in 43 units at four occasions during a period of 21 months of the construction of a road tunnel. Data were analysed using two approaches for modelling change; an autoregressive latent variable model and a multi-level growth curve model. Results showed that individual perceptions of safety climate exerted a causal effect on individual safety behaviour, but we also found some evidence of a reversed relationship, where safety behaviour influenced safety climate. Furthermore, we found that work unit average perceptions of safety climate predicted the growth of the individual safety behaviour but this influence was mediated by the individual's perception of the safety climate. The results also indicate that supportive psychosocial conditions within an organisation influence individual safety perceptions but do not per se have an impact on safety behaviour.

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1. Introduction

Awareness of the importance of organisational factors in occupational safety has encouraged a large amount of research into safety climate and safety culture in recent decades (Clarke, 2000, 2006a; Glendon, 2008; Guldenmund, 2000). Recent meta-analyses suggest a positive relation between safety climate and safety outcomes (Beus et al., 2010; Christian et al., 2009; Kuenzi and Schminke, 2009). However, these conclusions rely largely on cross-sectional studies since longitudinal studies of these relations are few and, when present, often comprise only two measurement points. Causal relations between safety climate and safety outcomes are therefore not clear. For example Beus et al. (2010) found that injury rate was a stronger predictor of safety climate than the reverse. To better understand the causal relationships between safety climate and safety outcomes, longitudinal studies based on multiple measurement points are needed. The first aim of this study was therefore to investigate the causal relationships between safety climate and safety behaviour by means of a four wave longitudinal design. We also applied a multi-level approach to further investigate the causal relations at both the group and the individual level.

There is also a need to better understand the role of safety climate in a broader organisational context (Kuenzi and Schminke, 2009; Zohar, 2010). Safety climate is often described as the

organisational members' perceptions of the value placed on safety by management (Griffin and Neal, 2000). Zohar and co-workers suggest that, based on shared perceptions of management safety commitment, the employees infer the relative value of safety performance in the organisation. This informs employees' behaviour-outcome expectancies, and safety behaviour is contingent on beliefs that such behaviour is expected and will be rewarded (Zohar, 2008; Zohar and Erev, 2007). However, such a contingent reward perspective on safety behaviour does little to explain the aetiology and role of safety climate in a broader organisational context. In any production work the (at least short term) conflict between production and safety is continually present. The contingent reward perspective on safety climate requires that managers, to retain credibility in their demand for safety, should always prioritise safety in the large variety of work situations in order to clarify to the employees what type of behaviour is expected and will be rewarded. This is an over simplification of managers' work. The challenge for managers is rather to balance these priorities and still be able to encourage members' responsibility for safety in the organisation. To better understand psychological and social processes in relation to safety at work it is therefore important to investigate how safety climate relates to more generic psychosocial conditions in the organisation, which was the second aim of the present study. This calls for a relational rather than an instrumental perspective on safety climate. Theory of social exchange (Blau, 1986) suggests that if one party in a social interaction acts in a manner that benefits the other party, a mutual expectation will arise that this behaviour will

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be reciprocated at some later stage. In an organisational context this implies that management behaviour that in a variety of ways offers support to the employees in performing the job, for example by creating supportive psychosocial work conditions, would give rise to an obligation, as well as a wish, among the employees to reciprocate by contributing to the organisational goals. Eisenberger et al. (1986) suggested that employees who develop global perceptions of organisational support (POS), i.e., that the organisation values their contributions and cares about their wellbeing, will develop an affective attachment toward the organisation which will contribute to positive interpretations of organisational actions and characteristics and a commitment to organisational values and norms. They gained empirical support for this theory and also found that the positive effects of perceived organisational support on work outcomes were reliant on a social exchange ideology (Eisenberger et al., 1986). Supportive psychosocial conditions have been operationalized through conditions such as clear work roles, ample information for job performance and predictability in the working situation, opportunity for employee influence and for development at work, feedback on work performance, good leadership and social support, and a sense of community (Kristensen et al., 2002; Nahrgang et al., 2011). Such conditions, contributing to the individuals' resources to perform the job, may be viewed as a manifestation of leaders' benevolence, caring, and support toward their constituency, mirroring leader's concern for members' welfare. Employees who experience that their leaders are concerned about workers' welfare would be likely to infer that leaders are also concerned about workers' safety. Supportive psychosocial conditions would thus contribute both to employees' perceptions of organisational support and to a high safety climate. Through social exchange mechanisms this would then encourage employee safety behaviour. The psychosocial environment is broadly recognised to affect health (Bond et al., 2007) and positive relationships between aspects of general work climate and safety climate have received empirical support (Neal et al., 2000). Supportive psychosocial conditions relating to the aspects mentioned above have also shown to be related to safety behaviour (Nahrgang et al., 2007; Parker et al., 2001). Still, due to the small number of longitudinal studies, the causal relations between psychosocial conditions and safety climate and safety outcomes are not clear.

Regarding the relation between psychosocial conditions and safety climate the following hypothesis was formulated:

Hypothesis 1. Supportive psychosocial conditions will have a positive causal effect on safety climate. This relation may be observed as psychosocial conditions having a lagged effect on safety climate in a longitudinal autoregressive model.

Also the way that safety climate may impact on safety behaviour deserves more in depth study. The safety climate is considered a phenomenon at the group level, while behaviour is an individual level phenomenon. The mechanism for how these phenomena at different levels interrelate has not yet been studied. We propose that the shared component of the safety climate affects the individual perceptions of the safety climate, which in turn affect the individual behaviour. We may then expect that both the unit level safety climate, and the individual perceptions of the safety climate, will all have an impact on safety behaviour. We therefore formulated a second set of hypotheses:

Hypothesis 2a. Safety climate will have a positive causal effect on safety behaviour, which may be observed as a lagged effect in a longitudinal autoregressive model.

The effect of safety climate on safety behaviour operates cross level, shown as a unit level as well as an individual level effect, thus:

Hypothesis 2b. The average perception of the safety climate in the work unit predicts the growth of individual safety behaviour.

Hypothesis 2c. The individual perception of the safety climate in the work unit predicts the growth of individual safety behaviour.

According to Social Exchange Theory (Blau, 1986) supportive, non-exploitative management behaviour would also contribute to legitimizing leadership authority. Managers who provide good, supportive psychosocial working conditions may therefore gain more authority in their demand for safety, than managers who fail to provide supportive psychosocial conditions. This indicates that safety climate would have an intermediary function in the relationship between supportive psychosocial conditions and safety performance. Wallace et al. (2006) empirically found safety climate to mediate a positive relation between foundation organisational climate and lower accident rates. These relations, and how they operate, need to be better understood. We therefore formulated a third set of hypotheses:

Hypothesis 3a. Supportive psychosocial conditions have a positive causal effect on safety behaviour, and this effect is fully mediated through safety climate. This causal sequence may be observed in a longitudinal autoregressive model as the psychosocial conditions having a lagged effect on safety climate, which in turn will have a lagged effect on safety behaviour.

The influence of psychosocial conditions on safety behaviour operates cross level, shown as a unit level as well as an individual level effect, thus:

Hypothesis 3b. The average perception of the psychosocial conditions in the unit predicts the growth of individual safety behaviour.

Hypothesis 3c. The individual perception of the psychosocial conditions in the unit predicts the growth of individual safety behaviour.

2. Methods

2.1. Study overview

This article presents the results of a prospective study of occupational safety in the Swedish construction industry, carried out during the construction of a 1.5 km road tunnel under central parts of a major Swedish city. The study had a non-experimental design, using self-reported questionnaire data from four measurement waves, T1–T4, performed with an interval of 7 months from October 2002 to October 2004. The interval was chosen to counteract recall bias but still allow registration of fluctuations in the measures. To reduce systematic influence due to seasonal characteristics of the work, we preferred a 7-month to a 6-month interval. The questionnaire was comprehensive, so feasibility, i.e., the number of measurement waves expected to be acceptable to the respondents with a maintained high response rate, was also taken into account. The parts of the questionnaire reported on here covered psychosocial conditions, safety climate, and safety behaviour. Members of the research team were present during data collection, which took place close to the construction site, during working hours. The respondents were informed of the purpose and procedures of the study, that participation was voluntary, and that strict confidentiality was guaranteed regarding individual responses outside the research team.

2.2. Participants

Five main construction contractors were engaged in this large construction project. Four of these were involved throughout the

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