A comparison of safety climate and safety outcomes between construction and resource functions in a large case study organisation

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Abstract

The research described in this paper forms part of an in-depth investigation of safety culture in one of Australia's largest construction companies. The research builds on a previous qualitative study with organisational safety leaders and further investigates how safety culture is perceived and experienced by organisational members, as well as how this relates to their safety behaviour and related outcomes at work. Participants were 2273 employees of the case study organisation, with 689 from the Construction function and 1584 from the Resources function. The results of several analyses revealed some interesting organisational variance on key measures. Specifically, the Construction function scored significantly higher on all key measures: safety climate, safety motivation, safety compliance, and safety participation. The results are discussed in terms of relevance in an applied research context.

Background

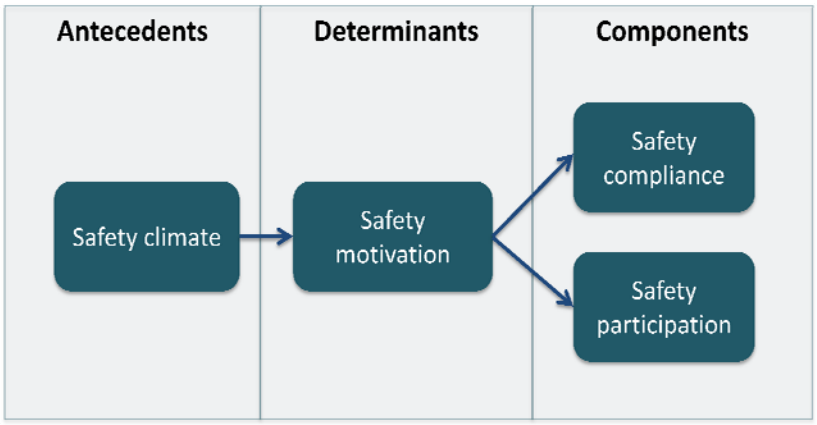
Safety performance in the construction industry is of great importance to many Australian organisations. Occupational injury and death statistics confirm that the construction industry is over-represented compared to other industries (Safe Work Australia, 2010). In addition to legislative and system-based safety initiatives, organisations are attempting to directly influence the safety culture to achieve improved safety outcomes (Glendon & Stanton, 2002). Cultural aspects of safety are particular relevant in the construction industry, due to the labour-intensive nature of construction works (Lingard & Yesilyurt, 2003). In addition, construction projects vary in length and complexity, requiring a constantly shifting workforce (Biggs, Banks, Davey & Freeman, in press).

Despite agreement on the importance of safety culture, the concept remains somewhat elusive to researchers (Zohar, 2010). It encompasses many intangible layers of individuals' values, opinions and assumptions about the world which are often not explicitly known to the individual. In a model of safety culture, Guldenmund (2000) borrows from the organisational culture literature (Schein, 1992) and defines three layers of culture. The core is the innermost layer, and comprises the basic assumptions of the individuals in an organisation; the middle layer reflects the espoused values in the organisation (often determined through perception surveys); and the outer layer consists of the artefacts of culture, such as safety behaviour, PPE and safety posters. Due to the core being so difficult to tap into, the middle and outer layers are relied on to draw conclusions about the safety culture. Safety climate is often used as a measure of culture because it can be determined easily and efficiently through survey questions (Glendon, Clarke & McKenna, 2006; Guldenmund, 2007).

Safety climate refers to the shared perceptions employees have about how safety is valued and prioritised in an organisation. As it suggests, 'climate' reveals the safety temperature at a point in time, and is most valuable when measured at regular intervals to compare changes

and track progress over time (Zohar, 2010). Climate is conceptualised as a group level construct, which necessitates the definition of the group in a particular context. It is possible that in large organisations, more than one safety culture (and therefore climate) exists (Hopkins, 2005), and that subcultures may in fact have different experiences and interpretations of the cultural environment (Glendon et al, 2006).

Safety climate is also considered to be a lead indicator of potential safety performance and behaviour outcomes, however exactly how safety climate affects safety outcomes is debated in the research literature. Whilst it is intuitive that an individual's perception about how safety is valued would influence their safety behaviour, the specific pathway is difficult to define. This research is guided by a work performance model from Neal, Griffin and Hart (2000), presented below, that links safety climate and outcomes, through the concept of safety motivation.



Conceptual model underpinning safety climate survey (adapted from Neal et al., 2000)

Safety performance is conceptualised here as being comprised of compliance and participation. Safety compliance involves adhering to safety procedures and carrying out work in a safe manner. Safety participation involves helping co-workers, promoting the safety program within the workplace, demonstrating initiative and putting effort into improving safety in the workplace. It is suggested that these two dimensions of performance are in part determined by the motivation of the individual to perform safety-related activities. That is, safety motivation is proposed to mediate between safety climate and performance. Existing research on safety climate in the construction industry supports the importance of safety motivation with this population (Lingard & Yesilyurt, 2003; Mohamed, 2002).

The research presented here builds on a previous qualitative study with organisational safety leaders (Biggs et al, in press) and further investigates how safety culture is perceived and experienced by organisational members, as well as how this relates to their safety behaviour and related outcomes at work. Of particular interest for this paper, is whether groups within the organisation report different safety climates and behaviours. The two largest organisational groups are compared: the Construction function and the Resources function.

Method

Participants

Participants were 2273 employees of the case study organisation, with 689 from the Construction function and 1584 from the Resources function. Based on headcount data at the time of the survey, response rates for each function were 16% and 49% respectively.

Participants from the Construction function of the organisation were mostly male (87%) and had an average age of 40 years. The most common position types were manager, wages employee and engineer, and 68% were full-time, non-shift workers. Participants from the Resources function were also mostly male (89%) and had an average age of 38 years. The majority of respondents from this function were wages employees (59%) and were full-time shift workers. The median organisational tenure in both functions was 2-5 years.

The sample demographics were also compared to current payroll data and previous organisational survey data. Comparisons revealed that the respondents in this sample were representative of the broader workforce, and had a similar profile to previous organisational survey respondents.

M*easures*

The survey measures were based on Neal et al.'s 12-item scale, and are detailed in the table below.

Safety Climate items (α = .94)
1. Senior management places a strong emphasis on workplace health and safety 2. Safety is given a high priority by senior management 3. Senior Management considers safety to be important
Safety Motivation items (α = .94)
1. I feel that it is worthwhile to put in effort to maintain or improve my personal safety 2. I feel that it is important to maintain safety at all times 3. I believe that it is important to reduce the risk of accidents and incidents in the workplace
Safety Compliance items (α = .88)
1. I use all the necessary safety equipment to do my job 2. I use the correct safety procedures for carrying out my job 3. I ensure the highest levels of safety when I carry out my job
Safety Participation items (α = .92)
1. I promote safety within the organisation 2. I put in extra effort to improve the safety of the workplace 3. I voluntarily carry out tasks or activities that help improve workplace safety

Table showing key survey measures

All measures included three items each, and used a scale of 1 to 5, where 1 = strongly disagree, to 5 = strongly agree. Items for each measure were combined and averaged to provide one composite score for each. Reliability was excellent across all measures (α = .88 - .94). For questions that asked about senior management, this was defined as consisting of the

Managing Director and all divisional General Managers. Demographic measures were also included in the survey, including gender, age, position type, and employment status.

Procedure

University human research ethical clearance was obtained prior to the conduct of the survey. The survey was conducted late 2011/early 2012. Survey drafts were reviewed prior to this, and a small pilot was conducted to ensure face validity and comprehension with a blue collar workforce. Distribution occurred through the organisational safety network after consultation with relevant business representatives. Respondents were directed to an online or hardcopy version of the survey, as appropriate for their workplace environment and role type. Demand characteristics of the workplace were minimised by ensuring anonymous and confidential online completion of the survey. In addition, those employees that completed hardcopy surveys were ensured confidentiality by distribution through safety managers directly to the research team, rather than through line management channels. Hardcopy surveys were manually entered by the research team, and all data were analysed using SPSS v19.

Results

Results are described below in relation to each key measure. Means, standard deviations, *t* values, degrees of freedom and effect sizes are provided for each function on each measure. Statistically significant differences are indicated in the table notes.

Measure	Organisation mean (*SD*)	Construction mean (*SD*)	Resources mean (*SD*)	*t* value *(df)*	*Effect size (r)*
Safety Climate	4.26 *(0.75)*	4.50 *(0.69)*	4.12 *(0.75)*	11.24 (*2226)***	.05
Safety Motivation	4.65 *(0.50)*	4.73 *(0.44)*	4.63 *(0.52)*	4.58 *(1489.42*)**†	.01
Safety Compliance	4.47 *(0.59)*	4.54 *(0.56)*	4.45 *(0.59)*	3.39 *(1350.22)*†*	.01
Safety Participation	4.25 *(0.67)*	4.35 *(0.66)*	4.23 (*0.65)*	4.12 (2246)**	.01

Note. * Significant at $p<.05$; ** Significant at $p< .001$; † Unequal variances accounted for

Table showing average scores for each function

As can be seen from the table, the Construction function score was higher on average on the safety climate, safety motivation, safety compliance and safety participation measures compared to the Resources function. Independent group *t*-tests were conducted and revealed that these differences were statistically significant.

Discussion

Overall the results seem to paint a positive picture for safety culture in the organisation. Generally, all scores were high, reflecting moderate to strong agreement with the items. Interestingly, safety motivation scores were particularly high for both groups. The Resources

function scores were generally reflective of the organisational scores more broadly, which is likely due to their relative size in the sample.

Differences on the safety climate measure were of particular interest in this study, and a significant difference was found between the two organisational functions. Given that perceptions of the same leadership group (the managing director and general managers) were measured in the climate items, the results suggest that leaders' safety values and practices are being interpreted differently by each functional group. It is possible that as safety messages are filtered through the organisational levels, different translations and meanings are being applied by the middle and frontline leadership. Previous research in construction safety has highlighted the importance of frontline supervisors in influencing safety attitudes and behaviours (Biggs & Biggs, in press; Lingard & Yesilyurt, 2003).

Significant differences were also found between the functions on safety motivation, safety compliance and safety participation. The Construction function again scored higher, suggesting that there is a greater focus on safety, especially around the importance of following safety rules. Both functions operate in an environment with serious safety risk exposure, so the difference in self-reported compliance is interesting. It is not possible to know from the survey results whether these differences are a result of leadership and management practices, peer group influences, or the presence or absence of operational barriers to safety performance. In addition, it is possible that the differences are due to previous exposure to safety training, both formal and on-the-job. Furthermore, given the difference in response rates across the functions, it is possible that particularly safety-minded people participated in the survey, possibly influencing the positively skewed responses from the Construction function. Finally, motivational influences may be intrinsic or extrinsic, and further exploration is needed to determine what underlies this intra-organisational variance.

An important limitation of the research is that safety climate surveys may be confounded by social desirability biases (Hale, 2000). For example, it is difficult to determine to what extent employees are truly motivated to be safe and to what extent they provide positive responses in line with social expectations. The findings of this research also suggest that there may be subcultures operating within large organisations, and that the organisational-level safety message needs to be complemented by group-specific direction and support in middle and frontline management. Future research needs to further explore how the climate and behaviour pathway is experienced by different workers, and what barriers, if any, are operating when workers make decisions about safety behaviour.

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