Theoretical Components of Workplace Safety Climate and Their Implications for Practice

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Abstract Management safety commitment is an important theoretical factor in safety climate measurement and research; however, the influence of co-workers has received less attention. This study investigated whether co-worker safety attitudes and behaviours contributed explanatory variance to associations with burnout or whether management attitudes and behaviours primarily determine this association. Hospitality employees ($N = 111$) completed safety climate, psychosocial safety climate (PSC), and burnout measures. Results showed safety climate was significantly correlated with personal, work and customer-related burnout. Multiple regressions showed co-worker factors did not add predictive capacity for burnout above management factors, although did for determining whether workers experienced customer-related burnout. Results were compared to findings for Disability Support Workers where co-worker factors added predictive capacity above management factors for burnout. Findings suggested worker and manager safety-related attitudes and behaviours are important theoretical components of safety climate, but their relative influence varies according to the safety climate measure used and organisational structure.

Keywords Organisational psychology · Psychosocial safety · Burnout
Safety climate

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1 Introduction

1.1 Work Safety in Australia

There are significant economic costs associated with poor physical and psychological health at work. Work injuries not only directly affect employees, but they also indirectly affect employers, workers compensation insurers and administrators due to the associated financial costs (Guthrie, Ciccarelli, & Babic, 2010). Economic costs of workplace injury to the Australian economy were estimated at $61.8 billion for the 2012–13 financial year (Safe Work Australia, 2015). According to the Australian Compensation Statistics 2011–12, the Health and Community services industry made the largest number of serious claims, at 19,060. This was followed by the manufacturing industry, with 16,670 serious claims, and construction at 12,485.

Psychological injury costs arising from workplace stress for organisations and the broader economy are also substantial (Safe Work Australia, 2013). Work-related mental stress claims are the most expensive form of workers' compensation claim because of the length of the absence from work that is typical of these claims. A study by an Australian private health insurance company reported that in 2008, the total cost of work-related mental stress to the Australian economy was $14.81 billion; the direct cost to employers alone in stress-related absenteeism was $10.11 billion (Medibank Private, 2008). It was noted that these figures would be higher if they included the hidden costs associated with re-staffing and re-training that result from high staff turnover caused by stress.

Statistics like these indicate that work safety, including psychological health, ought to be an important concern for all organisations. Thus, being able to predict and prevent an accident or injury, whether physical or psychological, is of particular importance.

1.2 Safety Climate

In recent years, interest in the concept of safety climate and its utility in predicting organisational safety performance has increased. Contributing to this interest has been research demonstrating that organisational safety climate is related to the number of workplace accidents in a variety of occupational settings, including chemical plants (e.g. Hofmann & Stetzer, 1996), manufacturing (Clarke, 2006), construction (e.g. Dodobbeleer & Beland, 1991; Nielsen & Mikkelsen, 2007; Siu, Phillips, & Leung, 2004), and offshore environments (e.g. Cox & Cheyne, 2000; Flin, Mearns, Gordon, & Fleming, 1996). As such, a variety of safety climate surveys have been created and are commonly used in organisations. This has been associated with a movement away from safety measures based on retrospective data ("lag indicators") such as fatalities, lost time, accident rates and incidents,

towards "leading indicators" such as safety audits or measurements of safety climate. These predictive measures enable organisations to monitor their safety conditions, which may reduce the need for an accident to occur in order to identify safety weaknesses and to make improvements. Furthermore, a safety climate survey costs an organisation far less money than proactive preventions such as a safety audits, although they cannot entirely replace other diagnostic tools (Siu et al., 2004).

Safety climate, as first conceptualised by Zohar (1980), was defined as "a summary of molar perceptions that employees share about their work environments. It is a frame of reference for guiding appropriate and adaptive task behaviours" (p. 96). Since its conception, a number of different definitions for safety climate have arisen. Griffin and Neal (2000) argue that safety climate is employees' perceptions of the policies, procedures, and practices relating to safety. However, others have proposed broader definitions in which safety climate encompasses a wider range of components, including attitudes towards safety (e.g. Mearns, Whitaker, & Flin, 2003). Despite differences in definition, the fundamental assumptions of safety climate are the same. Safety climate is a multi-dimensional construct that influences the safety behaviour of workers at the individual, group, and organisational level. Furthermore, it provides a snapshot of the current state of safety in an organisation at a distinct point in time while recognising that it is a dynamic process that changes over time (Cheyne, Cox, Oliver, & Tomas, 1998; Griffin & Neal, 2000; Guldenmund, 2000).

Zohar (1980) conceptualised safety climate as an antecedent of workplace injuries. It is thought that the influence of perceptions of workplace safety policies, procedures and practices on injuries is mediated via their direct effects on behaviour-outcome expectancies, which consequently affect safety behaviour and performance (Christian, Bradley, Wallace, & Burke, 2009; Clarke, 2006; Guldenmund, 2000). Christian et al. (2009) found group safety climate had the strongest association with accidents and injuries through meta-analytic correlations and path analysis results. This process occurs because safety climate acts as a frame of reference for the behaviour and attitudes of employees. As such, safety climate guides normative safety behaviour. For example, an organisation that encourages and rewards safety provides a clear message to employees that working safely is a suitable organisational behaviour and as such employees of this organisation will consider working safely to be the norm. On the other hand, an organisation that prioritises production over safety and does not reward safety behaviour sends a message to employees that working safely is not a priority. This organisation is more likely to have workplace accidents. Models of accident causation have provided support for this interpretation (Tomas, Melia, & Oliver, 1999).

1.3 Safety Climate and Worker Well-being

In addition to demonstrating the relationship between safety climate and work injuries, the relationship between a positive safety climate and reduced workplace

stress has also been highlighted in the literature (Oliver, Cheyne, Tomas, & Cox, 2002; Siu et al., 2004). As such, safety climate is an important construct to examine in an organisation as the consequences of a negative safety climate extend beyond that of accidents and includes influences on worker well-being. In particular, jobs that are characterised by high role demands (e.g. role overload and role conflict) are thought to foster the perception that production is prioritised over safety, which could lead to a negative safety climate (Clarke, 2010). Clarke and Cooper (2004) argue that safety climate predicts employees' general health, which in turn predicts workplace accidents. According to this model, a negative safety climate leads to increased occupational stress, which reduces physical and psychological well-being. This leaves employees more susceptible to accidents and injuries. Hofmann and Stetzer (1996) found that a perception of high role overload was predictive of a greater likelihood to cut-corners and demonstrate unsafe behaviours. Siu, Phillips, and Leung (2004) concluded that the reason for this increase was that employees with a perceived high level of work pressure focused on completing their tasks and less on the safety of their work procedures. The question still remains whether causation can go both ways; for example, that stress from role conflict leads to a negative safety climate which in turn creates greater stress, both of which lead to increased risk of stress effects and accidents.

1.4 Measuring Safety Climate

As yet there is no consensus as to which factors comprise the construct of safety climate (Guldenmund, 2000). Often researchers have created industry-specific measures (e.g. Flin et al., 2000), which have led to very different numbers and types of factors in safety climate measures. Flin et al. (2000) concluded that management commitment to safety, safety systems, risk, work pressure, and competence, were the most common safety climate factors in the literature. However, despite these being the most common factors, there is no evidence to suggest that they comprise the best factors of the safety climate construct in terms of its relationship to work accidents, or that some of these dimensions even represent safety climate at all (Beus et al., 2010). The factor with the most consensus in the literature is management commitment to safety, which has been seen as a fundamental factor in safety climate research (Brown & Holmes, 1986; Cox & Cheyne, 2000; Dedobbeleer & Beland, 1991). Therefore, it is widely acknowledged that the degree to which managers are viewed as setting safety as a priority in an organisation will significantly influence employees' perceptions of the importance of safety (Clarke, 2010).

Less widely researched, and of particular focus in the current study, is the influence of co-workers in determining a safety climate within an organisation. Co-worker influences may be less researched due to the more limited focus on health care and human service work, where co-worker interactions and decision making may be more influential in terms of safety-related behaviour,

compared with less interactive and individualised work settings, as in manufacturing. Becker (1992) found from research with 30 organisations that individuals feel more committed to their co-workers than to their supervisors, managers, or the organisation itself. Andriessen (1978) found that when groups in the construction industry are well coordinated in their work there are less misunderstandings and accidents. This is attributed to the group atmosphere that promotes the development of positive safety norms. When this occurs members of an organisation are supported to work safely by approval of their peers and colleagues. Alternatively, if an employee is perceived to look "childish" or "not tough enough" for following safety regulations by their co-workers, they may be easily motivated to work less safely or to take risks. Therefore, it can be argued that co-workers may be highly influential on someone's motivation to work safely (Andriessen, 1978). Thus, the attitudes and norms of co-workers may be an influential factor in relation to safety climate, despite the limited research that has examined this perspective.

It is important to note that the factors relevant to work safety climate may vary from one type of work to another. For example, workers who work by themselves are not going to have a work safety climate that is influenced by co-worker behaviour. The importance of work attitudes may also depend on the extent to which workers are required to make decisions for themselves or together. For example, in human service work employees are given far more autonomy to make decisions both individually and with co-workers than in manufacturing, where employees generally follow established procedures or the directions of their supervisors. In recent years, there have been changes in the way people work, with an increase in human service industries, meaning more people work in groups and have to make decisions with co-workers than previously (Industry Employment Projections Report, 2016). As such, to the extent that human services increase and manufacturing industries decrease in the future, co-worker influences are likely to become more important for more jobs. This may also be evident in virtual organisations to the extent that people who are not together physically nevertheless have to make decisions together that may affect work safety.

1.5 Comparison of Two Approaches to Measuring Safety Climate

Kines et al. (2011) developed the Nordic Safety Climate Questionnaire (NOSACQ-50) for measuring safety climate, covering dimensions based on organisational and safety climate, psychological theory, previous empirical research, and empirical results acquired through developing the measure. The NOSACQ-50 measures seven safety climate dimensions, including respondents' perceptions of both the management level (management safety priority, commitment, and competence; management safety empowerment; and management safety justice) and the co-worker level (workers' safety commitment; workers' safety

priority and risk non-acceptance; safety communication, learning, and trust in co-worker safety competence; and workers' trust in the efficacy of safety systems). The use of different dimensions allows diagnosis of the overall safety climate of an organisation and also specific areas of concern. Kines et al. (2011) concluded that the questionnaire should evaluate the safety climate of both the management and workgroup policies separately based on previous studies, including that of Dodobbeler and Beland (1991) who indicated that safety climate measures should cover management and workgroup conditions. The NOSACQ-50 has been developed and tested in a number of employment sectors, including the construction industry, the food industry, and the health care context (Kines et al., 2011).

Although the NOSACQ-50 provides a comprehensive assessment of relevant manager and co-worker attitudes and behaviours related to safety in the workplace, a problem associated with this comprehensive assessment is the length of the survey; it includes 50 items and requires considerable time to be completed. This makes it difficult to include in a survey of safety-related issues that may be designed to assess the relationship between the safety climate and measures of other individual or organisational factors that may also take some time to complete.

In the current study, the NOSACQ-50 safety climate measure was compared with Hall, Dollard, and Coward's (2010) Psychosocial Safety Climate (PSC-12) scale. The PSC-12 reflects the "communicated management position about the value and priority of worker psychological health and safety in the workplace" (Hall et al., 2010, p. 356). The PSC-12 scale includes 12 items measuring the factor of Psychosocial Safety Climate (PSC) and includes only management level items. This is because Hall et al. (2010) consider PSC to be largely driven by management values and beliefs, and a "top down" phenomenon set by the organisation's management. The PSC-12 has been developed and tested with a wide range of occupations, including managers, associate professionals, tradespersons, clerical or sales workers, and labourers (Hall et al., 2010).

The PSC-12 scale provides a much shorter and hence a more user acceptable measure of safety climate; however, the shortness is obtained by not having any scales related to co-workers on the assumption that their attitudes and behaviours add no further safety climate information. The scale also has no subdomains and only provides an overall measure of PSC, which limits its use for identifying particular areas of safety concern. Another problem with assessing particular areas of safety concern is that some of the questions in the scale cover more than one issue and are quite complex. Hall et al. (2010) made note of this concern and indicated that the scale had a Flesch-Kincaid Grade level of 10.5, which is higher than the recommended score of 7.0–8.0 levels that an average eighth-grader student could understand. This makes it difficult to include in a survey designed to measure the safety climate of organisations with higher levels of international workers, or workers with lower levels of education.

In a previous study carried out by the authors of this study, results obtained through multiple regression analysis indicated that the co-worker section of the NOSCAQ-50 did add variance above that of management for burnout scores of Disability Support Workers who worked in a human service organisation providing

residential care for people with disabilities in community-based houses. Disability Support Workers generally work in small groups in dispersed settings with limited direct supervision from supervisors or managers and as such, co-worker safety attitudes and behaviours are likely to be important for work safety in an organisation with this structure. The current study aimed to investigate whether this finding would be replicated with a more typical organisational structure in which workers are in closer contact with supervisors or management.

1.6 Current Study

The aim of this study was to investigate the concept of Workplace Safety Climate in terms of which of its key components affect aspects of work-related stress. In particular, the study aimed to determine whether co-worker attitudes and behaviours contribute additional explanatory variance to the association with key work-related stress indicators or whether, as suggested in some studies, management attitudes and behaviours either wholly or primarily determine associations of this kind. Giving participants both the NOSACQ-50 and PSC-12 scales would test this association and determine which measure performed best.

Participants in this study consisted of hospitality workers from a large entertainment and hospitality organisation. This organisation was chosen to test the two safety climate questionnaires as workers in the organisation are required to interact with co-workers and with customers but also with supervisors and managers. If, as assumed by the NOSACQ-50, both manager and co-worker safety climate dimensions are important predictors of safety-related outcomes such as workplace stress, then it would be expected that co-worker dimensions would contribute additional variance to that provided by the manager dimensions. However, if as assumed by the PSC-12, manager influenced safety climate is all that is important in determining such outcomes, then the co-worker dimensions would not contribute additional variance, and the PSC-12 should explain the same amount of variance as all the dimensions of the NOSACQ-50. It was hypothesised that the co-worker safety climate dimensions in the NOSACQ-50 would add additional predictive capacity above that of the management dimensions, and as such provide a more comprehensive understanding of the factors influencing safety climate than would the PSC-12.

In the current study, the safety climate related outcome measure used was the Copenhagen Burnout Inventory (CBI). The CBI assesses personal, work-related and customer-related burnout (Kristensen, Borritz, Villadsen, & Christensen, 2005). It defines burnout as the "attribution of [physical and emotional] fatigue and exhaustion to specific domains or spheres in the person's life" (Kristensen et al., 2005, p. 197). As such, the CBI is organised into three distinct types of burnout. The first is personal burnout, which refers to the degree of exhaustion experienced by individuals in a generic sense. Work-related burnout refers to the degree of physical and psychological exhaustion perceived by individuals as related to their

work. Lastly, customer-related burnout refers to the degree of physical and psychological exhaustion perceived by an individual as related to their work with customers. It was hypothesised that safety climate, as measured by the NOSACQ-50 and PSC-12, would be correlated with this measure of health and well-being, including personal burnout, work-related burnout, and customer-related burnout.

2 Method

2.1 Participants

Participants were 111 employees from a large entertainment and hospitality organisation. Of the 111 employees, there were 58.6% females and 41.4% males. The participant mean age was 35.6 years (SD = 10.84). Mean employment length was 7.29 years (SD = 8.43). The percentage of participants born in Australia was 79.3%. Most participants worked full-time (48.6%) with others working part-time (30.6%) or casually (19.8%). Median hours worked per fortnight were 60 (SD = 23.16). One third of participants had University degrees (33.3%), 28.8% had certificates, 27% had graduated from secondary school, and 10.8% had diplomas.

2.2 Measures

Responses for this investigation were drawn from a larger questionnaire used by the authors in an ongoing safety-related study of Disability Support Workers. The parts of that questionnaire used in the present study included demographics (e.g. age, gender, country of birth), employment characteristics (e.g. length of service, hours worked per fortnight), burnout (the CBI) and work safety climate perceptions (the NOSACQ-50). An additional work safety climate measure used in the present study but not in the ongoing Disability Support Worker study was the PSC-12. Additionally, although not provided in the published versions of these questionnaires, participants were provided with opportunities to record qualitative comments to elaborate on or qualify responses in each of them. In the following sections, the structure and properties of these measures are described.

2.2.1 Burnout

Burnout was assessed using the Copenhagen Burnout Inventory (CBI; Kristensen, Borritz, Villadsen, & Christensen, 2005). The CBI comprises three subscales. Central to the CBI is the association between burnout and physical and psychological fatigue and exhaustion. CBI subscale structure reflects attribution of

exhaustion to specific life domains. The personal burnout subscale (six items) assesses exhaustion regardless of occupational status (e.g. "How often do you feel tired?"). The work-related burnout (seven items) and customer-related burnout (six items) subscales measure the extent exhaustion is perceived as related to work or customers, respectively (e.g. "Is your work emotionally exhausting?" and "Do you find it hard to work with customers?"). Item responses are rated on a 5-point scale (0 = never/almost never or to a very low degree, 25 = not often or to a low degree, 50 = sometimes or somewhat, 75 = often or to a high degree and 100 = always or to a very high degree). Higher scores represent more symptoms of burnout, with the mean of 50 or greater considered as indicating burnout. The normative sample comprised 1914 human service sector workers.

2.2.2 Psychosocial Safety Climate

PSC was measured using the Psychosocial Safety Climate (PSC-12) Scale (Hall, Dollard, & Coward, 2010). The PSC-12 comprises 12 questions all phrased positively. The PSC-12 does not have any subscales and includes items such as "In my workplace senior management acts quickly to correct problems/issues that affect employees' psychological health" and "In my organisation, the prevention of stress involves all levels of the organisation". The PSC-12 uses a 5-point scale of strongly disagree, disagree, neither agree or disagree, agree, and strongly agree. Higher scores represent a better psychosocial safety climate.

2.2.3 Safety Climate

Safety climate was measured using the Nordic Occupational Safety Climate Questionnaire (NOSACQ-50; Kines et al., 2011) which includes 50 items phrased positively or negatively across seven climate dimensions. Three scales concern the perceptions of safety at the level of management and four scales relate to the work-unit level. The three management level dimensions include Management safety priority, commitment and competence (e.g. "Management encourages employees here to work in accordance with safety rules—even when the work schedule is tight"), Management safety empowerment (e.g. "Management strives to design safety routines that are meaningful and actually work"), and Management safety justice (e.g. "Management collects accurate information in accident investigations"). The four work-unit level dimensions include Workers' safety commitment (e.g. "We who work here try hard together to achieve a high level of safety"), Workers' safety priority and risk non-acceptance (e.g. "We who work here regard risks as unavoidable"), Peer safety communication, learning, and trust in co-workers' safety competence (e.g. "We who work here try to find a solution if someone points out a safety problem"), and Workers' trust in the efficacy of safety systems (e.g. "We who work here consider that a good safety representative plays an important role in preventing accidents"). Items are rated on a 4-point scale of

strongly disagree, disagree, agree, and strongly agree. Scores for these dimensions are obtained by summing items (with reverse scoring for negatively worded items) and dividing by the number of items in the dimension to provide an average score that can be considered in terms of the above criteria. The normative sample consisted of 3853 health care sector workers. Mean scores of 3.30 or more out of 4 indicate a good safety climate for maintaining and continuing safety development; 3.00–3.30 reflect a fairly good safety with a slight need for improvement indicated; 2.70–2.99 suggest a fairly low perceived safety with need for improvement; and scores below 2.70 indicate a low safety climate with a great need for improvement.

2.3 Procedures

A pilot study was conducted with the Health and Safety Specialist and two employees (two females, one male) from the entertainment and hospitality organisation. The results indicated that the questionnaires were easy to understand and all questions were considered appropriate. The time required to complete the survey was approximately 20 minutes. At the request of the pilot trial participants, a time bar was added to the survey to allow participants to know how much of the questionnaire they have left to complete. One other modification was the addition of a question before the customer-related burnout questions which asked, "How often in your work are you required to interact with customers?" This question was added because some employees never work with customers. Those answering that they never interact with customers were instructed not to answer the customer burnout questions.

The final procedure involved information of the project and a web link to the survey being distributed to all employees by email by the Health and Safety Specialist in the Human Resources department at the organisation. Participants were informed that participation was voluntary that their responses would be confidential and only group results would be reported. They were also informed that participants would be included in a draw for a gift voucher to encourage participation. Completing and submitting the survey was taken as consent to participate in the research.

3 Results

3.1 Comparisons Between the Current Sample and Norm Groups

It can be seen in Fig. 1 that all mean dimension scores for the entertainment and hospitality organisation were in the fairly good safety climate range and that for some dimensions they were close to the good safety climate range. It can also be

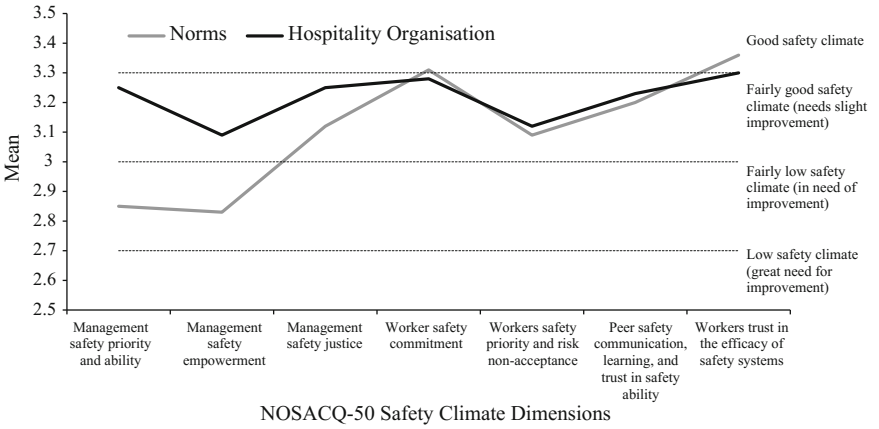

Fig. 1 NOSACQ-50 safety climate dimension mean scores in comparison to the norms

seen that these mean scores were higher for all the management dimensions than for the norm group and that the pattern of scores was very similar between the co-worker dimensions and the norm groups. The two lowest dimension scores for the organisation also correspond to the two lowest domain scores for the norms; namely, for management safety empowerment and for workers' safety priority and risk non-acceptance.

Table 1 provides the descriptive statistics for the NOSACQ-50, PSC-12 and CBI measures. It can be seen that both measures possessed adequate reliability for subsequent analyses with alphas ranging from 0.72 to 0.96. Table 1 also shows the *t*-values derived from comparisons with the normative samples. Compared to the NOSACQ-50 normative samples the employees of the large entertainment and hospitality organisation reported significantly higher perceived safety climate for all three of the management dimensions but not for any of the four co-worker dimensions.

As indicated in Table 1, personal burnout levels of the current sample were significantly higher than the norms. Work-related burnout was slightly higher and customer-related burnout was slightly lower than the norms but neither difference was significant. However, the current sample was consistent with the normative data in that personal burnout was the highest and customer-related burnout was the lowest amongst the three types of burnout.

3.2 Safety Climate, Psychosocial Safety Climate and Worker Health and Well-being

Table 2 provides correlations between measures. All correlations were significant and consistent with predictions. Personal, work-related and customer-related

Table 1 Descriptive and reliability statistics for the NOSACQ-50, PSC-12 and CBI for employees of the large entertainment and hospitality organisation (N = 111) and comparisons to normative samples

	Hospitality sample					Normative sample		
Scales	Range	Mean	SD	α	CI	Mean	SD	t value
NOSACQ-50								
Management safety priority and ability	1.78–4.00	3.25	0.47	0.87	0.83–0.91	2.85	0.58	0.40***
Management safety empowerment	2.00–4.00	3.09	0.50	0.85	0.81–0.89	2.83	0.55	0.26***
Management safety justice	1.93–4.00	3.25	0.50	0.90	0.86–0.93	3.12	0.50	0.13**
Worker safety commitment	2.33–4.00	3.28	0.43	0.72	0.63–0.80	3.31	0.47	−0.03
Workers safety priority and risk non-acceptance	1.86–4.00	3.12	0.44	0.75	0.68–0.82	3.09	0.51	0.03
Peer safety communication, learning, and trust in safety ability	2.13–4.00	3.23	0.44	0.88	0.84–0.91	3.20	0.44	0.03
Workers trust in the efficacy of safety systems	1.71–4.00	3.30	0.46	0.88	0.84–0.91	3.36	0.44	−0.06
PSC-12	1.17–5.00	3.33	0.92	0.96	0.95–0.97			
Copenhagen burnout inventory								
Personal burnout	0–91.67	43.54	20.01	0.90	0.86–0.92	35.9	16.5	7.64***
Work-related burnout	0–96.43	36.87	21.66	0.91	0.89–0.94	33.0	17.7	3.87
Customer-related burnout	0–91.67	26.98	22.84	0.91	0.88–0.94	30.9	17.6	−3.92

**$p < 0.01$ ***$p < 0.001$

Note α = Cronbach's alpha; CI = 95% confidence intervals; df = 110

burnout were all significantly correlated with each other, consistent with norm group correlations between the measures, meaning increased personal burnout is associated with increased work-related burnout and customer-related burnout and vice versa.

Correlations between the PSC-12 scale and the NOSACQ-50 dimensions with the measures of burnout were all significant indicating that higher scores on the workplace safety climate measures were associated with lower levels of personal, work-related and customer-related burnout. It can also be seen in Table 2 that the correlations between the NOSACQ-50 and the personal burnout measures were generally similar with the equivalent correlations for the PSC-12, but they were lower in all cases for work-related burnout and higher in all cases for the

Table 2 Correlation matrix for the Copenhagen Burnout Inventory, PSC-12, and NOSACQ-50 scores

Scales	1	2	3	4
1. CBI personal burnout	–			
2. CBI work-related burnout	0.73***	–		
3.CBI customer-related burnout	0.60***	0.56***	–	
4. PSC-12 scale	−0.46***	−0.47***	−0.39***	–
5. NOSACQ management safety priority and ability	−0.46***	−0.38***	−0.54***	0.54***
6. NOSACQ management safety empowerment	−0.44***	−0.41***	−0.52***	0.52***
7. NOSACQ management safety justice	−0.44***	−0.35***	−0.47***	0.50***
8. NOSACQ worker safety commitment	−0.33***	−0.25**	−0.42***	0.39***
9. NOSACQ workers safety priority and risk non-acceptance	−0.46***	−0.32**	−0.51***	0.37***
10. NOSACQ peer safety communication, learning, and trust in safety ability	−0.42***	−0.36***	−0.44***	0.57***
11. NOSACQ workers trust in the efficacy of safety systems	−0.35***	−0.27**	−0.47***	0.38***

**$p < 0.01$ ***$p < 0.001$

customer-related burnout. These results suggest that the two safety climate measures may predict different aspects of burnout.

With respect to the NOSACQ-50, significant negative correlations were obtained with all burnout measures, although the magnitude was generally lower for work-related burnout, particularly with workers' safety commitment, workers' safety priority and risk non-acceptance, and workers' trust in the efficacy of safety systems. Findings suggest burnout was associated with less favourable safety climate perceptions, although it is possible the lower ratings on some of the co-worker safety climate dimensions may mean that managers play a larger role in work-related burnout than co-workers.

Comparing the correlations between the NOSACQ-50 and the PSC-12, it can be seen, as expected, that the PSC-12—which measures management-related safety—correlated more highly with the management dimensions than with three of the four co-workers dimensions of the NOSACQ-50.

3.3 Safety Climate Measurement

Table 3 provides correlations between each of the dimensions in the NOSCAC-50. Correlations between the management dimensions were all very high and significant, ranging from 0.76 to 0.81. This suggests that worker perceptions of management dimensions were largely measuring very similar sources of variance.

Table 3 Correlation matrix the NOSACQ-50 dimension scores

NOSACQ-50 dimensions	1	2	3	4	5	6
1. Management safety priority and ability	–					
2. Management safety empowerment	0.79***	–				
3. Management safety justice	0.81***	0.76***	–			
4. Workers' safety commitment	0.68***	0.63***	0.66***	–		
5. Workers' safety priority and risk non-acceptance	0.74***	0.70***	0.69***	0.62***	–	
6. Peer safety communication, learning, and trust in safety ability	0.71***	0.73***	0.74***	0.73***	0.70***	–
7. Workers' trust in efficacy of safety systems	0.59***	0.59***	0.60***	0.69***	0.69***	0.73***

***$p < 0.001$

In contrast, there was larger variability in the significant correlations between the co-worker dimensions, ranging from 0.62 to 0.73, suggesting that workers were more variable in their perceptions of safety amongst their co-workers. This could reflect greater awareness of the part of workers concerning their own attitudes and behaviours towards different aspects of safety. These results suggest that the four co-worker dimensions were important in the NOSCAQ-50 as each dimension was adding additional information to the questionnaire.

To understand the importance of measuring both manager and co-worker safety attitudes and behaviours, multiple regression analyses were performed to establish the extent to which the co-worker dimensions were important predictors of health and well-being for the workers. As can be seen in Table 4, the variance explained in the management dimensions (step 1) ranged from 17% for work-related burnout to 31% for customer-related burnout. Management safety priority and ability demonstrated a significant main effect for customer-related burnout but not personal or work-related burnout. Management safety empowerment and management safety justice did not have significant main effects with any of the well-being measures. The addition of the co-worker safety climate dimensions at step 2 explained 1–3% of additional variance, with no significant R^2 changes and no significant effects demonstrated. These regression results show that co-worker safety attitudes and behaviours, as assessed by workers, were not important additional predictors of well-being for employees in the large entertainment and hospitality organisation, suggesting that the measurement of safety climate for occupational groups such as these only requires consideration of management attitudes and behaviours.

Further multiple regression analyses were performed to establish the extent to which the co-worker dimensions were important predictors for being assessed as

Table 4 Results of multiple regression analysis (unstandardised coefficients) to test the extent that NOSACQ-50 management and co-worker dimension scores predicted worker well-being (using the CBI)

Variables	Work-related burnout	Personal burnout	Customer-related burnout
Step 1 R^2	0.17***	0.23***	0.31***
Management safety priority and ability	−0.72	−9.97	−19.27*
Management safety empowerment	−11.46	−6.71	−8.76
Management safety justice	0.75	−3.73	3.97
Step 2 $R^2/\Delta R^2$	0.18**/0.01	0.24***/0.01	0.34***/0.03
Management safety priority and ability	−9.60	−7.47	−17.72
Management safety empowerment	−10.50	−4.35	−7.89
Management safety justice	2.06	−2.07	4.80
Workers' safety commitment	4.99	2.30	−1.84
Workers' safety priority and risk non-acceptance	4.12	−7.01	−3.26
Peer safety communication, learning and trust in co-worker safety competence	−9.53	−4.15	8.50
Workers' trust in the efficacy of safety systems	0.81	0.42	−10.36

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

burnt out or not (i.e. obtaining scores of 50 or above or below 50, respectively, on CBI measures). Forty-seven workers that were considered to be experiencing personal burnout, 32 were considered to be experiencing work-related burnout and 13 were considered to be experiencing customer-related burnout. As can be seen in Table 5, the variance explained in the management dimensions (step 1) ranged from 6% for work-related burnout to 27% for customer-related burnout. No main effects were demonstrated with any of the well-being measures. The addition of the co-worker safety climate dimensions for burnout at step 2 explained 2–20% of additional variance, with significant R^2 changes for customer-related burnout. Workers safety commitment, workers' safety priority and risk non-acceptance, peer safety communication and workers' trust in the efficacy of safety systems were significant predictors of experiencing customer-related burnout in addition to the variance explained by the management dimensions. These regression results show that co-worker safety attitudes and behaviours are important predictors of whether workers are experiencing customer-related burnout in addition to what is predicted by management dimensions, suggesting that the prediction of workers at risk of customer-related burnout requires consideration of co-worker safety attitudes and behaviours as well as management safety attitudes and behaviours.

Table 5 Results of multiple regression analysis (unstandardised coefficients) to test the extent that NOSACQ-50 management and worker dimension scores predicted worker well-being for workers considered to be experiencing burn out (using the CBI)

Variables	Work-related burnout	Personal burnout	Customer-related burnout
Step 1 R^2	0.06	0.16***	0.27**
Management safety priority and ability	−0.10	−0.36	−0.11
Management safety empowerment	−0.13	−0.03	−0.21
Management safety justice	0.00	−0.03	−0.20
Step 2 $R^2/\Delta R^2$	0.08/0.03	0.18**/ 0.02	0.47**/0.20*
Management safety priority and ability	−0.13	−0.38	−0.26
Management safety empowerment	−0.11	−0.01	−0.39
Management safety justice	0.05	−0.03	−15
Workers' safety commitment	−0.02	0.19	−0.44*
Workers' safety priority and risk non-acceptance	0.14	−0.07	0.43*
Peer safety communication, learning, and trust in co-worker safety competence	−0.29	−0.14	0.60*
Workers' trust in the efficacy of safety systems	0.15	0.05	−0.37*

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

4 Discussion

The aim of this study was to investigate the concept of Workplace Safety Climate in terms of its key components affecting aspects of work-related safety. This study focused, in particular, on the importance of co-worker attitudes and behaviours in explaining additional variance with key work-related indicators above that of management attitudes and behaviours. It was hypothesised that (a) safety climate, as measured by the NOSACQ-50 and PSC-12, would be correlated with measures of health and well-being, as measured by the CBI and (b) that the co-worker safety climate dimensions in the NOSACQ-50 would add additional predictive capacity above that of the management dimensions for workers in the large entertainment and hospitality organisation, and as such provide a more comprehensive understanding of the factors influencing safety climate than would the PSC-12.

4.1 Safety Climate, Psychosocial Safety Climate and Worker Health and Well-being

The hypothesis that safety climate, as measured by the NOSACQ-50 and PSC-12, would be correlated with measures of health and well-being was supported.

This is consistent with the findings of Oliver et al. (2002) and Siu et al. (2004), both of whom reported a relationship between a positive safety climate and reduced workplace stress. The PSC-12 was significantly and negatively correlated with personal burnout, work-related burnout, and customer-related burnout, indicating that the higher the perceived PSC the lower the levels of worker burnout. Customer-related burnout had the weakest correlation with PSC. As PSC reflects managements' behaviours and attitudes to working safely, it is understandable that customer-related burnout would be the lowest as management is less involved in relations between workers and customers. Nonetheless, there were aspects of work that respondents reported in their qualitative comments that indicated management behaviour did contribute to customer-related stress when working with customers, for example when management made decisions in relation to changes to promotional offers made to customers without consulting staff. The NOSACQ-50 was more strongly correlated with customer-related burnout than was the PSC-12, suggesting the NOSACQ-50 identified elements of workplace safety attitudes and behaviours that were relevant to customer-related burnout that were not as effectively measured by the PSC-12, for example, the extent to which co-workers support each other in their work which includes their work with customers.

The NOSACQ-50 was significantly and negatively correlated with the three areas of burnout. Personal and customer-related burnout were significantly correlated with the seven dimensions. Though work-related burnout also correlated significantly with all seven of the NOSACQ-50, the magnitude of the correlations was higher for the three management dimensions and the peer safety communication, learning, and trust in safety ability dimension than was the case for the other three co-worker dimensions. It is therefore possible that management behaviours and attitudes had a larger effect on work-related stress than co-workers in this organisation.

The three management dimensions of the NOSACQ-50 were very highly and significantly correlated with each other. These results may accurately reflect a more general attitude of management towards safety issues that influences all their safety-related behaviours, but it may also reflect a more general positive or negative bias on the part of workers towards all aspects of management and safety. In contrast, there was greater variability in the correlations between the four co-worker dimensions of the scale. This could reflect greater awareness of the part of workers concerning their own attitudes and behaviours towards different aspects of safety. Future research would be needed to assess the extent to which the opposite effects would occur with managers and supervisors completing the questionnaire; that is, more variability amongst their scores for the management dimensions of which they may be more aware than for the co-worker dimensions.

4.2 The Importance of Co-workers in Safety Climate Measurement

The hypothesis that the co-worker safety climate dimensions in the NOSACQ-50 would add additional predictive capacity above that of the management dimensions was not supported with respect to degree of personal, work or customer-related burnout measured by the CBI for this organisation. This is inconsistent with the results of a previous study conducted by the same authors involving Disability Support Workers, in which the co-worker section of the NOSACQ-50 did add variance above that of management dimensions on their own. These findings suggests that the relative influence of safety-related attitudes and behaviours of managers and co-workers may vary depending on the structure of the organisation since Disability Support Workers work in community housing in more isolated environments that are associated with less control and on-the-job support from supervisors and managers. In contrast, the large entertainment and hospitality organisation in the present study is an organisation in which workers are generally working in close proximity to their managers on the same site. This finding may support the use of the PSC-12 scale as an adequate measure of safety climate in organisations with this type of organisational structure, which considers safety to be a "top down" phenomenon determined by the organisation's management. The PSC-12 has been developed with a wide range of occupations; however, the structures of the organisations that the scale was based on are not clear. If participants worked for organisations with similar structures to that investigated in this study where managers and co-workers are in close proximity, it would explain why the scale has been developed to only focus on management's attitudes and behaviours. Future research on safety climate measures needs to consider the type of structure of the organisation being assessed, particularly with respect to the working relationship between managers and workers.

The co-worker section of the NOSACQ-50 was found to add predictive capacity above that of management for predicting which employees were considered as experiencing customer-related burnout, defined as being at or above a score of 50 on the burnout scale. As such, the co-worker sections of the NOSACQ-50 were found to be important in identifying factors that predicted whether employees are likely to be above a stress level of particular concern in regards to customers. The multiple regression results indicate that this could not be done with just the management dimensions of the scale, thus supporting the inclusion of the co-worker dimensions in the NOSACQ-50 for measuring safety climate for practical purposes even with an organisational structure in which managers and workers work together in the same physical environment. This result suggests that the relative influence of management and co-worker behaviours and attitudes with respect to work safety also depends on the type of work safety measure used.

A limitation of this study was the use of one dependent variable. The CBI was chosen because it is well established and there was evidence in the literature to indicate that workplace safety climate is related to worker burnout. The use of other

dependent variables related to work safety would have provided a more comprehensive assessment on the importance of the co-worker sections of the NOSCAQ-50. However, results from the three measures of burnout provided by the CBI did suggest that co-worker safety climate factors may have more of less influence depending on the type of work safety measure being predicted. The use of the CBI as the only dependent variable in this study was partly determined by the fact that with the two measures of safety climate the survey was already a reasonable size for workers to complete.

4.3 Future Research

More research is needed to determine whether measures of work safety climate should include both management and co-worker behaviours and attitudes in relation to work safety. Important issues to consider in such research include consideration of different types of organisations, such as human service and manufacturing organisations and, in particular, organisations having different structural relationships between managers and workers. There is also a need to investigate the extent to which management and co-worker work safety climate factors relate to different types of work safety variables, and to different ways of measuring those variables. In the present study, co-worker safety climate factors did not add variance in relation to the degree of customer burnout but did add variance to what may be a more important measure for practical purposes, and that is whether workers were considered as experiencing customer burnout or not.

5 Conclusions

The results of this study did not find support for the hypothesis that the co-worker safety climate dimensions would add predictive capacity above that of management in a large entertainment and hospitality organisation. However, this study did find that co-worker safety climate dimensions could add predictive capacity above that of management for whether workers were assessed as burnt out or not according to a criterion used for the CBI. This could be an important practical outcome of using both the management and co-worker safety climate dimensions to the extent that workers assessed as burnt out are found to be more likely to be involved in negative safety outcomes such as accidents and stress claims.

A major difference between the current study and a previous study using two of the same safety climate and burnout measures was the structure of the organisations in which the research was conducted. In the large entertainment and hospitality organisation in this study the workers were generally in close proximity to their managers on the same site and the relative influence of co-worker safety climate dimensions was less than in another human service organisation involving work in

community housing in more isolated environments, where there was less control and on-the-job support from supervisors and managers. These findings suggest that the relative influence of safety-related attitudes and behaviours of managers and co-workers may vary depending on the structure of the organisation.

An important driver for understanding the relative influence of manager and co-worker dimensions for the structure of the concept of work safety climate is the changing nature of work over the last decade that includes more human service organisations with co-workers working more directly with each other in teams and with customers. This trend is likely to continue to increase in the future, with health care and social assistance projected to be the largest areas of employment growth. Accordingly, there is a need to determine the structure of work safety climate in terms of its important dimensions if work safety climate measures are to be used most effectively and efficiently to maximise work safety in organisations.

References

Australian Government Department of Employment. (2016). Industry employment projections report. Retrieved from http://lmip.gov.au/default.aspx?LMIP/EmploymentProjections.

Andriessen, J. (1978). Safe behaviour and safety motivation. *Journal of Occupational Accidents, 1,* 363–373.

Becker, T. E. (1992). Foci and bases of commitment: Are they distinctions worth making? *Academy of Management Journal, 35,* 232–244.

Beus, J. M., Payne, S. C., Bergman, M. E., & Arthur, W. (2010). Safety climate and injuries: An examination of theoretical and empirical relationships. *Journal of Applied Psychology, 95*(4), 713–727. https://doi.org/10.1037/a0019164.

Brown, R. L., & Holmes, H. (1986). The use of a factor-analytic procedure for assessing the validity of an employee safety climate model. *Accident Analysis and Prevention, 18*(6), 455–470.

Cheyne, A., Cox, S., Oliver, A., & Tomás, J. M. (1998). Modelling safety climate in the prediction of levels of safety activity. *Work & Stress, 12*(3), 255–271. https://doi.org/10.1080/02678379808256865.

Christian, M., Bradley, J., Wallace, J., & Burke, M. (2009). Workplace safety: A meta-analysis of the role of person and situation factors. *Journal of Applied Psychology, 94*(5), 1103–1127.

Clarke, S. (2010). An integrative model of safety climate: Linking psychological climate and work attitudes to individual safety outcomes using meta-analysis. *Journal of Occupational and Organizational Psychology, 83*(3), 553–578. https://doi.org/10.1348/096317909x452122.

Clarke, S. (2006). Safety climate in an automobile manufacturing plant. *Personnel Review, 35*(4), 413–430. https://doi.org/10.1108/00483480610670580.

Clarke, S., & Cooper, C. L. (2004). *Manageing the risk of workplace stress*. London: Routledge.

Cox, S. J., & Cheyne, A. J. T. (2000). Assessing safety culture in offshore environments. *Safety Science, 35,* 111–129.

Dedobbeleer, N., & Beland, F. (1991). A safety climate measure for construction sites. *Journal of Safety Research, 22,* 97–103.

Flin, R., Mearns, K., Gordon, R., & Fleming, M. (1996). Risk perception by offshore workers on UK oil and gas platforms. *Safety Science, 22,* 131–145.

Flin, R., Mearns, K., O'Connor, P., & Bryden, R. (2000). Measuring safety climate: Identifying the common features. *Safety Science, 34,* 177–192.

Griffin, M. A., & Neal, A. (2000). Perceptions of safety at work: A framework for linking safety climate to safety performance, knowledge, and motivation. *Journal of Occupational Health Psychology, 5,* 347–358.

Guldenmund, F. W. (2000). The nature of safety culture: A review of theory and research. *Safety Science, 34,* 215–257.

Guthrie, R., Ciccarelli, M., & Babic, A. (2010). Work-related stress in Australia: The effects of legislative interventions and the cost of treatment. *International Journal of Law and Psychiatry, 33,* 101–115.

Hall, G. B., Dollard, M. F., & Coward, J. (2010). Psychosocial safety climate: Development of the PSC-12. *International Journal of Stress Management, 17*(4), 353–383.

Hofmann, D. A., & Stetzer, A. (1996). A cross-level investigation of factors influencing unsafe behaviours and accidents. *Personnel Psychology, 49,* 307–339.

Kines, P., Lappalainen, J., Mikkelsen, K. L., Olsen, E., Pousette, A., Tharaldsen, J., … Törner, M. (2011). Nordic safety climate questionnaire (NOSACQ-50): A new tool for diagnosing occupational safety climate. *International Journal of Industrial Ergonomics*, *41*, 634–646.

Kristensen, T., Borritz, M., Villadsen, E., & Christensen, K. (2005). The Copenhagen burnout inventory: A new tool for the assessment of burnout. *Work and Stress, 19*(3), 192–207.

Mearns, K., Whitaker, S. M., & Flin, R. (2003). Safety climate, safety management practice and safety performance in offshore environments. *Safety Science, 41,* 641–680. https://doi.org/10.1016/s0959-8049(03)00363-0.

Medibank Private. (2008). The cost of workplace stress in Australia. Retrieved from http://www.medibank.com.au/client/documents/pdfs/The-cost-of-Workplace-stress.pdf.

Nielsen, K., & Mikkelsen, K. (2007). Predictive factors for self-reported occupational injuries at 3 manufacturing plants. *Safety Science Monitor, 11*(2).

Oliver, A., Cheyne, A., Tomas, J. M., & Cox, S. (2002). The effects of organizational and individual factors on occupational accidents. *Journal of Occupational and Organizational Psychology, 75,* 473–488.

Safe Work Australia. (2013). The incidence of accepted workers' compensation claims for mental stress in Australia. Retrieved from http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/workers-compensation-claims-for-mental-stress-in-australia.

Safe Work Australia. (2015). The cost of work-related injury and illness for australian employers, workers and the community: 2012–13. Retrieved from http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/940/cost-of-work-related-injury-and-disease-2012-13.docx.pdf.

Siu, O.-L., Phillips, D. R., & Leung, T.-W. (2004). Safety climate and safety performance among construction workers in Hong Kong. *Accident Analysis and Prevention, 36*(3), 359–366. https://doi.org/10.1016/s0001-4575(03)00016-2.

Tomas, J. M., Melia, J. L., & Oliver, A. (1999). A cross-validation of a structural equation model of accidents: Organisational and psychological variables as predictors of work safety. *Work & Stress, 13,* 49–58.

Zohar, D. (1980). Safety climate in industrial organisations: Theoretical and applied implications. *Journal of Applied Psychology, 65,* 96–102.