

Safety Climate, Safety Behaviours and Control: An Application of the Job Demand-
Control model to Occupational Safety

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Abstract

While the literature surrounding the negative effects of stress on health and well-being is plentiful, there is a distinct lack of research applying stress frameworks to an organisational safety context. This study investigated the impact of stressors and strains on safety in the workplace, using the Job Demand-Control model as a research framework. In order to maintain a proactive approach to safety management, safety climate, safety compliance and safety participation were used as study variables as they have been established as antecedents to accidents and injuries in the workplace. From questionnaire data from employees with regular safety issues it was found that a positive relationship exists between safety climate and safety behaviours. Satisfaction was found to mediate the relationship between safety climate and one dimension of the safety compliance measure used. Providing support for the buffer hypothesis of the Job Demand-Control model, safety control moderated the relationship between safety climate and safety participation. Control over work scheduling, and decision latitude moderated the relationship between safety climate and safety participation but were indicative of an enhancing effect, rather than a buffering effect. The results suggest that control is an important variable to consider in terms of safety.

Introduction

Health and safety is an important consideration for organisations. In New Zealand in the year 2007/8 285, 400 people suffered some kind of injury at work out of total workforce of 2.26 million people (ACC New Zealand, 2008). Ultimately, illness and injury are costly for an organisation. Absent employees reduce productivity and increase costs and often workplace injuries and illness require time off work. The ability to avoid illness and injury in the workplace is beneficial for an organisation and therefore an important consideration for health and safety policy. The negative effects of stressors and strains on health and well-being outcomes are well established, yet these findings are only beginning to be applied to employee safety. The current study focuses on the role of stressors and strains as applied to an occupational safety context.

Safety Climate

Safety climate involves “perceptions of policies, procedures and practices relating to safety in the workplace” (Neal & Griffin, 2002, p. 69). These perceptions in turn influence employees’ attitudes, interactions and behaviours in terms of safety (Neal & Griffin, 2004). Safety climate is a multidimensional construct (Guldenmund, 2000) but there is so far no consensus on the factor structure of the concept. Zohar (1980), for example, identified 8 different dimensions of safety climate involving perceptions of: importance of safety training, perceived effects of required work pace on safety, perceived status of safety committee, perceived status of safety officer, perceived effects of safe conduct on promotion, level of risk at work place, management attitudes toward safety, and effect of safe conduct on social status. In contrast, Dedobbeleer and Beland (1991) identify only management commitment to safety and worker involvement in safety activities to be dimensions of safety climate. It has

been suggested that safety climate be conceptualised as the extent that employees believe safety is valued in the organisation as reflected in their perceptions of safety related policies, procedures and rewards (Griffin & Neal, 2000).

Measuring accident rates as an indicator of the state of safety within an organisation has been criticised due to the reactive nature of this approach (Cooper & Phillips, 2004). Instead, a focus on “leading” indicators of safety, such as safety climate (Flin, Mearns, O'Connor, & Bryden, 2000), has emerged. A prospective view of safety suggests that safety climate operates as an antecedent to injuries or accidents in the workplace but is not a direct cause, rather a contributing factor. Payne et al (Payne, Bergman, Beus, Rodríguez, & Henning, 2009) suggest that safety climate is related to safety related behaviours which are related to accidents and injuries.

Neal and Griffin (2002) determine safety climate to be an antecedent to safety behaviour. The authors' conceptualisation of safety behaviour consists of safety compliance and safety participation. Examples of safety compliance are wearing protective equipment and adhering to safety regulations. Safety participation involves behaviours that support safety within an organisation but do not directly contribute to individual safety, for example attending safety meetings and helping co-workers with safety related issues) (Neal & Griffin, 2002, 2004). A positive relationship has been identified between safety climate and safety compliance and participation (Clarke, 2006; Griffin & Neal, 2000; Neal, Griffin, & Hart, 2000a) in that a more positive safety climate results in greater safety participation and safety compliance. A significant relationship has been identified between safety performance (compliance/participation) and accident involvement (Clarke, 2006). Accidents are low frequency events often caused by individuals engaging in unsafe acts that result in hazardous conditions in the workplace (Reason, 1990). Low levels of safety compliant and safety participatory behaviours may create hazardous conditions that allow for accidents to occur.

Neal and Griffin (2006) found that safety compliance and safety participation has a lagged effect on accidents in the workplace. Refusal to comply with safety procedures or participate in activities that ensure colleagues safety may not directly impact the person who is engaging in these unsafe behaviours but rather create the ideal conditions for accidents to occur at a later time. In addition to this, the authors found support for the direction of causality between safety behaviours and accidents. They found, when considering the issue of reverse causality that the relationship goes from behaviours to accidents and that accidents do not increase the occurrence of safety behaviours. They also found that an increase in the engagement of safety behaviours reduces the rate of accidents. This suggests that like safety climate, safety behaviours may be used as a “leading indicator” (predictor) of accidents. Safety climate is used as a “leading indicator” on the basis that a prior levels of safety climate are related to subsequent safety outcomes (Payne et al., 2009). Safety climate is an antecedent to safety behaviours which are in turn an antecedent to accidents. Thus, measuring safety climate allows a proactive approach to accident and injury prevention.

The positive relationship between safety climate and safety behaviours may be explained by social exchange theory (Blau, 1964). Social exchange theory predicts that when an employee perceives that an organisation is concerned with their well-being, they will feel obligated to reciprocate by engaging in behaviours that benefit the organisation. To apply this in the explanation of the safety climate-safety behaviours relationship, an employee believes that the organisation is concerned for their safety from their perceptions of the safety procedures and policies the organisation has in place, and therefore reciprocates by engaging in positive safety behaviours (Hofmann & Morgeson, 1999). Based in social exchange theory and previous research the following hypothesis is made.

Hypothesis 1: There will be a positive relationship between safety climate and safety compliance and safety participation.

Strains and Safety

Strain is a reaction to overly taxing demands, or stressors, in the workplace. Strains may be physical, psychological or behavioural in nature (Beehr & Franz, 1987). An example of a psychological strain is job dissatisfaction.

Safety climate may be conceptualised as a psychological stressor (demand). Leather (1987) argues that in addition to providing a physically safe working environment, organisations should also provide that which is “psychologically necessary to convince lower organizational members that safety really counts as a primary organizational goal” (pp. 169). Therefore, while absence of that which provides a physically safe working environment may constitute a physical stressor, a poor organisational safety climate then becomes a psychological stressor.

Psychological strains are related to organisational safety outcomes. For example there is a positive relationship between job dissatisfaction and accidents and injuries on the job (Holcom, Lehman, & Simpson, 1993). As safety behaviour is used as a “leading indicator” to accidents in the workplace, job dissatisfaction should lead to less safety compliance and safety participation in an organisation. Satisfaction has been found to have a positive impact on organisational safety. Satisfied employees are more motivated towards safety behaviours and more knowledgeable about safety which are in turn predictors of safety compliance (Probst & Brubaker, 2001). In addition to this, satisfied workers are less likely to be involved in accidents (Gyekye, 2005). Job satisfaction has further been found to mediate the relationship between high performance work systems and accidents (Barling, Kelloway, & Iverson, 2003). As such, high performance work systems lead to job satisfaction which leads to fewer accidents. In other words, as well as having direct effects of safety outcomes, psychological strains also have indirect effects on the relationship between stressor and safety

outcomes. If this is true, satisfaction should mediate the relationship between safety climate and safety performance. Satisfaction is a reaction to a stressor, in this instance safety climate. A positive safety climate, or the absence of a stressor, should lead to job satisfaction which leads to increased safety compliance and safety participation.

The frameworks of Sanders & Baron (1975) and Kanfer and Ackerman (1989) can be applied to explain these relationships. The distraction-conflict theory (Sanders & Baron, 1975) proposes that distraction impairs performance on complex tasks. To apply this to the current research, poor safety climate leads to dissatisfaction, which is a psychological strain and a distraction. As a result of this distraction, safety compliance and safety participation, both complex tasks, are less than if the stressor and therefore strain were absent (ie good safety climate).

The cognitive resources frame work (Kanfer & Ackerman, 1989) suggests that cognitive resources to deal with a task are finite. These finite resources can be dedicated to on-task activities, off-task activities and self-regulating activities. On -task activities include productivity, safety and quality. Off- task activities include interacting with co-workers about job unrelated things. Self-regulating activities involve monitoring the environment. In this case, on-task activities would be safety performance- compliance and participation. Self-regulating activities would be monitoring issues in the environment that stem as a result of a poor safety climate. When climate is high, there is no need for these self-regulatory activities so more cognitive resources are available to complete on-task activities. However, if a poor safety climate exists, some of an employee's finite cognitive resources are allocated to monitoring the work environment and deciding how to deal with the issues that arise as a result of a poor safety climate, for example dissatisfaction. This leaves less cognitive resources available for on-task activities and thus a reduction in safety behaviours.

Hypothesis 2: Satisfaction will mediate the relationship between safety climate and safety compliance and safety participation.

Job Demands, Control and Safety

Karasek (1979) labels stressors as ‘job demands’. Long working hours are a job demand and are known for their deleterious effects on health and well-being (Caruso et al., 2006; Caruso, Hitchcock, Dick, Russo, & Schmit, 2004; Harrington, 2001; Kawada & Ooya, 2005; Sparks, Cooper, Fried, & Shirom, 1997). These effects include increases in cardiovascular disease, stress, fatigue, sleep disorders, gastrointestinal disorders, musculoskeletal disorders and mental disorders (Caruso et al., 2006). Overtime may be considered a job demand as well as, by definition, it implies working hours in addition to those that are contracted (Beckers et al., 2007). It is therefore an extra strain in the work place. Little research exists addressing the impact of overtime on organisational safety. However, that that does exist points towards negative outcomes of overtime. Ong, Fung, Chow and Kleeven (1982) found an increase in hand injuries in factory workers working an average working day of 11.5 hours. There exists an increasing risk of injury in those who work over 8 hours a day or more than 40 hours a week (Dembe, Erickson, Delbos, & Banks, 2005). Furthermore, overtime work is a risk factor for injury in the workplace (Lowery et al., 1998) and related to accident incidence (Schuster & Rhodes, 1985). Even more concerning is an increase in mortality rate among women that work overtime of more than 5 hours a week (Nylen, Voss, & Floderus, 2001).

It is important to note that long work hours and overtime are not the same thing (Beckers et al., 2007). Most of the research that does exist uses long work hours and overtime interchangeably. While long work hours and overtime may be intertwined (Beckers et al.,

2007) in that those who work long hours are most probably working overtime, working overtime does not automatically mean long work hours. There have been calls from researchers for the influence of long working hours to be studied in terms of safety (Dembe et al., 2005). Spurgeon, Harrington and Cooper (1997) cite an emphasis on shift work within the health and safety literature suggesting that long work hours and overtime are neglected but important to study.

The Job Demand-Control model (JDC) (Karasek, 1979) is a stress model for explaining psychological and physical well-being. Central to the model are three concepts: job demands (a source of stress in the job, a stressor such as workload), job control (also called decision latitude; an employee's control over tasks and how they work), and strain. The strain hypothesis proposes that the most adverse psychological strain results from a high strain job (high demands and low control). In addition to this, a second hypothesis proposes that the combination of high demands and high control results in increased learning, motivation and development of skills. This hypothesis, the learning hypothesis, is beyond the scope of this paper. Thirdly, the buffer hypothesis, suggests that control provides a buffer against the negative effects of high demands on health and well being. Central to the hypothesis is the idea that control moderates the effects of high demands on health and well-being.

Empirical evidence for the strain hypothesis is well established. For example, the combination of high job demands and low control have been found to increase psychological distress (Daniels & Guppy, 1994), exhaustion and depression (Karasek, 1979). Reviews of the JDC model have shown support for the strain hypothesis when physical health is an outcome (Van der Doef & Maes, 1998) and when the outcome is psychological well-being (Van der Doef & Maes, 1999).

Evidence for the buffer hypothesis is less clear with studies reporting mixed results. Some provide support for the interactive effects of demands and control. Dwyer & Ganster (1991) found that employees with a high work load and high control of their work environment were more satisfied than those with a high workload and low control over their work environment. Reviews of empirical research of the job demand-control model also show mixed results for the buffer hypotheses (de Lange, Taris, Kompier, Houtman, & Bongers, 2003; Van der Doef & Maes, 1998; Van der Doef & Maes, 1999).

In addition to this, control has also been shown to have direct effects on strains. In a test of the JDC model task control using nurses, significant variance in job satisfaction was explained by resource control and control over physical environment (McLaney & Hurrell Jr, 1988). Indeed, when first establishing the model Karasek (1979) noted the direct effect of control on psychological strains himself.

While the negative effects of stress have been well documented in the health literature through the application of the job demand-control model, little research exists in integrating the stress and safety fields of study. The JDC model has been applied previously as a framework for researching safety (Snyder, Krauss, Chen, Finlinson, & Huang, 2008). Snyder et al., (2008) established support for the buffer hypothesis when applied to the prediction of workplace injuries from situational constraints such as fault equipment. They found that employee safety control interacted with situational constraints such that injury incidence was less under conditions of high situational constraints and high safety control than low safety control. Turner, Chmiel and Walls (2005) found direct effects of job demands and job control on safety citizenship role definition (employees role orientation toward improving workplace safety). They also found that job demands and job control interacted to predict additional variance in safety citizenship role definition. When demand was high and control was low, less safety citizenship role definition was reported.

The current study attempts to apply the JDC model to a safety context, by focussing on antecedents to accidents as leading indicators of safety outcomes rather than accident rates themselves. In this instance, the positive relationship between safety climate and safety performance is examined using the buffer hypothesis as a framework. As mentioned previously, low safety climate could be considered a demand in a workplace. High safety climate would then be conceptualised as low demand. By applying the buffer hypothesis to this relationship, control will interact with safety climate such that the effects of climate on safety performance will be more positive under conditions of high control.

Control over overtime and working schedule are included based on the previously mentioned negative effects of overtime and long working hours on safety outcomes in an organisation. The assumption is that overtime and long working hours are precursors to accidents and injury in the workplace and perceptions of control over these precursors will buffer the relationship between safety climate and safety performance as they utilised as leading variables to accidents. Thus, giving control over overtime and long working hours may improve organisational safety. Based on this, the following hypotheses are proposed.

Hypothesis 3 a: The positive relationship between safety climate and safety behaviours will be stronger for individuals with high control of overtime worked than those with low control.

Hypothesis 3 b: The positive relationship between safety climate and safety behaviours will be stronger for individuals with high control of work scheduling than those with low control.

Hypothesis 3 c: The positive relationship between safety climate and safety behaviours will be stronger for individuals with high control of safety than those with low control.

Hypothesis 3 d: The positive relationship between safety climate and safety behaviours will be stronger for individuals with high decision latitude than those with low decision latitude.

Based on the previously mentioned direct effects of control on strains;

Hypothesis 4: There will be a positive relationship between control of (a) overtime, (b) work scheduling and (c) safety and (d) decision latitude and satisfaction.

Figure 1 presents a graphical representation of these relationships

Method

Participants and Procedure

Participants completed a self administered survey either online or on paper. Organisations that were deemed to operate in industries that pose a risk to employee safety were approached, by email, for inclusion in this study. Three organisations agreed for their staff to participate, either online or by paper. Online participants volunteered in response to a recruitment email sent to them by their organisation. Those who completed the paper version of the survey volunteered in response to a recruitment poster displayed in their organisation (appendix A). Participants who completed a paper questionnaire did so on-site. All participants gave their informed consent prior to commencing the study and were rewarded with the option of entering a raffle draw to win one of eight \$100 grocery vouchers.

Participants holding a casual contract with their employer and that answered yes to working overtime were excluded as they did not have contractual hours. As overtime is defined as any hours in addition to the hours and employee is contracted to work, an answer of yes to working overtime suggests a misunderstanding of the question. Further to this,

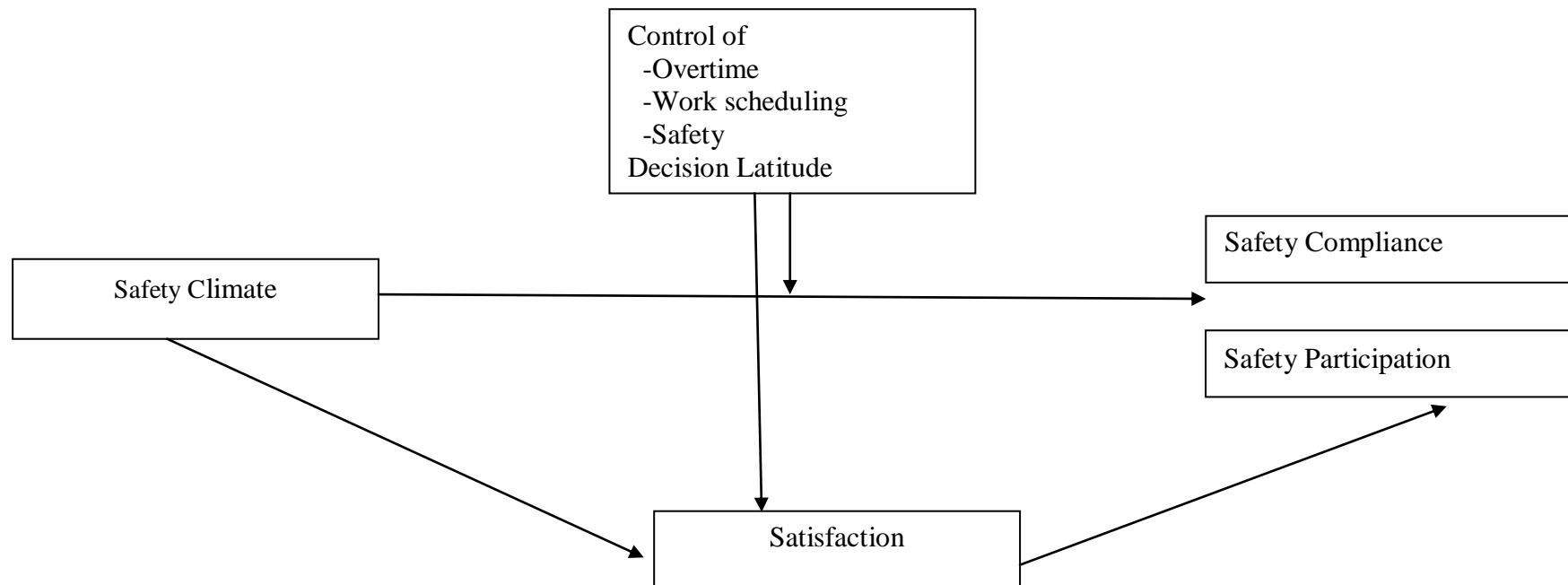


Figure 1. Graphical representation of hypothesised relationships.

participants with missing data were also excluded as the statistical analysis employed requires no missing data (see Analyses). This resulted in a sample of 96 participants (53 males, 42 females). 94.8% of the participants worked overtime. Participants held one of 4 contracts with their employers; Full Time (78.1%), Part Time (18.8%), Fixed Term Full Time (1%) or Fixed Term Part Time (2.1%). Participants worked in a large variety of occupations (for example, mechanic, social worker, office administrator).

Measures

All measures used were established scales, but the dimensionality in the present sample was tested by exploratory factor analyses (principal axis factoring) with oblique rotation. This resulted in some instances in the removal of items which did not seem to work satisfactorily in the present sample; either by loading on different factors or not loading strongly enough on the factor intended (loadings below .35).

The original questionnaire participants completed can be found in appendix B.

The final items retained for analysis can be found in appendix C.

Safety climate was measured using a 6-item safety climate scale described in Hahn and Murphy (2008). Responses are measured on a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Internal consistency for the scale is acceptable, $\alpha = .84-.92$ (Hahn & Murphy, 2008). Analysis determined a 1-factor solution for the safety climate measure as applied to the current research sample. The exclusion 1 item due to poor factor loading resulted in $\alpha = .76$.

Two components of safety behaviour were measured; safety participation and safety compliance. Safety compliance was measured using an 11-item compliance with safety

behaviours (CBS) scale developed by Hayes, Perander, Smecko and Trask (1998). Items reflect either a safe or unsafe work practice. Responses are recorded as how frequently a behaviour is done in the respondents current job using a 5-point Likert-type scale from 1 (*never*) to 5 (*always*). After reverse coding higher scores reflect greater compliance with safe work behaviours. An example of an item measuring compliance with safety behaviours is “*I follow all safety procedures regardless of the situation I am in.*” Internal consistency of the CBS has been established as acceptable, $\alpha = .85$. Analysis resulted in a 2-factor solution for the current research sample, these factors were both retained and named safety compliance 1 and safety compliance 2. On inspection of the items loading on each factor safety compliance 1 was more concerned with general obedience and perhaps also with whether people think the safety procedures in place are sensible or not. Safety compliance 2 was more concerned with how compliant participants are based on the frequency of safety compliant behaviours. After items with a poor factor loading were removed, 4 items loaded to each factor ($\alpha = .66$).

Neal and Griffin's (2006) 3-item measure of safety participation was used. The scale requires responses to statements on a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). An example of an item measuring safety participation is “*I promote the safety program within the organisation.*” Internal consistency for the scale is acceptable, $\alpha = .89$ (Neal & Griffin, 2006).

The job safety subscale of the Work Safety Scale (Hayes, Perander, Smecko & Trask, 1998) was used to assess participants' perception of the safety of their job and ensure that research regarding organisational safety was applicable. The scale requires a response to 10 statements used to describe the participants current job using a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). An example of such a statement is “*Chance of death.*” Internal consistency of this subscale has been established as acceptable,

$\alpha = .95$ (Hayes, Perander, Smecko & Trask, 1998). After analysis, the removal of 3 items resulted in a 1 factor solution for the current research sample ($\alpha = .89$).

The dichotomous scale used by Beckers et al (2008) to measure employee control of overtime worked was adapted for use in the current study. Instead of using yes/no responses, how much participants agreed with the reasons given for working overtime was measured using a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). An example of an item measuring control of overtime is “*I work overtime because I want to.*” After reverse coding, higher scores indicate more control over overtime. For the current research sample, removal of 1 item resulted in a 1-factor solution ($\alpha = .63$).

Job demands and decision latitude (job control) were measured. Job demands were measured using the job demand subscale of Karasek’s (1979) Job Demands and Decision Latitude scale. Seven items describe psychological stressors such as workload and time pressures. Responses are measured on a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*extremely often*). An example of an item measuring job demands is “*To what extent does your job require your working fast?*” Coefficient alpha values for job demands range from .79 to .88 (Chay, 1993; Fortunato, Jex, & Heinich, 1999; Moyle & Parkes, 1999; Parkes, 1990; Westman & Eden, 1997; Xie, 1996; Zohar, 1997). A 1-factor solution was achieved with the current research sample by the removal of 1 item ($\alpha = .87$).

Job control was measured using the job decision latitude subscale of the Job Demands and Decision Latitude scale. This consists of eight items; four relating to an employee’s discretion in applying skills to do the job and four describing an employee’s authority to make job-related decisions. Responses are measured on a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*extremely often*). An example of an item measuring job decision latitude is “*To what extent do you have control over what happens on your job?*”. Higher scores

indicate more perceived discretion in applying skills to do the job and authority to make job-related decisions. Coefficient alpha values for decision latitude ranged from .77 to .85 (Chay, 1993; Fortunato et al., 1999; Moyle & Parkes, 1999; Parkes, 1990; Westman & Eden, 1997; Xie, 1996; Zohar, 1997). The removal of 2 items resulted in a 1-factor solution when applied to the current research sample ($\alpha = .79$).

Employee safety control was measured using 3 items from Huang, Chen, Krauss and Rogers (2004). These items measured employee's belief in how knowledgeable they are about safety and their ability to control their safety behaviour. An example of an item measuring employee safety control is "*I know my attitude plays an important role in working safely.*" Responses are measured on a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The coefficient alpha of the scale is .70. Higher scores indicate a stronger sense of control over safety behaviours. 1 item was removed due to poor factor loading for the current sample. The removal of this item resulted in an internally consistent scale ($\alpha = .75$).

Six items used by Agho, Price & Mueller (Agho, Price, & Mueller, 1992) from Brayfield & Rothe (Brayfield & Rothe, 1951) were used to measure global job satisfaction. These items measured the extent to which employees like their work. Examples of items measuring job satisfaction include "*I would not consider taking another kind of job*" and "*Most days I am enthusiastic about my job.*" Responses are measured on a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to (*strongly agree*). The coefficient alpha for the scale is .90. Higher scores indicate greater job satisfaction.

Analyses

Mediation and moderation were tested using the process macro for SPSS provided by Hayes (2012)

The possible mediating effect of satisfaction on the relationship between safety climate and safety participation and safety compliance 1 and safety compliance 2 was examined using hierarchical regression analyses. Baron and Kenny (1986) make recommendations for testing mediation. The authors approach, though widely used, has been criticised and alternative methods for testing mediation have been suggested (Hayes, 2009). For the current study, the Baron and Kenny approach was used in combination with a bootstrap approach as suggested by Preacher and Hayes (Preacher & Hayes, 2004), where a mediating effect is identified by a significant indirect effect, as identified by the bootstrapping method (bootstrap samples=1000).

In order to test the hypotheses 3a-d predicting moderating effects, hierarchical regression was used. Average hours worked per week, safety climate, overtime control, control of work scheduling, decision latitude and safety control were centred (by subtracting the mean from the scores thereby making the new mean 0) prior to analysis to prevent problems of multicollinearity between the predictor variable, the moderator variable and the interaction term (McClelland & Judd, 1993). Safety behaviours (safety participation, safety compliance 1 and safety compliance 2) were first regressed onto the control variable (average hours worked per week), safety climate and the proposed moderator variable. Safety behaviours were then regressed onto the control variable, safety climate, the proposed moderator variable and the interaction term. Moderation was indicated when the interaction term was significant and contributed a significant change in the variance explained by the regression step (Baron & Kenny, 1986). When moderation was indicated, the interaction was

plotted using data generated by the macro. The relationship between predictor and outcome at +1SD and -1SD of the moderator was plotted.

Results

Descriptive statistics and scale reliabilities are presented in table 1. Exploratory factor analysis showed that the measure for safety compliance consisted of two factors, safety compliance 1 and safety compliance 2. Each factor was used independently in the analysis. Cronbach's alpha for the measures are acceptable. Table 2 presents zero-order correlations among the study variables. Average hours worked per week was included in analyses as a control variable due to the relationship between long working hours and safety. As the current research analyses antecedents to organisational safety outcomes it is appropriate to control for average hours worked per week.

Table 1
Descriptive Statistics and Scale Reliabilities

	Range	Mean	Std. Deviation	A
Av. Hrs Per Week	0-70	40.65	11.17	NA
Overtime Control	1-5	2.42	1.25	.76
Satisfaction	1-5	3.68	.72	.84
Safety Climate	1-5	3.95	.70	.88
Safety Participation	1-5	3.69	.67	.68
Job Demands	1-5	3.41	.77	.86
Work Choice	1-5	3.20	1.02	.79
Decision Latitude	1-5	3.57	.68	.81
Safety Control	1-5	4.22	.61	.75
Risk	1-5	2.59	.92	.89
Safety Compliance 1	1-5	2.98	.95	.79
Safety Compliance 2	1-5	3.80	.60	.67

Mediation

As predicted by Hypothesis 1 and confirmed by the zero-order correlations in table 2, safety climate was positively related to safety participation ($r = .49, p < .01$) and factor 2 of safety compliance ($r = .34, p < .01$). There was a significant relationship between safety climate and factor 1 of safety compliance, however the relationship was not in the expected direction ($r = -.20, p < .05$).

Hypothesis 1 was further partially confirmed by examining step 1 of the regression analyses (table 3) predicting safety participation, safety compliance 1 and safety compliance 2. The relationships between safety climate and safety compliance 2 were shown to be positive and statistically significant, even when controlling for the effects of average hours worked per week. The relationship between safety climate and safety compliance 1, while being statistically significant when the effects of average hours worked per week were controlled for, was in the opposite direction to that expected.

Table 2

Interscale Correlations of Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. Av. Hrs Per Week	-	.41**	-.02	-.04	.08	.31**	-.36**	-.01	.13	.37**	.29**	.29**
2. Overtime Control		-	-.03	-.05	-.03	.04	-.33**	-.08	.01	.23*	.37**	.13
3. Satisfaction			-	.54**	.31**	.06	.21*	.43**	.29**	-.30**	-.26**	.24*
4. Safety Climate				-	.49**	-.15	.25*	.32**	.54**	-.32**	-.20*	.34**
5. Safety Participation					-	.13	.03	.02	.43**	-.06	-.28**	.45**
6. Demand						-	-.08	.32**	.08	.09	-.17	.11
7. Work Choice							-	.36**	.13	-.20	-.16	-.04
8. Decision Latitude								-	.08	-.18	-.19	-.07
9. Safety Control									-	-.14	-.04	.40**
11. Safety Compliance1											-	.02
12. Safety Compliance 2												-

* $p < .05$. ** $p < .01$; n= 96

Table 3

Summary of Regression Analyses Predicting Safety Participation, Safety Compliance 1 and Safety Compliance 2.

	Satisfaction	Safety Participation		Safety Compliance 1		Safety Compliance 2	
		Step1	Step2	Step1	Step2	Step1	Step2
Av Hrs Worked	.00	.01	.01	.02**	.02**	.02**	.02**
Safety Climate	.56*	.47**	.43**	-.26*	-.10	.31**	.27**
Satisfaction	-		.07		-.30*		.07
R^2	.28	.25	.25			.21	.21

* $p < .05$; ** $p < .001$; $n = 96$

Table 4 presents the results for the different steps testing for the mediating effect of satisfaction on the relationship between safety climate, safety participation and safety compliance 1 and safety compliance 2. It was established that a relationship exists between safety climate and satisfaction, while controlling for average number of hours worked. There was no indirect effect of safety climate through satisfaction on safety participation or safety compliance 2. As a result, satisfaction does not mediate the relationship between safety climate and these two outcomes. However, there was a significant indirect effect of safety climate through safety compliance 1, which indicates mediation. Further to this, it was established that the relationship between safety climate and safety compliance 1 became non-significant when satisfaction was introduced in the regression analyses. The bootstrapping method further confirms the mediating effect of satisfaction ($B = -.17$, 95% CI $[-.37, -.02]$). This suggested that the negative relationship between safety climate and safety compliance 1 is mediated by satisfaction.

Moderation

Tables 4-7 summarise the findings of the hierarchical moderation analysis. As shown in Table 5, safety climate had a positive main effect on safety participation and safety compliance 2. Safety climate had a negative main effect on safety compliance 1, but this was diminished and became non-significant with the addition of the interaction term. These findings support Hypothesis 1 for safety participation and safety compliance 2 but not for safety compliance 1. The regression coefficient for the interaction term, nor the change in variance accounted for by the interaction term were not significant indicating that overtime control does not moderate the relationship between safety climate and safety participation, safety compliance 1 or safety compliance 2. Thus Hypothesis 3a is not supported.

Table 4 shows the results from the moderation analysis with control of work scheduling as a moderator. When predicting safety participation, there was a significant main effect of both safety climate. The interaction term safety climate x overtime control was not a significant predictor of safety participation. Additionally, it did not explain unique variance in safety participation. Therefore overtime control does not moderate the relationship between safety climate and safety participation. Safety climate showed a significant main effect for safety compliance 1 and safety compliance 2. However, the interaction terms were not significant and did not explain unique variance. Overtime control did not moderate the relationship between safety climate and safety compliance 1 or safety compliance 2. From these results, hypothesis 3a is not confirmed.

Table 4

Moderated Hierarchical Regression Analysis for Relationship Between Safety Climate and Safety Behaviours (Participation and Compliance 1 and 2), With Overtime Control as a Moderator (Unstandardised Coefficients)

	Safety Participation			Safety Compliance 1			Safety Compliance 2		
	Step1	Step2	Step 3	Step1	Step2	Step3	Step1	Step2	Step3
Av.Hours	.01	.01	.01	.03*	.01	.01	.02*	.02*	.02*
SC		.47**	.57**		-.25*	-.24		.31**	.32**
OTC		-.03	-.05		.22*	.22*		.01	.01
SCxOTC			.08			.02			.03
R^2	.01	.25	.26	.09	.17	.16	.08	.21	.21
ΔR^2	.01	.25**	.01	.09*	.11*	.00	.08*	.13**	.00

* $p < .05$ ** $p < .001$ $n=96$

Note: SC= Safety Climate, OTC= Overtime Control

Table 5 shows the results from the moderation analysis with control of work scheduling as a moderator. Safety climate showed a main effect for safety participation. The interaction term safety climate x work choice accounted for an additional 9% of the variance in safety participation. In addition to this the regression coefficient was statistically significant. Therefore, choice in work scheduling is a significant moderator of the relationship between safety climate and safety participation. The interaction is plotted in Figure 2. As the plotted interaction shows, the relationship between safety climate and safety participation was more positive when employees perceived high choice in work scheduling than if they perceived low choice in work scheduling. However, safety participation was higher for the low safety climate (high demand) and low choice in work scheduling condition than the low safety climate (low demand) and high choice in work scheduling condition. These results suggest partial support for Hypothesis 3b.

Table 5

Moderated Hierarchical Regression Analysis for Relationship Between Safety Climate and Safety Behaviours (Participation and Compliance 1 and 2), With Control of Work Scheduling as a Moderator (Unstandardised Coefficients)

	Safety Participation			Safety Compliance 1			Safety Compliance 2		
	Step1	Step 2	Step 3	Step1	Step2	Step3	Step1	Step 2	Step 3
Average Hours	.01	.01	.00	.03*	.02*	.02	.02*	.02**	.02**
SC		.49**	.48**		-.27*	-.27		.37**	.53**
WSC		-.04	-.09		-.01	-.01		-.19	-.18
SCxWSC			.31**			-.02			.19
R^2	.01	.25	.35	.09	.12	.12	.08	.21	.21
ΔR^2	.01	.25*	.09**	.09*	.04	.00	.08*	.13**	.00

* $p < .05$ ** $p < .001$ $n=96$

Note: SC= Safety Climate, WSC= Choice in Work Scheduling

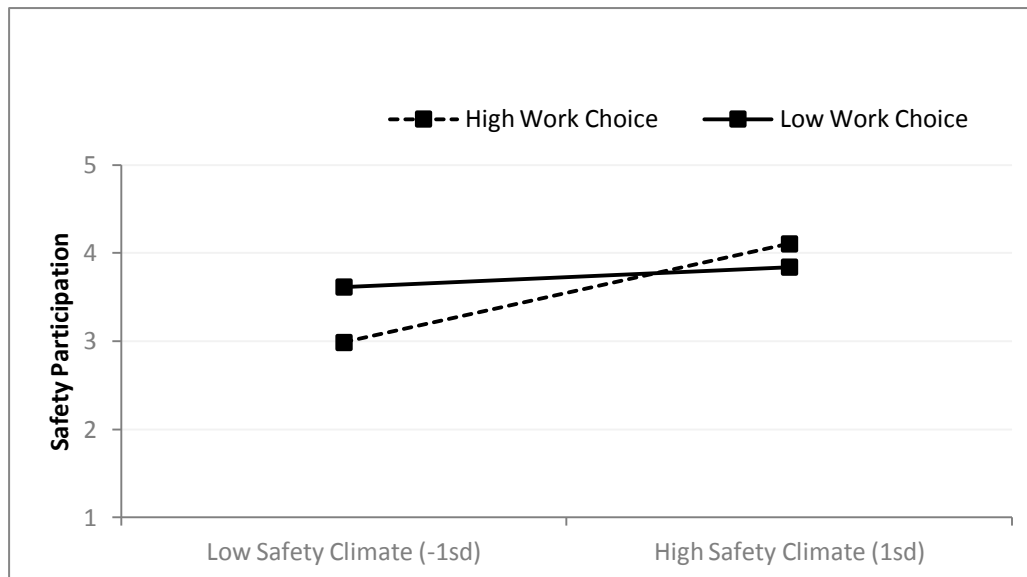


Figure 2: The moderating effect of choice in work scheduling on the relationship between safety climate and safety participation

Table 6 shows the results for the moderation analysis with decision latitude as a moderator. Main effects exist between safety climate and safety participation. The interaction term safety climate x decision latitude is a significant predictor of safety participation in that it accounted for an additional 1% of the variance when added to the regression. This interaction is plotted in figure 3. As the plotted interaction shows, the relationship between safety climate and safety participation is more positive if participants perceive high decision latitude than if they perceive low decision latitude. It also shows that when safety climate is

low and decision latitude is low safety participation is more than when decision latitude is high. Decision latitude is therefore a significant moderator of the relationship between safety climate and safety participation. The interaction terms do not explain significant variance when predicting safety compliance 1 or safety compliance 2. Therefore, decision latitude is not a significant moderator of the relationship between safety climate and safety compliance 1 or 2. These findings partially support Hypothesis 3c.

Table 6

Moderated Hierarchical Regression Analysis for Relationship Between Safety Climate and Safety Behaviours (Participation and Compliance 1 and 2), With Decision Latitude as a Moderator (Unstandardised Coefficients)

	Safety Participation			Safety Compliance 1			Safety Compliance 2		
	Step1	Step2	Step3	Step1	Step2	Step3	Step1	Step2	Step3
Av.Hrs	.01	.01	.01	.03*	.02*	.02*	.02**	.02**	.02**
SC		.52**	.61		-.21	-.29*		.37**	.41**
DL		-.16	-.16		-.19	-.20		-.19	-.18
SCxDL			.42**			-.41			.17
R ²	.01	.27	.37	.09	.14	.18	.08	.25	.27
ΔR^2	.01	.27**	.01**	.09*	.06*	.04	.08*	.17**	.02

* $p < .05$ ** $p < .001$ n=96

Note: SC= Safety Climate, DL= Decision Latitude

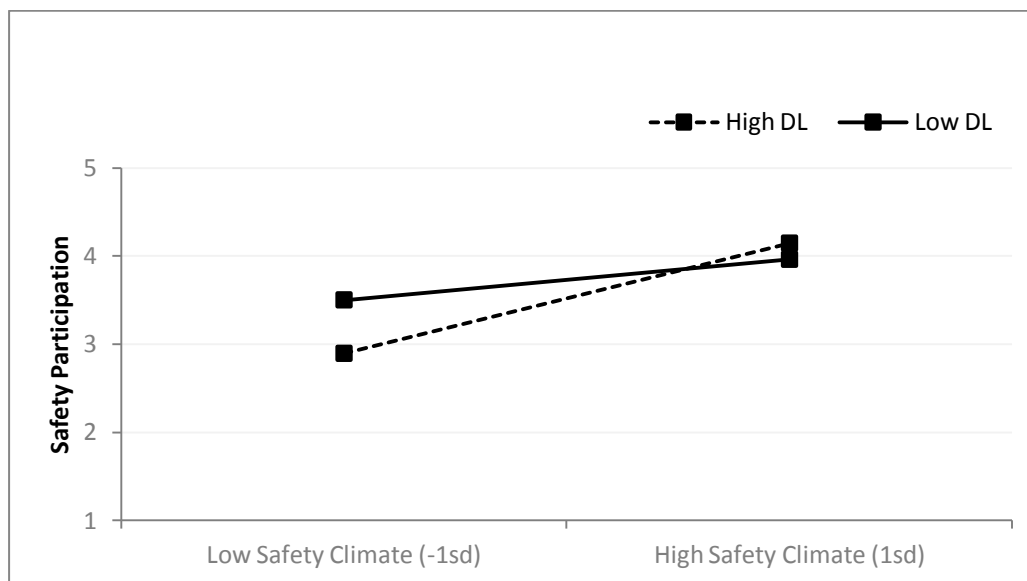


Figure 3: The moderating effect of decision latitude on the relationship between safety climate and safety participation

Table 7 shows the results of the moderation analysis with safety control as a moderator. A significant main effect exists between safety climate and safety participation. Additionally, there is a significant main effect between safety control and safety participation. Safety control moderates the relationship between safety climate and safety participation. The interaction term safety climate x safety control accounts for an additional 3% of the variance in safety participation when included in the regression. . This interaction is plotted in Figure 3. From the plotted interaction it can be seen that the positive relationship between safety climate and safety participation was more positive for participants that perceived high safety control than those that perceived low safety control. The interaction plot also shows that when safety climate is low (high demands) and safety control is high, levels of participation are higher than if demands are low and control is low. Safety control does not moderate the relationship between safety climate and safety compliance 1 or safety compliance 2, evident by non-significant coefficients for the interaction terms and non-significant change in R^2 . Thus, these results show that hypothesis 3d is partially supported.

Table 7

Moderated Hierarchical Regression Analysis for Relationship Between Safety Climate and Safety Behaviours (Participation and Compliance 1 and 2), With Safety Control as a Moderator (Unstandardised Coefficients)

	Safety Participation			Safety Compliance 1			Safety Compliance 2		
	Step1	Step 2	Step3	Step1	Step2	Step3	Step1	Step2	Step3
Average Hours	.01	.00	.01	.03*	.02*	.02	.02*	.01*	.01*
SC		.36**	.38*		-.30	-.32*		.19	.19*
SCT		.23*	.31		.07	.01		.24	.21
SCxSCT			.20*			-.13			-.06
R^2	.01	.28	.31	.09	.23	.13	.08	.25	.25
ΔR^2	.01	.28**	.03*	.09*	.04	.01	.08*	.17*	.00

* $p < .05$ ** $p < .001$ n= 96

Note: SC= Safety Climate, SCT= Safety Control

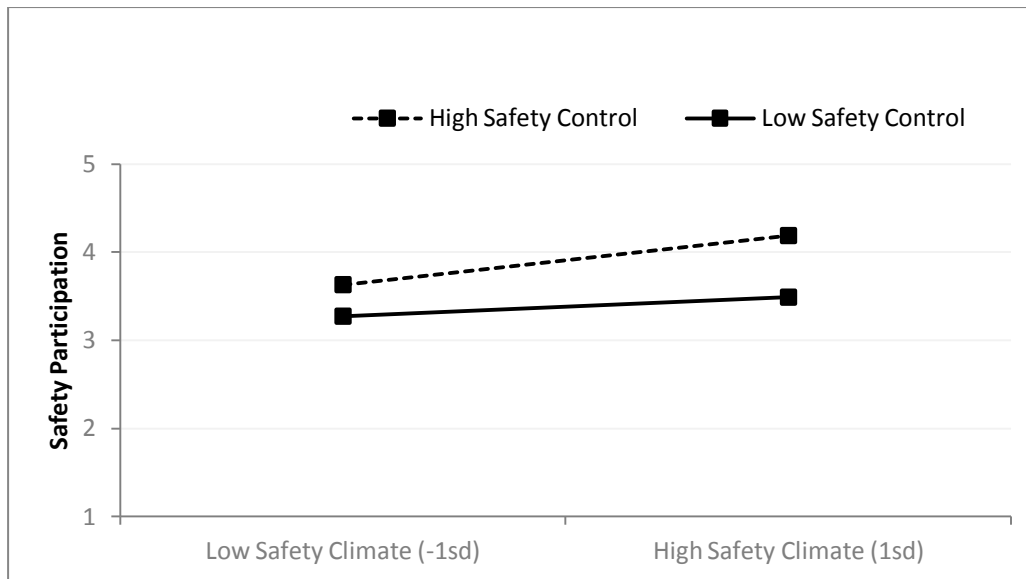


Figure 4: The moderating effect of safety control on the relationship between safety climate and safety participation

Satisfaction showed positive, significant zero-order correlations with work choice ($r = .21, p < .05$) decision latitude ($r = .43, p < .01$) and safety control ($r = .29, p < .05$), as predicted by Hypothesis 4. Consistent with earlier studies, having control in the workplace results in individuals that are more satisfied in their jobs. This was not the case for the relationship between satisfaction and overtime control which was statistically non-significant ($r = -.03$). Therefore Hypothesis 4 is partially supported.

Discussion

This study attempted to apply findings from the stress and well-being literature to the field of organisational safety. In particular, the mediating effect of satisfaction on the safety climate-safety behaviours relationship was investigated. Additionally, the buffer hypothesis of the JDC model was tested when applied to organisational safety. The moderating effect of

control over overtime, working schedule, ones job and safety on the relationship between safety climate and safety participation and safety compliance was examined.

Factor analysis of the safety compliance measure used revealed a 2-factor solution, suggesting that as applied to this sample safety compliance is a multi-factorial construct. Previously, 1-factor has been suggested. For the current study, each factor relating to safety compliance was analysed independently as safety compliance 1 and safety compliance 2. Inspection of the items that load for safety compliance 1 show that the items that load for safety compliance 1 seem to be more about general obedience and how sensible people think the safety procedures in place are. Safety compliance 2 was more concerned with how compliant participants are based on the frequency of safety compliant behaviours. Therefore, this dimension of the safety compliance measure may not measure safety specific compliance, but rather compliance in general. The items for safety compliance 2 ask about how often participants do specific safety compliant behaviours, such as wearing safety equipment and may reflect being a good employee. Additional research is required in order to further define the factor structure of safety compliance.

As hypothesised, there was a positive relationship between safety climate and safety participation and one of the safety compliance dimensions. These positive relationships are consistent with previous research (Clarke, 2006; Griffin & Neal, 2000; Neal et al., 2000a). This suggests that how individuals behave in terms of safety in an organisation is influenced by how they perceive the organisation deals with safety. If management is perceived to place value upon employee safety through the policies, procedures and rewards they have in place, employees then behave in ways that enhance safety. These findings are also consistent with the norm of reciprocity derived from Social Exchange theory (Blau, 1964). The organisation is perceived to be concerned with safety as a result of organisational safety policies and

procedures, and in return for this concern for their well-being employees reciprocate by complying with safety procedures and participating in extra-role safety initiatives.

The relationship between safety climate and one of the safety compliance dimensions was negative, suggesting that when safety climate is low in an organisation, employees are more likely to comply with safety procedures. This is contradictory to previous findings on the safety climate-safety behaviours relationship. Organisational climate is an antecedent to safety climate (Neal, Griffin, & Hart, 2000b). More safety compliance may therefore be a reaction to an overall dissatisfaction as a result of problems in the wider organisation. While they perceive that management does not value safety as a result of the policies, procedures and rewards in place regarding safety, employees may not want to be involved in an accident or sustain an injury at work. As a result, employees then they feel that their safety is their own responsibility. Though employees' perceptions of safety climate are low, they comply with what is there so that they can maintain their own safety.

Additionally, as hypothesised, satisfaction mediated the relationship between safety climate and this dimension of safety compliance. This mediation effect suggests that low safety climate (the presence of a stressor) leads to dissatisfaction which in turn leads to more safety compliance. A trade-off exists between productivity and safety in that productivity and safety are competing demands. Employees may perceive that safety is secondary when an organisation places emphasis upon productivity (Janssens, Brett, & Smith, 1995). It could be that low safety climate leads to feelings of dissatisfaction which employees then react to by acting in a safer manner, which in turn decreases productivity and ultimately organisational profit. Employees may display more safety compliance as a reaction to feelings of dissatisfaction as they know that reduced productivity is detrimental to the organisation.

As mentioned earlier, the safety compliance measure used was determined to have a 2-factor structure for the current sample. Perhaps in this instance the safety compliance dimension is measuring something other than compliance with safety procedures. The items that load for this dimension of safety compliance seem to measure obedience and compliance in general. General compliance may or may not be related to safety specific climate. Two of the four items that loaded onto this dimension of safety compliance were asked in the reverse, thus lower answers indicated more safety compliance. However, these items were recoded for higher scores to predict more safety compliance prior to analysis. It may be that participants did not read these questions correctly and therefore answered in the reverse.

Consistent with the buffer hypothesis of the JDC (Karasek, 1979), control over working schedule, job control and safety control moderated the relationship between safety climate and safety participation. However, control over working schedule, job control and safety control did not moderate the relationship between safety climate and safety compliance 1 or 2. Control of overtime did not moderate the relationship between safety compliance 1, safety compliance 2 or safety participation.

The interaction plots supporting the moderating effects of control over working schedule, decision latitude and safety control were further analysed. The interaction plot for safety control was consistent with the buffer hypothesis. Control buffers the effects of high demands in that when safety climate was low (high demand) and safety control was high, participation was higher. The interaction plots for control of work schedule and decision latitude also show that safety participation is higher for those who perceive a high safety climate and high control than for those who perceive a high safety climate and low control. However, these plots show that this does not hold true under conditions of low safety climate (high demand). The plots show the reverse to be true. When safety climate is low and control is high, safety participation is less than when control is low. Having control over the working

environment does lead to greater safety participation from employees, but only when safety climate is high. This suggests an enhancement effect of control over working schedule and decision latitude. Low demands have even more positive consequences when control is high. But when demands are high (low safety climate) control over working schedule or decision latitude do nothing to buffer the negative effects of demands for safety.

That no moderating effect was found when safety compliance was the outcome may be due to the nature of compliance. Compliance involves behaviours that may be seen as part of one's work role, for example wearing protective equipment. These are behaviours that employees may feel must be undertaken regardless of any other factors as they regard them as part of doing their job properly. Thus, perceptions of control in the workplace do nothing to enhance the positive relationship between safety climate and safety compliance as these are behaviours that are perceived as compulsory.

Choice in work scheduling, decision latitude and safety control all showed a moderating effect on the relationship between safety climate and safety participation. As with safety compliance, this could be explained by the nature of safety participation. Unlike complying with safety procedures, which could be perceived as non-negotiable, participation in extra-role safety in an organisation is voluntary. Behaviours that are indicative of safety participation are not directly related to one's individual safety, rather they help to support safety within the organisation. When employees perceive they have control over aspects of their working environment they are more willing to participate in safety as reciprocation for the value that the organisation places upon keeping its employees safe. This explanation is consistent with Social Exchange theory (Blau, 1964) and in particular the notion of reciprocity.

Control of overtime was not found to moderate any of the relationships between safety climate and safety behaviours. The measure used for overtime control was adapted for use in the current study and thus it is the first time it has been used. Cronbach's alpha for the scale was below that which is acceptable ($\alpha = .63$) which may lead to less strong associations, and explain why no moderating effect was found. Further work is required in developing continuous measure of control over overtime that is reliable. As mentioned, working overtime has been found to predict accidents and injuries in the workplace. The finding of no moderating effect of control over overtime suggests that giving control of overtime does nothing to enhance the relationship between safety climate and safety behaviours, both antecedents to accidents. It may be that working overtime at all is detrimental to employee safety. Further research should address the mechanisms behind why overtime is a safety risk in an organisation.

Satisfaction was found to be predicted by control of working schedule, decision latitude and safety control. Employees with more control over these conditions were more satisfied. This is consistent with previous research using the JDC as a framework and suggests that there is a direct relationship between control and psychological strain. As such, strain (dissatisfaction) can be avoided by giving control of one's working environment. Control of overtime was not a significant predictor of satisfaction. It may be that overtime is a source of stress in an organisation that may not impact safety through psychological strains but rather physical strains, such as fatigue. Further research should address the psychological impact of working overtime on organisational safety.

From a practical perspective the moderating effect of control on the safety climate and safety behaviours relationship has implications for organisations. The incidence of safety participation, which is an antecedent to accidents and injuries, may be increased by allowing employees control over their work scheduling. Where possible, employees should be allowed

greater choice in when they start and finish work, when they take holidays and when they start and end their working week. In addition to this, allowing more job control will increase safety participation which will again have positive effects for organisational safety, such as the reduction of accidents and injuries. However, it is important to note that this moderating effect is only the case for employees who perceive a high safety climate within their organisation. Future research should address the effects of control on safety outcomes when climate is low, and seek to find ways to buffer the negative effects of low safety climate as a demand. Enhancing employees' perceptions of control over safety in the workplace will mitigate the negative effects of low safety climate on safety participation. Utilising this in a proactive approach to safety management, should measurement show that an organisation has a low safety climate, interventions that give employees more control over safety should result in more safety participation, and thus a lower rate of accidents and injuries. However, more research is required to understand how to encourage employees to be more compliant with safety procedures.

Limitations

The research does have some limitations. Firstly, data was collected via an online questionnaire as well as a paper questionnaire. Differences may exist in the types of participants that completed each. For example, within an organisation it is more likely that management have access to a company email address. This may have excluded from participation lower level employees who are less likely to have access to a company email address but more likely to be working in positions that allow for them to give an accurate representation of safety in the organisation. Recruitment also included that the study was in regards to safety and as a result may have attracted participants who were more concerned

with or interested in safety. Both questionnaires were distributed by the organisation and were therefore susceptible to social desirability bias. Participants may not have responded accurately as they were concerned with what the organisation would think of their answers. However, utilising both online and paper methods of data collection ensured that participants who may have not been able to complete the questionnaire due a to lack of access to the internet still had an opportunity to do so.

The sample size ($n=96$) was low and therefore may have influenced the power of the results. Additionally, the sample consisted of participants from a wide range of occupations. This is positive for generalisability of the results but a concern as the questionnaire was not tailored to each occupation. As a result, some of the questions may not have been applicable to all participants in the state that they were administered.

The study did not control for the effects of participants working overtime. Overtime is detrimental to organisational safety and 98.4% of participants in the study reported working overtime. Overtime itself may be a demand and therefore should be controlled for in the analyses. Additionally, a measure of how important control is to employees should have been included and controlled for. If an employee does not value control over their working environment, it is unlikely that giving them control is going to have any positive effects for them.

Finally, the use of cross-sectional design is a limitation of the study. As a result of using this design, no casual inferences can be made regarding the effects of safety climate, control on safety behaviours. Consequently, care must be taken when interpreting the relationships found in this study.

Conclusion

In conclusion, this study was an attempt at applying the JDC model to an occupational safety context, using “leading indicators” of safety outcomes and thus allowing utilising a proactive approach to safety management. The results suggest some support for the buffer hypothesis and also suggest an enhancement hypothesis, whereby control over ones working environment enhances the positive relationship between safety climate and safety participation. While future research is required to address some of the limitations of the study, it is a starting point in investigating the applicability of findings from the stress literature to organisational safety.

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Want to go in the draw to win one of 8 \$100 grocery vouchers?

You can by participating in a study about working
conditions and safety

You will be required to complete a short online questionnaire.

This study has been reviewed by the University of Canterbury Human
Ethics Committee.

If you are interested please email Megan Pearce and she can send you
the link to the survey: mnpl8@uclive.ac.nz

Appendix B- Questionnaire

1. Your age: _____Years
2. Your gender: Male ☐ Female ☐
3. What is the title of your current job? _____
4. How long have you been in the job that you identified above? ____Years__Months
5. How long have you been an employee of the organisation that you work for?
____Years__Months
6. What type of contract do you hold?
 - ☐ Full Time
 - ☐ Part Time
 - ☐ Casual
 - ☐ Fixed Term- Full Time
 - ☐ Fixed Term- Casual
7. How many hours are you contracted to work per week? _____Hours
8. On average, how many hours do you work a week? _____Hours
9. *Overtime is any hours worked in addition to those that are contracted. For example, if you are contracted to work 37 hours a week and work 42 hours you have worked overtime. If your contract states that you are to work 8 hours a day and you work 9 you also work overtime.*

Do you work overtime? ☐ Yes ☐ No

10. The following are statements are about why you work overtime. **If you do not work overtime in your job, do not answer this question and move on to the next.**

Please circle the number that indicates how much you agree or disagree with each of the statements

	Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
I work overtime because I want to	1	2	3	4	5
I work overtime because my supervisor wants me to	1	2	3	4	5
I work overtime because by colleagues expect me to	1	2	3	4	5

11. The following statements relate to how satisfied you are with your job
Please circle the number which indicates how much you agree or disagree with the following statements

	Strongly Disagree	Disagree	Neither Agree/Disa gree	Agree	Strongly Agree
I find real enjoyment in my job	1	2	3	4	5
I like my job better than the average person	1	2	3	4	5
I am seldom bored with my job	1	2	3	4	5
I would not consider taking another kind of job	1	2	3	4	5
Most days I am enthusiastic about my job	1	2	3	4	5
I feel fairly well satisfied with my job	1	2	3	4	5

12. The following items are about safety within your organisation.

Please circle the number which indicates how much you agree or disagree with each of the statements.

In my organisation.....	Strongly disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
New employees learn quickly that they are expected to follow good health and safety practices	1	2	3	4	5
Employees are told when they do not follow good safety practices	1	2	3	4	5
Workers and management work together to ensure the safest possible conditions	1	2	3	4	5
There are no major shortcuts taken when worker health and safety are at stake	1	2	3	4	5
The health and safety of workers is a high priority with management where I work	1	2	3	4	5
I feel free to report safety problems where I work	1	2	3	4	5
I promote the safety program within the organisation	1	2	3	4	5
I put in extra effort to improve the safety of the workplace	1	2	3	4	5
I voluntarily carry out tasks or activities that help improve workplace safety	1	2	3	4	5

13. These questions describe demands that might relate to your job

Please circle the number which answers the question in relation to your job

	Never	Rarely	Sometimes	Often	Extremely Often
What extent does your job require your working fast?	1	2	3	4	5
To what extent does your job require a great deal of work to be done?	1	2	3	4	5
To what extent is there not enough time for you to do your job?	1	2	3	4	5
To what extent is there excessive work in your job?	1	2	3	4	5
To what extent do you feel there is not enough time for you to finish your work?	1	2	3	4	5
To what extent are you faced with conflicting demands on your job?	1	2	3	4	5

14. The following questions are about how much choice you have in when you work
Please circle the number which answers the question in relation to your job

	Very Little	Little	A Moderate Amount	Much	Very Much
How much choice do you have over when you begin and end each work day?	1	2	3	4	5
How much choice do you have over when you begin and end each work week?	1	2	3	4	5
How much choice do you have over when you take holidays or days off?	1	2	3	4	5
How much control do you have over when you can take a few hours off?	1	2	3	4	5
In general, how much control do you have over the hours that you work?	1	2	3	4	5

15. The following questions relate to the amount of choice you have in applying skills to do your job and your authority to make job related decisions
Please circle the number which answers the question in relation to your job

	Never	Rarely	Sometimes	Often	Extremely Often
What extent does is high skill level required?	1	2	3	4	5
To what extent are you required to learn new things?	1	2	3	4	5
To what extent is your work non-repetitious?	1	2	3	4	5
To what extent does your job require creativitiy?	1	2	3	4	5
To what extent do you have the freedom to decide how to organise your work?	1	2	3	4	5
To what extent do you have control over what happens on your job?	1	2	3	4	5
To what extent does your job allow you to make a lot of your own decisions?	1	2	3	4	5
To what extent are you assisted in making your own decisions?	1	2	3	4	5

16. The following items relate to your compliance with organisational safety procedures
Please circle the number which indicates how much you agree or disagree with these statements

	Strongly Disagree	Disagree	Neither Agree/Disa gree	Agree	Strongly Agree
I overlook safety procedures in order to get my job done more quickly	1	2	3	4	5
I follow all safety procedures regardless of the situation I am in	1	2	3	4	5
I handle all situations as if there is a possibility of having an accident	1	2	3	4	5
I wear safety equipment required by practice	1	2	3	4	5
I keep my work area clean	1	2	3	4	5
I encourage my co-workers to be safe	1	2	3	4	5
I keep my work equipment in safe working condition	1	2	3	4	5
I take shortcuts to safe working behaviours in order to get the job done faster	1	2	3	4	5
I do not follow safety rules that I think are unnecessary	1	2	3	4	5
I report safety problems to my supervisor when I see safety problems	1	2	3	4	5
I correct safety problems to ensure accidents will not occur	1	2	3	4	5

17. Listed below are items about the amount of risk associated with your job.
For each item please circle the number which indicates the extent to which you agree or disagree.

My job is.....	Strongly Disagree	Disagree	Neither Agree/Disa gree	Agree	Strongly Agree
Dangerous	1	2	3	4	5
Could easily get hurt	1	2	3	4	5
Safe	1	2	3	4	5
Unsafe	1	2	3	4	5
Hazardous	1	2	3	4	5
Fear for my health	1	2	3	4	5
Risky	1	2	3	4	5
Chance of death	1	2	3	4	5
Unhealthy	1	2	3	4	5
Scary	1	2	3	4	5

18. The following statements are about how much control you have over safety in your organisation

Please circle the number that indicates how much you agree or disagree with each of the statements

	Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
I am comfortable talking with Health and Safety committee members about safety issues	1	2	3	4	5
I know exactly what is expected of me when it comes to safety at work	1	2	3	4	5
I know my attitude plays an important role in working safely	1	2	3	4	5

If you have any additional comments, feel free to leave them below

Thank you for participating in this study. If you wish to be included in the draw to win one of 8 \$100 grocery vouchers please write your email address on the next page.

I wish to be included in the draw to win one of 8 \$100 grocery vouchers

Email address: _____

Appendix C- *Questionnaire items retained for analysis*

Control of Overtime

I work overtime because my supervisor wants me to

I work overtime because by colleagues expect me to

Demand

What extent does your job require your working fast?

To what extent is there not enough time for you to do your job?

To what extent does your job require a great deal of work to be done?

To what extent is there excessive work in your job?

To what extent do you feel there is not enough time for you to finish your work?

To what extent are you faced with conflicting demands on your job?

Choice in Work Scheduling

How much choice do you have over when you begin and end each work week?

How much choice do you have over when you take holidays or days off?

How much control do you have over when you can take a few hours off?

In general, how much control do you have over the hours that you work?

Decision Latitude

To what extent is your work non-repetitious?

To what extent does your job require creativity?

To what extent are you assisted in making your own decisions?

To what extent does your job allow you to make a lot of your own decisions?

To what extent do you have control over what happens on your job?

To what extent do you have the freedom to decide how to organise your work?

Safety Compliance 1

I overlook safety procedures in order to get my job done more quickly (reverse coded)

I follow all safety procedures regardless of the situation I am in

I do not follow safety rules that I think are unnecessary (reverse coded)

I report safety problems to my supervisor when I see safety problems

Safety Compliance 2

I handle all situations as if there is a possibility of having an accident

I wear safety equipment required by practice

I keep my work area clean

I keep my work equipment in safe working condition

Safety Control

I know my attitude plays an important role in working safely

I know exactly what is expected of me when it comes to safety at work

Working Conditions and Safety Questionnaire

Please read the following before beginning the questionnaire

You are invited to participate in a study of working conditions and safety by completing the following questionnaire. Participation is completely voluntary. As a reward for participating, those who complete the questionnaire are invited to enter a draw to win one **of 8 \$100 grocery vouchers**.

Please indicate whether you would like to be entered in the draw to win one of the grocery vouchers by entering your email address in the space provided at the end of the survey

The survey should take approximately 10-15 minutes to complete.

Confidentiality

In order to enter the draw to win one of the grocery vouchers, it will be necessary to collect an email address so you can be notified that you have won. This will be kept **confidential**. **The draw for the vouchers will be completed before data analysis then the email addresses will be deleted.** Due to this it will not be possible to identify your individual responses or withdrawal participation after the prize draw is completed. The data will only be presented on a group level and **only the researchers will have access to individual responses**.

Researcher information

The project is being carried out at the University of Canterbury as the research component of a Masters of Science in Applied Psychology by Megan Pearce under the supervision of Dr Katharina Naswall. It has been reviewed and approved by the University of Canterbury Ethics Committee.

If you have any questions about the project contact details are:

megan.pearce@pg.canterbury.ac.nz (Megan)

katharina.naswall@canterbury.ac.nz (Katharina)

Informed Consent

By completing the survey it will be understood that you have consented to participate in the project, and that you consent to publication of the results of the project with the understanding that it will not be possible to individually identify you.

Appendix E- Information and Consent (Online)



Informed Consent

Please read the following note before completing the questionnaire.

You are invited to participate in a study of working conditions and safety by completing following online questionnaire which should take approximately 10-15 minutes. As a reward for participating, those who complete the questionnaire will be entered in the draw to win one of 8 \$100 grocery vouchers

The project is being carried out at the University of Canterbury as the research component of a Master in Applied Psychology by Megan Pearce under the supervision of Katharina Naswall. If you wish to discuss any concerns about participation in the project contact details are: megan.pearce@pg.canterbury.ac.nz (Megan) or katharina.naswall@canterbury.ac.nz (Katharina).

Should you wish to be entered in the draw to win one of the grocery vouchers it will be necessary to collect your contact details. These contact details will be kept confidential and will not be stored alongside your data, hence your data will be anonymous. Due to this anonymity it is not possible to withdrawal participation once the questionnaire has been submitted. The data will only be presented on a group level, and only the researchers will have access to individual responses. These individual responses will be kept confidential. The results will be presented in a dissertation as well as possible publication in an academic journal.

By completing the questionnaire it will be understood that you have consented to participate in the project, and that you consent to publication of the results of the project with the understanding that anonymity will be preserved.

