Extending Psychosocial Safety Climate Theory to Practice: Injury Management Systems and Organisational Intervention Frameworks

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Glossary and Abbreviations

Absenteeism: Work absence.

Depression: Mental health condition characterised by pervasive low mood (Beecher & Dollard, 2016).

Demand-Induced Strain Model (DISC): Work stress theory proposing that job demands, job resources, and job related outcomes may contain cognitive, emotional and physical dimensions and the strongest interactive relationships occur when demands, resources, and outcomes are based on similar dimensions (de Jonge & Dormann, 2003, 2006).

Effort Reward Imbalance (ERI) Model: Work stress theory proposing that when an imbalance occurs between the level of effort expended and rewards obtained at work, psychological strain develops (Siegrist, 1996).

Emotional Exhaustion: Conceptualised as a facet of burnout, in combination with depersonalisation and reduced personal accomplishment (Maslach, 1982; 1993).

Engagement (work): Work fulfilment, characterised by vigour, dedication, and absorption (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001).

GDP: Gross Domestic Product, i.e. the value of a country's net output per year.

Job Demand-Control (JD-C) Model: Work stress theory proposing that employees working in jobs with high demands and low control experience the poorest psychological health (Karasek, 1979).

Job Demand-Control Support (JDCS) Model: Work stress theory proposing that the worst psychological health outcomes are amongst workers with high demands, low control and low social support (Johnson & Hall, 1988).

Job Demands-Resources (JD-R) Model: Work stress theory proposing that jobs with high demands lead to a state of exhaustion (health impairment process) and high resources lead to better work engagement (motivational process) (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001).

Intervention (primary/secondary): Primary interventions aim to prevent disease; secondary interventions aim to reduce the impact of the disease after it has occurred.

Presenteeism: Being present at work but with reduced output (Beecher & Dollard, 2016).

Productivity: The effectiveness of converting effort into output (Beecher & Dollard, 2016).

Psychosocial Safety Climate (PSC): Type of organisational climate, characterised by policies, practices and procedures for the protection of worker psychological health and safety (Dollard & Bakker, 2010).

Sickness Absence: Work absence due to sickness.

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Statement of Authorship

I declare that this thesis presents work carried out by myself and does not incorporate without acknowledgement any material previously submitted for a degree of diploma in and university: to the best of my knowledge it does not contain any materials previously published or written by another person except where due reference is made in the text, and all substantive contributions by others to the work presented, included jointly authored publications, is clearly acknowledged (Appendix C).

I give my consent to this copy of my thesis, when deposited in the university library, being made available for loan and photocopying.

Signed[redacted]……18 May 2017

“There is nothing so practical as a good theory.”

Kurt Lewin, 1952.

Summary

Psychosocial safety climate (PSC) theory (Dollard & Bakker, 2010), concerning a climate for the protection of psychological health, is the framework that underpins every aspect of this thesis. The phenomenon of 'disposable workers' has emerged in the face of economic demands for higher profit margins, tighter timelines, and global competition. Workers increasingly face job insecurity and pressure to become more resilient to manage increasing demands and diminishing resources - yet this situation is fundamentally flawed (Benach, 2016; Dollard, 2006; Maslach, 2016). Placing the responsibility on the worker to manage his or her own mental health not only diminishes the role of the work organisation, but also reduces power to create real change. Our society, including academics, government agencies, businesses, politicians and local communities, have an opportunity to contribute to the building of healthy, sustainable workplaces filled with thriving, productive workers. Research attention to the development and influence of a work environment that nurtures and protects the psychological health of its valued contributors, the workers who are the back bone of the services it provides, is the first step in transforming work as we know it. We need to address the causes. It begins with PSC.

This thesis examines how PSC theory can be applied in practice. It makes four specific contributions. First, it outlines the theoretical framework for PSC theory (Zadow & Dollard, 2016). Second, using meta-analysis of prior relationships it explicates at both the individual and multilevel levels of analysis, cross sectional and longitudinal relationships between PSC, work conditions, health, and productivity using data from across 19 independent samples and 212 effect sizes (N = 24, 616). The third contribution extends the multilevel PSC theoretical framework to injury management systems using self-report data (T2, 2013) from hospital employees working in three different hospitals (N = 214, across 18

teams) linked at the workgroup level to a database of organisation recorded injury event data (T1, 2012; T2, 2013; and T3, 2014) (Zadow, Dollard, McLinton, Lawrence, & Tuckey, 2017). Finally, the fourth contribution, a meta-analysis of organisational stress interventions, uses the PSC framework (363 effect sizes, N = 17,834) to evaluate the efficacy of interventions that target the climate for psychological health and apply PSC principles in action, compared to other approaches (Zadow, Dollard, & Tuckey, in review).

The threat of a health-adverse psychosocial work environment is becoming more widespread due to technological changes, the growth of job insecurity, and the advent of economic globalization (Siegrist, 2016). Neoliberal and austerity policies have promoted significant changes in employment relations and working conditions, leading to lack of concern and commitment for employees, destructive competition, high work pressure and the underlying assumption that workers are expendable (Maslach, 2016). This current program of research proposes an alternative approach, PSC theory, and links management and organisational protection of the psychological health of workers with a healthy and productive workforce. Translating PSC theory to practice, this thesis proposes a way forward, an evidence based framework to intervene, to build the mentally healthy workplaces we seek.

1 Introduction

1.1 Overview

Healthy safe workplaces are a basic human right (International Labour Organization, 2016). Despite this principle global competitive processes and technological advancements are placing pressure on work conditions, creating stressed workers (Siegrist, 2016). Most theoretical models of work stress examine the manipulation of these adverse work conditions to attempt to reduce workplace stress (Dollard, Zadow, Pignata, & Bailey, 2016). The premise of this thesis is that we can prevent the development of adverse psychosocial work conditions by cultivating a strong climate to protect and support psychological health using the Psychosocial Safety Climate (PSC) model (Dollard & Bakker, 2010). Differentiating between a climate for the protection of psychological health and a climate for physical safety is important as research shows that PSC in organisations is typically lower than physical safety climate, reflecting a lack of priority given to workplace psychological health (Idris, Dollard, Coward, & Dormann, 2012). Understanding the role of PSC, and how it works in practice, is salient to promote healthy productive work.

In this introductory chapter, a brief overview of this thesis is provided, which reports a program of research that: details the PSC theoretical framework (Dollard & Bakker, 2010) and quantifies the meta-analytic relationships between PSC, work conditions, health, engagement, and productivity; examines how PSC theory operates from a practical perspective by exploring its role in applied injury management systems; and then examines how the PSC theoretical framework can be used to develop organisational interventions to reduce psychosocial risks and improve psychological health, and productivity. The primary purpose and specific aims of this research are highlighted and the gaps in the current

literature are reviewed and directions for future research outlined. This chapter concludes with an outline of the structure for the thesis.

1.2 The Context: The Growing Prevalence of Unhealthy Working Conditions

Increased global competition and work pressure, technological developments leading to greater numbers of jobs involving service delivery and communication, growing job insecurity, and demographic workforce changes including an ageing population, are creating higher levels of workplace psychosocial risks leading to unhealthy work (Siegrist, 2016). Work-related stress is characterised by the harmful physical and psychological responses that take place when demands at work, especially if not offset (or balanced) by adequate workplace resources, exceed the capacity of individuals to cope, which over time can affect mental and physical health and well-being (International Labour Organization 2016). The management of psychosocial risks and stress at work has received greater attention as our society, including academics, government agencies, businesses, health care institutions and providers, trade unions, politicians and local communities, increasingly recognise the need to provide safe and healthy workplaces with jobs that promote psychological health (Dollard, et al., 2016).

Recent research estimates that 40 million workers in Europe report experiencing work stress (Eurofound, 2007). For the 65 % of Americans reporting stress, work is a significant source (American Psychological Association, 2015). In the Asia Pacific, 61 % of employees in Japan and more than 31 % of Korean workers report high levels of work-related stress, while 70 % of Chinese employees indicate that they experience job strain (Kawakami, Park, Dollard, & Dai, 2014). The Australian Workplace Barometer project, comprising a sample of 4242 workers, reports a prevalence rate of 30% for mild to severe depression and 13.6% for severe psychological distress (Beecher & Dollard, 2016). Results have also identified that

workers are being exposed to high levels of psychosocial risks. In the Fifth European Working Conditions Survey conducted by Eurofound (2012) 62 % of workers report working under tight deadlines, 59 % at a quick pace, 51% were facing organisational change, and 24% reported being at work for more than 40 hours each week (Eurofound, 2012; Hassard, Teoh, Visockaite & Cox, 2017). The ascendancy of psychosocial risks and work-related stress across the world raises concern about the welfare of people at work, but it is also of significant concern to the wider community given the financial and social repercussions.

The financial impact of global work related stress is multifaceted including the fiscal impact to organisations resulting from loss of productivity including absence (e.g. sickness) and being present at work with reduced output (presenteeism), and social welfare costs in the form of disability benefit payments (Dollard et al., 2016). A recent global systematic review of the cost of work-related stress per country in 2014 ranges from US$221.13 million to $187 billion comprising productivity losses, healthcare and medical costs (Hassard, et al., 2017). Other estimates of the annual costs of work-related stress are €617 billion across the European Union, $285 to 634 billion in the United States, up to $11.7 billion in Canada, and $5.4 billion in Australia (European Risk Observatory 2014). Estimates from the Australian Workplace Barometer project, which collects national data on working conditions and outcomes, are that 9% of serious depression is due to job strain and workplace bullying (McTernan, Dollard, & LaMontagne, 2012). In Australia the estimated combined annual costs to organisations from presenteeism and absenteeism attributable to a poor climate for the protection of psychological health (PSC), depression (clinical and sub-clinical), psychological distress, and low engagement are $6 billion, $6.3 billion, $1 billion, and $5.4 billion respectively (Beecher & Dollard, 2016). Work stress also spills over to society, impacting on the health care system, increasing work family conflict and in general eroding community social capital (Hall et al., 2009). Research shows that psychosocial risk factors in

workplaces influence not only psychological health, but also physical health (Ahlberg-Hulten, Theorell, & Sigala, 1995; Bigos et al., 1991; Feurstein, Berkowitz, & Peck, 1997; Goldenhar, Williams, & Swanson, 2003; Stratil & Swincer, 2012). Yet despite these adverse effects evidence shows that the incidence and severity of work-related stress is increasing (International Labour Organization 2016).

National health and safety frameworks across the world have been put in place to address the causes of stress at work such as the European Psychosocial Risk Management Excellence Framework (PRIMA-EF), the Mental Health Commission in Canada, the Korea Occupational Safety and Health Agency Stress Management Guidelines, the Health and Safety Executive (HSE) in the United Kingdom, the National Institute for Occupational Safety and Health (NIOSH) research program in work organization and stress-related disorders in the United States, and the Australian Workplace Barometer in Australia (Dollard et al., 2016). Both evidence and guidelines suggest that the best approach to safeguard workplace mental health is by shaping managerial and environmental factors, in combination with individual work conditions. Yet despite this guidance, most theoretical models of workplace stress typically concentrate on the design of the individual job to explain how work conditions affect psychological health, neglecting the preceding climate, including how management and organisational practices create and sustain these adverse work conditions (Dollard et al., 2016). In other words, adverse individual work conditions can be targeted to improve workplace psychological health, but if the managerial climate does not value and prioritise psychological health, is not committed to work stress prevention, and does not encourage communication and active participation of employees in relation to the protection of worker mental health, changes to these individual work activities will be difficult and are unlikely to be sustained (Zadow & Dollard, 2016).

Consideration of workplace climate and how the climate of an organisation influences work place stress has been given limited attention in the occupational psychology literature, and in current models of workplace stress, despite a large body of climate research depicting the existence of work climates (Guedri & Griffin, 2016; Schneider, 1975; Schneider & Barbera, 2014). Organisational climate is a broad construct that can be conceptualised as the shared experience of policies, practices, and procedures in workplaces, regarding how behaviours are supported, encouraged and rewarded, leading to a perceived atmosphere of the organisation (Guediri & Griffin, 2016; Neal & Griffin, 2006; Schneider, 1975; Schulte, Ostroff, & Kinicki, 2006). The early theoretical underpinnings of organisational climate theory are found in Gestalt psychology and Functionalism (Schneider, 1975). It is proposed that employees are driven to apprehend order in a work environment (to perceive a structured climate) using the limited cues available to them rather than dealing with the sum of separate parts (e.g. disparate work characteristics) (Gestalt theory), and that creating perceptions of order in the work environment enables workers to adapt their behaviour to perceived requirements to be in homeostatic balance with their surroundings (Functionalism) (Schneider, 1975).

After the recognition of organisational climate in workplaces a number of surveys were developed to capture the totality of the climate experienced by employees, or the perceived atmosphere of their work group (Schneider & Barbera, 2014). Litwin and Stranger (1968) developed one of the first survey measures of organisational climate comparing structure, individual responsibility, rewards, risk, warmth and support and tolerance of conflict. Schneider and Bartlett (1968) developed an organisational climate measure including six domains: managerial support, management structure, concern for new employees, conflict, independence and general satisfaction. Schnieder (1975) later proposed that measures of climate needed a focus for assessment, that they should focus on a climate

for something rather than comprise items and dimensions that reflect generic experiences. This led an expansion of climate research from a focus on *molar* organisational climate, which describes the overall organisational climate, to sub-climates which are domain-specific climates (Schneider, 1975; Schneider, Ehrhart, & Macey, 2013; Schneider, Wheeler, & Cox, 1992). Domain-specific climates include a climate for service (e.g. Grandey, Foo, Groth, & Goodwin, 2012; Kao, Cheng, Kuo, & Huang, 2014), and a climate for safety (Clarke, 2006; Flin, Mearns, O'Connor, & Bryden, 2000; Neal & Griffin, 2006; Zohar, 1980, 2000, 2010). Schneider and Barbera (2014) argue that this development was important in understanding the role of climate as a predictor of important outcomes, and that to do this effectively it was necessary to match the 'bandwidth' of the predictor to the 'bandwidth' of the outcome to be predicted.

Another important aspect of climate research is the acknowledgement that organisations function on multiple levels which influence processes and outcomes differently. Organisational climate can be measured at the individual level as an employee's individual perception of policies, practices, and procedures, which is known as *psychological climate* (James, Gent, Hater, & Coray, 1979; James, Hartman, Stebbins, & Jones, 1977; James, Hater, Gent, & Bruni, 1978; James & Jones, 1974; Parker, Baltes, Young, Huff, Altmann, Lacost, and Roberts, 2003). When the experience of policies, practices and procedures are shared amongst a group (e.g. work unit, team, organisation) these combined perceptions are called *organisational climate* (Guedri & Griffin, 2016). Organizational climate can be operationalized by aggregating individual perceptions to the group level, using the direct consensus model which uses within-group agreement of scores to identify agreement at the lower level and to justify aggregation of lower level scores to represent scores at the higher level (Chan, 2014). It is proposed that as the concept of climate is based on the assumption of shared perceptions, and that restricting the conceptualisation and analytical strategy to the

individual limits understanding and could lead to misleading substantive inferences (Chan, 2014). Yet until recently the role of climate, and the development of a domain specific climate measure for work stress and psychological health, was not widely acknowledged or explored.

Instead the work psychology literature has focused predominantly on individual psychosocial risk factors. Psychosocial risk factors relate to aspects of job design and management of work, including the organisational and social context, that have the potential to cause psychological harm (Leka, Griffiths, & Cox, 2003). Psychosocial risks have also been interchangeably known as stress factors, psychosocial factors, and psychosocial hazards in the research literature (ILO, 2016). Psychosocial risk factors have been categorised in different ways by the ILO and PRIMA-EF. The ILO (2016) defines psychosocial risk factors in terms of the content and context of work. Examples of psychosocial risk factors that involve the *content* of work are the work environment and work equipment, task design, the workload (e.g. high work pressure) and work schedule (e.g. shift work, unpredictable hours). Alternatively, examples of psychosocial risk factors that relate to the *context* of work are organisational culture and function (e.g. poor communication, low levels of support for problem-solving), role in organisation (e.g. role ambiguity), career development (e.g. job insecurity), decision latitude / control (e.g. low participation in decision-making, lack of control over work), interpersonal relationships at work (e.g. interpersonal conflict, lack of social support), home-work interface (e.g. conflicting demands of work and home). PRIMA-EF (2008) defines psychosocial risk in terms of job content (e.g. a lack of variety or short work cycles), workload (e.g. high levels of time pressure), work scheduling (e.g. unpredictable hours), control (e.g. low participation in decision making), equipment (e.g. lack of space, poor lighting, excessive noise), organisational functioning (e.g. poor communication, low levels of support for problem solving and personal development),

interpersonal relationships at work (e.g. poor relationships with superiors or co-workers, interpersonal conflict, lack of social support), role in organisation (e.g. role ambiguity, role conflict), career development (e.g. career stagnation and uncertainty), home-work interface (e.g. conflicting demands of work and home), and bullying and violence. Both the ILO and PRIMA-EF provide a broad range of psychosocial risks that are useful for work health and safety strategies and policies, the design and publication of guidelines and protocols, and the creation of practical intervention tools in workplaces. For academic research purposes it is important, however, to look beyond a list of risk factors to the theoretical models of workplace stress to understand how these risks have been identified and the mechanisms through which they operate.

The concept of psychosocial risk has developed from commonly cited theoretical models of work stress such as the Job Demands-Control (JD-C) model (Karasek 1979), the Job Demands-Control-Support model (JD-C-S) (Johnson & Hall, 1988), the Effort-Reward Imbalance (ERI) model (Siegrist 1996), and the Job Demands-Resources (JD-R) model (Demerouti et al. 2001) (Dollard et al., 2016). These models focus on the characteristics of the job as the primary sources of work stress (and, in some cases, of its 'opposite' – work engagement) and how these work conditions influence workplace mental health. The theoretical foundation of the JD-C model (Karasek, 1979) is that employees working in a high strain job (high demands-low control) experience the poorest psychological health. Psychosocial risks are conceived as the work characteristics of high demands (e.g. work pressure) and low levels of control (e.g. decision authority, skill discretion). When workers experience high demands, with little opportunity to use their skills or decision making to control them, personal energy reserves and coping resources are taxed. The expanded JD-C-S model (Johnson & Hall, 1988) proposes that workplace psychosocial risks are high demands (e.g. work pressure), low control (e.g. autonomy), and low social support work (e.g.

supervisor, peer support). Social support from supervisors and coworkers, lending a helping hand, providing emotional consolation, can augment the role of job control in moderating the effect of demands Research evidence supports the JD-C and JDCS theoretical model, and the relationship between the psychosocial risks articulated in these models and poor mental health (e.g. Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010; Van der Doef & Maes, 1999). Another highly cited model in the work stress literature is the Effort-Reward Imbalance (ERI) model (Siegrist, 1996). The theoretical foundation of this model is that workers expend effort at work and gain rewards as part of a socially negotiated process (Siegrist, 1996). Psychosocial risks develop when an imbalance occurs between the level of effort (e.g. high work pressure) and rewards (e.g. low pay, recognition) obtained. When gains do not match rewards, then a worker is at risk of poor mental health outcomes. Research evidence supports the ERI model and the proposition that high effort combined with low reward negatively affects employee health (Van Vegchel, de Jonge, Bosma, & Schaufeli, 2005). The JD-R model (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker, 2004) proposes that work with high levels of demands (e.g. work overload, emotional demands) and low levels of job resources (e.g. low social support, low autonomy) are at risk of poor psychological health outcomes. High levels of resources can lead to positive states such as work engagement. The JD-R model is widely supported, specifically the additive effects of stressors and resources on job strain and poor psychological health (Crawford, Le Pine, & Rich, 2010; de Jonge et al., 2014; Demerouti & Bakker, 2011; Schaufeli & Taris, 2014). These theoretical models provide a taxonomy for the classification of psychosocial factors in workplaces, and further explain how these job characteristics are related to poor workplace mental health.

Another approach to work stress is PSC theory (Dollard & Bakker, 2010), which proposes that, while poor psychological health is caused by the adverse work conditions

articulated in these work stress models (e.g. high effort, low reward, high demands, low resources), PSC precedes, and is a leading indicator of, working conditions. PSC is therefore a precursor to the job characteristics that are fundamental in other work stress theories (e.g. Dollard, Opie, Lenthall, Wakerman, Knight, et al., 2012; Owen, Bailey, & Dollard, 2016; Zadow & Dollard, 2016). It is important to identify, measure, and benchmark PSC as it represents an optimal point to intervene, to modify managerial and organisational practices, to prevent the development of unhealthy work conditions that ultimately lead to poor workplace mental health. Previous research has either ignored the contribution of a climate for psychological health or included it in one measure incorporating physical and psychological measurements of safety climate (e.g. Larsson, Pousette, & Torner, 2008; Nahrgang, Morgeson, & Hofmann, 2011; Neal & Griffin, 2006; Pousette, Larsson & Torner, 2008). Global and unidimensional measures of safety climate may obscure the differential impact of the different climates (de Jonge & Dormann, 2006). Previously psychological health has not been given the same priority as physical health in legislation and practice (Productivity Commission, 2010). Evidence suggests that the climate for the support and protection of psychological health is typically lower than the climate for physical safety in work places across Australia and Malaysia (Idris, et al., 2012). These findings emphasize the importance of differentiating between the climate for psychosocial safety and physical safety to understand the relative contribution of each, to ensure that psychosocial safety is prioritized and accorded sufficient research attention.

1.3 Psychosocial Safety Climate (PSC)

1.3.1 Understanding PSC

PSC reflects management philosophy and values in relation to worker psychological health and refers to shared perceptions regarding organisational policies, practices, and procedures

for the protection of worker psychological health and safety (Dollard and Bakker 2010). Psychosocial safety climate (PSC) theory (Dollard & Bakker, 2010) provides a framework that combines principles of safety science and work stress to build workplaces that prevent the development of unhealthy psychosocial risk factors that can lead to poor workplace mental health. The organisational context is a critical and pervasive influence on safety outcomes (Griffin & Curcuruto, 2016). PSC refers to the organisational functional and structural requirements to protect the psychological health of workers. Evidence supports PSC as a multilevel theory combining organisational, team, and individual level elements (e.g. Dollard, 2012; Dollard, Tuckey, & Dormann, 2012; Dollard, et al., 2016; Idris, Dollard, Coward, & Dormann, 2012; Law, Dollard, Tuckey, & Dormann, 2011; Owen, et al., 2016).

PSC theory differs from other work stress theories because it provides information that can directly assist organisations to build psychosocially healthy work. For example, by measuring PSC, an organisation can predict where unhealthy levels of effort and reward imbalance, job strain, bullying, and harassment are likely present among (or experienced by) its workers (Dollard & Bailey, 2014; Owen et al., 2016). PSC describes the management and organisational practices that precede the task conditions experienced by individual workers, described in current dominant models of work-related stress (e.g. JD-R, Demerouti, et al., 2001; ERI, Siegrist, 1996; and the JD-C, Karasek, 1979). These models have provided research evidence to suggest that prevailing work conditions (e.g. high job demands and low resources, or high effort and low rewards) are creating endemic work stress, with its direct and indirect pathogenic effects (Levi, 2016). PSC proposes that the origin of stress begins with the organisation via management practices, priorities and values, and the way resources are allocated, that in turn can promote the development of unhealthy job characteristics. As such, PSC can act as a leading indicator of the work conditions articulated in these work stress models (Dollard & Bakker, 2010; Dollard et al., 2012; Law et al., 2011; Owen et al.,

2016). Recognising that management and leadership are an essential part of psychosocial risk prevention, PSC theory (Dollard & Bakker, 2010) provides a theoretical framework and tool for ongoing psychosocial risk surveillance at the organisational level to provide evidence for prevention and intervention to promote psychosocially healthy systems of work (Bailey, 2014).

Chapter 2 of this thesis will outline PSC theory (Dollard & Bakker, 2010) in detail: it explains how PSC extends current work stress frameworks (JD-R, ERI, JD-C, JDCS), and predicts, and also moderates, the impact of the adverse work conditions that create poor psychological health. The chapter will also describe the multilevel characteristics of PSC, how PSC can be targeted in interventions, and the evidence base for PSC, concluding with recommendations for future PSC research. Chapter 3 – the first empirical chapter in the program of research – will then quantify the multilevel meta-analytic relationships between PSC, work conditions, health and productivity. These two chapters will provide an overview of current research knowledge, what we know, and where future research needs to be directed to address gaps in PSC theory. Chapter 4 will address one of the gaps identified, the application of PSC theory to real world problems, by triangulating evidence from alternative sources (e.g. organisational injury management systems). Chapter 5 will then examine how organisational stress interventions can be shaped using PSC theory, and the efficacy of high PSC organisational stress intervention approaches based on PSC principles that target the work climate compared to alternate approaches that focus on the individual job characteristics in improving workplace psychological health and productivity. Finally, Chapter 6 provides an overview of the thesis, the role of stakeholder engagement in the development of the research, major empirical findings, practical implications, and makes further recommendations for research.

1.3.2 PSC Theory and Injury Management Systems

The cost of nonfatal injuries in the US has been estimated recently to approach $186 billion, and the incidence rate of injuries are increasing (Leigh, 2011). Adding the cost of fatal injuries, the total cost of injury and illness in the US is estimated to be around $250 billion per annum (Leigh, 2011). In Australia alone the cost of workplace fatalities, injuries, and illnesses, both physical and psychological, is $57.5 billion dollars or 5.9% of Australia's gross domestic product per annum (SafeWork Australia, 2012). To reduce these significant personal and societal costs of workplace injury, safety scientists have focused on understanding organisational system factors, including safety climate, physical hazards, leadership styles and safety behaviour as precipitants of accidents and injuries (Clarke, 2006; Clarke, 2013; Nahrgang, Morgeson, & Hofmann, 2011; Neal & Griffin, 2006; Zohar, 2008).

An emerging literature has also implicated psychosocial factors and psychological health states (e.g. emotional exhaustion, psychological well-being) as important for injury (Clarke, 2010; Nahrgang et al., 2011). This evidence draws the work stress literature into our understanding about how PSC (Dollard & Bakker, 2010) relates to work injury via psychological health. Neglecting psychosocial risk factors in workplaces represents a significant problem because of their established relationship with outcomes such as psychological health (Dollard & Bakker, 2010), physical injuries (Goldenhar, Williams, & Swanson, 2003; Oliver, Cheyne, Tomas, & Cox, 2002; Siu, Phillips, & Leung, 2004; Smith, Huang, Ho, & Chen, 2006) and errors (Berland, Natvig, & Gundersen, 2008, Reid, 2001; Reinman, Pietikainen, & Oedewald, 2010). Greater research attention to psychosocial factors, particularly to organisational origins of psychological health (i.e., PSC), is required to assist understanding regarding the evolution of workplace injuries, with a view to primary prevention.

The aim of this research is to present a unifying multilevel framework, integrating organisational psychosocial safety climate (PSC), emotional exhaustion, to predict workplace injury and injury reporting practices. We tested this theory in hospital workers, using multilevel analytic techniques and self-report cross-sectional data and registered safety data collected over three years. There is a strong imperative for research to be focused on action that is practical and valuable with an impact on human existence (Goldkuhl, 2006). Theory can be interpreted as a structure of relationships, but without action these relationships are meaningless (Blumer, 1969). Focussing on workplace activities (injury management systems), this research paper moves PSC theory (Dollard & Bakker, 2010) to a "practical theory" providing knowledge about how the theory is applied in practice (Goldkuhl, 2006).

1.3.3 PSC Theory as a Framework for Organisational Stress Interventions

The first part of this thesis outlines the PSC theoretical construct, the evidence base, and then defines its role in the development of work injuries and injury reporting (Chapters 2, 3, and 4). The next part of this program of research examines what we can do with this knowledge to improve workplace conditions, health, and productivity. In Chapter 5 organisational interventions are meta-analysed with particular attention to interventions that target the climate for psychological health, PSC. In this sense, PSC theory (Dollard & Bakker, 2010) is examined in action across a range of workplaces. In this chapter a framework for the evaluation of organisational interventions using the PSC approaches is proposed, followed by a meta-analysis of the efficacy of organisational interventions that use PSC approaches, which are compared with organisational interventions that do not use PSC approaches. This research suggests a revolutionary paradigm shift in the development and evaluation of work stress interventions away from traditional models that focus on work conditions towards targeting the climate using the PSC framework.

Interventions are required to address the escalating consequences of work stress; theory suggests that organisational interventions should create broader sustainable change by addressing unhealthy work environments rather than interventions focusing on specific individuals (Jordon and Giga, 2003; LaMontagne, Noblet, & Landersbergis, 2012; Montano, Hoven, & Siegrist, 2014). Yet the meta-analytic research evidence to support the efficacy of organisational interventions is meagre with most meta-analyses unable to conclude that organisational interventions are effective at all, or finding that they have limited efficacy compared with individual interventions (Marine, Ruotsalainen, Serra, & Verbee, 2009; Richardson & Rothstein, 2008; van der Klink, Blonk, Schene, & van Dijk, 2001; Van Wyk & Pillay-van Wyk, 2010). Research shows that climate (i.e., Psychosocial Safety Climate (PSC), Dollard & Bakker, 2010) plays an important role in developing the conditions that create psychologically healthy work environments (Zadow & Dollard, 2016) yet work stress interventions targeting the climate are rare.

This paper, the third study in this PhD program of research (Chapter 5), revisits the organisational stress intervention evidence with a fresh vision. Absent from the literature is a meta-analysis to determine whether organisational interventions that target the managerial and organisational practices to improve the climate (high PSC approaches) are more effective in improving psychological health and work conditions than organisational interventions that address existing work conditions (e.g. external trainers to provide team building exercises, structured supervision arrangements) (low PSC approaches). This represents a paradigm revision from examining organisational interventions in terms of their modification of work conditions (i.e., job demands and resources, JD-R theory) to how organisational interventions shape the work climate that precede and sustain the unhealthy work conditions leading to poor mental health.

The evidence base for organisational interventions is limited and erratic, particularly in the meta-analytic literature, despite a wide range of theoretical models supporting the importance of poor work conditions in the development of adverse psychological health symptoms (i.e., JDCS model, Karasek, 1979; the ERI model, Siegrist, 1996; the JD-R model, Demerouti et al., 2001; and the DISC Model, de Jonge & Dormann, 2006). Organisational interventions need to address complex social structures that are difficult to manage and quantify, and the implementation process is often complex and inconsistent (Nielsen, Fredslund, Christensen, & Albertsen, 2006; Nielsen, Randall, & Albertsen, 2007). The heterogeneity in organisational intervention approaches and the wide range of outcomes measured (e.g. performance, absenteeism, physical health, emotional exhaustion, fatigue) both within and across studies creates poor methodological rigour and difficulty in implementing traditional experimental processes such as randomisation and control groups (van der Hek & Plomp 1997; van Wyk & Pillay van-Wyk, 2010). Compensatory rivalry occurs between groups where control groups attempt actions to compete with intervention groups or adopt intervention activities independently, or programme failure can occur when the intervention is not implemented as anticipated (e.g. due to competing work deadlines, middle management disinterest in the intervention process) leading to smaller effect sizes (i.e., see Zapf et al., 1996) or effects that take a longer time period to manifest (Nielsen, Randall, & Albertson, 2007). Ever-changing organisational structures including mergers, expansions and downsizing, together with the need for organisations to constantly change to meet targets in a globally competitive environment, have strong implications for risk assessment and intervention activities (Nielsen et al., 2010). These problems have hampered efforts to undertake research to quantify the impact of organisational stress interventions, and the efficacy of different strategies. This third study described in Chapter 5 has important practical implications for workplaces seeking to improve the psychosocial work conditions,

psychological health, and productivity of their employees because a clear framework is provided and evaluated, using synthesised data from a range of organisational interventions conducted in workplaces across a range of occupations around the world, that can be used for guidance in the development, implementation, and evaluation of organisational stress interventions, based on the PSC theoretical model. Again, this research extends PSC theory (Dollard & Bakker, 2010) to practice, applying PSC principles to interventions conducted in the field and demonstrating how PSC theory works in action as a 'practical theory' (Goldkuhl, 2004).

1.4 Purpose of This Thesis

1.4.1 Extending the Knowledge Base

From the previous discussion, there is clearly a strong need to examine how workplaces can be structured to build healthy work environments. There has so far been limited attention directed towards investigating how the climate for the protection of psychological health and safety (PSC) including the managerial and organisational practices in workplaces, creates healthy psychosocial work conditions and protects workers from developing poor mental health. Gaps in knowledge include what is the evidence base for a climate for the protection of psychological health (PSC) as a precursor to healthy psychosocial work conditions, and how these process relationships are quantified meta-analytically. These issues are addressed in Chapter 2 and 3. Second, a gap in the current literature is how a climate for the protection of psychological health (PSC) influences work injuries and how they are reported, including self-report and registered organisational injury incidences used in practice to inform safety decisions in the field. Chapter 4 addresses this research question. Third, the literature to date has not examined the efficacy of organisational stress interventions that target the climate for psychological health and safety (PSC), and compared these interventions with other

interventions that focus on improving specific aspects of job design. This information is critical to develop effective interventions to address the factors that create unhealthy work. Chapter 5 explores this research question in detail.

1.4.2 Research Questions

Therefore, in this research, the following questions are raised.

1. How does PSC theory extend our theoretical and practical knowledge of workplace safety? This question is addressed in Chapter 2 and 3.

2. Does PSC (reported at the work group level) influence work injuries and whether they are reported on workplace injury management systems? How does the relationship between PSC and work injury rates extend our theoretical knowledge, and how can such knowledge be applied to improve workplace safety in practice? This question is addressed in Chapter 4.

3. Are organisational stress interventions that target PSC more effective than alternative interventions that focus on the improving work conditions (reducing job demands, increasing job resources), reducing adverse psychological health symptoms and improving productivity including work absence (e.g. sickness) and reduced work output (e.g. presenteeism)? This question is addressed in Chapter 5.

1.5 Thesis Structure

To address the specific issues identified in relation to PSC theory in practice the remainder of the thesis is structured in six chapters, which are defined below.

1.5.1 Overview of the Thesis

In Chapter 1 an overview of the research is provided. In particular the gaps in current knowledge are identified and introduced in the research questions. The structure and content

of the thesis are described, showing the prevalence of psychosocially unhealthy work. The chapter structure is described in detail including the sequential evaluation of PSC theory (Chapter 2 and 3), its application to injury management systems (Chapter 4), and how it can be used to guide organisational stress interventions (Chapter 5).

1.5.2 Workplace Safety and Psychosocial Safety Climate (PSC) Theory

In Chapter 2 the background to the research is outlined. It begins by explaining how PSC theory (Dollard & Bakker, 2010) has evolved and why we need to measure it, describing the four domains of PSC and how they can be evaluated, and demonstrating how PSC acts as an extension of current work stress frameworks. Next the chapter examines the role of PSC as both a predictor of work characteristics and health and productivity outcomes, and as a moderator of relationships between work characteristics and health/ productivity. Then the multilevel characteristics of PSC are examined, along with its role in interventions, the evidence base is evaluated, and possible directions for future research are outlined (Zadow & Dollard, 2016).

1.5.3 Multilevel Meta-Analytic Associations

Using meta-analysis, Chapter 3 defines the relationships linking PSC, work conditions, health and productivity measures at both the individual and group level of analysis, as a mechanism to summarise the cross sectional and longitudinal relationships across 19 independent samples and 212 effect sizes (N = 24, 616). This meta-analysis addresses a gap in the literature created by the lack of a synthesis and systematic review of the existing PSC research as mentioned earlier. The analyses undertaken in Chapter 3 aid in bringing the research findings together, to determine standardised effect sizes for the relationships between PSC and work conditions, psychological health, motivational and productivity outcomes, and to quantitatively summarise these relationships across studies.

There is a strong argument for systematically reviewing research evidence in the development of theoretical frameworks. With multiple studies, we can report that the effect is robust, or else varies according to context (or just 'is variable'), which is useful to understand the strength of relationships across different samples (Borenstein, 2013). While multilevel meta-analyses are rare in the research literature, in occupational stress research multilevel research is crucial to understand the hierarchical structure of data and effects occurring within and across levels (Probst, 2010). Chapter 3 extends knowledge of the meta-analytic relationships between PSC, work conditions, productivity and health, and also examines new techniques to examine cross-level meta-analytic relationships to explore the relationship between PSC at the work unit level, and work conditions, productivity and health at the individual level.

1.5.4 PSC, Work Injuries and Injury Reporting Practices

Chapter 4 examines the relationship between PSC, work injuries, and injury reporting practices. The innovation is to propose and examine a new psychosocial pathway to both work injuries and injury (under)reporting. Specifically, the issue of how PSC at the team level relates to physical and psychological workplace injuries (unreported and reported) via psychological health erosion (emotional exhaustion) is examined. It is proposed that workers in low PSC environments, who are experiencing high levels of emotional exhaustion, lack the physiological and cognitive capacities to prevent and manage work injuries. Further, such workers likely also lack the resources to participate in discretionary safety activities such as work injury reporting. We use multilevel analysis with hospital employees nested within teams, to test paths to injuries and underreporting, and link our survey data to registered organisational safety risk management data. Our design, tracking variance due to team level effects in injuries and underreporting, provides evidence beyond individual explanations.

This chapter examines whether perceptions of PSC in a work group influence work injuries and how they are reported on workplace injury management systems. Understanding the role of more distal 'causes' such as PSC (managerial or organisational practices) may provide a more effective target for intervention to prevent work injuries, than attempting to treat the adverse psychosocial work conditions or psychological health states once they have manifested. Extensive preliminary work with industry was undertaken to develop this project to ensure that this academic work would have pragmatic value in the field and this work is outlined in Appendix A. The initial industry work was used to delineate these important relationships between PSC, emotional exhaustion, and injuries, which were then expanded in more detail in Chapter 4.

1.5.5 Meta-Analytic Evaluation of High PSC Organisational Stress Interventions

Chapter 5 reports a meta-analytic review of organisational stress interventions using the PSC theoretical framework. Interventions are required in order to address the escalating consequences of work stress; organisational interventions are theorised to create broader sustainable change by addressing unhealthy work environments, rather than interventions focussed on specific individuals that do not tackle the underlying risks. Yet, as previously mentioned, the meta-analytic research evidence to support the efficacy of organisational interventions is meagre; most meta-analyses have been unable to conclude that organisational interventions are effective at all, or have revealed limited efficacy compared to individual interventions. To resolve this discrepancy between theory and evidence, we propose a paradigm shift: from examining organisational interventions in terms of how they change work conditions (i.e., job demands and job resources) to how organisational interventions shape the work climate Specifically this meta-analysis examines the efficacy of organisational stress interventions that use high PSC approaches compared to organisational

stress interventions that use low PSC approaches. The meta-analytic evidence provides data to inform the development, implementation, and evaluation of organisational stress interventions to effectively reduce adverse psychological health symptoms, and improve work conditions and productivity.

1.5.6 Extension to Theory, Practical Recommendations, and Future Research

Chapter 6 outlines the key messages from this program of research including the major empirical findings, theoretical contributions, practical implications, and opportunities for future research. In particular this thesis explains how the thesis findings promote a paradigm shift in work stress theory, extend work safety theory, identify the role of PSC as a facilitator of job resources, and examines how PSC theory (Dollard & Bakker, 2010) can be used in action as a practical theory. It provides practical recommendations to apply theoretical findings to practice including pragmatic steps to improve the four workplace PSC domains, and the development of process principles for organisational stress interventions using a rating criteria for practitioners. Finally, Chapter 6 reviews the study limitations, and makes further research recommendations to advance theoretical and applied knowledge in the field of occupational stress management.

1.6 Summary

The PSC concept provides an opportunity to design healthy workplaces. Poor workplace mental health (e.g. burnout, depression and anxiety) leads to enterprise restrictions (e.g. absenteeism and productivity loss), physical impairment (e.g. cardiovascular disease and musculoskeletal disorders), and harmful coping behaviours (e.g. alcohol and drug abuse, unhealthy diet, sleep disorders) (International Labour Organization, 2016). This has subsequent impacts upon worker families and the wider community (International Labour

Organization, 2016). Yet until recently managers have had little available research theory and evidence to structure organisations to prevent the development of the work conditions that lead to poor psychological health (Law et al., 2011).

This program of research can be used to inform binding legal instruments such as International Labour Standards, Regional Standards (e.g. declarations, directives), National Legislation (e.g. Labour Codes, OHS Laws), collective agreements, and non-binding standards and tools (e.g. technical standards, guidelines, protocols, intervention tools, training materials) (International Labour Organization, 2016). The thesis findings can be used to guide key stakeholder groups (such as trade unions, government agencies, researchers and academics), and non-traditional intervention groups (such as social security agencies, health insurers, families and partners, health care institutions, customers or clients, communities, employment agencies, media, and business consultants) (World Health Organization, 2008) to identify why, when and how they can proactively identify, measure, and monitor organisational PSC and psychosocial risks. Ultimately the thesis findings can be used to design and evaluate targeted organisations interventions at multiple levels, to build and sustain healthy workplaces that protect and support the psychological health of workers.

2 Psychosocial Safety Climate: State of the Art

2.1 Overview

This chapter provides an overview of Psychosocial Safety Climate (PSC) theory (Dollard & Bakker, 2010). It outlines how PSC extends current work stress frameworks (JD-R, ERI), how PSC predicts and also moderates the impact of the adverse work conditions that create poor psychological health, the multilevel characteristics of PSC, how PSC can be targeted in interventions, and recommendations for future research. This chapter was published in the *Wiley Handbook for the Psychology of Occupational Health* and was jointly authored with Professor Maureen Dollard.[1] This publication outlines how PSC, as a precursor of other work stress theories, is a critical component of any approach to prevent workplace stress, by addressing the causes of the workplace psychosocial risks that lead to poor mental health including workplace stress, burnout, anxiety and depression.

[1] **Zadow, A.,** & Dollard, M. F. (2016). Psychosocial safety climate. In S. Clarke, T. M. Probst, F. Guldenmund, & J. Passmore (Eds.), *The Wiley Blackwell Handbook of the Psychology of Occupational Safety and Workplace Health (*pp. 414-436). Chichester, UK: John Wiley & Sons Ltd.

2.2 Introduction

Demographic shifts, increased economic globalization, and accelerated technological change have led to a range of emerging workplace psychosocial hazards such as precarious contracts, job insecurity, lean production and outsourcing, long working hours, work intensification and high emotional demands (European Agency for Safety and Health at Work, 2012). Work-related stress affects more than 40 million individuals across the European Union costing an estimated 3–4 percent of GNP (World Health Organization, 2008). Stress, depression, or anxiety are considered the second most frequently reported work-related health problem after musculoskeletal health problems (European Agency for Safety and Health at Work, 2012). Therefore, psychosocial hazards and their health and safety risks are a significant challenge for contemporary managers, employees, and policymakers alike (Biron, Karanika-Murray, & Cooper, 2012).

Recent evidence suggests that the causes of work stress are more distal than initially assumed and are influenced by the organizational context (Dextras-Gauthier, Marchand, & Haines, 2012; see also Guediri & Griffin, 2016). Previously, work stress theory and research has emphasised job design, or the individual work conditions that cause work stress such as work pressure, job control, and social support, highlighted in models such as the Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2007; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Schaufeli & Bakker, 2004), the Job Demands-Control (JD-C) model (Karasek, 1979), the Job Demands-Control-Support (JDCS) model (Johnson & Hall, 1988), and the Effort-Reward Imbalance (ERI) model (Siegrist, 1996).

Growing evidence suggests that multilevel systems or comprehensive organizational approaches in combination with individual-level job design changes are required to make sustainable change to levels of workplace stress (LaMontagne, Noblet, & Landsbergis, 2012).

Multilevel system approaches to manage physical safety at work have been used for more than 30 years (Law, Dollard, Tuckey, & Dormann, 2011). The development and operation of high-risk organizations such as nuclear power plants, hospitals, petrochemical plants, aircraft, and modern defence systems entail significant potential harm to people and the environment and have prompted organizations to proactively identify, measure, mitigate, and monitor organizational risk (Bloomfield et al., 2012). For instance, the nuclear power industry clearly recognised the importance of organizational climate in safety performance following the Chernobyl accident (European Agency for Safety and Health at Work, 2011; International Atomic Energy Agency, 2002).

The assessment of "leading indicators" such as the measurement of safety climate reduces the need to wait for the system to fail in order to identify weaknesses and to take remedial action (Flin, Mearns, O'Connor, & Bryden, 2000). Yet the research literature has been markedly silent in identifying a climate construct related to psychological health and safety (Idris, Dollard, Coward, & Dormann, 2012). Two separate research and practice literatures have developed in the fields of work, health and safety, and occupational health psychology. On the one hand work health and safety research, has focused on workplace climate, management systems, the physical work environment, physical health (mainly referred to in terms of injuries), and accidents; on the other hand, occupational health psychology literature has focused on work-related stress research linking job characteristics to psychological health (Dollard & Bakker, 2010).

Within these two bodies of literature a clear gap in safety research knowledge has developed that has hampered prevention efforts particularly in relation to psychosocial hazards. In the work health and safety literature there is evidence that physical safety climate is related to physical injury risk, safety behaviours, and physical accidents and injuries such as musculoskeletal pain and hearing loss (e.g. Huang, Ho, Smith & Chen, 2006; Neal &

Griffin, 2006; Snyder, Krauss, Chen, Finlinson, & Huang, 2008). Work related stress, burnout, depression, and anxiety represent an immense growing cost for organizations due to productivity loss, staff turnover, absenteeism, and workers' compensation claims, yet until recently managers had little available research theory and evidence to structure organizations to prevent the development of the work conditions that lead to poor psychological health (Law et al., 2011).

This chapter chronicles the development of the safety climate construct in psychosocial terms, that is, psychosocial safety climate. The elaboration of this construct draws together the two fields of research and helps us address the question: What is the role of the organization or system factors in the creation of the psychosocial work characteristics that are risk factors for poor psychological health? Psychosocial safety climate theory (Dollard & Bakker, 2010; Dollard & Karasek, 2010; Dollard & McTernan, 2011; Hall, Dollard, & Coward, 2010; Idris, Dollard, & Winefield, 2011) defines the organizational context preceding the development of risky work conditions that lead to poor psychological health. Psychosocial safety climate is conceptualised as the "cause of the causes" of workplace stress (Dollard, 2012). Psychosocial safety climate theory proposes that the origin of stress begins at the organizational level via management practices, priorities and values, supervisory methods, production methods, budgets, and resource allocation, before the development of the specific job level characteristics such as high job demands and low resources emphasised in dominant work stress theories (Dollard, 2012; Dollard & Karasek, 2010; Law et al., 2011). Since psychosocial safety climate is proposed as a precursor to these workplace stressors the theory challenges the conception of the individual as responsible for monitoring and managing psychological health, proposing instead that a broader systems level approach will promote more effective sustainable change (Law et al., 2011).

Psychosocial safety climate theory, as it links to both areas, brings together these two unconnected areas of research; the safety climate research and the work stress literature, filling an abysmal gap in safety research (Dollard & Karasek, 2010). This chapter further outlines psychosocial safety climate as an extension of current work stress frameworks, expounds its predictive and ameliorating or moderating roles, its multilevel characteristics, and role in interventions to improve workplace psychological health. The evidence-base for psychosocial safety climate theory is examined and potential future research directions are explored.

2.3 Psychosocial Safety Climate

2.3.1 Psychosocial Safety Climate: Conceptualisation

Psychosocial safety climate is a specific aspect of organizational climate relating to psychological health and safety (Dollard & Bakker, 2010). Psychosocial safety climate may be conceptualised as the organisational policies, practices, and procedures for the protection of worker psychological health and safety (Dollard & Neser, 2013). Workers reporting high levels of psychosocial safety climate feel that their psychological safety and well-being is protected and supported by senior management (Bond, Tuckey, & Dollard, 2010).

To promote a strong psychosocial safety climate, senior management value worker psychological health, prioritise the psychological health of workers over profit and productivity, and commit to and support psychological health protection (Hall et al., 2010). General measures of safety climate are defined in this chapter as measures of physical safety climate. Both psychosocial safety climate and physical safety climate measure worker perceptions of organizational policies, procedures, and practices as they relate to safety (Cox & Cheyne, 2000; Reichers & Schneider, 1990), reflect the properties of a group or

organization (Hall et al., 2010), and precede safety behaviour (Hall et al., 2010). The distinction between the two constructs is that general measures of safety climate emphasise physical health and injuries while measures of psychosocial safety climate prioritise psychological health and safety.

The Psychosocial Safety Climate tool has 12 items (PSC-12) that reflect the four main theoretical domains of PSC (Hall et al., 2010). These domains were developed by Dollard and Bakker (2010) following a review of stress prevention interventions (Dollard & Bakker, 2010; Dollard & Kang, 2007; Jordan et al., 2003; Kompier & Cooper, 1999; Kompier & Kristensen, 2001). After a further review of the safety climate literature the management priority for safety was included as a further domain (Cheyne, Cox, Oliver, & Tomás, 1998; Zohar, 1980). The four specific domains are defined in Table 2.1.

Table 2.1. The Organisational Psychosocial Safety Climate Framework (A New Stress Theory).

Domain	Key processes	Example item
Management commitment and support	Senior management show support and commitment to psychological health through involvement and commitment. Senior management take quick and decisive action to correct problems or issues that affect psychological health.	Senior management acts decisively when a concern of an employee's psychological status is raised.
Management priority	Priority management give to psychological health and safety versus productivity goals. Demonstrated by the enacted policies, procedures, and practices of an organization and the priority of psychological health policies relative to policies promoting productivity goals.	Senior management considers employee psychological health to be an important as productivity.
Organizational communication	Extent and effectiveness of organizational communication. An organization communicates	There is good communication around here

	with employees about issues that may affect psychological health and safety, and brings these issues to the attention of employees. Part of this is the way employees communicate occupational health and safety concerns and how this process is reflected in policies and procedures.	about psychological safety issues that affect me.
Organizational participation	Organizational participation and involvement. Involves the integration of stakeholders including employees, unions, and health and safety representatives in the occupational health and safety process, through participation and consultation involving all levels of the organization.	Employees are encouraged to become involved in psychological safety matters.

Together these domains depict what an organization, unit, or team would need to develop in order to create a strong psychosocial safety climate (Dollard, Tuckey, & Dormann, 2012). The construct validity (Hall et al., 2010), predictive validity (Dollard, 2012; Dollard & Bakker, 2010; Law et al., 2011) and conceptual distinctiveness (Idris, et al., 2012) of the psychosocial safety climate measure have been established in research. Psychosocial safety climate items have recently been included in the Job Content Questionnaire-2 (JCQ-2), a highly cited measure of workplace psychosocial factors used in a wide range of languages (Karasek et al., 1998). In delineating a new construct, it is important to verify that it differs from related constructs. Using confirmatory factor analysis, Idris and colleagues demonstrated that psychosocial safety climate is uniquely different from a measure of physical safety climate when operationalised in matching domains (Idris et al., 2012).

There is an extensive range of physical safety climate measures that have accumulated over 30 years (Zohar, 2010). Measures such as the Loughborough Safety Climate Assessment

Toolkit (LSCAT) (Cox & Cheyne, 2000), the Multilevel Safety Climate Scale (MSC) (Zohar & Luria, 2005), the Nordic Safety Climate Questionnaire (NOSACQ-50) (Kines et al., 2011), the Safety Awareness Questionnaire (SAQ) (Grote & Kunzler, 2000; Grote, 2008) and the Organizational and Safety Climate Inventory (OSCI) (Silvia, Lima, & Baptista, 2004) to help managers and researchers develop and identify safety climates that reduce physical injury risk, and promote safety behaviours to predominantly protect physical health, physical accidents, and injuries. Idris et al. (2012) identified that psychosocial safety climate makes a unique and important contribution to measures of workplace psychological health (psychological distress and emotional exhaustion) outcomes over and above that of physical safety climate. Levels of psychosocial safety climate were also significantly lower than those of physical safety climate indicating a lack of attention to workplace psychological health in Australian and Malaysian samples in comparison to physical health and safety.

Idris et al. (2012) also identified that the psychosocial safety climate construct is distinct from other related climate measures and is superior to other team-level climate measures such as perceived organizational support (Eisenberger, Huntington, Hutchison, & Sowa, 1986), and team psychological safety (Edmonson, 1999) in its negative relationship to both job demands and psychological health problems. Perceived organizational support measures the extent workers feel that their organization values their contribution and well-being, resulting in perceived productivity outcomes (Eisenberger et al., 1986). Psychosocial safety climate goes further than perceived organizational support by focusing specifically on psychological health, employee psychological status, and stress prevention (Idris et al., 2012). Another similar construct, team psychological safety, reflects a belief that a work team is safe to engage in new interpersonal behaviours necessary for learning and performance (Edmonson, 1999). Psychosocial safety climate is more strongly related to psychological health than team psychological safety as it is not limited to interpersonal behaviours but

rather affects a range of workplace stressors (Idris et al., 2012) that may shape interactions within the team.

Another construct that should not be confused with psychosocial safety climate is psychological climate. Psychological climate defines individual perceptions and beliefs about the work environment measured at the individual level (Clarke, 2006, 2010; Parker et al., 2003) while psychosocial safety climate measures individual perceptions of organizational policies, practices and procedures to protect psychological health and safety which are aggregated to the level of the team, organization, or even at a socio-political level; for example, large databases such as the European Working Conditions Survey (2010) and the European Survey on New and Emerging Risks (2009) enabled comparisons of organizational psychosocial safety climate levels between countries (Dollard & Neser, 2013).

2.3.2 Psychosocial Safety Climate: An Extension of Current Work Stress Frameworks

An important aspect of the psychosocial safety climate construct is that it can be integrated with, as well as extend, current theoretical frameworks of workplace stress. Most existing workplace stress models begin with job design and explain how psychosocial work conditions affect psychological health. Currently the most highly cited models of workplace stress seen in the literature are defined in Table 18.2.

The Job Demands -Resources (JD-R) model (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker, 2004) is widely used by researchers because of its broad scope and flexibility, and has been cited more than 24,000 times (de Jonge, Demerouti, & Dormann, 2014; Schaufeli & Taris, 2014). The JD-R model describes two processes. The first process is a health impairment process whereby job demands such as work overload, cognitive or emotional demands can exhaust mental and physical resources, contributing to emotional exhaustion and in turn chronic health problems (Bakker & Demerouti, 2007). The

second process is a motivational process whereby job resources promote high work engagement and in turn greater work performance (Bakker & Demerouti, 2007), greater productivity and profit (Harter, Schmidt, & Hayes, 2002). There are cross-links between the processes whereby poor psychological health is associated with reduced productivity (McTernan, Dollard, & LaMontagne, 2013; Sanderson, Tilse, Nicholson, Oldenburg, & Graves, 2007), and has even been related to accidents and errors (Clarke, 2010; Nahrgang, Morgeson, & Hofmann, 2011).

Table 2.2 Workplace Stress Models

Model	Key processes	Evidence
Job Demands-Resources framework (JD-R model) (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker, 2004).	Proposes two processes: (1) poorly designed jobs or chronic job demands (e.g. work overload, emotional demands) exhaust employees' mental and physical resources leading to a state of exhaustion (health impairment process); (2) workers with high levels of job resources have high work engagement (motivational process). Proposes that high demands require sufficient resources to offset the negative effects of the job demands.	Supports the additive effects of stressors and resources on job strain (Crawford, Le Pine, & Rich, 2010; de Jonge et al., 2014; Demerouti & Bakker, 2011; Schaufeli & Taris, 2014). Evidence for combined effects of demands and resources shown through moderating effects has received mixed support. For example, some studies have failed to confirm the moderating role of personal resources in predicting psychological health outcomes (e.g. Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007).
Job Demands-Control model (JD-C model) (Karasek, 1979; Karasek & Theorell, 1990) and the Job Demands-Control-Support model (JDCS) (Johnson & Hall, 1988).	The JD-C model proposes that employees working in a high strain job (high demands-low control) experience the poorest psychological health. Control can moderate the negative effects of high demands on well-being. The expanded JDCS model predicts the worst psychological health	Supports the additive effects of demands, control, and social support on general psychological well-being although this relationship is more consistently supported in cross-sectional studies than in longitudinal data suggesting that reversed causation might account for part of the association and

Model	Key processes	Evidence
	outcomes among workers when they experience high demands-low control-low social support work. The JDCS model proposes that social support can moderate the negative impact of high demands and low control on psychological health.	evidence for interactive effects is weak (Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010; Van der Doef & Maes, 1999).
Effort-Reward Imbalance (ERI) model (Siegrist, 1996).	Workers expend effort at work and expect rewards as part of a socially negotiated organised exchange process. When an imbalance occurs between the level of effort and rewards obtained, psychological strain develops. Extrinsic (job demands) and intrinsic (over-commitment) efforts are differentiated and it is proposed that over-commitment could moderate or mediate the relationship between job demands and rewards.	Most studies support the proposition that high effort and low reward impairs employee health (Van Vegchel, de Jonge, Bosma, & Schaufeli, 2005). While most studies find evidence that high overcommitted employees have impaired health compared with less overcommitted counterparts, the interaction hypothesis between ERI and OVC lacks evidence (Van Vegchel et al., 2005).
Demand-Induced Strain Model (DISC) (de Jonge & Dormann, 2003, 2006).	Based on the Triple Match principle (TMP) proposing that job demands, job resources, and job related outcomes may contain cognitive, emotional, and physical dimensions where the strongest interactive relations between job demands and job resources are observed when demands, resources, and outcomes are based on similar dimensions. The TMP is a probabilistic principle so while TMP effects are considered to be more likely non-matching effects are also anticipated.	This is a relatively new model with recent DISC studies showing support for the TMP (de Jonge et al., 2014; Van den Tooren, de Jonge, & Dormann, 2011; Van de Ven, de Jonge, & Vlerick, 2014).

Psychosocial safety climate extends JD-R theory and is conceived as trigger for both the health erosion and motivational hypotheses of the JD-R model, as shown in Figure 2.1 (Dollard & Bakker, 2010; Idris et al., 2011; Law et al., 2011). Reviewing Figure 2.1 from left to right research has shown that socio-political factors (e.g. union membership, national socio-economic framework) have a direct effect on levels of psychosocial safety climate; this probably occurs because of the associated political power actors (unions, policy makers) influencing work health and safety policy within organisations and consequently the psychosocial safety climate (Dollard & Neser, 2013). Low psychosocial safety climate is then related to higher levels of job demands (Dollard, Bailey, et al., 2012; Dollard & Bailey, 2014; Dollard, Opie, et al., 2012; Idris & Dollard, 2011; Idris, Dollard, & Winefield, 2011; Yulita, Idris, & Dollard, 2014). The existing research literature also demonstrates a relationship between job demands and psychological health (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker, 2004) which is known as the health erosion pathway in the JD-R literature. When psychosocial safety climate acts as a trigger for the health erosion pathway it can be conceptualised as an extended health erosion pathway (see the arrow above the figure). High psychosocial safety climate is also directly related to high levels of job resources (Dollard, Bailey, et al., 2012; Dollard & Bailey, 2014; Dollard, Opie, et al., 2012; Idris & Dollard, 2011; Idris, et al., 2011; Yulita, et al., 2014). The existing research literature also demonstrates a relationship between job resources and engagement (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker, 2004) which is known as the motivational pathway in the JD-R literature. When psychosocial safety climate acts as a trigger for the motivational pathway it can be conceptualised as an extended motivational pathway (see the arrow below the figure). Research has also shown that psychosocial safety climate moderates the relationship between job demands and psychological health (Dollard, Tuckey, & Dormann, 2012; Hall, Dollard, Winefield, Bakker, & Dormann, 2013).

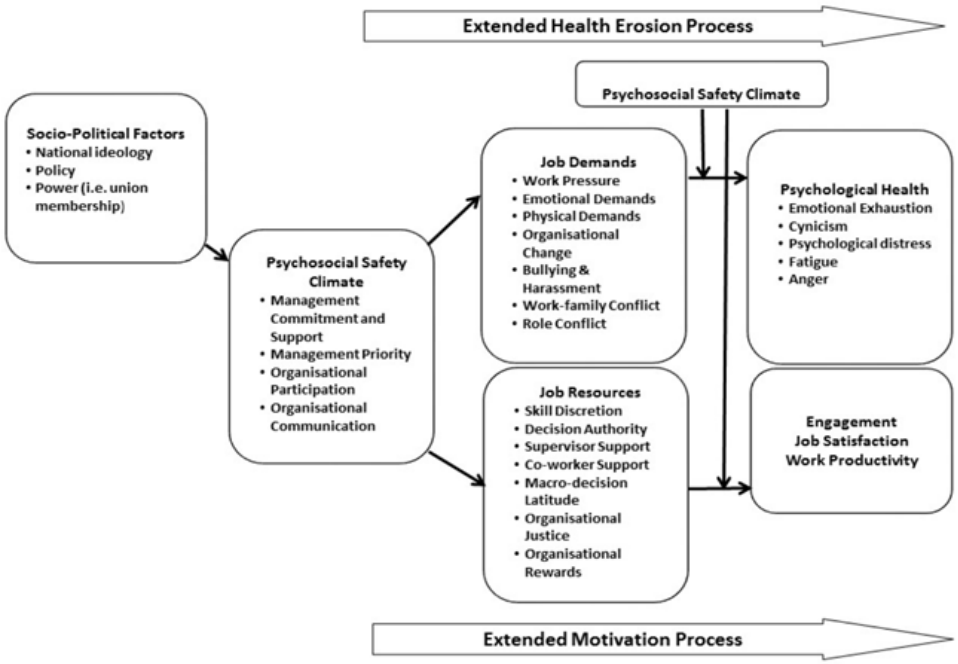

Figure 2.1 Psychosocial safety climate theoretical framework

Psychosocial safety climate defines the organizational context and management practices that precede the individual job demands and job resources articulated in the JD- R model. This clarification provides an opportunity to intervene at an organizational level to proactively identify and mitigate psychosocial risk by establishing organizational and management systems to create and sustain healthy work conditions with associated health and productivity benefits. By contrast, targeting individual- level job demands and resources defined in the JD- R, as they arise, is a complex, time consuming, and potentially less effective process for organizations.

Longitudinal studies show that psychosocial safety climate negatively predicts psychosocial risk factors (e.g. emotional demands, bullying, harassment), that are subsequently positively related to psychological health problems in the so-called extended

health impairment pathway (Bond et al., 2010; Dollard & Bailey, 2014; Dollard & Bakker, 2010; Dollard, Opie, et al., 2012; Idris & Dollard, 2011; Idris et al., 2012; Law et al., 2011). There is also evidence for the extended motivational pathway as resources mediate the relationship between psychosocial safety climate and engagement (Dollard & Bailey, 2014; Dollard & Bakker, 2010; Idris & Dollard, 2011; Idris et al., 2012). These findings provide evidence for a multilevel model of psychosocial safety climate as a lead indicator of work conditions, psychological health, and employee engagement (Law et al., 2011). More broadly psychosocial safety climate extends all stress theories that elaborate job design as the starting point for psychological health problems, such as the JD-R model (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker, 2004), the JD-C model (Karasek, 1979), the JDCS model (Johnson & Hall, 1988), and the ERI model (Siegrist, 1996). A summary of these models of workplace stress including a description of the processes involved and associated research evidence is provided in Table 2.2.

2.3.3 Psychosocial Safety Climate: Predicting and Moderating Functions

Psychosocial safety climate exerts a *primary* and *secondary function* in the development of workplace psychological health. As a *primary predictor*, psychosocial safety climate directly prevents adverse work conditions leading to poor psychological health (see Figure 2.1). In its primary role, psychosocial safety climate predicts job demands such as work pressure and emotional demands, and subsequent change in psychological health problems, as well as job resources such as skill discretion and decision authority and subsequent changes in engagement (Dollard & Bakker, 2010).

Psychosocial safety climate also has a *secondary function* as an ameliorator or moderator of the impact of the negative work conditions when they are present in an organization. Several longitudinal studies have found that psychosocial safety climate is a

buffer to moderate the effects of job demands and bullying on psychological health outcomes (Bond et al., 2010; Dollard & Bakker, 2010; Dollard, Tuckey, & Dormann, 2012; Law et al., 2011). In particular, the impact of job demands on psychological health is reduced when psychosocial safety climate is high (Dollard & Bakker, 2010; Dollard, Tuckey, & Dormann, 2012; Law et al., 2011). In its secondary role, psychosocial safety climate acts as a safety signal indicating to workers when it is safe to use personal (e.g. coping strategies) and organizational (e.g. autonomy) resources to manage job demands (Dollard, Tuckey, & Dormann, 2012).

The secondary function of psychosocial safety climate may explain the variability in empirical findings testing interaction effects proposed in work stress models. Several work stress theories are based on an interaction hypothesis, that is, a high level of job demands will lead to psychological distress and this relationship will be moderated when there are high job resources such as job control and social support. For instance, the JD-C model (Karasek, 1979) proposes that the positive relationship between demands and psychological health problems will be reduced when job control is high. The JDCS model (Johnson & Hall, 1988) proposes that higher levels of social support may moderate that negative impact of high job demands and limited job resources on psychological health. While the literature has found substantial evidence to support main effects, reviews have found limited or mixed evidence to support interactive effects. Van der Doef and Maes (1999) found that job control moderated the negative effect of job demands on psychological health in only 15 of the 31 studies reviewed and that there was insufficient evidence to assess the impact of social support. De Lange, Taris, Kompier, Houtman, and Bongers (2003) selected 19 longitudinal studies of perceived high methodological quality for analysis finding that only eight studies demonstrated the expected combination of additive and multiplicative effects. Finally, Häusser, Mojzisch, Niesel, and Schulz-Hardt (2010) identified that only 29 of 97 studies

supported the demand–control interaction and that only seven of 52 studies supported the interaction between demand, control, and social support. An explanation for the inconsistent interaction effects could be that the organizational context, and the role of management, influences when and how job resources are used (Dollard, Tuckey, & Dormann, 2012). Poor psychosocial safety climate may negatively influence the proposed beneficial interaction between job demands and control and consequent psychological health, and therefore may account for the inconsistent findings of the job demand–job control interaction between studies (de Lange et al., 2003; Häusser et al., 2010; Van der Doef & Maes, 1999).

Dollard, Tuckey, and Dormann (2012) proposed that the demand–resource interaction depends on the organizational context; in particular, high levels of psychosocial safety climate will enable the safe utilization of resources to reduce demands. Dollard, Tuckey, and Dormann (2012) found that high emotional resources moderated the positive relationship between emotional demands and change in workgroup distress only when there were high levels of unit psychosocial safety climate. For example, employees may only feel comfortable to report violence or bullying, or seek additional supervisor or co-worker support, when they are working in an environment where their psychological health is valued above productivity concerns and communication practices are in place to raise and address these issues. The practical implication of these findings suggests that the provision of resources alone to counter high demands may be insufficient to improve psychological health in an environment where senior management support, commitment, and priority of psychological health is not evident, and when communication and participation strategies to manage psychological health issues are not clearly structured and understood. Resources may only be utilised when the climate is right.

2.3.4 Psychosocial Safety Climate: Multilevel Characteristics

Evidence supports psychosocial safety climate as a multilevel theory combining organizational, job, and individual level aspects (Dollard & Bakker, 2010; Dollard, Tuckey, & Dormann, 2012; Idris et al., 2012; Law et al., 2011). General measures of safety climate have also been recently redefined as multilevel to contrast the priorities of senior management with those of work group supervisors (Zohar, 2008). Theoretical rationale and empirical data indicate significant variation between organization and group-level priorities (Zohar, 2008). For example, a supervisor who directs workers to disregard safety procedures when production falls behind schedule creates a distinction between the organizational goals dictated by senior management and their own work group practices (Zohar, 2008). Psychosocial safety climate research has also demonstrated climate properties at the work group level (Dollard & Bakker, 2010; Idris et al., 2012) and at the level of the organization (Law et al., 2011). Psychosocial safety climate at the group level may be a property of the higher, organizational level, but may have distinct components as well.

Recent research has shown that psychosocial safety climate assessed by one group of workers can predict work conditions (e.g. workload, control) and psychological health at a later time in different workers in the same work unit, supporting the premise that psychosocial safety climate is the property of the organization and not the individual (Dollard, Opie, et al., 2012). Dollard, Opie, et al. (2012) used two unrelated samples of remote area nurses from two separate time periods matched at the work unit level. Unit psychosocial safety climate assessed by nurses predicted work conditions (workload, control, supervisor support) and psychological strain in different nurses in the same work unit 24 months later. The research design used also overcame a problem in longitudinal research of workers in high-stress industries where matching data over time is a problem because of high turnover and sickness absence. Multilevel modeling enabled the aggregated data, in this case

psychosocial safety climate at the work unit level, to be combined with the individual data of other workers in the same unit. The research design enabled the examination of an under resourced, remote group of employees facing high work demands and turnover, and demonstrated that the assessment of psychosocial safety climate can predict the future work conditions and the health of other employees (Dollard, Opie, et al., 2012; Wakerman & Davey, 2008). In this highly complex work environment primary prevention of negative psychological health outcomes may be achieved by targeting organizational and management practices, and the development of a strong psychosocial safety climate, rather than the individual employee's specific job design which, given the high turnover, would only constitute a temporary solution (Dollard, Opie, et al., 2012).

Extending beyond the multilevel structure of organizational, work group, and individual characteristics, recent research has identified that external or macro-level factors affect workplace psychological health (Dollard, Osborne, & Manning, 2012). A recent study of psychosocial safety climate levels across 31 countries has identified that macro-level union density and organizational psychosocial safety climate are important predictors of worker self-reported health (Dollard & Neser, 2013). Dollard and Neser suggest that socio-political mechanisms of countries such as national ideology, policy, and power (e.g. union density) influence organizational levels of psychosocial safety climate and the subsequent health of the workforce across nations (Dollard & Neser, 2013). Notably it was not the quality of work conditions, but rather, workplace protective factors at both the macro (union density) and organizational level (psychosocial safety climate) that were most important in terms of national differences in worker health. Importantly the measure of psychosocial safety climate used in the research was reported by work health and safety managers, and not the workers themselves, yet it was still related to self-reported worker health at a national level. Worker self-reported health was also related to population health and gross domestic product (GDP)

at a national level. Dollard and Neser (2013) propose that the nature of society, its fundamental ideology regarding labor market legislation, policies and welfare regimes, influenced by and in combination with unions and management, give rise to important protective structures and functions within the workplace that influence worker health. For instance, countries that are social democratic in nature (i.e., Sweden, Finland, Denmark, and Norway) reported high levels of psychosocial safety climate, but so too did a few neo-liberal economies (e.g. UK, Ireland). Dollard and Neser (2013) argued that acknowledgement of the sheer economic costs of work stress to organizations and production may be an effective strategy to trigger change in organizations in neo-liberal economies that are driven by economic rationalist principles (Dollard & Bailey, 2014). This research also showed that the health of workers is higher, as is the national gross domestic product, in countries that take action to develop higher levels of psychosocial safety climate within their organizations by using consultation and participatory processes, and implementing procedures to address stress, bullying, and violence (Dollard & Neser, 2013).

2.3.5 Psychosocial Safety Climate: Role in Interventions

Workplace stress interventions can be classified in terms of the approach (i.e., primary, secondary, tertiary) and the target population (i.e., individual, organization, individual/ organization interface) (Pignata, Biron, & Dollard, 2014). Primary interventions are long-term approaches that attempt to eliminate the source of the stressors (e.g. reducing staff workloads). Secondary interventions try to reduce the effects of stress in employees who are showing signs of stress by modifying their reaction to the existing stressor (e.g. relaxation training). Finally, tertiary interventions focus on managing employees with stress-related health problems (e.g. anxiety and depression) by providing professional treatment for the identified health problem (Kompier & Cooper, 1999).

Stress management interventions may also be classified in terms of the targets of interventions (Pignata et al., 2014). Interventions to reduce stress in the workplace may target the individual, the organization, or the interface between the individual and the organization (De Frank & Cooper, 1987). Interventions targeted at the individual seek to help the individual adapt to the stressful work condition while organizational interventions aim to modify certain aspects of the organization such as leadership structure (Pignata et al., 2014). Actions taken within a team or a department may focus on the interface between the individual and the organization. An example would be setting up coworker support groups to improve relationships at work (Pignata et al., 2014).

While stress interventions are usually categorised within these classification systems the boundaries between these levels are not mutually exclusive and may overlap (Giga, Noblet, Faragher, & Cooper, 2003; Pignata et al., 2014). Most approaches to reduce anxiety, depression, burnout, and workplace stress use secondary approaches to target the individual (Biron, Karanika-Murray, & Cooper, 2012). Individual-level interventions often use external trainers to provide cognitive behavioural training, mindfulness training, or relaxation and communication skills exercises to assist participants to adapt to the taxing aspects of the job design (Marine, Ruotsalainen, Serra, & Verbeek, 2006; Richardson & Rothstein, 2008; Van Wyk & Pillay-Van Wyk, 2010). Positive psychology interventions, such as self-help interventions and individual therapy, can be classified as secondary approaches targeted at the individual level and are primarily aimed at raising positive feelings, cognitions, or behavior. These approaches are currently widely used and show some limited enhancement of subjective well-being among individuals (Bolier et al., 2013).

Psychosocial safety climate theory challenges the orthodoxy of monitoring and managing psychological health by an individual worker, proposing that interventions need to address the cause of the adverse work conditions using a primary prevention approach to

target the organizational context and management practices that create and sustain unhealthy work environments (Rickard et al., 2012). These organizational responses may be more effective and sustainable (Law et al., 2011). Targeting psychosocial safety climate for intervention will ensure that the adverse work conditions will be ameliorated at the source providing a more reliable, efficient, and sustainable control strategy than addressing existing work conditions (Dollard, 2012). Psychosocial safety climate theory is consistent with evidence suggesting that individually focused approaches are effective at the individual level but high-level system approaches combining individual and organization directed approaches (i.e., working conditions and management practices) provide broader benefits for both the individual and organization (LaMontagne, Keegel, Louie, Ostry, & Landsbergis, 2007). Sustainable change can be achieved by shifting management values, attitudes and actions for short-term profit to the long-term protection of psychological health and associated productivity benefits (Idris et al., 2012). Psychosocial safety climate theory suggests that interventions to improve workplace conditions and psychological health should be tailored to the level of the organization with a socially coordinated approach including management commitment and priority, organizational communication, participation and involvement (Dollard & Karasek, 2010). Interventions pitched at the level of the organization using socially collective structures provide an opportunity for social dialogue, empowerment, and democratic engagement. These features are best practice elements identified in psychosocial risk management intervention evaluations (Dollard & Karasek, 2010).

Interventions to develop a strong psychosocial safety climate in organizations will ensure that senior managers and leaders create and enact policies, practices, and procedures that protect worker psychological health and well-being (Bond et al., 2010). Empirical data indicates that leaders have a significant role in the development of worker health and well-being (e.g. Arnold, Turner, Barling, Kelloway, & McKee, 2007; Tuckey, Bakker, & Dollard,

2012; Skogstad, Einarsen, Torsheim, Aasland, & Hetland, 2007). By developing clear practices and policies, management establishes a protocol for the type of behaviors that are valued and encouraged within the workplace (Bond et al., 2010). The psychosocial safety climate domains can be used as guidance for building psychosocial safety climate and should be viewed as a continuous organizational development strategy (Law et al., 2011). Dollard and Karasek (2010) proposed the Healthy Conducive Production Model to use as a guide to structure organizational intervention processes. The main steps involve the development of management or political will to facilitate the change, to build a social-level controller (e.g. a tripartite committee) to resource incoming demands, to provide social dialogue between stakeholders to promote democratic engagement, and to design and develop well-coordinated policies, practices and procedures (e.g. action plans). These steps are also consistent with international best practice, established work, health, and safety methods, and continuous improvement processes (Bailey, Pignata, & Dollard, 2014).

It is important to consider the levels of PSC in organizations and work units where interventions are planned. Dollard (2012) found significantly better intervention implementation in work units with higher starting levels of psychosocial safety climate. Nielsen and Randall (2012) also identified that employees' participation in intervention processes was significantly related to levels of pre-intervention autonomy and job satisfaction. Nielsen (2013) argued that the role of employees in interventions needs to be reconsidered as employees are not passive recipients and actively shape the intervention process and context. Organizational stress management interventions are typically complex, long term, and require significant resources. Pre-intervention work to build strong management support and an organizational environment with effective communication and stakeholder consultation processes, using the psychosocial safety climate theoretical

framework, may strongly influence how employees shape and develop the intervention process, and the ultimate efficacy of the project.

Some interventions have been accomplished using a socially coordinated approach consistent with psychosocial safety climate theory, with strong senior management support, the active participation of employees, the development and implementation of policies and procedures based on the intervention findings, and the coordination of strategies to ensure that the intervention impact is sustainable, with evaluations showing improvement in either work conditions or psychological health measures. However, the number of these organizational interventions is currently very limited (Dollard & Gordon, 2014; Dollard & Karasek, 2010; Halbesleben, Osburn, & Mumford, 2006; Le Blanc, Hox, Schaufeli, Taris, & Peeters, 2007; Leiter, Laschinger, Day, & Oore, 2011). Dollard and Gordon (2014) recently completed an intervention following best practice principles including top management commitment and support provided through a written statement to employees from the chief executive officer and resourcing of the project. The study made use of existing workgroup structures and organizational data (i.e., annual organization development survey, sick leave, and grievance data) to generate change plans modifying policies, procedures, and norms. The organization enlisted external facilitators to convene capacity-building workshops and an expert researcher to supply workgroup reports that specifically highlighted stress risks as determined from the organization development survey. The intervention used a participatory approach, with inputs from employees and a tripartite health and safety committee, with an upward communication system. A fundamental premise of the intervention was that workgroups developing action plans were part of an overall socially coordinated workplace stress reduction system connected to higher-level committees and power structures. Job design, training and development, and morale improved following the intervention compared to the control group. Marginal improvements for quality and positive performance

management were also seen in the intervention group. Organizational sickness absence duration decreased in the intervention group consistent with an intervention effect.

2.4 Evidence Base for Psychosocial Safety Climate

Dollard and Bakker (2010) first tested the psychosocial safety climate framework using a sample of teachers. They found that psychosocial safety climate predicted changes in work characteristics (skill discretion, work pressure, and emotional demands) leading to individual psychological health problems (psychological distress and emotional exhaustion) (see Figure 2.1). When senior management failed to value psychological well-being, this was evident in terms of increased demands, perhaps because of a lack of attentiveness to work scheduling and adjustments of workload, leading to an erosion of health (Dollard & Bakker, 2010). Psychosocial safety climate also moderated the impact of emotional demands on psychological health problems while skill discretion mediated the effect of psychosocial safety climate on work engagement (Dollard & Bakker, 2010). This research was the first to define the organizational conditions leading to the adverse work characteristics articulated in the JD-R framework (Dollard & Bakker, 2010). The comprehensive research design of this study used an aggregated measure of psychosocial safety climate, and a longitudinal design that controlled for baseline measures, added to the strength of the findings (Dollard & Bakker, 2010).

Using a sample of police officers, Bond et al. (2010) identified that workplace bullying was predicted by psychosocial safety climate, and psychosocial safety climate also moderated the impact of workplace bullying on post-traumatic health symptoms. Psychosocial safety climate aggregated to the level of the police station predicted future levels of bullying. These findings highlight psychosocial safety climate as a crucial intervention target in not only preventing the development of workplace bullying, but also in

moderating the impact of this form of organizational crisis on psychological outcomes for victims.

Law et al. (2011) extended the findings of Dollard and Bakker (2011) operationalizing other sources of stress (e.g. workplace bullying and harassment) and job resources (e.g. rewards) that could carry the effects of psychosocial safety climate on to psychological health outcomes. Law et al. (2011) used data from telephone interviews of 220 employees in 30 organizations. They demonstrated that psychosocial safety climate was negatively associated with workplace bullying and harassment (i.e., emotional demands) and in turn psychological health problems. Psychosocial safety climate was also positively associated with work rewards (job resources) and in turn work engagement. Accordingly, the researchers concluded that psychosocial safety climate triggers the health impairment and motivational pathways justifying the extension of the JD-R model in a multilevel way.

Law et al. (2011) identified that psychosocial safety climate, as an organization-based resource, also moderated the positive relationship between bullying/harassment and psychological health problems, and the negative relationship between bullying/harassment and engagement (Law et al., 2011). Importantly, the research found a significant relationship between organizational-level psychosocial safety climate and bullying/ harassment and further tests showed this was over and above within-group effects of psychosocial safety climate (i.e., individual self-reports of psychosocial safety climate) (Bond et al., 2010; Law et al., 2011). This illustrates that the link between climate and bullying and harassment cannot be dismissed as purely subjective (Law et al., 2011). This result is important as it indicates that we can predict reports of bullying/harassment from knowing about organizational levels of psychosocial safety climate (Bond et al., 2010; Law et al., 2011). The study used population-based sampling telephoning individuals at home and then grouped individuals within the same organizations. The advantage of this design was that organizations did not

have the power to veto the participation of employees therefore ensuring a more diverse and potentially representative sample of organizations participating in the research (Law et al., 2011). Furthermore, socioeconomic effects were addressed in the study by controlling for income level.

Idris and Dollard (2011) found that psychosocial safety climate had an indirect effect on negative emotions (e.g. anger and depression) via job demands (emotional demands, role conflict). Psychosocial safety climate also related to job resources (supervisor support, coworker support), which correlated with engagement. Idris, Dollard, and Winefield (2011) went further and identified that psychosocial safety climate was negatively related to job demands that in turn were associated with burnout (emotional exhaustion and cynicism). Psychosocial safety climate was also positively related to resources and subsequent levels of engagement. This suggests that psychosocial safety climate can be perceived as antecedent to the health erosion and motivational pathways articulated in the JD-R model (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker, 2004), or as an extension of these pathways. A further Malaysian-Australian study (Idris et al., 2012) identified that psychosocial safety climate related to demands and in turn to psychological health problems in a Malaysian sample but not an Australian sample. It was acknowledged that these results were limited by restricted sample sizes.

Dollard, Opie, et al. (2012) determined that work unit-level measures of psychosocial safety climate predicted work conditions (workload, control, and supervisor support) and psychological strain in different nurses in the same work unit 24 months later. There was evidence that the between-group relationship between unit psychosocial safety climate and psychological strain was mediated by Time 2 work conditions (workload, job control) as well as Time 1 emotional demands. The results supported a multilevel work stress model with

psychosocial safety climate as a plausible primary cause, or "cause of the causes" of work-related psychological strain.

Dollard, Tuckey, and Dormann (2012) demonstrated that high emotional resources moderated the positive relationship between emotional demands and change in workgroup psychological distress when there were high levels of unit psychosocial safety climate. The results supported psychosocial safety climate as a property of the organization and a target for higher order controls to reduce work stress suggesting that the "right" climate enables resources to do their job. A major strength of this study was that support was found for the three-way-interaction even when data relating to psychosocial safety climate was derived from a different source (i.e., split-samples). Split-samples overcame the problem of common method variance of single source studies. A limitation of the study was low power due to the small number of upper level units. Although effects were small they were consistent with theoretical predictions and it is widely acknowledged in social science research that effect sizes are typically small and in the order of 1–3 percent (Champoux & Peters, 1987; Chaplin, 1991; Evans, 1985).

The Australian Workplace Barometer (AWB) project also tested the relationship between psychosocial safety climate, job demands, and psychological health (Dollard, Bailey, et al., 2012; Dollard & Bailey, 2014). The final multi-occupational sample comprised 5743 interviews from individual participants representing a wide range of occupations and industries. Researchers identified that organizational psychosocial safety climate (in this large population-based study psychosocial safety climate was assessed at the individual level since most interviewees came from different organizations – a limitation in this study is it is not possible to determine if effects are due to perceived psychosocial safety climate or organizational-level psychosocial safety climate) was negatively associated with demands (in particular work–family conflict, work pressure, emotional demands, and workplace bullying

and harassment) that in turn related to poor psychological health including psychological distress, emotional exhaustion, depression, and fatigue (Dollard, Bailey, et al., 2012). Psychosocial safety climate was also positively associated with resources (job control and social support) as well as macro-decision latitude, work rewards, organizational justice, and in turn work engagement (Dollard, Bailey, et al., 2012). The research indicated that a 10 percent increase in psychosocial safety climate within organizations would lead to a 4.5 percent decrease in bullying, a 4 percent decrease in demands, and an 8 percent increase in resources (Dollard & Bailey, 2014). Using hierarchical multiple regression psychosocial safety climate explained 9 percent of the variance in psychological health outcomes and 13 percent of the variance in engagement (Dollard & Bailey, 2014). The AWB project also identified that people with only mild symptoms of depression took twice as many sick days as those with no symptoms of depression (McTernan et al., 2013). These results suggest that psychosocial safety climate is a logical upstream target, not just for injury prevention but also for productivity outcomes such as absenteeism (McTernan et al., 2013). The AWB project provides a compelling evidence base for the creation of adequately resourced work environments that stimulate problem solving, creativity, and innovation, underpinned and maintained by a strong psychosocial safety climate (Dollard & Bailey, 2014).

Hall, Dollard, Winefield, Bakker, and Dormann (2013) used a general population sample of 2343 workers (an earlier AWB sample) and identified that psychosocial safety climate moderated the effects of job demands (psychological and emotional demands) on depression and further moderated the effects of depression on positive organizational behaviors (engagement and job satisfaction). Zimmerman, Haun, Dormann, and Dollard (2009) also found, in a study of 50 car sales employees, that high levels of psychosocial safety climate protected employees from the negative consequences of difficult customer behavior, by reducing their negative emotional reactions.

Yulita, Idris, and Dollard (2014), using a sample of 909 police personnel from 58 departments, examined how team-level psychosocial safety climate affects job demands, specifically challenge demands and hindrance demands (Cavanaugh, Boswell, Roehling, & Boudreau, 2000). Hindrance demands were defined as demands that could be perceived as a threat to personal growth and mastery, such as role conflict and job insecurity, while challenge demands were defined as those that can be perceived to lead to personal growth, creativity, and innovative performance such as high workload and job complexity (LePine, Podsakoff, & LePine, 2005). Yulita et al. (2014) identified that psychosocial safety climate at the team level was negatively related to hindrance demands. Hindrance demands were also positively related to emotional exhaustion and physical health problems (Yulita et al., 2014). This study used cross-sectional data so further exploration of the hindrance and challenge job demand differentiation using longitudinal data is needed.

Bailey, Dollard, and Richards (2015) identified benchmark levels of psychosocial safety climate that would signify risk of job strain (jobs with high levels of demands and low levels of resources), and subsequent levels of adverse workplace psychological health in organizations. Using the AWB data set (N = 1081) and interview data from Australian employees matched at two time points 12 months apart, psychosocial safety climate was a significant predictor of job strain (determined by combining two separate measures of psychological demands and job control), and in turn depression. Using additional data (N = 3,140) benchmarks of organizational psychosocial safety climate (range 12–60) were established for low-risk (41 or above) and high risk (37 or below) for employee job strain and depressive symptoms. Finally, population attributable risk was assessed finding that improving psychosocial safety climate in organizations to 37 or above could reduce 14 percent of job strain and 16 percent of depressive symptoms in the Australian working population.

2.5 Future Research

An extended four-level framework incorporating socio-political, organizational, work group, and individual factors is warranted in further research to explain the multifaceted causes of work-related psychological health across a wider range of socio-political contexts (Dollard & Neser, 2013). Future research should try to maximise the number of upper-level groups in the sample to examine between-organization relationships (Idris et al., 2012).

To manage problems associated with common method variance and subjective bias, future studies could triangulate evidence from a variety of sources (e.g. injury rates, sickness absence, near miss reports, work stress compensation claims, focus groups, situational audits, hospital records, or levels of patient readmission or mortality rates) (Idris et al., 2012; Law et al., 2011). Psychosocial safety climate could be measured in alternative ways, for example, as actual awareness of organizational policies, practices, and procedures, or by assessing whether the monitoring or assessment of psychosocial hazards actually occurs (Dollard, Bailey, et al., 2012). For example, Dollard and Neser (2013) operationalised psychosocial safety climate in terms of policies and procedures for stress, bullying, and violence. Specific labor policies and their direct effect on worker health could also be assessed (see Dragano, Siegrist, & Wahrendorf, 2011), and the impact of external policy influences on internal workplace policy development (Dollard & Neser, 2013).

Item response analysis to verify that items and scales carry the same meaning across different cultures should be completed (Shimazu, Schaufeli, Miyanake, & Iwata, 2010). Knowledge development in Eastern and emerging economies in the field of work stress is especially scarce (Kang, Staniford, Dollard, & Kompier, 2008; Kortum, Leka, & Cox, 2008). Despite the adoption of Western-style working practices in developing countries most Western-derived theoretical models of stress have not been tested in these populations

(Brough, Dollard, & Tuckey, 2014). The Asia Pacific, in particular, is the world's most populous region, yet many workers experience poor work conditions and insecure employment (Dollard, Shimazu, Nordin, Brough, & Tuckey, 2014). Greater research attention needs to be directed toward understanding the nature and influence of psychosocial factors in this region (Dollard et al., 2014).

Longitudinal data collection at three separate time points to test mediation is recommended for future research (Idris et al., 2012). Psychosocial safety climate strength and its correlates could also be examined (Dollard, Tuckey, & Dormann, 2012). Future studies could differentiate between permanent and temporary employees as Luria and Yagil (2010) found differences between the two groups in relation to safety perceptions.

Leaders are largely responsible for psychosocial safety climate and it is likely that different leadership styles influence levels of psychosocial safety climate (e.g. Barling, Loughlin, & Kelloway, 2002; Zohar, 2002). Future research could compare the effects of psychosocial safety-specific leadership training on psychosocial factors and psychological health, in comparison with work groups where leaders are trained in general transformational leadership practices (Dollard, Tuckey, & Dormann, 2012). It is expected that training in leadership for psychosocial safety climate will be superior than training in other kinds of leadership for predicting psychosocial safety climate, work conditions, and health outcomes.

2.6 Conclusion

Work related stress, burnout, depression, and anxiety create workers' compensation claims, absenteeism, productivity loss, and staff turnover, yet until recently managers have had little available research theory and evidence to structure organizations to prevent the development of the work conditions that lead to poor psychological health (Law et al., 2011). Key stakeholder groups (such as trade unions, employer organizations, government agencies,

occupational health services, researchers and academics), and non-traditional intervention groups (such as social security agencies, health insurers, families and partners, non-government organizations, health care institutions, customers or clients, shareholders, communities, employment agencies, media, judiciary system employees, and business consultants; World Health Organization, 2008) can use the psychosocial safety climate framework to proactively identify, measure, and monitor organizational psychosocial risk, design and evaluate targeted interventions at multiple levels, develop and set priorities for policies and interventions, benchmark progress, and monitor changing trends to improve work conditions, engagement, psychological health, and the productivity of employees (Hall et al., 2010). Organizations are complex multi-layered systems (Mathieu & Taylor, 2007) with dynamic interplay between levels (e.g. the organization, work unit and/or individual) (Dollard, Tuckey, & Dormann, 2012). Additional multilevel, longitudinal research using triangulated evidence, and interventions to evaluate the efficacy of psychosocial safety specific leadership training will assist our understanding of the mechanisms involved to promote the development of healthy workplaces.

2.7 Summary

This chapter summarises the conceptual framework for PSC theory, previous findings, and describes opportunities for future research. A gap in the PSC literature is a synthesis of the quantitative relationships across the studies between PSC and health, work conditions, motivational and productivity outcomes. From an academic perspective, it is important to examine these quantitative relationships across samples to understand the magnitude of the relationships and their variability, identifying important gaps in theoretical knowledge requiring additional research attention. In terms of the practical utility of PSC theory (Dollard & Bakker, 2010), through many meetings with business organisations in preparation of this

thesis, it is common for managers to request statistical information to assist in the justification and prioritization of resources to promote psychological health. This synthesis of statistical information will be invaluable for these organisations seeking additional information to begin translating PSC theory (Dollard & Bakker, 2010) into organisational practice.

3 Psychosocial Safety Climate Theory: A Multilevel Meta-Analysis

3.1 Overview

While a growing body of literature demonstrates that PSC is linked to job demands, job resources, psychological health, engagement and productivity outcomes, a systematic review of PSC research has yet to be undertaken. Such a review is necessary to consolidate (or integrate) the research findings, and to determine standardized effect sizes for the various relationships. Chapter 3 reports the results of a multilevel meta-analysis of 19 independent samples and 212 effect sizes (N = 24, 616) which was undertaken for this purpose. The analysis sought to quantify the relationship between PSC, job demands, job resources, psychological health and work injuries at three levels (the organisational, the work team, and the individual), and the relationships among these levels of analysis.

The multilevel meta-analysis demonstrates that PSC is related to job demands, job resources, health, motivation and productivity at the individual level, and that, between groups, teams with low PSC experience worse health and productivity outcomes. The resulting publication was co-authored with Professor Maureen Dollard and Dr Awang Idris, and the preliminary results were presented at the 12th European Academy of Occupational Health Psychology, 'Occupational Health in Times of Change: Society and the Workplace in Athens', Greece[2]. As the approach to meta-analysis described in this chapter is a relatively new one, advice was sought from international experts, including Professor

[2] Zadow, A. J., Idris, M. A., & Dollard, M. F. (April, 2016). Psychosocial Safety Climate theory meta-analysis. In K. Teoh, V. Dediu, Saade, N. J., & Hassard, J. *12th European Academy of Occupational Health Psychology.* (Conference proceedings). Occupational Health in Times of Change: Society and the Workplace. Paper presented in Athens, Greece.

Christian Dormann, Professor Fred Oswald, and Dr Michael Borenstein, who reviewed and provided feedback in relation to aspects of the paper.

3.2 Abstract

Psychosocial safety climate (PSC) theory defines the organisational context preceding the development of work conditions that lead to poor psychological health (Dollard & Bakker, 2010). In a multilevel meta-analysis of 19 independent samples and 212 effect sizes (N = 24, 616) this study examines the relationship between PSC, job demands, job resources, psychological health and work injuries at the individual level, and also the cross-level relationship between perceptions of PSC at the work unit level, and job demands and resources, health, motivation and productivity at the individual level. Most current meta-analyses use individual level data but the difficulty is that conclusions are influenced by common method variance, perception, or mood differences as the reason for the link between work factors and psychological health. This meta-analysis showed that PSC at the individual level is negatively related to job demands, adverse health symptoms, and reduced productivity, and positively related to job resources. As a between- group effect, teams with low PSC experienced higher rates of adverse health symptoms and worse productivity outcomes. These results show strong support at the individual level for a relationship between high PSC and low job demands, higher job resources, improved motivation, rates of productivity and better health (psychological and physical). The multilevel meta-analytic findings were promising with relationships seen between high work unit PSC, and improved health and productivity, but the other relationships, although in the proposed direction, were compromised, potentially due to the smaller samples. The meta-analytic findings, in particular, at the individual level, suggest that work conditions, health, motivation and productivity can improve with the right psychosocial safety climate.

3.3 Introduction

3.3.1 PSC and Work Stress

As world economies move to extreme capitalism and globalisation, workplaces experience demanding timelines, diminishing resources and global competition are promoting job insecurity, lack of concern and commitment for employees, destructive competition, divisive tactics, and the underlying assumption that workers are disposable (Benach, 2016; Dollard, 2006; Maslach, 2016). Unhealthy psychosocial work environments increase workers' experience of work stress, which refers to the damaging physical and psychological reactions that occur when individuals are unable to manage work conditions, often due to high levels of job demands and reduced job resources (Dollard, Zadow, Pignata, & Bailey, 2016). Research shows that poor psychosocial work conditions lead to poor workplace psychological health affecting productivity, family and community relationships, and physical health (International Labour Organization, 2016). Globally, a recent systematic review of countries including Australia, Canada, Europe, and the United States has identified that the total estimated cost of work stress in 2014 ranged substantially from US$221.13 million to $187 billion, with the majority of costs related to productivity losses (Hassard, Teoh, Visockaite, & Cox, 2017). This does not include many countries in the Asia Pacific with 70% of Chinese workers reporting stressful working conditions, 61% of Japanese employees reporting high levels of stress, anxiety and worry at work, and 31% of Korean workers indicating that they are stressed in the workplace (Kawakami, Park, Dollard, & Dai, 2014). In this context managers need research theory and evidence to structure organisations to build psychologically healthy jobs, preventing the development of the work conditions that lead to poor psychological health (Law, Dollard, Tuckey, & Dormann, 2011).

PSC theory (Dollard & Bakker, 2010) describes the organisational conditions creating the adverse work conditions that lead to workplace stress, emotional exhaustion, anxiety and depression. PSC (Dollard & Bakker, 2010) describes the managerial and organisational climate for the protection of psychological health, which is proposed to be a leading indicator of poor psychosocial work conditions (e.g. high job demands, low job resources) (Dollard, et al., 2016). PSC therefore precedes the work conditions outlined in other work stress theories (e.g. Job Demands-Resources (JD-R) model, Demerouti et al., 2001; Job Demand-Control (JD-C) theory, Karasek, 1979; Effort-Reward Imbalance (ERI) model, Siegrist, 1996). Research evidence confirms PSC as a precursor to the JD-R (Dollard & Bakker, 2010), JD-C (Dollard, Opie, Lenthall, Wakerman, Knight, et al., (2012), and ERI (Owen, Bailey, & Dollard, 2016) models. The PSC Survey has 12 items (PSC-12) (Hall, Dollard, & Coward, 2010) and four main domains which depict what an organisation, unit, or team would need to develop in order to create a strong climate to protect workplace mental health including management commitment and support of psychological health, priority of psychological health over productivity, communication between all layers of the organisation about issues relating to psychological health, and the active participation of stakeholders in psychological health and safety decision making (Dollard, Tuckey, & Dormann, 2012).

Targeting PSC for intervention will prevent the development of adverse job design which is a more efficient, and sustainable strategy than addressing existing work conditions (Dollard, 2012). Since its introduction into the published literature in 2010 (Dollard & Bakker, 2010) numerous studies have been published with a growing body of literature showing relationships between PSC and job demands, job resources, psychological health, engagement and productivity outcomes (see Zadow & Dollard, 2015). A gap in the literature is a synthesis and systematic review of the PSC research, bringing the research findings together, to determine standardised effect sizes for the relationships between PSC and work

conditions, psychological health, motivational and productivity outcomes to quantitatively summarise these relationships across samples to examine the strength of these relationships across industry groups and cultures.

3.3.2 PSC Meta-Analysis

There is a strong argument for the systematic review of research evidence in the development of theoretical frameworks. A review of the quantitative relationships between variables shows us what has been done and what needs to be done by identifying important gaps in theoretical knowledge requiring further research attention (Humphrey, 2011). With multiple studies, we can report that the effect is robust, or that it varies, which is important in understanding the strength of relationships across different samples (Borenstein, 2009). An example of the importance of meta-analysis is the systematic review of preventable risk factors for Sudden Infant Death Syndrome (SIDS). Individual studies were frequently underpowered preventing opportunities to identify important relationships. If a meta-analysis had been completed sooner risk factors would have been clearly identified preventing over 10 000 infant deaths in the UK and at least 50 000 in Europe, the USA, and Australasia (Gilbert, Salanti, Harden, & See, 2005). In psychological research, large samples are required to demonstrate effects which are often difficult to achieve in workplaces. Combining the effects sizes from several studies across countries and industries, will provide greater power to understand the magnitude of the relationships. Understanding the strength of the relationships across studies between PSC, work conditions, psychological health and productivity outcomes will provide important quantitative evidence to address damaging work conditions, and improve workplace psychological health.

Previous research has placed the responsibility on the individual worker to manage their own mental health and productivity (e.g. resilience research) (Bolier, Haverman,

Westerhof, Riper, Smit, Bohlmeijer, et al., 2013), diminishing the role of the work organisation. Understanding how PSC influences work conditions, psychological health, and productivity, provides power and opportunity for management and organisations to protect employees and build psychologically healthy, productive and sustainable workplaces.

3.3.3 PSC Multilevel Meta-Analysis

Multilevel meta-analyses are rare in the research literature and the majority of meta-analyses purporting (or claiming) to be multilevel are actually examinations of relationships between group-level data, or relationships between organisational-level data, but not cross-level relationships between organisational or group data and individual-level data (e.g. Taras, Kirkman, & Steel, 2010). In occupational stress research, multilevel research is crucial to understand the hierarchical structure of data and effects occurring within and across levels (Probst, 2010). PSC theory proposes that PSC is a property of the organisation, one that is largely determined by senior management. Therefore, PSC is operationalised by assessing the shared perceptions; research has shown the climate properties of PSC, reflecting shared perceptions at the level of the organisation (Law et al., 2011) and the work group (Dollard & Bakker, 2010; Idris et al., 2012). To thoroughly describe the focal PSC relationships, it is critical to examine the cross-level relationships between PSC at the level of the organisation and/or work group, and job demands, resources, psychological health and productivity at the individual level. In the research literature, the meta-analytic examination of cross level relationships between work organisations or groups, and individual level variables, is extremely limited, and extensive review of the occupational health meta-analytic evidence was unable to identify a study examining these cross-level relationships. This study will examine both the individual-level relationships, consistent with most meta-analytic examinations, and will compare and

contrast the individual-level relationships with the cross-level relationships. Both individual and cross-level relationships will be examined to cover the entire research literature in this area, which reports both individual and multilevel relationships.

3.3.4 PSC and Work Conditions

Early theoretical models of work stress explain how work conditions affect psychological health. These models include the Job Demand-Control model (Karasek, 1979), the Effort-Reward Imbalance model (Siegrist, 1996), and the Job Demands-Resources model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). PSC theory describes the management and organisational policies, practices and procedures that precede the causes (i.e., work conditions) of work stress articulated in these models (Dollard & Bakker, 2010). Empirically, research has shown that low levels of organisational or work group PSC is related to higher levels of workplace job demands (e.g. work pressure, emotional demands). Theoretically, in high PSC environments, senior management promotes psychological health, prioritises psychological health over productivity, and provides a work environment where workers are able to communicate concerns effectively and participate in decision making about issues relating to psychological health, so that unhealthy work demands are addressed and reduced (Dollard & Bakker, 2010).

PSC has been shown to relate to job demands such as workload (Dollard, Opie, et al., 2012), role conflict and job insecurity (Yulita, Idris, & Dollard, 2014), psychological demands (Hall, Dollard, Winefield, Bakker, & Dormann, 2013), work pressure (Dollard & Bakker, 2010; Dollard & Bailey, 2014), emotional demands (Dollard, Tuckey, & Dormann, 2012; Hall et al., 2013), and bullying (Bond, Tuckey, & Dollard, 2010). These relationships have been shown in both multilevel and individual level research, and across cross-sectional and longitudinal research designs (Zadow & Dollard, 2016). Thus, both an

individual and multilevel relationship is proposed for the meta-analytic relationship between PSC and job demands, for both cross sectional and longitudinal research designs as follows:

Hypothesis 1: PSC is negatively related to job demands (individual-level relationship).

Hypothesis 2: Work unit PSC is negatively related to individual job demands (cross level relationship).

Theoretically, an organisation prioritizing psychological health, and communicating and engaging workers to participate in the development of psychosocially healthy work conditions, will provide job resources to manage work tasks (Dollard & Bakker, 2010). Research evidence has also demonstrated a relationship between PSC and job resources such as supervisor support (Dollard, Opie, et al., 2012; Idris & Dollard, 2011), job control (Bailey, Dollard, & Richards, 2015), and job rewards (Dollard & Bailey, 2014; Law et al., 2011; Owen, Bailey, & Dollard, 2016). Again, these relationships have been shown in multilevel and individual level research and across cross sectional and longitudinal research designs leading to the following meta-analytic hypotheses:

Hypothesis 3: PSC is positively related to job resources (individual level relationship).

Hypothesis 4: Work unit PSC is positively related to individual job resources (cross-level relationship).

In high PSC contexts, senior management show support and commitment to psychological health, prioritise the psychological health of their workers, promote effective communication strategies so that workers within all levels of the organisation can articulate concerns, and encourage the participation and involvement of stakeholders in matters relating to psychological health and safety. Consequently, workers feel that they are

protected from workplace threats and experience better psychological (Dollard & Bakker, 2010) and physical health outcomes (Bailey, Dollard, McLinton, & Richards, 2015; Zadow, Dollard, McLinton, Lawrence, & Tuckey, 2017). The relationship between PSC and health outcomes, including emotional exhaustion (Afsharian, Zadow, & Dollard, 2016; Dollard & Bakker, 2010; Zadow et al., 2017), depression (Dollard & Bailey, 2014; Hall et al., 2013), post-traumatic stress (Bond et al., 2010), psychological distress (Dollard & Bailey, 2014), musculoskeletal injuries (Bailey et al., 2015), general health (Dollard, Bailey, & Hall, 2014), and work injuries (Zadow et al., 2017), has been explored extensively across a range of work environments and cultures using multilevel and individual level analysis. Hence it is proposed that the meta-analytic findings will show that:

Hypothesis 5: PSC is negatively related to adverse health symptoms (psychological and physical) (individual level relationship).

Hypothesis 6: Work unit PSC is negatively related to adverse health at the individual level (cross level relationship).

Motivational outcomes include high levels of work engagement, job satisfaction and job performance. Prior research has identified a positive relationship between PSC and work engagement (Dollard & Bailey, 2014; Idris & Dollard, 2011; Law et al., 2011). Therefore, it is proposed that the meta-analytic findings will show that:

Hypothesis 7: PSC is positively related to motivational outcomes (high work engagement and job satisfaction, low worker's compensation claims and sickness absence) (individual level relationship).

Hypothesis 8: Work unit PSC is positively related to motivational outcomes (high work engagement and job satisfaction, low worker's compensation claims and sickness absence) at the individual level (cross level relationship).

Research evidence indicates that high PSC is related to low organisational records of sickness absence rates (Australian Public Service Commission, 2015; Dollard & Bakker, 2010), worker's compensation claims (Bailey, Dollard, McLinton, & Richards, 2015) and work injuries (Zadow, Dollard, McLinton, Lawrence, & Tuckey, 2017). It is proposed that:

Hypothesis 9: PSC is negatively related to low productivity (sickness absence, claims, work injuries) (individual level relationship).

Hypothesis 10: Work unit PSC is negatively related to low productivity at the individual level (sickness absence, claims, work injuries) (cross level relationship).

3.3.5 The Current Study

The major conceptual advance in this study is to quantify the meta-analytic relationships between PSC, job demands and resources, health and productivity measures. We use methodological advances to address a gap in multilevel meta-analytic research by examining these relationships at the individual level, and also the cross-level relationships between the work unit and the individual.

3.4 Method

A literature search was conducted to identify published articles, conference papers, doctoral dissertations and unpublished manuscripts. The articles were identified through computer-based searches of the PsychINFO, Google Scholar and ISI Web of Science (48, 449 articles). The electronic search was supplemented with a manual search of reference lists of articles relating to PSC (13 articles). Authors were contacted to obtain additional statistical information for the meta-analysis in most cases. Authors were also asked to provide any unpublished PSC data as well and conference attendees at the 12th European Academy of Occupational Health Psychology, Occupational Health in Times of Change: Society and the

Workplace were also asked to provide or recommend any additional data following a presentation showing the preliminary findings. Two papers were excluded from the final sample as PSC measures were divided into four domains and a complete value for PSC was not available (Idris & Dollard, 2011) and another paper did not provide correlational data (Rickard, Lenthall, Dollard, Opie, Knight, Dunn, et al., 2012). The final set included 19 independent samples and 212 effect sizes (N = 24, 616). The samples were considered independent if participants in one study were not participants in another study. Random–effects meta-analyses were conducted. All estimates were calculated using Comprehensive Meta-Analysis 3.0 software (Borenstein, Hedges, Higgins, & Rothestein, 2005).

Two authors were used to code the papers (Idris and Zadow). When categorisation of a particular effect size was unclear then these authors organised further discussion with the remaining authors (Dollard and Tuckey) to reach unanimous consensus before the effect size was categorized. Each article needed to use the PSC tool (Hall, Dollard, & Coward, 2010) to be included. Then each relationship between PSC and specific psychosocial risks were categorized. Psychosocial risk factors are parts of the job design and management of work, including the organisational and social context, that have the potential to cause psychological harm (Leka, Griffiths, & Cox, 2003). Psychosocial risks are also known as stress factors, psychosocial factors, and psychosocial hazards in the research literature (ILO, 2016). The JD-R model (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker, 2004) proposes that work with high levels of demands (e.g. work pressure) and low levels of job resources (e.g. low autonomy) are at risk of poor psychological health outcomes. High levels of resources can lead to positive states such as work engagement. The JD-R model is widely used and supported, specifically the additive effects of stressors and resources on job strain and poor mental health outcomes (Crawford, Le Pine, & Rich, 2010; de Jonge et al., 2014; Demerouti & Bakker, 2011; Schaufeli &

Taris, 2014). The JD-R model provides a taxonomy for the classification of psychosocial factors in workplaces, and explains how work conditions are related to poor workplace psychological health outcomes. PSC theory (Dollard & Bakker, 2010), proposes that, while poor psychological health is caused by the adverse work conditions articulated in the JD-R model (e.g. high effort, low reward, high demands, low resources), PSC precedes, and is a leading indicator of, these working conditions. PSC is therefore a precursor to the work conditions that are fundamental in JD-R theory, and an ideal place for intervention as it is expected that changing managerial and organisational characteristics would be more effective than redesigning individual job conditions.

There were four categories for the effect sizes including the relationship between: 1) PSC and job demands, 2) PSC and job resources, 3) PSC and health outcomes, 4) PSC and motivational outcomes, and 5) PSC and productivity outcomes. Job demands were defined as physical, social, or organizational parts of the job that require ongoing physical or mental effort and are therefore associated with certain psychological symptoms (e.g. exhaustion); demands in the analysis included psychological demands, work pressure, work complexity, emotional demands, bullying and harassment. (Bakker & Demerouti, 2007; Bakker, Demerouti, de Boer, & Schaufeli, 2003; Bakker, Demerouti, & Euwema, 2005; Crawford et al., 2010; Demerouti, et al., 2001). Job resources were defined as those aspects of the job that are functional in achieving work goals, assist personal growth and development, and reduce job demands and their associated physiological and psychological costs; resources in the review included job control, opportunities for development, participation in decision making and social support (Bakker & Demerouti, 2007; Bakker, et al., 2003; Bakker, et al., 2005; Crawford et al., 2010; Demerouti, et al., 2001). Health was defined as a state of physical, mental, or social well-being (ILO, 2014). Examples of poor health included in the review were anxiety, depression, burnout, musculoskeletal disorders

and fatigue. Work motivation outcomes were defined as outcomes that reflected a cognitive process that demonstrated a high level of direction, intensity and persistence of behaviour (performance) in the workplace" (Kalliath, Brough, O'Driscoll, Manimala, Siu & Parker, 2014). Examples of motivational outcomes included in the review were vigour, dedication, and absorption (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). Finally, productivity outcomes were outcomes that showed effectiveness of converting effort into output (Becher & Dollard, 2016). Examples of productivity outcomes included were absenteeism, presenteeism, and workers' compensation claims (Dollard & Bailey, 2014).

Computations were performed using the Fisher *Z* transformation. For the individual level effect sizes the following calculations were conducted:

Fisher's Z = 0.5* Log (1+ Corr)/ (1 – Corr))

Fisher's Z SE = 1 / (Sq (N – 3))

Correlation = provided

CorrSE = (1 – Corr ^ 2)*Fisher's Z SE

Ten studies had cross level effects. Cross level correlations were generated using reported t values for the multilevel relationships. Multilevel relationships were calculated using the hierarchical linear modelling *t* values for the specific cross level relationships using the formula recommended by Borenstein et al. (2005) as follows:

Fisher's Z = 0.5*Log ((1 + Corr)/ (1 – Corr))

N = 2 + (t-value ^ 2* (1-Corr ^)/Corr*2)

Fisher's Z SE = 1/ CSqr (N – 3)

Corr = Sqr (t-value ^ 2/ (t-value ^ 2 + (N – 2)))

Corr SE = (1-Corr ^ 2) * Fisher's Z SE

Both the individual and multilevel effect sizes were converted to meta-analytic standardised correlation coefficients so that they could be directly compared.

The funnel plots for the individual and multilevel samples (refer to Figure 3.1 and Figure 3.2) show that the studies are distributed symmetrically about the combined effect size. In the presence of publication bias, we would expect that that the bottom of the plot would show a higher concentration of studies on one side of the mean than the other. This would reflect the fact that the smaller studies are more likely to be published if they have larger than average effects which makes them more likely to meet the criterion for statistical significance (Borenstein et al., 2005). A symmetrical distribution of studies demonstrates that publication bias is unlikely to impact the meta-analytic conclusions for this analysis.

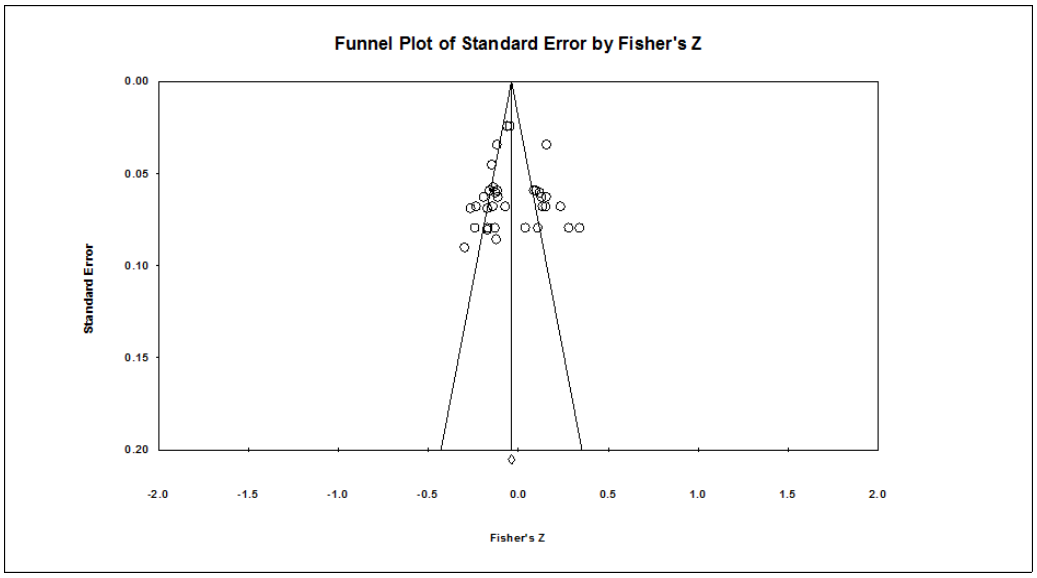

Figure 3.1. Funnel plot of standard error by standardized difference in means for the multilevel sample

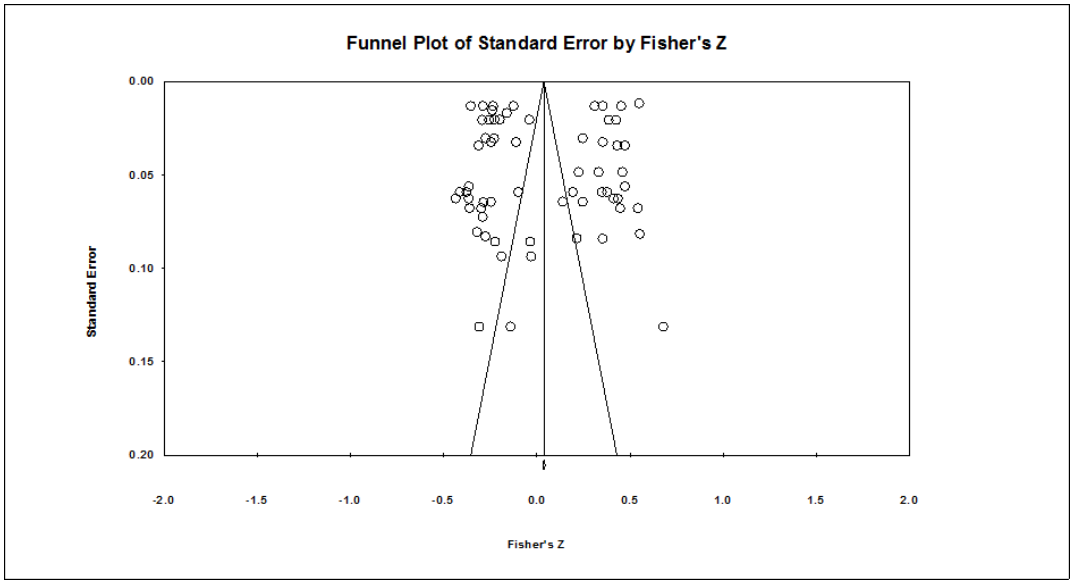

Figure 3.2. Funnel plot of standard error by standardised difference in means for the individual level sample

3.5 Results

Hypothesis 1 was supported showing a negative meta-analytic correlation between PSC and job demands at the individual level (r = -.28). Work unit PSC was also negatively related to job demand (r = -.16) (Hypothesis 2).

The meta-analytic correlation coefficient for the relationship between PSC and job resources at the individual level was moderate and positive (r = .39) indicating that individuals reporting high levels of workplace PSC also reported higher levels of work job resources such as decision authority, skill discretion, social support, procedural justice and rewards supporting Hypothesis 3. The multilevel relationship between PSC at the unit level (organisational or work group) and individual job resources was also positive (r = .18) (Hypothesis 4).

The results showed a significant negative meta-analytic correlation coefficient between PSC and negative health outcomes at the individual level (r = -.28) and also at the

multilevel unit of analysis (between PSC at the group level and negative health outcomes reported at the individual level; r = -.16) supporting Hypotheses 5 and 6. This suggests that individuals, groups and organisations reporting higher levels of PSC experience lower levels of negative health outcomes such as anxiety, depression, burnout, musculoskeletal disorders and fatigue.

Hypothesis 7 was supported, with PSC at the individual level demonstrating a positive relationship with motivational outcomes (r = .38). Work unit PSC also demonstrated a positive relationship with work motivation at the individual level (r = .11) (Hypothesis 8).

Finally, Hypothesis 9 was supported, with PSC at the individual level demonstrating a negative relationship with productivity impediments (e.g. absenteeism, workers' compensation claims) however this relationship was relatively low (r = -.08). Hypothesis 10 was also supported, with work unit PSC being negatively related to individual level productivity impediments (r = -.04), although the effect was small.

Table 3.1. Meta-Analysis of Standardised Correlation Scores for Psychosocial Safety Climate, Work Conditions, Health and Productivity.

Variable	Definition	Relationship	K	*r*	95% CI		*Q*	*p*	*T*	I^2
					LL	UL				
Job Resources	Relating to job control (e.g. decision authority, skill discretion), social support (e.g. supervisor support), procedural justice and rewards.	Individual	13	.39	.37	.40	77.07	.001	.08	84.43
		Multilevel	7	.18	.11	.24	10.80	.10	.06	44.45
Job Demands	Relating to psychological demands, work pressure, work complexity, emotional demands, bullying and harassment.	Individual	15	-.28	-.29	-.26	97.66	.001	.08	85.67
		Multilevel	7	-.16	-.20	-.11	3.45	.84	.00	.00
Health	Psychological (e.g. anxiety, depression, burnout) and physical (e.g. musculoskeletal disorders, fatigue)	Individual	19	-.25	-.26	-.24	35.56	.01	.04	57.81
		Multilevel	14	-.13	-.16	-.09	23.74	.03	.04	45.24
Motivation	Relating to work engagement and job satisfaction.	Individual	10	.38	.34	.42	28.81	.001	.05	68.76
		Multilevel	5	.11	.06	.17	1.73	.79	.00	.00
Productivity	Relating to work injuries, workers' compensation claims, presenteeism.	Individual	4	-.08	-.11	-.06	54.06	.001	.11	94.45
		Multilevel	5	-.04	-.14	.06	55.66	.001	.11	92.81

Note. *k* = the number of independent effect sizes; *r* = the weighted mean effect size; LL = the lower limit and UL = upper limit, of the 95% confidence interval for mean *r*; *Q* = a measure of potential heterogeneity; *p* = the *p* value for the *Q* statistic; *T*= the standard deviation of true effect sizes; I^2 = a measure of the proportion of dispersion that can be attributed to real differences in effect sizes as opposed to within-study error.

3.6 Discussion

3.6.1 Overview of Results

Meta-analytic results at the individual level support PSC theory (Dollard & Bakker, 2010) relationships, with individuals reporting high PSC, also reporting higher levels of job resources, work engagement, improved health and productivity, and lower levels of job demands. Multilevel (between groups) results showed that work teams with high PSC also experienced better health and productivity outcomes. Unfortunately, the other multilevel relationships were compromised, with heterogeneity statistics indicating that the results were due to sampling error, potentially due to the smaller number of available studies showing cross-level effects that could be included in the analysis. In general, based on the individual relationships, combining the effects sizes from several studies across cultures (including Australia, Asia and the Middle East) and industries (e.g. healthcare, government agencies, transport), the results support the strength of the relationships across samples between PSC, work conditions, psychological health and productivity outcomes, providing additional evidence to support the PSC theoretical framework.

3.6.2 Theoretical Implications

This research makes three important theoretical contributions. First, using the PSC model (Dollard & Bakker, 2010) we were able to demonstrate an integrative theoretical framework that can account for the reduction in job demands and improvement of job resources in the working environment, and further improvements in health, motivation and productivity. This has not been explored in past meta-analytic summaries. At the individual level, which is the level that most meta-analyses examine, we found support for all relationships. Second, we are the first to examine the relative importance of the factors related to PSC,

with job resources (r = .39) and motivational outcomes (r = .38) demonstrating the strongest relationships, and productivity measures such as absenteeism and worker's compensation claims showing the weakest relationship (r = -.08), which is unsurprising as they are distal measures. This is an important contribution, as it suggests that across studies PSC has a stronger role in enhancing positive work conditions and psychological health states, than in improving negative job design and poor psychological health. Third, the current study clarifies the meta-analytic cross level relationship between PSC at the work unit level and psychological health and productivity at the individual level, strengthening support for the cross cultural multilevel influence of PSC on health and productivity outcomes across a variety of countries and industries.

3.6.3 Limitations and Future Research

A strong limitation was the restricted number of multilevel studies available examining these relationships, which potentially influenced the ability to draw conclusions about cross level relationships between work unit PSC, and individual level job demands and resources, and motivational outcomes. Future research examining these multilevel relationships is required. Probst (2010) argues that occupational stress researchers usually investigate individual factors related to stress and well-being (e.g. emotions, coping skills). Work unit characteristics such as job and organizational factors (e.g. job insecurity, role overload) are also regularly measured at a single level, usually at the individual level (Probst, 2010). To ensure that the entire PSC literature was included in this meta-analysis, which includes a large number of studies examining individual level relationships, both individual and cross level relationships were examined. As PSC is a property of the organisation/ work unit in future the meta-analytic investigation could be limited to the cross-level relationships. PSC would Probst (2010) suggests that it is odd that researchers acknowledge that individual,

group, and organisational variables are theoretically necessary to understand and predict stress outcomes, and that these data exist in a hierarchical structure, yet they are rarely measured at their appropriate level. It is proposed that a multilevel framework can be useful not only for understanding the stress-strain process, but also critical in developing and conceptualizing stress interventions (Probst, 2010). Methodologically it is also critical that statisticians examine strategies to explore meta-analytic relationships for multilevel data and routinely include these cross-level relationships in meta-analyses. This study provides initial ideas to begin this process.

A second limitation, also related to the limited sample, is the restriction in the analysis of cross sectional and longitudinal data separately, and also the relationships between PSC and separate categories of job demands (i.e., work pressure versus job insecurity), job resources (i.e., social support versus autonomy), health (i.e., stress versus depression), and productivity outcomes (i.e., absenteeism versus work injuries). It is anticipated as this research agenda grows that sufficient studies will become available to examine these groups separately, and hence understand the relative strength of relationships in more detail.

3.6.4 Conclusions

The major conceptual advance in this study is to quantify the meta-analytic relationships between PSC, job demands and resources, health and productivity measures. We used methodological advances to address a gap in multilevel meta-analytic research by examining these relationships at the individual level, and at the cross-level relationships between the work unit and the individual. Meta-analytic results at the individual level support the PSC theoretical framework (Dollard & Bakker, 2010), with individuals reporting high PSC, also reporting higher levels of job resources, work engagement,

improved health and productivity, and lower levels of job demands. Multilevel results showed that work teams with high PSC also experienced better individual health and productivity outcomes. As previously mentioned, unfortunately, the other multilevel relationships were compromised, potentially owing to the smaller number of available studies showing cross-level effects that could be included in the analysis. The results provide initial evidence to support PSC theory (Dollard & Bakker, 2010) and provide initial steps to develop multilevel meta-analyses to quantify important cross level relationships in occupational stress research.

3.7 Summary

This chapter provides a synthesis of the quantitative relationships between PSC and health, work conditions, and motivational and productivity outcomes addressing a significant gap in the literature identified in relation to PSC theory (Dollard & Bakker, 2010). One of the additional future research directions, suggested in Chapter 2, is to examine the impact of PSC by triangulating data and exploring data options beyond self-report data to address issues of common method variance and subjective bias. This sets the agenda for the next study which is reported in Chapter 4, the examination of the role of PSC and work injury rates, and how PSC affects the reporting of injuries, through an examination of work group self-reported PSC, emotional exhaustion and injuries, and archival injury data provided by the organisation for the same work groups over a three- year period. Chapter 4 extends theoretical knowledge of PSC, and of how PSC influences emotional exhaustion and work injuries. Knowing how PSC shapes injuries, and the reporting of these events, shows us how the influence of management and organisational support of psychological health can have both psychological and physical health implications.

4. Psychosocial Safety Climate, Emotional Exhaustion, and Work Injuries in Hospitals

4.1 Overview

This chapter extends the PSC framework to examine the role of a climate for psychological health, emotional exhaustion, work injuries and injury reporting practices. This paper was jointly authored with Professor Maureen Dollard, Associate Professor Michelle Tuckey, Dr Sarven McLinton, and Mr Peter Lawrence.[3] Further work was also completed using this data comparing two different cultural contexts in the Asia Pacific community, Australia and Iran, demonstrating that these theoretical relationships apply cross culturally (Afsharian, Zadow, & Dollard, 2016). A third paper, an extensive industry report outlining the project findings and recommendations for future intervention, co-authored with Professor Maureen Dollard and Associate Professor Michelle Tuckey,[4] was provided to the organisation in which the research was conducted and is included in Appendix A. The industry report was developed at the request of hospital management and required extensive consultation and collaboration in its development. At the request of the industry partner a great level of detail was provided, beyond the scope of an academic paper, to support efforts to target particular areas for immediate improvement. The industry partner also provided important insights in the development of the academic paper and is listed as a co-author. Sections of this paper were

[3] **Zadow, A**., Dollard, M. F., Lawrence, P., & Tuckey, M. R. (2017). Psychosocial safety climate, emotional exhaustion, and work injuries in healthcare workplaces. *Stress and Health*. Advance online publication. http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1532-2998/earlyview

[4] **Zadow, A. J**., Dollard, M. F., & Tuckey, M. R. (2014). Psychosocial safety climate research project findings and recommendations. ARC Linkage and SafeWork SA Pilot Project Industry report.

also presented at the *11th European Academy of Occupational Health Psychology*[5] and the *International Commission for Occupational Health –Work and Organisational Psychology Symposium*[6] and the *31st International Congress for Occupational Health*[7][8]. Feedback provided by the hospital management involved in the project in relation to the industry report provided the impetus for the development of a systematic review of organisational interventions, which is described in Chapter 5.

4.2 Abstract

Preventing work injuries requires a clear understanding of how they occur, how they are recorded, and the accuracy of injury surveillance. Our innovation was to examine how Psychosocial Safety Climate (PSC) influences the development of reported and unreported physical and psychological workplace injuries beyond (physical) safety climate, via the erosion of psychological health (emotional exhaustion). Self-report data (T2, 2013) from 214 hospital employees (18 teams) was linked at the team level to the hospital workplace injury register (T1, 2012; T2, 2013; T2, 2014). Concordance between survey-reported and registered injury rates was low (36%), indicating that many injuries go unreported. Safety climate was the strongest predictor of T2 registered injury rates (controlling for T1); PSC and emotional exhaustion also played a role. Emotional exhaustion was the strongest predictor of

[5] **Zadow, A. J**., Dollard, M. F., Tuckey, M. R., & Chen, P. (April, 2014). The dynamic role of psychosocial safety climate in frontline healthcare workplaces. In Andreou, N, J, A., Jain, A., Hollis, D., Hassard, J., & Teoh, K. Looking at the past – planning for the future: Capitalizing on OHP multidiscliplinarity. *11th European Academy of Occupational Health Psychology (Conference Proceedings)*. Paper presented in London, United Kingdom.

[6] **Zadow, A. J.,** Dollard, M. F., & Tuckey, M. R. (September, 2014). Psychosocial and physical safety climate, health and safety performance in healthcare. ICOH-WOPS (Ed.). *Worker health: A basic human right for all. International Commission on Occupational Health: Work Organization and Psychosocial Factors* (Conference Proceedings). Paper presented in Adelaide, Australia.

[7] McLinton, S. S., **Zadow, A.,** Dollard, M. F., & Tuckey, M. R. (2015). Psychosocial and physical safety climate, health and safety performance in healthcare. *31st International Congress for Occupational Health (ICOH)*. Paper presented in Seoul, Korea.

[8] McLinton, S. S., **Zadow, A**., Dollard, M. F., & Tuckey, M. R. (2015). Violence and emotional labour at work; national and local evidence from healthcare workers. *31st International Congress for Occupational Health* (ICOH). Paper presented in Seoul, Korea.

survey-reported total injuries and underreporting. Multilevel analysis showed that low PSC, emanating from senior managers and transmitted through teams, was the origin of psychological health erosion (i.e., low emotional exhaustion), which culminated in greater self-reported work injuries and injury underreporting (both physical and psychological). These results underscore the need to consider, in theory and practice, a dual physical-psychosocial safety explanation of injury events and a psychosocial explanation of injury underreporting.

4.3 Introduction

4.3.1 Work Injuries

Errors and accidents in hospitals are the third leading cause of death in the United States (Makary & Daniel, 2016). Accidents leading to work injuries are rising with an estimated cost of $186 billion in the US (Leigh, 2011) and $57.5 billion in Australia (SafeWork Australia, 2012). The main aim of our research is to investigate: (1) how organisation climate, both physical and psychosocial safety climate (PSC), and worker psychological health, affect how workplace injuries (both physical and psychological) develop, and (2) how these factors affect whether injuries are reported and registered by the organisation. We explore these issues in a multilevel study of hospital employees working in teams, using both survey and registered injury data.

Our first aim concerns the causes of workplace injury, and researchers have largely investigated these through separate lines of enquiry. The dominant line has established the role of organisational system factors (such as safety climate), physical hazards, and safety related behaviour (Neal & Griffin, 2006; Zohar, 2008); another emerging line, includes psychosocial risk factors (e.g. job design) (Clarke, 2012; Nahrgang, Morgeson, & Hofmann, 2011) and psychological health states (e.g. emotional exhaustion) (Halbesleben, 2010;

Nahrgang et al., 2011), as important predictors of safety behaviour and events. In practice, psychosocial factors at work are not given the same attention in legislation and by health and safety inspectors as physical hazards (Productivity Commission, 2010). Moreover, existing research focuses almost exclusively on physical, rather than the combination of physical and psychological, injuries. Accordingly, the influence of physical safety climate as an upstream factor has been extensively explored, without consideration of its psychosocial counterpart – Psychosocial Safety Climate (PSC) – defined as a climate for worker psychological health and safety (Dollard & Bakker, 2010). Research across Australia and Malaysia shows that PSC in organisations is typically lower than physical safety climate indicating a lack of priority given to workplace psychological health (Idris, Dollard, Coward, & Dormann, 2012).

It is important to differentiate between physical safety climate and PSC, as they may differ within the same organisation. An organisation may show high levels of physical safety climate, and emphasise physical health and injuries, while not prioritizing psychological health and safety. In this paper, we integrate different lines of enquiry—physical safety climate, psychosocial work conditions, and psychological health states—and extend the research by introducing the PSC construct. We propose to examine how PSC, as a leading indicator of psychosocial risks and psychological health (i.e., emotional exhaustion), influences the development of physical and psychological workplace injuries. Understanding the role of more distal 'causes' such as PSC (managerial or organisational practices) may provide a more effective target for intervention to prevent work injuries, than attempting to treat the adverse psychosocial work conditions (e.g. job insecurity, production pressure) or psychological health states once they have manifested (Zadow & Dollard, 2015).

In relation to our second aim, injury reporting, evidence suggests that 60 to 80% of experienced work injuries are not captured on national data bases due to underreporting by both employees and organisations (Probst, 2015). Evidence to drive organisational

endeavours to reduce injuries relies on accurate reports by employees and records by companies. Recent studies have predominantly explored accident underreporting via physical safety mechanisms with increasing attention given to multilevel causes. Concepts such as safety climate and supervisory enforcement of safety practices (Probst & Estrada, 2010; Probst, 2015), production pressure (Probst & Graso, 2013), job insecurity (Jiang & Probst, 2015), and burnout (Halbesleben, Wakefield, Wakefield, & Cooper, 2010) have been linked to accident or near miss underreporting.

The major conceptual advance in this study is to propose and examine a new psychosocial pathway to both work injuries and injury (under)reporting. Specifically, we explain how PSC at the team level relates to physical and psychological workplace injuries (unreported and reported) via psychological health erosion (emotional exhaustion). We use multilevel analysis with hospital employees nested within teams, to test paths to injuries and underreporting, and linking our survey data to registered organisational safety risk management data. Our design, tracking variance due to team level effects in injuries and underreporting, provides evidence beyond individual explanations.

4.3.2 Workplace Injury Events and Psychosocial Factors

The PSC theoretical framework extends job design models of work stress (e.g. Demand-Control theory, Karasek, 1979; JD-R model, Demerouti et al., 2001), by defining the organisational and managerial conditions that precede the development of the damaging work conditions articulated in these work stress models. PSC is characterised by senior management support and commitment to psychological health, the priority of psychological health over productivity, the extent and effectiveness of organisational communication, and the participation and involvement of all stakeholders in relation to matters of psychological health and safety (Dollard & Bakker, 2010). PSC is conceived as a property of the

organisation, and as a climate construct is usually assessed by aggregating individual perceptions within the organisation (Law et al., 2011) or team (Dollard & Bakker, 2010; Dollard et al., 2012; Idris, Dollard, Coward, & Dormann, 2012). We propose that team PSC influences individual emotional exhaustion with implications for work injury rates. We expect that shared perceptions of organisational PSC might vary between teams because of team (middle) managers' values and actions, and their own levels of decision authority to enact policies and procedures (Zohar, 2008). In high PSC contexts, immediate supervisors show support and commitment to psychological health, prioritise the psychological health of their workers, promote effective communication strategies so that workers within all levels of the organisation are able to articulate concerns, and encourage the participation and involvement of stakeholders in matters relating to psychological health and safety. As explained by Conservation of Resources (COR) theory (Hobfoll, 1989; 2001), workers will experience stress when there is the threat of a loss of resources, a loss of resources, or a lack of resource gain following the investment of resources. COR theory predicts that when confronted with stress, individuals will strive to minimise net loss of resources. In high PSC environments workers feel they are protected from psychological resource loss due to unmanageable workload, low levels of supervisor support or job control, or workplace violence and bullying, and do not need to invest time and resources managing perceived threats to their psychological health. Workers in a high PSC context are not struggling to maintain depleted resources and are able to invest resources to protect their health and safety at work including accessing and remembering new safety information, monitoring hazards, and effectively using safety materials. Supporting this theorisation, evidence shows that PSC is associated with lower rates of musculoskeletal disorders, workers' compensation claims (Bailey, Dollard, McLinton, & Richards, 2015) and organisation records of sickness absence

rates (Australian Public Service Commission, 2015; Dollard & Bakker, 2010). Thus, we predict that:

Hypothesis 1: Team PSC will be negatively related to workplace injuries.

In this study burnout, in the form of emotional exhaustion, is proposed as the main mediator between PSC and workplace injuries, as the process of health erosion creates physiological and cognitive vulnerability to injury. Despite a range of conceptualisations of burnout, there is consensus in the literature that emotional exhaustion is the core component of burnout (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Halbesleben & Bowler, 2007). PSC theory offers a process of how emotional exhaustion develops in teams and if one can quantify PSC levels it is possible to predict individual emotional exhaustion (Dollard et al., 2012; Zadow & Dollard, 2015). Workers operating in low PSC environments are likely to experience high levels of work stressors, a lack of support, ineffective communication strategies to articulate concerns, and limited potential to change poor work practices through participation and involvement, leading to emotional exhaustion. In a range of multilevel studies PSC at the organisation or team level has been linked to emotional exhaustion at the individual level (e.g. Dollard & Bakker, 2010; Law, Dollard, Tuckey & Dormann, 2011). We expect:

Hypothesis 2: PSC at the team level will be negatively related to individual reports of emotional exhaustion.

We propose that PSC varies by team and affects levels of emotional exhaustion in team members, which contributes to the incidence of work injuries. Emotional exhaustion may mediate the relationship between PSC and work injuries in two separate ways. First, workers in low PSC environments experiencing high levels of emotional exhaustion lack the physical capacity to prevent and manage injury. Physiologically, emotional exhaustion can be conceptualised as a state of threatened homeostasis (Tsigos, Kyrou, Kassi, & Chrousos,

2016). To maintain the optimal body equilibrium, physical responses involving the hypothalamic-pituitary-adrenal axis and the autonomic nervous system interact with the central and peripheral nervous systems to mobilise a response against the stressor (Tsigos et al., 2016). Through these pathophysiological mechanisms, prolonged emotional exhaustion affects growth, metabolism, and immunity thereby creating susceptibility to serious injury and disrupting mechanisms to prevent, manage and heal damage that may impact physical and psychological health (Everly & Lating, 2012). For psychological health, this is consistent with a process of health erosion where workers experiencing high levels of emotional exhaustion are more likely to go on to report mental health problems such as depression (Hakanen, Schaufeli, & Ahola, 2008). Second, emotionally exhausted workers with depleted resources to manage work requirements may experience impaired cognitive functioning, and be more likely to make mistakes (Ahola, Salminen, Toppinen-Tannerr, Koskinen, & Väänänen, 2013; Oosterholt, Van der Linden, Maes, Verbraak, & Kompier, 2012; Sandström, Rhodin, Lundberg, Olsson, & Nyberg, 2005) and experience reduced job performance (Cropanzano, Rupp & Byrne, 2003; Leiter & Maslach, 2009; Schaufeli & Bakker, 2004) leading to greater potential for physical or psychological injury. There is a growing evidence that links emotional exhaustion to musculoskeletal injuries (Bailey et al., 2015), needlestick injuries (Clarke, Sloane, & Aiken, 2002), and physical injuries (Li, Jiang, Yao, & Li, 2013). Taken together these combined mechanisms suggest:

Hypothesis 3: The relationship between team PSC and workplace injuries will be mediated by worker emotional exhaustion.

4.3.3 Underreporting Injury Events and Psychosocial Factors

Research indicates that there is gross under-reporting of the true volume of work-related illnesses and injuries with the average number of experienced accidents more than

five times higher than reported accidents (Probst & Graso, 2013). This evidence problematises previous research that has not considered unrecorded injuries when establishing causes of workplace injury. Understanding safety requires an examination of both unrecorded and recorded injuries to ascertain true injury rates and to identify the contributing factors. PSC could influence injury reporting practices via two mechanisms. First in a high PSC context, where managers are truly concerned about worker psychological health, consistent with social exchange theory (Blau, 1964), employees are likely to reciprocate with pro-organisational behaviours such as reporting safety events. Safety learning systems require employees to monitor the work environment and recognise errors occurring, stop urgent work tasks, navigate time consuming and potentially frustrating online data entry, and deal with enquiries and follow up (see Halbesleben et al., 2008). Workers in high PSC environments will be motivated to invest time in safety activities to protect psychological health including the recognition of errors, have more positive attitudes about injury reporting, and feel that reporting injuries, including psychological injuries, is supported and prioritised above productivity (consistent with theories of physical safety climate and safety motivation; Neal & Griffin, 2006; Zohar, 2008). Second, workers in high PSC environments will feel safe to engage in new interpersonal behaviours necessary for learning and performance in line with theories of team work and team psychological safety (Edmonson, 1999) including the identification and reporting of work injuries; workers in high PSC environments will feel protected and supported to enact or implement these reporting systems effectively. It is proposed that:

Hypothesis 4: Team PSC will be negatively related to injury underreporting.

While we argued above that emotional exhaustion will lead to increased total injury events, it may also be associated with underreporting of safety events (Halbesleben et al., 2008). We anticipate that PSC varies by team, affecting emotional exhaustion in team

members, which shapes work injury reporting practices. When workers are working in low PSC work environments, where senior management is unsupportive of psychological health, facing potential psychosocial threats such as high work pressure and low social support, workers are at risk of experiencing high levels of emotional exhaustion (Dollard & Bakker, 2010; Idris, Dollard, & Yulita, 2014). High emotional exhaustion further erodes available resources, so workers may conserve existing resources (as described in COR Theory; Hobfoll, 1989) by bypassing discretionary safety activities. In teams with low PSC, employees experiencing higher rates of emotional exhaustion may have impaired error recognition, lack the resources to identify the need to report the injury and the emotional energy to make the online report, and recognise that they have emotionally exhausted team members who also lack the resources to complete the appropriate follow up which is an additional disincentive to report (see Halbesleben et al., 2008). Emotional exhaustion could result in bypassing safety procedures resulting in more injuries, but also higher levels of underreporting of workplace injuries disguising true injury rates.

Hypothesis 5: The relationship between team PSC and injury underreporting will be mediated by emotional exhaustion.

4.4 Method

4.4.1 Participants and Procedure

Three Australian hospitals participated, with the same owner and senior management structure, work health and safety policies and procedures, and online safety learning system for registered injury data. Registered data for work injuries were obtained from the hospitals for 2012 (T1), 2013 (T2) and 2014 (T3). A range of safety issues were reported by staff including manual handling injuries, needle-stick injuries, exposure to infectious agents, and

bullying or harassment. Ethics approval was given by the University of South Australia and the hospital group ethics committee. The self-report data was obtained by three Research Assistants who visited the hospitals using iPads and paper surveys. The organisational archival data (i.e., registered injuries) was obtained from an online safety risk management system. The hospitals promoted a procedure supported by team managers where staff were expected to record all work injuries using an online system.

Employees completed a survey in 2013 (T2). The initial response rate for the self-report data at T2 was 26 teams (48% of team members completed the survey), with N = 288. However, eight of these teams did not provide registered organisational data so the final sample matching self-report (T2) to registered data was 18 teams with a minimum of three participants (N = 214) with an individual response rate of approximately 51%, and a team response rate of 62% (18 teams taken from a total of 29 available teams across the three hospitals). Most participants were female (87.6 %), and around one third were aged 50-59 years (30.8 %). We defined a work team as an employee group with different roles and responsibilities who work interdependently to achieve organisational goals with an identifiable leader (Kozlowski & Iljen, 2006). Participants responded to survey questions with reference to the work team in which they spent the majority of their work time.

Both clinical (N = 141) (operating theatres, day procedures, wards, and specialist areas such as oncology and allied health) and non-clinical teams participated (N = 73) (administration, catering, cleaning, and maintenance). There were no significant differences between the teams on focal variables, PSC, physical safety climate and emotional exhaustion.

4.4.2 Measures

Psychosocial safety climate (PSC) was measured using the 12-item PSC scale (PSC-12; Hall, Dollard, & Coward, 2010) comprised of four sub-scales: management commitment,

organizational communication, management priority, and organizational participation. Respondents were informed that "The next set of questions concern the psychological health and safety in your workplace. Positive psychological health includes feelings of belongingness, self-esteem, wellbeing, feeling enthusiastic about work, sense of purpose and fulfilment. Poor psychological health may be perceived as feeling stressed, worried, tired, detached, cynical, alienated, overextended, exhausted, distressed or sad. Please consider each question in relation to your whole organisation, and indicate your level of agreement" (note this prelude was included at the request of the organisation). An example item is: "Management shows support for stress prevention through involvement and commitment" (management commitment), and "Management clearly considers the psychological health of employees to be of great importance" (management priority). Items were rated on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Foundational research on the PSC-12 scale in two population based samples showed that the three items of each of the four factors accounted for significant variance in each factor. Since high correlations were noted between the factors, scales were added to form a global variable with a Cronbach's alpha coefficient (α) of .94. (Hall, Dollard, & Coward, 2010). Given these sound psychometrics, in the current study we also used the items to form a global scale (α = .97).

Physical safety climate was measured using the 12-item scale developed by Idris and colleagues (2012), comprising the same base 12 PSC items across four sub-scales, but with the item stem changed to "the next set of questions concerns physical health and safety in your workplace. Please consider each question in relation to your whole organisation". Words such as 'psychological' were replaced with 'physical'. Responses were on a 5-point scale, from 1 (*strongly disagree*) to 5 (*strongly agree*). Items such as: "Management shows support for injury prevention through involvement and commitment" (management commitment) and

"Management clearly considers the safety of employees to be of great importance" (management priority) (Hall, et al., 2010), were added to form a global scale (α = .97).

Emotional exhaustion was measured using the five-item scale from the Maslach Burnout Inventory (MBI) (Schaufeli, Leiter, Maslach, & Jackson, 1996). Participants responded on a 7-point scale, from 1 (*never*) to 7 (*every day*), to situations such as: "I feel tired when I get up in the morning and have to face another day on the job" (α = .92).

Demographic questions included age, gender, employment status, hours worked last week, whether the staff member was a senior manager, team manager or employee, the team (e.g. oncology, catering), the number of workers in the team, and patient care rates.

Self-report reported work injuries were defined as the number of safety accidents (i.e., accidents that have caused a physical injury) or an injury causing psychological or emotional harm experienced in the last twelve months that were reported to the safety risk management system. *Self-report unreported work injuries* were identically defined, including both physical and psychological events but referred to those that were *not* reported to the safety risk management system database. Responses were on a 7-point scale from 1(*none)* to 7(*6 or more*). *Total self-report work injuries* were operationalised as self-report (unreported + reported) work injuries (as per above).

Organisation registered work injuries were recorded on the safety risk management system database across three time points, T1 (2012), T2 (2013) and T3 (2014). The organisation provided injury data, both physical (e.g. needle-stick injuries) and psychological (e.g. experiencing psychological harm through violence or bullying), for each work team in each of the three calendar years. These objective data were used to examine patterns and trends in the progression of organisation recorded work injury rates across an extended period of time, before, during and after the self-report data were collected at T2. Team registered

work injury rates were determined by work injury incidences divided by the team size (not the sample size for each team).

Underreported work injuries. This was not measured directly but following Probst (2015), was operationalised statistically. In a multilevel analysis underreporting was determined as the *residual*, by using the number of self-report unreported work injuries as the dependent measure, while controlling for the number of reported work injuries measured as (1) self-report work injuries at the individual level; and (2) registered work injuries (T2, 2013) at the organisational level. As recommended by Probst (2015) controlling for self-report reported work injuries and registered work injuries allowed us to test hypotheses regarding the impact of PSC, physical safety climate and emotional exhaustion on unreported injuries after controlling for any experienced accidents that employees may have already reported. Probst (2015) argues that this approach is superior for calculating underreporting compared to approaches that estimate the proportion of total experienced accidents that go unreported because proportions can be mathematically problematic as many employees have not experienced work injuries and therefore the denominator in their case would be zero. Aggregating the individual data to the organisational level addresses this issue however the approach loses critical information about individual- and cross-level effects (Probst, 2015).

4.5 Results

4.5.1 Confirmatory Factor Analysis

We used Confirmatory Factor Analysis (CFA; in AMOS 21) to determine whether Psychosocial Safety Climate, physical safety climate, and emotional exhaustion, all self-report scales, were distinct constructs. The proposed 3-factor model fit was assessed with a range of goodness-of-fit indices, and a comparison of fit indices was used to test model

acceptability (Bollen & Long, 1993). The proposed 3-factor solution (CFI = .90; IFI = .91; RMSEA = .08) met the minimum guidelines for acceptable fit (Byrne, 2001; Bollen & Long, 1993), with values equal to or greater than 0.90 for Comparative Fit Index (CFI) and Incremental Fit Index (IFI), and less than 0.08 for Root Mean Square Error of Approximation (RMSEA). The fit was superior to a single factor solution (CFI = .65; IFI = .65; RMSEA = .16), with a significant improvement in chi-square, $\Delta\chi^2(3) = 1997.50$, $p < .001$. The results confirm that PSC, physical safety climate and emotional exhaustion are separate constructs.

A separate issue is that the two climate scales may actually be measuring the same construct, since PSC and physical safety climate are highly correlated. We assessed a 2-factor versus a single 'safety climate' factor solution. The CFA for the 2-factor model indicated good model fit across indices (CFI = .91; IFI = .91), approaching acceptable model fit (RMSEA = .09), and a superior fit compared to a single-factor solution (CFI = .70; IFI = .71; RMSEA = .17), with a significant improvement in chi-square, $\Delta\chi^2(1) = 1378.75$, $p < .001$). Although PSC and physical safety climate are correlated, the CFA confirmed them as two separate constructs. Tables are provided in Appendix B so that the two factor and three factor models are able to be compared directly.

4.5.2 Multilevel Analyses

Given the multilevel theory and nature of the data (individuals nested in teams) we used hierarchical linear modelling (HLM 7 software) to test the hypotheses, where Level 2 represented aggregated work team data and Level 1 represented individual data. We report the intercept value (γ_{00}), the within-team Level 1 variance level (r), the intercept Level 2 variance (u_0), the -2 log-likelihood (full information maximum likelihood estimation, FIML), and the number of estimated parameters as recommended for multilevel data (Aguinis, Gottfredson, & Culpepper, 2013). Pseudo R^2 values were calculated using the formula

recommended by Kreft and de Leeuw (1998) and Singer (1998). Pseudo R^2 values estimate the amount of variance accounted for by comparing the variance component in the unconditional model to the same variance in the conditional model (e.g. using the formula σ^2unconditional - σ^2conditional/ by σ^2unconditional). The chi square significance difference is used to assess the change in deviance shown in Table 4.3, Table 4.4. and Table 4.5 to enable systematic comparison of the models. Using 18 teams with on average 11 team members will lead to statistical power of over .65 for medium size effects (Scherbaum & Ferreter, 2009). Power increases as the number of teams and participants increase. With the proposed numbers the power to detect small effects was limited however several safety climate studies with limited power have detected small effects (e.g. Dollard & Bakker, 2010; Neal & Griffin, 2006).

Aggregation. Prior to aggregating climate data to the team level, we confirmed the group like properties of the climate measures. The mean r(WG)(j) agreement index (James, Demaree, & Wolf, 1984) for PSC was .90 (SD = 0.12, range = .44 - .98), and for physical safety climate was .93 (SD = 0.10, range = .46 - .99), representing adequate levels of agreement within teams to justify aggregation to the team level. Moreover we assessed the intra-class coefficient (ICC), using a null model (a random effect model with no level 1 or level 2 predictors) to determine the proportion of variance in the climate measures due to team level factors (Mathieu, & Taylor, 2007) (see Table 2); for PSC 17% of the variance was due to team level factors, $\chi^2(17) = 51.97$, $p < .001$, and for physical safety climate it was 9% ($\chi^2(17) = 37.51$, $p < .01$), again justifying aggregation.

We confirmed sufficient between-team variance in the mediator (emotional exhaustion) and dependent (unreported injuries) measures to justify examination of predictors from higher level factors. Variance due to team factors accounted for 7% of the variance in total

self-report work injuries, $\chi^2(17) = 30.83$, $p < .05$; for emotional exhaustion it was 10%, $\chi^2(17) = 40.00$ $p < .01$.

Mediation. Since our main proposition was that PSC at the team level conferred effects on other variables we were interested in between-team effects on the mediator and dependent measures while parsing within-team variance (Zhang, Zyphur, & Preacher, 2009). To assess mediation, we considered the two paths, connecting the predictor (*X, PSC*) to the mediator (*M*, emotional exhaustion), $X \rightarrow M$ (path a), and connecting the mediator to the dependent measure (*Y*, unreported work injuries), $M \rightarrow Y$ (path b, controlling for $X \rightarrow Y$). As the hypotheses involved between-team effects the models used a random intercept model with the predictor variable at the lower level team-mean centred (Aguinis et al., 2013) with its mean returned to Level 2 to determine the between-team estimate (Zhang et al., 2009).

To formally test the mediation effect, we used the Monte Carlo Method (MCM), a form of parametric boot strapping, to determine confidence intervals of the mediations (i.e., a*b) as this is recommended for assessing mediation in multilevel models especially with small samples (MacKinnon, Lockwood, & Williams, 2004; Selig, & Preacher, 2008). The MCM used 95% confidence intervals (CI) and 20,000 repetitions. When zero was not included in the CI the null decision was rejected (Preacher & Hayes, 2008).

4.5.3 Descriptive Statistics

Table 1 presents the descriptive statistics and correlations between variables. All measures had acceptable reliability. On average work teams registered an injury rate of .20 work injuries over the previous 12 months on the online registered safety risk management system at T2 whereas survey participants indicated that they had experienced 2.52 reported work injuries during the same time period. In the survey 66 staff experienced one or more physical work injuries, whilst 63 experienced one or more psychological work injuries. For physical

work injuries, 73% (N = 48) reported it whilst 27% (N = 18) of staff left it unreported. Survey reports of psychological work injuries indicate that 35% (N = 22) of staff who experienced an injury reported it as whereas 65% (N = 41) did not. Despite roughly equal numbers of physical and psychological work injuries, there is greater unreported psychological harm.

Moreover, the correlation between survey self-report data for total work injuries and the organisation online safety learning system data varied from r = .09 (2014), r = .29 (2012) to r = .61, p < .01 (2013). The strongest correlation was in 2013, which makes sense since self-report and organisational registered data were collected simultaneously at this time; concordance between self-report and registered work injury rates was 36%.

Table 4.1. Means, Standard Deviations, and Zero-Order Correlations

Variable	Mean (I)	SD	Mean (T)	SD	1	2	3	4	5	6
1. Psychosocial safety climate	2.99	.90	3.01	.53	-	.71**	-.38**	-.42**	-.14	-.40**
2. Physical safety climate	3.56	.83	3.61	.41	.91**	-	-.32**	-.44**	-.29**	-.45**
3. Emotional exhaustion	4.06	1.73	4.11	.81	-.75**	-.71**	-	.30**	.11	.31**
4. Unreported work injuries (SR)	2.92	1.83	2.96	.89	-.75**	-.74**	.74**	-	.27**	.89**
5. Reported work injuries (SR)	2.64	1.32	2.52	.42	-.26	-.29	.30	.37	-	.68**
6. Total work injuries 2013 (unreported and reported) (SR)	5.29	2.38	5.27	1.26	-.58*	-.64**	.65**	.87**	.68**	-
7. Registered work injuries 2012 (Org)	-	-	.13	.11	-.17	-.31	.33	.39	.12	.29
8. Registered work injuries 2013 (Org)	-	-	.20	.13	-.50*	-.62**	.62**	.64**	.49*	.61**
9. Registered work injuries 2014 (Org)	-	-	.09	.08	.17	-.82	.06	.09	.09	.09

Note. *$p < .05$. ** $p < .01$. Org, Organisational registered records; SR, survey; Correlations below the diagonal are at the team level ($N = 18$) whereas those above the diagonal are at the individual level (N = 214). Means and SDs are reported at the individual (I) and team (T) level. To address issues of skew, the injury variables were log-10 transformed at the individual level.

4.5.4 Hypothesis Testing

Hypothesis 1 proposed that PSC at the team level will be negatively related to work injuries. First looking at registered injury rates, as shown in Table 2 M2, using linear regression, PSC at the team level was significantly negatively related to 2013 rates, while controlling for registered 2012 team work injury rates. Table 3 shows hierarchical linear regression survey results and another significant relationship between PSC team level and total self-report work injuries at the individual level. PSC was significantly negatively related to work injuries (reported and unreported), B = -0.30, SE =.11, $p < .05$. Considered in competition with physical safety climate with both registered and self-report injuries, neither climate was significant (results not shown), likely due to their shared variance and low power to show separate effects. Hypothesis 1 was supported with PSC as a predictor of registered and self-report injuries – however physical safety climate is also a plausible predictor.

Hypothesis 2 proposed PSC at the team level will be negatively related to individual reports of emotional exhaustion. As shown in Table 4 (M9) PSC was significantly negatively related to emotional exhaustion B = -.40, SE = .09, $p < .001$; adding PSC to the null model significantly improved the model fit, Chi-square (1) = 13. 39, $p < .001$. Physical safety climate was also significantly negatively related to emotional exhaustion, but as can be seen the effect compared to PSC was smaller, and the fit was not as good (18% less variance in the residual variance at Level 2 explained). Adding physical safety climate to M9 (now M11) we saw that there was no model fit improvement from M9 (-2 log likelihood both 547.5). We then accepted the most parsimonious model M9 as the best model to predict emotional exhaustion.

Hypothesis 3 proposed that the relationship between team PSC and work injuries will be mediated by worker emotional exhaustion. Path a of the mediation is M9, B = -.40, SE =

.09, and path b is M8, Table 3, upper level, B = .34, SE = .12. Using the Monte Carlo method, the 95% CI, for the effect was, Lower Level (LL) = -.26, Upper Level (UL) = -.04. Note that since the 95% confidence interval for the indirect effects did not contain zero, the result is significant. Hypothesis 3, was supported indicating a significant mediation effect PSC → emotional exhaustion→total self-report injuries.

Hypothesis 4 proposed that team PSC will be negatively related to underreporting of work injuries (note this is different from unreported injuries - see operationalisation). As shown in Table 5 M12 PSC was significantly negatively related to underreporting of work injuries, after controlling for survey reported work injuries, and upper level registered work injuries, B = -.24, SE = .11, t = -2.61, $p < .05$. Physical safety climate was not related to underreporting. This confirms Hypothesis 4, that PSC is negatively related to underreporting.

Table 4.2. Prediction of Registered Team Injury Rates by Previous Injuries, Climate and Emotional Exhaustion (N = 18)

	Team Registered Injury Rates 2013				
	M1	M2	M3	M4	M5
Constant	.00 (.17)	.00 (.17)	.00 (.17)	.00 (.17)	.00 (.17)
Registered injury rates 2012	.72 (.17)**	.65 (.15)**	.58 (.15)**	.58 (.16)**	.48 (.17)*
Psychosocial safety climate 2013		-.39 (.15)*			.40 (.43)
Physical safety climate 2013			-.45 (.15)*		-.60 (.38)
Emotional exhaustion 2013				.43 (.16)*	.36 (.23)
Adjusted R square	.48	.62	.65	.63	.66

Note. Individuals, $N = 214$; Teams, $N = 18$. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. The first value is the parameter estimate (B), and value in parenthesis is the standard error.

Table 4.3. HLM Between-team Effects; Multilevel Estimates for Models Predicting Self-report Total Work Injuries.

	Self-report Total Work Injuries (reported & unreported)			
	Null	M6	M7	M8
Intercept	.07 (.11)	.02 (.08)	.06 (.09)	.09 (.08)
Level 1				
Emotional exhaustion				.24 (.08)**
Level 2				
Psychosocial safety climate		-0.30 (.11)*		.33 (.24)
Physical safety climate			-.34 (.11)**	-.41 (.22)^
Emotional exhaustion				.34 (.12)*
Variance components				
Within-team (L1) variance (*r*)	1.02	1.00	.99	.92
Intercept (L2) variance (u_0)	.08	.03	.02	.0003
Additional Information	-232.23	-229.06	-227.70	-286.86
-2 log likelihood (FIML)	464.65	458.11	455.40	436.72
Estimated parameters	3	4	4	7
Chi-square (*df*) significance		6.54 (1)*	9.25 (1)**	27.93 (4)***
Pseudo R^2 (percentage)				
Level 1		03	03	10
Level 2		63	75	97

Note: Individuals, $N = 214$; Teams, $N = 18$. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, ^, $p < .05$ (1-tailed); FIML = full information maximum likelihood estimation; L1 = Level 1; L2 = Level 2; the first value is the parameter estimate (B), and value in parenthesis is the standard error.

Table 4.4. HLM Between-team Effects; Multilevel Estimates for Models Predicting Emotional Exhaustion

	Emotional Exhaustion			
	Null	M9	M10	M11
Level 2				
Intercept	.06 (.11)	.02 (.08)	.01 (.08)	.02 (.05)
Psychosocial safety climate		-.40 (.09)***		-.41 (.21)^
Physical safety climate			-.34 (.10)**	.02 (.18)
Variance components				
Within-team (L1) variance (*r*)	.94	.94	.94	.94
Intercept (L2) variance (u_0)	.11	.01	.03	.01
Additional Information				
-2 log likelihood (FIML)	560.84	547.46	550.89	547.45
Estimated parameters	3	4	4	5
Chi-square (df) significance		13.39 (1)***	9.97 (1)**	13.39 (2)**
Pseudo R^2 (percentage)				
Level 1		00	00	00
Level 2		91	73	90

Note: Individuals, $N = 214$; Teams, $N = 18$. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, ^, $p < .05$ (1-tailed); FIML = full information maximum likelihood estimation; L1 = Level 1; L2 = Level 2; the first value is the parameter estimate (B), and value in parenthesis is the standard error.

Table 4.5. Underreporting; Multilevel Estimates for Models Predicting Underreporting Work Injuries

	Unreported Work Injuries				
	Null	M12	M13	M14	M15
Intercept	.10 (.11)	.00 (.08)	.00 (.08)	.05 (.06)	.03 (.08)
Level 1					
Reported work Injuries		.28 (.09)**	.28 (.09)**	.25 (.11)*	.25 (.08)*
Emotional Exhaustion				.19 (.06)***	.19 (.08)*
Level 2					
Organisational injuries recorded		.18 (.10)	.14 (.12)	.12 (.07)	.04 (.12)
Psychosocial safety Climate		-0.24 (.11)*			.18 (.25)
Physical safety climate			-.26 (.13)		-.27 (.24)
Emotional exhaustion				.33 (.06)**	.33 (.12)**
Variance components					
Within-team (L1) variance (*r*)	1.02	.88	.87	.83	.83
Intercept (L2) variance (u_0)	.09	.007	.01	.0001	.0001
-2 log likelihood (FIML)	-251.09	-217.08	-217.18	-209.89	-209.18
Deviance	502.17	434.17	434.38	419.79	418.79
Estimated parameters	3	6	6	7	7
Chi-square (df)		68.00 (3)***	67.79 (3)***	82.38 (4)***	83.82
significance					(6)***
Pseudo R^2					
Level 1		14	15	19	19
Level 2		92	89	99	99

Note: Individuals, $N = 214$; Teams, $N = 18$. *** $p < 0.001$, **$p < 0.01$, *$p < 0.05$, ^, $p < .05$ (1-tailed); FIML = full information maximum likelihood estimation; L1 = Level 1; L2 = Level 2; the first value is the parameter estimate (B), and value in parenthesis is the standard error.

Hypothesis 5 proposed that team PSC and work injury underreporting will be mediated by emotional exhaustion. Path a of the mediation process was supported as in M9, Table 4 (Hypothesis 2). Results for path b are shown in Table 5, M15. Emotional exhaustion was significantly positively related to unreported injuries, B = .33, SE = .12, $p < .01$, after accounting for PSC, physical safety climate, and self-reported and registered work injuries. We found a significant mediation effect PSC → emotional exhaustion→underreporting injuries, 95% CI, LL = -.26, UL = -.03, supporting Hypothesis 5.

In each analysis, we examined the effect of physical safety climate and as expected it was also significantly related to total self-report injuries in M3, $t = -2.01$, $p < .01$ (1-tailed), but was not significantly related to underreporting. The psychosocial mediated effects are therefore over and above the effect of physical safety climate. The study relationships are seen in Figure 4.1.

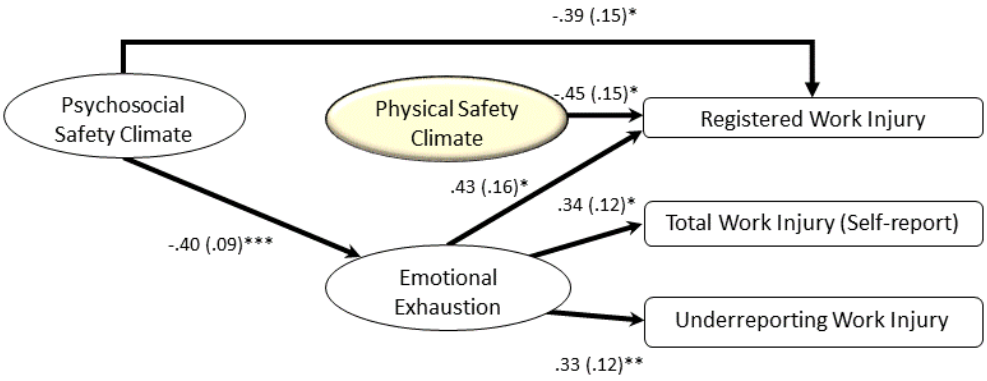

Figure 4.1. Study model and results; Between-team effects

In case the results were influenced by the inclusion of psychological injuries we teased out total self-report physical work injuries alone and found similar results; Team PSC was significantly negatively related to self-report total physical work injuries (reported and unreported), B= -.63, SE = .20, $p < .05$. For underreported physical work injuries, although

not significant, the pattern of relationships was similar with team PSC negatively related to individual self-report unreported physical work injuries, after controlling for self-report reported physical work injuries, and upper level registered work injuries.

4.6 Discussion

4.6.1 Overview of Results

The major contribution of this study was the application of a new theoretical framework, PSC theory, proposing a multilevel psychosocial pathway to workplace injuries (both psychological and physical) and underreporting of work injuries. This new approach articulated an organisation climate for psychosocial safety, to complement the physical safety climate construct predominantly used in the literature, to explain workplace injury and underreporting. For registered and self-report work injuries, we found that both PSC and physical safety climate were plausible predictors. The proximal measure emotional exhaustion, was clearly related to self-report injuries in competition with the climate measures, but for registered injuries emotional exhaustion remained a plausible main effect.

In relation to the mediation processes, we found that low team PSC was related to high levels of emotional exhaustion in individual workers, which was associated with increased self-report total work injuries. A second process was confirmed from low team PSC to higher levels of team emotional exhaustion, in turn leading to greater work injury underreporting. The findings suggest that to address the numbers of registered injuries, then organisations should target physical safety climate, but to prevent all work injuries, including those that are not reported, then PSC should be prioritised. This new knowledge is important because it shows that the promotion of safety climates that focus on physical aspects do not entirely

address the origins of injury underreporting; without recognition, there may be a perception of improvement while the chasm between registered and unreported work injuries widens.

4.6.2 Theoretical Implications

These findings extend current safety theory in four separate ways. First, this study supports an extension of PSC theory to include effects on personal safety and helps to confirm the theoretical process of health erosion demonstrating how PSC might affect work injuries via emotional exhaustion. Second, the findings also extend physical safety theory (see Zohar, 2008) by including PSC; it helps to extend the theory of safety by elucidating physical safety and psychosocial safety pathways to work injuries. Third, the findings challenge the testing of safety in current theoretical models as it uncovers the problem of the operationalisation of safety with concordance rates between the self-report and registered data showing that only 36 % of work injuries are reported. This research extends current theoretical pathways to include reported and unreported work injury pathways. Fourth, the findings extend current underreporting theory proposing a psychosocial pathway via emotional exhaustion. These findings build upon previous work linking psychosocial work conditions and psychological health with safety behaviour and work injuries (Clarke, 2012; Halbesleben, 2010), and reporting practices (Halbesleben et al., 2010; Jiang & Probst, 2015; Probst & Graso, 2013), by explicating the role of a climate for psychological health and safety (PSC), that creates the job conditions and workplace mental health articulated in these studies, and linking PSC to work injuries and underreporting.

4.6.3 Practical Implications

The research indicates that in considering the effect of safety climate in relation to worker injuries that it is important to consider beyond physical safety climate, the role of PSC in organisations. Our findings suggest that the development of high PSC organisations by

shifting management values and actions from productivity imperatives to the protection of psychological health will likely reduce workplace injury rates and improve injury reporting. Building a social level controller involving key stakeholder groups (i.e., a committee) to design and monitor policies, practices and procedures to promote the management of psychosocial risks will likely improve PSC (e.g. Dollard & Karasek, 2010). Intervening at the organisational and management level to improve the PSC and develop organisational systems to proactively identify and mitigate psychosocial risk, is potentially an efficient and more sustainable option for organisations than to focus on downstream factors such as work conditions or emotional exhaustion once manifested (Zadow & Dollard, 2016). The PSC domains (Dollard & Bakker, 2010) may be used as a guide to build organisational operating procedures (Dollard & Gordon, 2014) such as regular surveillance of psychosocial risks and psychological health (e.g. as part of an ongoing employee opinion survey); benchmarking PSC, risks and health against wider industry, state or national data can provide intervention targets and baselines against which to evaluation intervention effectiveness (see Bailey, Pignata, & Dollard, 2014). Interventions to build PSC are described in a range of sources (see Bailey et al., 2014; Dollard & Gordon, 2014; Dollard & Karasek, 2010). Our research also has practical implications for organisation injury surveillance systems; we confirm that registered data is likely incomplete and basing decisions to modify dangerous workplace practices and take preventative action by focusing on physical safety alone is likely not enough (see also Probst et al., 2008).

4.6.4 Limitations and Future Research

We used both registered and self-report injury data but each has limitations. The organisational register data is limited because workers report many additional injuries that they do not report to the organisation. The self-report measures of unreported and reported

work injury events may also be biased because even though we had good coverage of teams, the response rates within teams was 51% (similar to Neal & Griffin, 2006, safety research in hospitals); moreover, participants were asked to recall injury over the past 12 months which could attract recall bias. A plausible reverse causal pathway or reciprocal self-report relationship cannot be discounted. This study addresses the problems associated with cross sectional individual level data (e.g. common method variance) to some extent by modelling PSC at the team level, and estimating between-teams effects in individual level data.

Since PSC and physical safety climate were highly correlated at the aggregate level, the results should be interpreted with caution since the small sample size may make it difficult to disentangle the effects. Bronkhorst and Vermeeren (2016) found the climate measures related .76 at the unit level, so the high correlation could be due to the specific sample rather than conceptual confounding. To measure the physical and psychosocial safety organizational climate the four factor PSC-12 scale was developed by Hall et al.(2010) and an extra fifth factor added. Although the PSC-12 scale was originally developed to measure psychosocial safety climate, we used the same 12 items to measure physical safety climate. We substituted the words or phrases that referred to psychological health and safety with words or phrases that refer to physical health and safety (e.g. “psychological well-being” is replaced with “physical well-being” and “the prevention of stress” is replaced with “the prevention of physical injury”). Two previous studies by Hall et al. (2010) and Idris et al. (2012) have used the same substitution procedure to measure physical safety climate and showed good internal validity and reliability.

A methodological improvement of the study was the inclusion of organisation online registered work injuries taken over a three-year period, which is difficult to obtain because organisations are often reticent to release this information. An advantage of the registered data was that it was longitudinal; through linking our self-report data to the longitudinal data

we were able to show predictive relationships. Reverse tests showed injury rates did not predict future climates nor emotional exhaustion.

For the registered data although there were relationships between PSC, physical safety climate, and emotional exhaustion and registered injuries in 2013, there were no correlations for the subsequent year of registered data (T3 2014). It is expected that the strongest relationship would be between the self-report measures and the registered data collected within the same calendar year (2013). It is possible that these measures of climate were transient and did not endure into the following year. These results are consistent with Neal and Griffin (2006) who also did not identify a relationship between physical safety climate and registered accidents taken from a hospital injury database in subsequent years. Further research should take longitudinal self-report measures of PSC and emotional exhaustion, in combination with the registered data, to examine these causal relationships over time.
The number of teams with organisation registered work injuries over two years was small with only sufficient power to detect large effect sizes so non-significant results need to be treated with caution. The sample was predominantly female and mainly aged 50 to 59 years so the applicability of these findings to other occupational groups needs to be explored. Finally, Cronbach's alpha for PSC and physical safety climate was high at .97. Future research may consider the redundancy of items in the scale which may be asking the same question in a different guise (Streiner, 2003). However, this is not a threat to our results since cross-level links such as between PSC and exhaustion is consistent with prior research (e.g. Dollard & Bakker, 2010; Idris et al., 2012; Law et al., 2012).

4.6.5 Conclusion

We proposed a multilevel theoretical PSC framework of workplace injuries and reporting, emphasising the psychosocial components of work injury antecedents, underreporting of

work injuries, and including both self-report and registered psychological and physical work injury data. We proposed that PSC, emanating from senior managers and transmitted through teams, was the origin of psychological health erosion (i.e., emotional exhaustion), that culminated in greater work injuries and underreporting of work injuries (both physical and psychological). These results were over and above effects of physical safety climate on work injuries and underreporting, underscoring the need to consider a dual physical-psychological safety explanation of these outcomes to understand all work injuries, and not just the restricted number of injuries that are registered.

4.7 Summary

When these results were made available to the hospital management potential interventions were proposed to improve PSC, reduce levels of emotional exhaustion and subsequent injury rates, and promote reporting practices. An industry report was developed which is included in Appendix C. Management responded by asking for statistical evidence to support the efficacy of interventions targeting the improvement of PSC in organisations. A review of the literature was conducted and the evidence was limited and inconclusive. This led to the development of the next paper in this thesis, a meta-analysis to evaluate the efficacy of organisational stress interventions using the PSC framework, to fill this current gap in the research literature, and provide organisations with the statistical evidence to justify large scale organisational approaches, and an evidence-based theoretical framework to guide intervention development.

5 Psychosocial Safety Climate as a Meta-Analytic Framework for Organisational Stress Intervention Evaluation

5.1 Overview

The second and third chapters summarised the research evidence for PSC, demonstrating a clear relationship between PSC, damaging psychosocial work conditions, and poor psychological health. Then the fourth chapter extended our knowledge of the PSC theoretical framework, linking PSC with physical injuries, and injury reporting practices. The research evidence indicates that organisations need to target PSC to improve psychosocial work conditions, psychological health, and injury rates, but there is a gap in the literature. Despite theoretical knowledge and non-experimental research demonstrating the efficacy of organisational stress interventions, the meta-analytic evidence to support the use of these approaches is sparse and inconclusive. This chapter co-authored with Professor Maureen Dollard and Associate Professor Michelle Tuckey,[9] addresses this gap in the literature and specifically examines the efficacy of organisational stress interventions that target PSC. Sections of this chapter have been presented at the *28th International Congress of Applied Psychology*[10], the *2014 International Commission for Occupational Health – Work and Organisational Psychology Symposium*,[11] the *2015 European Association of Work and*

[9] **Zadow, A. J**., Dollard, M. F., & Tuckey, M. R. (in review). Psychosocial safety climate as a meta-analytic framework for organisational stress intervention evaluation

[10] **Zadow, A. J**, Dollard, M. F., & Tuckey, M. R. (2014). Organizational stress interventions in healthcare. In International Association of Applied Psychology (Ed*.) From Crisis to Sustainable Well-Being*. 28th International Congress of Applied Psychology. Paris: IAAP(Conference Proceedings). Presented in Paris.

[11] **Zadow, A. J.,** Dollard, M. F., & Tuckey, M. R. (2014). A meta-analysis of organisational stress interventions. ICOH-WOPS (Ed.). *Worker health: A basic human right for all. International Commission on Occupational Health: Work Organization and Psychosocial Factors.* (Conference Proceedings). Presented in Adelaide.

Organisational Psychology Conference[12] and also as a poster presentation at the *2013 International Forum on Quality and Safety in Healthcare.*[13]

5.2 Abstract

Substantial occupational stress theory suggests that organisational interventions should be more effective than individual level interventions in reducing psychosocial risks and improving worker psychological health. The findings of existing intervention reviews, however, indicate otherwise. Using fresh tools, we re-investigated the organisational intervention evidence through a meta-analysis of 42 studies, 70 independent samples, and 363 effect sizes (N = 17,834). Our observational framework was Psychosocial Safety Climate (PSC) which refers to a climate (values, systems and processes) for the protection of workplace psychological health. Consistent with PSC theory we found that organisational interventions using high PSC delivery techniques (including the involvement of senior management and employees, policies/ procedures developed and implemented, and sustainable strategies put in place to maintain the impact of the intervention over time) are more effective in improving psychological health, job resources, and productivity compared to low PSC approaches. Although the challenges of organisational intervention research (e.g. problems of implementation, heterogeneity of methods used, and the long duration required to manage change) may play an important role, we propose that a major reason for the lack of significant effects in organisational evaluation research, compared to individual level interventions, is a failure to apply the correct lens through which to evaluate the research. Our findings underscore the need for a paradigm shift in the development and evaluation of work stress interventions away from models focussed on

[12] **Zadow, A.J**, & Dollard, M.F., & Tuckey, M. R. (2015). Organisational Stress Interventions. *European Association of Work and Organisational Psychology* (Conference Proceedings) Presented in Norway.
[13] **Zadow, A. J**. Dollard, M. F., & Tuckey, M. R. (2013). Improving safety performance in healthcare using organisational stress interventions. Poster presentation at the *2013 International Forum on Quality and Safety in Healthcare*, London.

job characteristics to those centred on building a strong climate for psychological health and safety.

5.3 Introduction

5.3.1 Interventions to Address Workplace Stress

Economic change and socio-demographic workforce factors are leading to tighter profit margins, demanding timelines, and global competition (NIOSH, 2016). Worldwide work stress is growing, affecting more than 55.6 million individuals in the European Union (European Agency for Safety and Health at Work, 2014) while in the United States 120,000 deaths per year and approximately 5%–8% of annual healthcare costs are attributed to workplace stressors (Goh, Pfeffer, & Zenios, 2015). Interventions are required to address the escalating consequences of work stress. Organisational interventions are theorised to create broader sustainable change by addressing unhealthy work environments, rather than interventions focussed on specific individuals that do not tackle the underlying risks (Jordon, Gurr, Tinline, Giga, Faragher, & Cooper, 2003; LaMontagne, Noblet, & Landersbergis, 2012; Montano, Hoven, & Siegrist, 2014). Yet the meta-analytic research evidence to support the efficacy of organisational interventions is meagre, since most meta-analyses have been unable to conclude that organisational interventions are effective at all, or have revealed limited efficacy compared to individual interventions (Marine, Ruotsalainen, Serra, & Verbee, 2009; Richardson & Rothstein, 2008; van der Klink, Blonk, Schene, & van Dijk, 2001; Van Wyk & Pillay-van Wyk, 2010).

To resolve this discrepancy between theory and evidence, we propose a paradigm shift: from examining organisational interventions in terms of their modification of work conditions (i.e., job demands and job resources) to how organisational interventions shape the work climate – specifically, the level of Psychosocial Safety Climate (PSC; Dollard & Bakker, 2010)

– that precedes and sustains the unhealthy work conditions leading to poor mental health. PSC plays an important role in developing the conditions that create psychologically healthy work environments (Zadow & Dollard, 2015). Absent from the existing literature is a meta-analytic comparison of whether organisational interventions that target the managerial and organisational practices to improve the climate (PSC) are more effective in improving psychological health and work conditions than organisational interventions that address existing work conditions. We need to identify how and when organisational stress interventions work, so as to uncover efficient and effective action points to build healthy workplaces.

5.3.2 Psychosocial Safety Climate

PSC theory (Dollard & Bakker, 2010) describes the organisational context preceding the development of adverse work conditions that create high levels of workplace stress, emotional exhaustion, anxiety, and depression. PSC theory proposes that work stress is caused by poor quality work conditions and suggests that PSC is a leading indicator of these causes (Dollard, Zadow, Pignata, & Bailey, 2016). PSC is therefore a precursor to the conditions described in other work stress theories (e.g. Job Demands-Resources [JD-R] model, Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Job Demand-Control [JD-C] theory, Karasek, 1979; Effort-Reward Imbalance [ERI] model, Siegrist, 1996) because it concerns the management and organizational environment that causes the adverse work conditions described by these models of work stress (Zadow & Dollard, 2016). Empirical evidence confirms PSC as a precursor to the JD-R (Dollard & Bakker, 2010), JD-C (Dollard, Opie, Lenthall, Wakerman, Knight, et al., 2012, and ERI (Owen, Bailey, & Dollard, 2016) models.

The four domains of PSC provide a framework for the development, implementation, and evaluation of a successful organisational intervention: (1) senior management support and commitment to psychological health; (2) the priority of psychological health over productivity;

(3) the extent and effectiveness of organisational communication; and (4) the participation and involvement of all stakeholders in relation to matters of psychological health and safety. These domains were developed by Dollard and Bakker (2010) following a review of the work stress prevention and safety climate literatures (Dollard & Bakker, 2010; Dollard & Kang, 2007; Jordan et al., 2003; Kompier & Cooper, 1999; Kompier & Kristensen, 2001; Cheyne, Cox, Oliver, & Tomas, 1998; Zohar, 1980). They depict what an organisation, unit, or team would need to develop in order to create a strong climate to protect psychological health at work (Dollard, Tuckey, & Dormann, 2012). Each of these domains and the items that comprise them (see Hall, Dollard, & Coward's PSC-12 measure) scope best practice principles for organisational stress intervention (Zadow & Dollard, 2016). Yet despite a growing body of evidence demonstrating the relationship between low PSC, adverse work conditions, and poor psychological health, these domains are not systematically addressed in workplace interventions.

5.3.3 Stress Intervention Taxonomy

To date, the focus of most (published) workplace stress interventions has been on cognitive behavioural strategies to improve the resilience of individual workers to cope with the prevailing work environment by addressing the severity of stress symptoms (i.e., secondary prevention) or treating psychological ill-health symptoms (i.e., tertiary prevention) (see Richardson & Rothstein, 2008). These *individual interventions* typically involve building the skills of individual employees in terms of arousal reduction, coping, mindfulness, relaxation, and communication (Biron, Karanika-Murray, & Cooper, 2012; Boiler, Haverman, Westerhof, River, Smit, & Bohlmeijer, 2013; Giga, Noblet, Faragher, & Cooper, 2003; Karasek, 2004; McVicar, Munn-Giddings, & Seebohm, 2013; Richardson & Rothstein, 2008). The problem with these individual approaches is that they do not address the development of psychosocial

risks in the workplace. With continued exposure to unhealthy work environments the worker faces the likelihood of relapse and ongoing problems requiring further interventions.

Organisational interventions modify organisational practices to address and prevent workplace stressors (i.e., primary prevention) (Richard & Rothstein, 2008). One focus of organisational approaches is changing the content and structure of jobs (e.g. job redesign/ restructuring) for all members of the organisation, or those in a particular job category (Giga et al., 2003). Organisational intervention approaches can include organisational restructuring, selection and placement, job redesign and training, building or modifying relationships at work, improving person-environment fit, co-worker support groups, role feedback and clarification, and participatory decision-making programs (Giga et al., 2003; Marine, Ruotsalainen, Serra, & Verbeek, 2006; Richardson & Rothstein, 2008). Organisational interventions involve dealing with all members of the organisation, or all members of a work unit, to address the work organisation and production process (Karasek, 2004; McVicar, Munn-Giddings, & Seebohm, 2013). In theory, organisational interventions can address existing work conditions (i.e., modify shift durations, workloads, or co-worker support) or focus on the development of a climate to support psychological health (i.e., setting up systems to encourage active involvement of senior management in workplace psychological health, encouraging policies and procedures that prioritise psychological health over productivity), which should also foster healthy working conditions. Currently there is no research evidence to guide practitioners to prioritise one organisational approach over another, leading to confusion about how to structure an intervention for optimal effect on psychological health.

The evidence base for organisational interventions is limited and inconclusive, particularly in the meta-analytic literature, despite a wide range of theoretical models highlighting the role of poor work conditions as primary determinants of the development of adverse psychological health problems (i.e., JD-C model, Karasek, 1979; the ERI model,

Siegrist, 1996; the JD-R model, Demerouti et al., 2001). A summary of existing literature reviews and completed meta-analyses examining the efficacy of organisational stress interventions is provided in Table 1. Organisational stress interventions need to address complex social systems that are difficult to control, and the implementation process is difficult and multi-faceted (Nielsen, Fredslund, Christensen, & Albertsen, 2006; Nielsen, Randall, & Albertsen, 2007). Major barriers to collating the evidence regarding organisational approaches is the heterogeneity of the interventions and the wide range of outcomes measured within and across studies. Researchers have also highlighted problems of poor methodological rigour and difficulty completing traditional experimental processes such as randomisation and the use of control groups (van der Hek & Plomp 1997; van Wyk & Pillay van-Wyk, 2010) which undermine study validity. Contamination effects such as compensatory rivalry between groups or programme failure when the intervention is not implemented as anticipated lead to smaller effect sizes (i.e., see Zapf, Dormann, & Frese, 1996) or effects that are not immediately apparent (Nielsen, Randall, & Albertson, 2007). Changing organisational structures including mergers and downsizing, and the need for organisations to be flexible in a competitive environment, have implications for risk assessment and intervention activities (Nielsen, Randall, Holten, & González, 2010). Employees, through hidden job crafting, may work against planned intervention activities (Nielsen et al., 2010). These problems have hampered efforts to undertake research to quantify the impact of organisational stress interventions, and the efficacy of different strategies.

Table 5.1. Summary of Review Articles Evaluating the Efficacy of Organisational Stress Interventions

Author	N	%	Results
Awa, Plaumann, and Water (2010)≈	2	8	The individual interventions led to a significant reduction in burnout lasting up to six months after the intervention. The results were inconclusive for organisation interventions and those involving both individual and organisational techniques.
Bambura, Egan, Thomas, Pettigrew, and Whitehead (2007)	19	100	Some evidence suggests that organisational interventions improved the psychosocial work environment, but health effects were less apparent. Studies were subject to several methodological limitations including the contamination of control groups and the use of concurrent interventions.
Edwards and Burnard (2003)	2	20	These two studies, despite methodological limitations, suggested that organisational interventions may impact different psychosocial risk and health outcomes compared to individual interventions, although the numbers are too limited to make definitive conclusions.
Caulfield, Chang, Dollard, and Elshaug (2004)	1	17	The researchers determined that the organisational program was more effective than the individual focused interventions however this conclusion was compromised by the limited number of studies, with only one organisational intervention study.
Egan, Bambura, Thomas, Pettigrew, Whitehead and Thomson (2007)	18	100	Eight controlled and three uncontrolled studies showed evidence of health benefits when control improved, and (less consistently) when demands decreased or support increased.
Giga, Noblet, Faragher and Cooper (2003)	3	19	Organisational interventions were more likely to lead to improvements in employee health and organisational performance. Alternatively, individual level interventions were often associated with improvements in mental and emotional wellbeing although some authors reported that improvements in mental and emotional wellbeing were short term.
Goldgruber and Aherns (2009)	4	100	This study comprised a review of the existing review articles for stress interventions. Results for organisational interventions were mixed with definitive conclusions about the efficacy of organisational stress interventions unable to be reached.
LaMontagne, Keegel, Ostry, & Landsbergis (2007)	47	52	Individual-focused approaches to job-stress interventions tended not to have favourable impacts at the organizational level while organisationally-focused systems approaches to job-stress interventions had favourable impacts at both the individual and organizational levels.

Author	N	%	Results
Marine, Ruotsalainen, Serra, and Verbee (2009) ≈	3	21	No meta-analytic evidence for the efficacy of organisational approaches in decreasing symptoms of stress, depersonalization and general health complaints.
McVicar, Munn-Giddings, and Seebohm (2013)	11	100	Organisational interventions had predominantly positive outcomes for major stress indicators, including job performance and productivity, absenteeism and mental health, yet there were still some inconsistency with some studies reporting partial or little overall impact. More successful interventions used an action group in close communication with a steering group and engaged managers as participants. Short evaluation time frames and the use of a diversity of self-report surveys in the majority of the studies were highlighted as problems.
Mimura and Griffiths (2002)	3	30	The number and quality of the studies identified was limited. The effectiveness of programmes based on personal support were more effective than environmental management to reduce stressors.
Montano, Hoven, and Siegrist (2014)	39	100	Interventions addressing material conditions (e.g. vibrations, noise, chemical substances), work time-related conditions (e.g. work speed, shifts, deadlines, or breaks), and work organisation conditions (e.g. job demands, job control, effort and rewards, methods of work, structure of leadership) more effectively improved the health of employees, including physical and psychological health. The research findings proposed by these three studies suggest that the more effective organisational-level interventions involved leadership support, shared understandings between stakeholders, and continuous improvement practices.
Morse, Salyers, Rollins, Monroe DeVita, and Pfahler (2012)	5	14	Results for organisational interventions were mixed with four studies showing improvement in some measures of psychological health.
Naghieh, Montgomery, Bonell, Thompson, & Aber (2015) ≈	2	50	The psychological outcome measures did not improve following either organisational intervention showing no difference compared to no intervention.
Richardson and Rothstein (2008) ≈	5	5	The researchers identified only five organisational intervention studies with a combined effect size of d = .14 (-.12, .41, ns) concluding that organisational interventions yield virtually no effect. In comparison, cognitive behavioural interventions produced a combined effect size of d = 1.16 (.46, 1.87, $p < .01$).
Ruotsalainen, Verbeek, Marine, & Serra (2015) ≈	20	33	Of the 21 studies, two studies reduced stress by changing work schedules showing a reduction in emotional exhaustion, d = -.55 (-.84, -.25, $p < .05$).

Author	N	%	Results
Van der Hek and Plomp (1997)	4	17	Impossible to determine which specific interventions or techniques were more effective.
Van der Klink, Blonk, Schene, and Van Dijk (2001) ≈	5	22	Organisational interventions were considered far less effective (d = .08, -.03, .19, ns) than cognitive behavioural therapy approaches (*N* = 18) (d =.68, .54, .82, p < .05).
Van Wyk and Pillay-van Wyk (2010) ≈	10	100	Divided ten interventions into three categories; social support, training in stress management techniques, and management interventions. The researchers found enormous heterogeneity of interventions and a wide range of outcomes measures. This review found no evidence to support the use of brief stress management interventions to reduce job stress but more extended interventions (more than six hours of contact for a minimum of four weeks) reduced symptoms of stress for the short term (less than six months). Management interventions alone did not reduce levels of organisational stress although only two studies were identified.

Note. ≈Meta-analytic study. N = number of organisational interventions. % = percentage of organisational interventions in the review compared to other interventions (individual, combination of individual and organisational).

5.3.4 Organisational Stress Intervention Meta-Analyses

Despite 13 review papers providing some evidence to suggest that organisational interventions to improve workplace stress are effective, meta-analytic data are sparse. Six meta-analyses, including only very small numbers of organisational intervention studies, garnered very limited evidence for the efficacy of organisational interventions to improve workplace psychosocial risk factors or psychological health. Three meta-analyses do not support the proposition that organisational stress interventions are effective in terms of improving psychological health and work conditions (Van der Klink et al., 2001; Richardson & Rothstein, 2008; Nagheih, Montgomery, Bonell, Thompson, & Aber, 2015) while the remaining three meta-analyses report very limited inconclusive evidence using samples of three, two, and ten studies respectively (Marine et al., 2009; Ruotsalainen, Verbeek, Marine, Serra, 2015; Van Wyk and Pillay-van Wyk, 2010).

Quantifying the efficacy of organisational interventions is important as it gives a precise estimate of the weighted effect size across a range of studies and provides increased statistical power compared to an individual study to identify interventions that may be effective but require larger samples to determine the effect (Borenstein, Hedges, Higgins, & Rothstein, 2009). Narrative reviews of studies rely on tests of significance, and often interpret a nonsignificant result to mean that there is no effect. So when the findings of some studies are statistically significant, and others are not, the pattern of results is interpreted as confusing and unclear when the problem may be that some of the source studies have low statistical power (Borenstein et al., 2009). Existing organisational stress intervention meta-analyses sample only a limited number of studies and group a wide range of organisational intervention methods together in one category, creating heterogeneity in effect sizes and inconclusive results. Grouping organisational interventions with similar characteristics is expected to provide greater consistency in effect

sizes, and aid the identification of which organisational interventions are most effective in improving work conditions, productivity, and psychological health.

5.3.5 Psychosocial Safety Climate Intervention Framework

The current study proposes that high PSC organisational intervention approaches will be more effective than low PSC approaches because they target the climate that underpins working conditions, and embody PSC principles such as democratic engagement, empowerment, and social dialogue. High PSC organisational stress interventions involve: (a) the participation of senior management; (b) employees who are encouraged to participate actively in the implementation of the intervention; (c) the development of policies and procedures as a result of the intervention (e.g. to deal with work stress, bullying or harassment); (d) new procedures put in place as a result of the intervention; and (e) strategies to make the impact of the intervention sustainable over time (e.g. planned evaluations or ongoing reviews). Organisational stress interventions that do not actively undertake these activities – low PSC interventions – instead target and modify the existing work conditions through processes such as job redesign, training to build teamwork, and structured supervision arrangements.

The rationale underlying this prediction is based on two key premises. First, high PSC interventions target the climate preceding the work conditions and poor psychological health with a focus on building PSC rather than managing and changing existing specific workplace problems. Addressing distal causes of poor mental health such as low PSC may be a more effective target for intervention than attempting to identify, measure and treat the complex adverse work conditions (e.g. job insecurity or production pressure), or poor workplace psychological health states (e.g. emotional exhaustion, depression or anxiety) once they have manifested (Zadow & Dollard, 2016). Second, high PSC interventions are qualitatively different from low PSC interventions as they use socially collective structures that provide an opportunity

for social dialogue, empowerment, and democratic engagement that are recognised as best practice elements of psychosocial risk management interventions based on systematic review of the existing research base, and the evaluation of applied management and organisational practices in the field (Dollard & Karasek, 2010; Jordon, Gurr, Tinline, Giga, Faragher, & Cooper, 2003; European Agency for Safety & Health at Work (EASHW), 2002). High PSC interventions ensure that senior managers and leaders actively create and enact policies, practices, and procedures that protect worker psychological health (Bond, Tuckey, & Dollard, 2010). Research evidence suggests that managers have an important role in the development of worker psychological health (e.g. Arnold, Turner, Barling, Kelloway, & McKee, 2007; Tuckey, Bakker, & Dollard, 2012; Skogstad, Einarsen, Torsheim, Aasland, & Hetland, 2007). Dollard and Karasek (2010) propose that organizational intervention processes need senior management support to facilitate the change, to manage a social-level controller (e.g. a tripartite committee), to resource incoming demands, to promote social dialogue between stakeholders, support democratic engagement, and to be involved in the design and support of longer term integration of ideas into regular policy and procedures. These steps are also consistent with international best practice, established work health and safety procedures, and continuous improvement processes (Bailey, Pignata, & Dollard, 2014). Alternatively, low PSC interventions may use consultants or trainers outside the organisation to manage and implement the intervention, bypassing the involvement of senior management. Yet this option could be attractive to organisations as the active involvement of senior management in intervention processes can be time consuming, may identify problems that are complex to address, and implies ownership of the intervention actions limiting flexibility to refuse or limit plans when organisational priorities change. Taken together, and using the prior literature as a guide, we expect the following:

Hypothesis 1: High PSC organisational interventions will be more effective than low PSC organisational interventions in reducing psychological health symptoms (e.g. emotional exhaustion, burnout, psychological distress, depression, anxiety).

Hypothesis 2: High PSC organisational interventions will be more effective than low PSC organisational interventions in improving job resources (e.g. job control, social support).

Hypothesis 3: High PSC organisational interventions will be more effective than low PSC organisational interventions in reducing workplace job demands (e.g. work pressure, emotional job demands).

Hypothesis 4: High PSC organisational interventions will be more effective than low PSC organisational interventions in improving productivity measures (e.g. job satisfaction, engagement, motivation, performance).

The first PSC domain relates to senior management support and commitment to psychological health through involvement and commitment (Dollard & Bakker, 2010). This can be seen when senior management take quick and decisive action to correct problems or issues that affect psychological health (Idris, Dollard, Coward, & Dormann, 2012). Accordingly, it is anticipated that organisational interventions with strong senior management support will more effectively reduce job demands and adverse psychological health symptoms, and improve job resources and employee well-being, leading to the following hypothesis:

Hypothesis 5: Organisational interventions with high levels of senior management support will be more effective in reducing adverse psychological health symptoms and job demands, and improving job resources and productivity, than organisational interventions with low levels of senior management support.

Another important domain articulated in the PSC framework is organizational participation and involvement. This involves the integration of stakeholders including employees, unions, and health and safety representatives in the occupational health and safety

process, through participation and consultation involving all levels of the organization including the active encouragement of employees to become involved in psychological health and safety matters (Dollard & Bakker, 2010). It is anticipated that organisational stress interventions that promote the active involvement of employees to identify what needs to be addressed in the intervention and the best way to approach the intervention process will be more effective than interventions that do not (i.e., external experts providing training with predetermined topics). With participation, the likelihood of the solution fitting the problem will be increased. The next hypothesis is:

> *Hypothesis 6: Organisational interventions wherein employees are encouraged to participate actively in the intervention will be more effective in reducing adverse psychological health symptoms and job demands, and improving job resources and productivity, than organisational interventions in which employees are not encouraged to participate actively.*

Another domain articulated in the PSC framework (Dollard & Bakker, 2010) concerns the value of worker psychological health and the priority management give to psychological health and safety versus productivity goals. This is demonstrated by the enacted policies, procedures, and practices of an organization and the priority of psychological health policies relative to policies promoting productivity goals. This suggests that organisational interventions need to develop policies, procedures and policies relating to psychological health to demonstrate the pre-eminence of psychological health in organisational terms, and that all layers of the organisation need to be involved in the implementation to promote team involvement and ownership of the changes. In terms of organisational interventions this can include policies, procedures and practices that are *developed*, and policies, procedures and practices that are specifically *implemented*. Based on these two options it is proposed that:

Hypothesis 7: Organisational interventions where policies, procedures and practices related to psychological health are developed will be more effective in decreasing adverse psychological health symptoms and job demands, and increasing job resources and productivity, than organisational interventions where policies, procedures and practices are not developed.

Hypothesis 8: Organisational interventions where policies, procedures and practices related to psychological health are implemented will be more effective in decreasing psychological health symptoms and job demands, and increasing job resources and productivity, than organisational interventions where policies, procedures and practices are not implemented.

The final PSC domain concerns the extent and effectiveness of organisational communication. It includes the way an organisation communicates with employees about issues that may affect psychological health and safety, and brings these issues to the attention of the employees (Idris et al., 2012). Part of this is the way employees communicate occupational health and safety concerns upwards (Idris et al., 2012). In organisational intervention terms these communication strategies ensure that there are opportunities to review, evaluate and reinforce strategies relating to psychological health and safety. In this context we would expect the following:

Hypothesis 9: Organisational interventions where sustainable communication strategies (e.g. evaluations, reviews) relating to psychological health are implemented will be more effective in decreasing psychological health symptoms and job demands, and increasing job resources and productivity, than organisational interventions where sustainable communication strategies are not implemented.

5.4 Method

A literature search was conducted to identify published articles, conference papers, doctoral dissertations, and unpublished manuscripts related to organisational interventions to reduce workplace stress. The articles were identified through computer-based searches of the PsychINFO (1980 to 2013) and ISI Web of Science (1980 to 2013). Searches included the terms *organisational interventions* and *stress* (533 articles), *anxiety* (159 articles), *depression* (308 articles), *burnout* (163 articles), and *emotional exhaustion* (32 articles). The electronic search was supplemented with a manual search of reference lists of empirical and theoretical reviews on interventions to reduce workplace psychosocial risk factors (24 articles). Authors of the identified papers were also contacted via email and asked to provide any unpublished manuscripts, papers under review, or student theses relating to organisational interventions to improve work conditions or psychological health.

5.4.1 Inclusion Criteria

The articles identified were reviewed for appropriate content. Studies eligible for inclusion: involved an organisational intervention to reduce adverse psychological health symptoms (i.e., workplace stress, anxiety, depression, burnout, generalised strain, psychosomatic problems, fatigue or emotional exhaustion), improve job resources (i.e., autonomy, social support), or reduce job demands (i.e., work pressure, role conflict); and contained sufficient empirical information (e.g. sample size, pre- and post-intervention means and standard deviations) for meta-analysis. The search identified 81 papers that met the criteria. Of these 39 were reviewed and rejected due to insufficient statistical information provided (e.g. means, standard deviations, sample sizes for each independent group, and/or *p* values), or the groups were not differentiated sufficiently to determine the independent effects of the intervention, although

where possible authors were contacted to obtain additional information. This process left a final sample of 42 studies, 70 independent samples and 363 effect sizes (N = 17,834).

5.4.2 Coding Procedure

5.4.2.1 Coding of PSC Principles

Each of the organisational interventions in the sample was coded by at least two different raters in terms of the degree to which the intervention targeted PSC and embodied the PSC principles. The coding criteria used to evaluate the organisational intervention characteristics in terms of PSC are described in Table 2. A 5-point Likert scale was used for the ratings, from *1 = strongly disagree* to *5 = strongly agree*.

Table 5.2. Organisational Intervention Psychosocial Safety Climate (PSC) Rating Criteria

1.	Did the intervention involve the participation of senior management?
2.	Were employees encouraged to participate actively in the implementation of the intervention?
3.	Were policies/ procedures developed as a result of the intervention? (i.e., to deal with work stress, bullying/harassment or work related violence?)
4.	Was there a procedure put in place as a result of the intervention?
5.	Were strategies put in place to make the impact of the intervention sustainable over time? (i.e., planned evaluations, ongoing reviews)

The authors of the journal articles included in the sample were contacted via email to make the ratings; 16 authors (40% of the sample) coded the interventions presented in their own articles in accordance with the five categories. Space was provided below each question for authors to include qualitative information to describe their ratings in more detail and record examples to promote rating accuracy. Four research staff (including the first three authors of this study) coded the remaining articles in terms of PSC, with a minimum of two raters coding each study.

The rating data were then exported to the Statistical Package for the Social Sciences (SPSS). Final ratings were developed as follows: 1) author ratings contributed to 50% of the final score and the other 50% of the score was developed combining the ratings of the two coders, 2) when author ratings were not available then the score was constituted by averaging the scores of raters (minimum of two raters per study).

5.4.2.2 Identification of High and Low PSC Interventions.

Based on a nationally representative data set, benchmarks for PSC have been established: when using the 12-item PSC survey (PSC-12; Hall, et al., 2010) scores ≥ 41 are classified as high PSC and scores < 37 or below reflect low PSC (Bailey, Dollard, & Richards, 2015). We utilised these benchmarks to classify the interventions in our sample as high and low PSC. Because the PSC intervention coding system (see Table 2) used five items compared to the original 12, we calculated proportional benchmark scores. Specifically, high PSC interventions were categorised as those with scores of 17 or above from the five items (n = 25) while low PSC interventions had scores of 15 or below (n = 17).

5.4.3 Meta-Analytic Procedures

Random effects meta-analyses using a pre-post within-subjects design were conducted according to procedures recommended by Borenstein, Hedges, Higgins, and Rothstein (2009). We report k, the number of independent effect sizes used to compute the mean effect; N, the number of participants within a sample; d, the weighted mean effect size; the p value for the difference between the effect sizes for the intervention and control groups using mixed effect analysis; and the 95% confidence interval for the mean effect. In addition, we report three statistics to quantify heterogeneity: the Q statistic, the weighted sum of squares and its associated p˜ value (a statistically significant p˜ value allows one to reject the null hypothesis that effect sizes are constant across all studies); T, the standard deviation of true effect sizes,

which indicates the absolute amount of deviation in effect sizes about the mean; and the I^2 statistic, which indicates the proportion of dispersion that can be attributed to real differences in effect sizes as opposed to within-study error (Borenstein et al., 2009). All estimates were calculated using Comprehensive Meta-Analysis 3.0 software (Borenstein, Hedges, Higgins, & Rothestein, 2005).

Of the 42 articles in the sample, 32 reported reliabilities for the scales and 29 included control groups. Job demands included general job demands, role conflict, work pressure, emotional demands, task obstacles, low role clarity, quantitative demands, and interpersonal demands. Job resources included co-worker and supervisor support; autonomy (including job control, decision authority, decision control, decision latitude, empowerment, pacing control); social resources, rewards; quality work; training; feedback; participation; skill utilization; fairness; positive challenges; and job content satisfaction. Psychological health symptoms measured were emotional exhaustion, cynicism, psychological distress, depersonalisation, anxiety, depression, stress, burnout emotional strain, relaxation deficit, tiredness, cognitive stress reaction, social dysfunction, and somatic symptoms. Productivity outcomes included dedication, vigour, work involvement, health, self-esteem, personal accomplishment, job satisfaction, engagement, professional efficacy, job motivation, flow, job morale, affective well-being, vitality, well-being, positive attitude, positive mental health, competency, and efficiency.

The funnel plot for this sample (refer to Figure 5.1) shows that the studies are distributed symmetrically about the combined effect size. In the presence of publication bias, we would expect that that the bottom of the plot would show a higher concentration of studies on one side of the mean than the other. This would reflect the fact that the smaller studies are more likely to be published if they have larger than average effects which makes them more likely to meet the

criterion for statistical significance. A symmetrical distribution of studies demonstrates that publication bias is unlikely to impact the meta-analytic conclusions for this analysis.

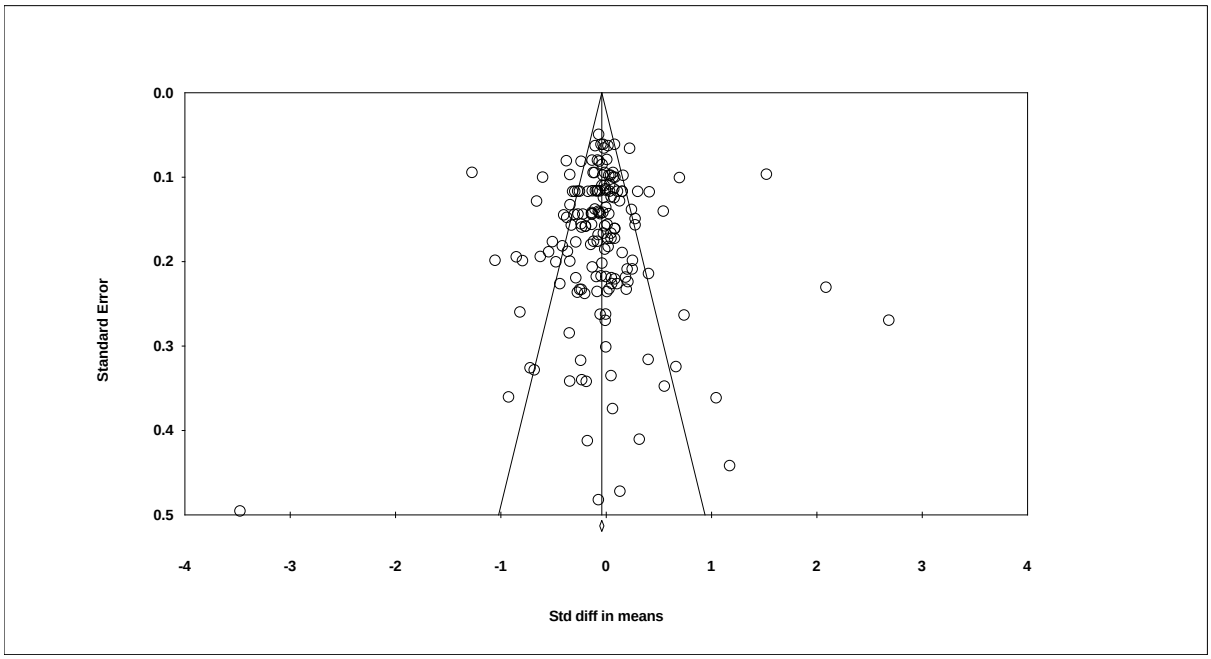

Figure 5.1. Funnel plot of standard effort by standardized difference in means.

5.5 Results

The meta-analytic results for high and low PSC intervention groups and their respective control groups are shown in Table 5.3. These indicate that high PSC organisational interventions – but not low PSC interventions – were more effective in reducing psychological health symptoms (e.g. psychological distress, burnout, emotional exhaustion, depression and anxiety) than equivalent control groups – supporting Hypothesis 1. Hypotheses 2 and 4 were also supported as high PSC interventions were also more effective in improving job resources (e.g. autonomy, social support) and productivity measures (e.g. engagement, job satisfaction, work performance) relative to equivalent control groups, whereas low PSC organisational intervention did not have the same beneficial effects relative to controls. Hypothesis 3 was not

supported as there was no reduction in job demands between the intervention and control groups for the high PSC condition (Hypothesis 3), nor for the low PSC condition.

When the specific domains of PSC interventions were examined separately, as shown in Table 5.4, we found that interventions with high senior management participation were more effective in reducing psychological health problems and increasing job resources and productivity measures compared to relative controls with mixed effects analysis demonstrating significant differences between intervention and control groups. Interventions with low senior management support did not show the same advantages relative to the control group. There was no significant difference between intervention and control groups for job demands for either high or low PSC interventions. Overall then, Hypothesis 5 was partially supported.

The second domain of PSC interventions, the active involvement of employees in the implementation of the intervention, was also examined meta-analytically, with the results summarised in Table 5.5. Results showed that compared to equivalent control groups, interventions that demonstrated active involvement of employees were effective in reducing psychological health problems, and improving job resources and productivity. Again, there was no significant difference between intervention and control groups for job demands. On the other hand, for organisational interventions with low active involvement of employees in the implementation of the intervention, there were no significant differences between the intervention and control groups for psychological health, job demands and resources, and productivity. Hypothesis 6 was thus supported in terms of psychological health, job resources, and productivity measures, but not in terms of job demands.

Table 5.3. Meta-Analysis of Standardised Mean Difference for Psychological Health Symptoms, Job Resources, Job Demands, and Productivity.

Variable	Intervention Type	Group	K	*N*	*d*	*P*	95% CI LL	95% CI UL	*Q*	*p˜*	*T*	I^2
Psychological Health Symptoms	High PSC**	Intervention	24	4207	-.34	.01	-.40	-.28	214.12	.01	.44	89.3
		Control	15	3997	.15		-.09	.22	239.51	.01	.53	94.2
	Low PSC	Intervention	18	4372	-.07	.61	-.14	.01	38.02	.01	.18	55.3
		Control	13	3609	-.03		-.09	.04	7.10	.85	.01	.01
	Total**	Intervention	42	8579	-.22	.01	-.27	-.18	285.26	.01	.37	85.6
		Control	28	7606	.07		.02	.11	261.80	.01	.38	89.7
Job Resources	High PSC**	Intervention	13	3379	.10	.01	.03	.17	163.84	.01	.21	92.7
		Control	10	4289	-.13		-.12	.18	27.901	.01	.14	67.7
	Low PSC	Intervention	4	712	-.03	.50	-.12	.18	1.01	.80	.01	.01
		Control	2	328	-.06		-.28	.16	.44	.51	.01	.01
	Total*	Intervention	17	4091	.09	.01	.03	.15	165.60	.01	.41	90.3
		Control	12	4617	-.12		-.18	-.07	28.70	.01	.02	28.7
Job Demands	High PSC	Intervention	11	2607	-.12	.89	-.20	-.04	42.70	.01	.24	76.6
		Control	8	2495	-.08		-.16	-.01	36.67	.01	.24	80.9
	Low PSC	Intervention	6	1364	.10	.35	-.01	.21	20.36	.06	.30	75.5

Variable	Intervention Type	Group	K	*N*	*d*	*P*	95% CI LL	95% CI UL	*Q*	*p˜*	*T*	I^2
		Control	4	1392	-.17		-.27	-.06	8.38	.04	.19	64.2
	Total*	Intervention	18	3971	-.04	.67	-.11	.02	74.24	.01	.26	78.5
		Control	17	3887	-.11		-.18	-.05	46.76	.01	.21	76.5
Productivity	High PSC*	Intervention	15	3603	.11	.02	.04	.18	103.27	.01	.34	86.4
		Control	9	2953	-.04		-.11	.04	12.43	.13	.09	35.6
	Low PSC	Intervention	6	847	.17	.50	.01	.34	13.54	.02	.28	63.1
		Control	4	377	.16		-.04	.37	3.25	.36	.07	7.6
	Total*	Intervention	21	4450	.12	.01	.06	.18	117.33	.01	.32	83.0
		Control	13	3330	-.02		-.08	.06	18.92	.09	.10	36.6

Note. * Significant difference between intervention and control groups $p < .05$. **Significant difference between intervention and control groups $p < .01$. ***Significant difference between intervention and control groups $p < .001$. *k* = the number of independent effect sizes used to compute the mean effect; *N* = number of participants within a sample; *d* = the weighted mean effect size; *p* = the *p* value for the difference between the intervention and control group using mixed effect analysis; LL = the lower limit and UL = upper limit, of the 95% confidence interval for mean *d*; *Q* = a measure of potential heterogeneity; *p˜* = the *p* value for the *Q* statistic; *T*= the standard deviation of true effect sizes; I^2 = a measure of the proportion of dispersion that can be attributed to real differences in effect sizes as opposed to within-study error

Table 5.4. Meta-Analysis of Standardised Mean Difference for PSC Domain Senior Management Participation.

Variable	Intervention Type	Group	K	*N*	*D*	*p*	95% CI LL	95% CI UL	*Q*	*p˜*	*T*	I^2
Psychological Health Symptoms	High Senior Management Participation***	Intervention	18	4189	-.22	.001	-.28	-.16	102.24	.01	.31	83.4
		Control	9	3415	-.02		-.08	.05	10.19	.25	.06	21.5
	Low Senior Management Participation	Intervention	24	3884	-.23	.19	.07	.20	183.02	.01	.45	92.6
		Control	19	4191	.13		.07	.20	241.53	.01	.53	92.6
Job Resources	High Senior Management Participation*	Intervention	11	2318	.14	.02	.06	.23	158.86	.01	.55	93.7
		Control	6	2271	-.12		-.20	-.03	15.63	.01	.17	68.0
	Low Senior Management Participation	Intervention	6	1773	.02	.12	-.07	.12	3.12	.65	.01	.01
		Control	6	1724	-.13		-.21	-.05	13.01	.02	.13	61.5
Job Demands	High Senior Management Participation	Intervention	10	2475	.04	.68	-.04	.12	52.42	.01	.30	82.8
		Control	6	2093	-.09		-.17	.01	35.00	.01	.29	85.7
	Low Senior Management Participation	Intervention	7	1496	-.18	.97	-.28	-.08	11.07	.09	.14	45.8
		Control	6	1794	-.14		-.24	-.05	11.03	.05	.13	54.7
Productivity	High Senior Management Participation*	Intervention	12	2306	.15	.04	.07	.23	99.65	.01	.43	89.0
		Control	7	2178	-.02		-.10	.07	11.71	.07	.12	48.8
	Low Senior Management Participation	Intervention	9	2144	.08	.31	-.01	.17	16.43	.04	.15	51.3
		Control	6	1152	.01		-.12	.12	7.13	.21	.10	29.9

Note. * Significant difference between intervention and control groups $p < .05$. **Significant difference between intervention and control groups $p < .01$. ***Significant difference between intervention and control groups $p < .001$. *k* = the number of independent effect sizes used to compute the mean effect; *N* = number of participants within a sample; *d* = the weighted mean effect size; *p* = the *p* value for the difference between the intervention and control group using mixed effect analysis; LL = the lower limit and UL = upper limit, of the 95% confidence interval for mean *d*; *Q* = a measure of potential heterogeneity; *p˜* = the *p* value for the *Q* statistic; *T*= the standard deviation of true effect sizes; I^2 = a measure of the proportion of dispersion that can be attributed to real differences in effect sizes as opposed to within-study error.

Table 5.5. Meta-Analysis of Standardised Mean Difference for PSC Domain Active Involvement of Employees in Implementation

Variable	Intervention Type	Group	K	*N*	*d*	*p*	95% CI LL	95% CI UL	*Q*	*p˜*	*T*	I^2
Psychological Health Symptoms	High Active Involvement of Employees***	Intervention	26	5177	-.23	< .001	-.28	-.17	117.75	.01	.29	78.8
		Control	16	5531	-.03		-.08	.03	16.96	.32	.04	11.6
	Low Active Involvement of Employees	Intervention	16	2896	-.22	.45	-.30	-.14	167.41	.01	.53	91.0
		Control	12	2075	.34		.25	.43	199.53	.01	.69	94.5
Job Resources	High Active Involvement of Employees*	Intervention	14	2791	.12	.02	.05	.20	160.95	.01	.50	91.9
		Control	7	2601	-.10		-.18	-.03	16.39	.01	.15	63.4
	Low Active Involvement of Employees	Intervention	5	1468	.01	.14	-.09	.12	3.92	.42	.01	.01
		Control	5	2016	-.15		-.24	-.06	11.68	.02	.14	65.7
Job Demands	High Active Involvement of Employees	Intervention	14	3039	.02	.77	-.55	.10	59.04	.01	.27	78.0
		Control	8	2593	-.08		-.15	.01	38.72	.01	.24	80.9
	Low Active Involvement of Employees	Intervention	4	1016	-.22	.87	-.34	-.10	4.84	.18	.12	38.01
		Control	4	1294	-.18		-.29	-.07	7.62	.06	.15	60.6
Productivity	High Active Involvement of Employees**	Intervention	17	3371	.12	.01	.05	.19	109.74	.01	.34	85.4
		Control	10	2687	-.02		-.10	.05	11.75	.23	.07	23.4
	Low Active Involvement of Employees	Intervention	5	1111	.12	.99	-.01	.25	7.90	.10	.16	49.3
		Control	3	643	.03		-.13	.18	6.89	.26	.03	71.0

Note. * Significant difference between intervention and control groups $p < .05$. **Significant difference between intervention and control groups $p < .01$. ***Significant difference between intervention and control groups $p < .001$. k = the number of independent effect sizes used to compute the mean effect; N = number of participants within a sample; d = the weighted mean effect size; p = the p value for the difference between the intervention and control group using mixed effect analysis; LL = the lower limit and UL = upper limit, of the 95% confidence interval for mean d; Q = a measure of potential heterogeneity; $p˜$ = the p value for the Q statistic; T= the standard deviation of true effect sizes; I^2 = a measure of the proportion of dispersion that can be attributed to real differences in effect sizes as opposed to within-study error.

The development of policies or procedures during the organisational intervention, the third domain against which interventions can embody PSC, was then examined. The findings are shown in Table 5.6. Consistent with Hypothesis 7, interventions that developed or espoused policies and procedures to support psychological health were effective in reducing psychological health symptoms, and improving job resources and productivity, compared to equivalent control groups. Again, there was no significant difference between intervention and control groups for job demands. There were no significant differences between the intervention and control groups for organisational interventions that did not develop policies or procedures during the implementation of the intervention.

The next domain, the implementation or enactment of policies or procedures during the organisational intervention, was meta-analytically assessed (see Table 5.7). Results showed that interventions that implemented procedures to support psychological health were effective in reducing negative psychological health symptoms, and improving job resources and productivity compared to equivalent control groups. The standardised mean difference for psychological health was relatively large (d = -.46). There was no significant difference between intervention and control groups for job demands. Organisational interventions that did not implement policies or procedures during the implementation of the intervention showed no significant differences between the intervention and control groups. Overall this pattern supports Hypothesis 8, except for the influence on job demands.

Table 5.6. Meta-Analysis of Standardised Mean Difference for PSC Domain Policies and Procedures Developed

Variable	Intervention Type	Group	K	*N*	*d*	*P*	95% CI LL	95% CI UL	*Q*	*p*˜	*T*	I^2
Psychological Health Symptoms	Evidence that Policies or Procedures Developed**	Intervention	15	2951	-.41	.01	-.48	-.34	177.38	.01	.52	92.1
		Control	10	3157	.23		.16	.30	212.91	.01	.59	95.8
	No Evidence that Policies or Procedures Developed	Intervention	22	4056	-.14	.13	-.21	-.08	66.38	.01	.24	68.4
		Control	13	3649	.04		.11	.02	12.51	.41	.03	4.1
Job Resources	Evidence that Policies or Procedures Developed**	Intervention	10	2524	.17	.01	.09	.25	142.96	.01	.51	93.7
		Control	8	3665	-.14		-.21	-.08	26.46	.01	.16	73.6
	No Evidence that Policies or Procedures Developed	Intervention	9	1735	-.04	.82	-.13	.16	13.84	.09	.13	42.2
		Control	4	952	-.05		-.12	-.08	.64	.89	.00	.00
Job Demands	Evidence that Policies or Procedures Developed	Intervention	8	1812	-.19	.77	-.28	-.10	17.14	.02	.17	59.2
		Control	6	1861	-.16		-.25	-.07	21.65	.01	.22	76.9
	No Evidence that Policies or Procedures Developed	Intervention	10	2243	.07	.73	-.01	.16	40.42	.01	.27	77.7
		Control	6	2026	-.07		-.15	.02	22.83	.01	.23	78.1

Variable	Intervention Type	Group	K	*N*	*d*	*P*	95% CI LL	95% CI UL	*Q*	*p˜*	*T*	I^2
Productivity	Evidence that Policies or Procedures Developed*	Intervention	10	2527	.17	.02	.09	.25	87.37	.01	.39	89.7
		Control	5	2120	.01		-.09	.09	8.03	.09	.11	50.2
	No Evidence that Policies or Procedures Developed	Intervention	12	2007	.05	.25	-.04	.15	26.84	.01	.21	59.0
		Control	8	1210	-.04		-.15	.08	10.66	.15	.21	34.3

Note. * Significant difference between intervention and control groups $p < .05$. **Significant difference between intervention and control groups $p < .01$. ***Significant difference between intervention and control groups $p < .001$. *k* = the number of independent effect sizes used to compute the mean effect; *N* = number of participants within a sample; *d* = the weighted mean effect size; *p* = the *p* value for the difference between the intervention and control group using mixed effect analysis; LL =the lower limit and UL = the upper limit of the 95% confidence interval for mean *d*; *Q* = a measure of potential heterogeneity; *p˜* = the *p* value for the *Q* statistic; *T*= the standard deviation of true effect sizes; I^2 = a measure of the proportion of dispersion that can be attributed to real differences in effect sizes as opposed to within-study error.

Table 5.7. Meta-Analysis of Standardised Mean Difference for PSC Domain Policies and Procedures Implemented

Variable	Intervention Type	Group	K	*N*	*D*	*P*	95% CI LL	95% CI UL	*Q*	*p*	*T*	I^2
Psychological Health Symptoms	Evidence that Policies or Procedures Implemented*	Intervention	22	3614	-.46	.01	-.53	-.39	164.99	.01	.44	87.3
		Control	12	3302	.19		.12	.26	224.61	.01	.58	95.1
	No Evidence that Policies or Procedures Implemented*	Intervention	14	3205	-.05	.74	-.12	.02	37.57	.01	.20	63.4
		Control	11	3648	-.03		-.09	.04	13.30	.21	.07	24.8
Job Resources	Evidence that Policies or Procedures Implemented*	Intervention	11	2778	.11	.01	.04	.18	162.76	.01	.51	93.9
		Control	8	3515	-.16		-.22	-.09	24.68	.01	.16	71.6
	No Evidence that Policies or Procedures Implemented	Intervention	8	1481	.04	.39	-.06	.14	4.01	.78	.01	.01
		Control	4	1102	-.03		-.15	.09	.58	.90	.01	.01
Job Demands	Evidence that Policies or Procedures Implemented	Intervention	10	2119	-.15	.89	-.24	-.06	44.13	.01	.28	79.6
		Control	7	1871	-.10		-.19	-.01	35.59	.01	.29	83.1
	No Evidence that Policies or Procedures Implemented	Intervention	8	1936	.07	.23	-.02	.16	18.37	.01	.18	61.9
		Control	5	2016	-.12		-.21	-.03	11.09	.03	.14	63.9

Variable	Intervention Type	Group	K	*N*	*D*	*P*	95% CI LL	95% CI UL	*Q*	*p*	*T*	I^2
Productivity	Evidence that Policies or Procedures Implemented*	Intervention	11	2087	.20	.02	.11	.29	101.54	.01	.46	90.2
		Control	7	2165	.01		-.09	.08	13.84	.03	.15	56.6
	No Evidence that Policies or Procedures Implemented	Intervention	11		.05	.27	-.04	.13	10.43	.40	.03	4.1
		Control	6		-.03		-.14	.09	4.97	.42	.01	.01

Note. * Significant difference between intervention and control groups $p < .05$. **Significant difference between intervention and control groups $p < .01$. ***Significant difference between intervention and control groups $p < .001$. *k* = the number of independent effect sizes used to compute the mean effect; *N* = number of participants within a sample; *d* = the weighted mean effect size; *p* = the *p* value for the difference between the intervention and control group using mixed effect analysis; LL = the lower limit and UL = upper limit, of the 95% confidence interval for mean *d*; *Q* = a measure of potential heterogeneity; *p˜* = the *p* value for the *Q* statistic; *T*= the standard deviation of true effect sizes; I^2 = a measure of the proportion of dispersion that can be attributed to real differences in effect sizes as opposed to within-study error.

The development of sustainable practices (e.g. regular evaluations, reviews) to maintain the effect of the intervention was assessed as the fifth PSC indicator of organisational interventions. As documented in Table 5.8, interventions that included sustainable practices were effective in reducing psychological health symptoms relative to control groups, whereas interventions in which sustainable practices were not developed did not have the same effect compared to control groups. Counter to predictions, interventions that did not include sustainable practices improved job resources and productivity compared to equivalent control groups, although the effect sizes were small (d = .05, d = .11), but no significant differences were found for interventions involving sustainable practices. There was no difference between intervention and control groups for job demands for either type of intervention. Hypothesis 9 was supported only in terms of psychological health, with the opposite pattern found for job resources and productivity indicators.

Table 5.8. Meta-Analysis of Standardised Mean Difference for PSC Domain Sustainable Practices Evident

Variable	Intervention Type	Group	K	*N*	*D*	*p*	95% CI LL	95% CI UL	*Q*	*p˜*	*T*	I^2
Psychological Health Symptoms	Sustainable Practices Evident*	Intervention	15	3403	-.23	.01	-.30	-.16	97.91	.01	.34	85.7
		Control	8	2771	-.01		-.08	.07	9.08	.25	.06	22.9
	Sustainable Practices Not Evident	Intervention	21	3476	-.11	.14	-.18	-.04	46.33	.01	.20	56.8
		Control	15	3861	-.03		-.10	.03	9.23	.82	.01	.01
Job Resources	Sustainable Practices Evident	Intervention	8	2028	.15	.20	.07	.24	49.26	.01	.32	85.8
		Control	6	2632	-.06		-.14	-.01	4.36	.50	.01	.01
	Sustainable Practices Not Evident*	Intervention	10	1627	.05	.05	-.05	.15	112.53	.01	.56	92.0
		Control	4	741	-.17		-.32	-.03	11.68	.01	.26	74.3
Job Demands	Sustainable Practices Evident	Intervention	7	1550	-.12	.46	-.22	-.02	6.01	.41	.02	1.7
		Control	5	1460	-.07		-.17	.04	1.72	.79	.01	.01
	Sustainable Practices Not Evident	Intervention	10	1901	-.08	.37	-.01	.17	52.80	.01	.36	83.0

Variable	Intervention Type	Group	K	*N*	*D*	*p*	95% CI		*Q*	*p˜*	*T*	I^2
							LL	UL				
		Control	6	1805	-.14		-.24	-.05	43.91	.01	.37	88.6
Productivity	Sustainable Practices Evident	Intervention	11	2560	.13	.06	.05	.20	14.58	.15	.09	31.4
		Control	6	2456	.01		-.08	.08	5.03	.41	.01	.64
	Sustainable Practices Not Evident*	Intervention	11	1974	.11	.05	.02	.21	103.02	.01	.52	90.3
		Control	7	874	-.06		-.20	.07	13.19	.04	.21	54.5

Note. * Significant difference between intervention and control groups $p < .05$. **Significant difference between intervention and control groups $p < .01$. ***Significant difference between intervention and control groups $p < .001$. *k* = the number of independent effect sizes used to compute the mean effect; *N* = number of participants within a sample; *d* = the weighted mean effect size; *p* = the *p* value for the difference between the intervention and control group using mixed effect analysis; LL = the lower limit and UL = upper limit, of the 95% confidence interval for mean *d*; *Q* = a measure of potential heterogeneity; *p˜* = the *p* value for the *Q* statistic; *T*= the standard deviation of true effect sizes; I^2 = a measure of the proportion of dispersion that can be attributed to real differences in effect sizes as opposed to within-study error.

5.6 Discussion

5.6.1 Overview of Findings

There is a paucity of acceptable evidence in support of the claimed effectiveness of organisational interventions for work stress (Cox, Karanika, Griffiths, & Houdmount, 2007). Organisational interventions are designed to address the risks of psychological harm closer to the source by modifying working conditions. We extend this reasoning by looking further upstream to PSC as a foundation for healthy working conditions. Using the PSC framework as an interpretive instrument, our goal was to understand the types of organisational interventions that are effective in improving working conditions and protecting psychological health by focussing on the degree to which they embody the principles of a strong PSC. Although there were no effects on job demands, we found a consistent effect when aggregating the PSC indicators or considering them as separate entities that psychological health problems could be reduced, and resources and productivity improved, when high PSC actions were implemented.

5.6.2 Theoretical Implications

Despite numerous reviews and meta-analyses of organisational stress interventions, this is the first study to examine organisational interventions through the lens of the climate for psychological health and safety and meta-analytically link these characteristics with the efficacy of the intervention in terms of the reduction of psychological health problems and job demands, and the improvement of job resources and productivity measures. Our findings provide evidence for a paradigm shift in terms of how organisational stress interventions are developed, implemented, evaluated, and reviewed. Specifically, we found that organisational stress interventions that embody and employ the PSC principles are more effective than other

organisational stress interventions. We know that PSC influences work conditions and psychological health using self-report cross-sectional and longitudinal data (e.g. Dollard & Bakker, 2010; Zadow & Dollard, 2016). The findings of the present study extend our theoretical understanding by demonstrating the impact of PSC, and its implemented principles, experimentally. This paradigm shift suggests that organisational stress interventions are more effective in reducing psychosocial risks (specifically, low resources) and improving psychological health and productivity when the intervention is characterised by PSC principles of democratic engagement, empowerment and social dialogue, and if the climate (PSC) preceding the adverse work conditions is addressed. The findings suggest that the key ingredients of successful organisational interventions involve the participation and support of senior management, the active participation of employees in the implementation (e.g. rather than them acting as passive recipients of expert knowledge), the development of policies or procedures as part of the intervention, putting a procedure in place as a result of the intervention, and the creation opportunities for feedback and ongoing improvement such as planned evaluations or reviews to make the impact of the intervention sustainable over time. Our findings underscore the need for a shift in the development and evaluation of work stress interventions away from models focussed on the modification of job characteristics (e.g. production pressure, social support) and the provision of expert knowledge and guidance by consultants from outside the organisation (e.g. training, team building) to those centred on actively encouraging the empowerment of organisational stakeholders to build a strong climate for psychosocial safety.

Our second theoretical contribution lies in determining the relative importance of the key domains that comprise PSC when they are examined in the field. While all of the components of high PSC interventions – but not low PSC interventions – demonstrate superior efficacy in improving psychological health symptoms compared to equivalent

controls, the development and implementation of policies and procedures to support the aims of the intervention have the strongest effect sizes. Said another way, our meta-analytic data reveal that the development and implementation of policies or procedures to support psychological health are vital ingredients of organisational stress interventions to reduce psychological health problems. In terms of knowledge development this finding is important as the development of policies and procedures in interventions is not commonly prioritised, acknowledged, or described in stress intervention research (Bambura, Egan, Thomas, Pettigrew, Whithead, 2007; Egan, Bambura, Thomas, Pettigrew, Whitehead, & Thomson, 2007; McVicar et al., 2013; Montano et al., 2014; Ruotsalainen et al., 2015).

Third, and perhaps the most important theoretical implication is that the PSC framework can be used to enhance work stress intervention theory. To date two separate lines of investigation are emerging, one focusing on work stress causes and another on work stress interventions, with sometimes little connection between them. The PSC framework sets out organisational *process* principles for healthy work for routine quotidian organisational consideration, in a business as usual setting, that may also be used to guide and interpret organisational work stress interventions. A wide range of empirical evidence emphasises the importance of organisational aspects (i.e., job demands and resources, effort and reward) in the development of work stress (Crawford, Le Pine, & Rich, 2010; de Jonge, Demerouti, & Dormann, 2014; Demerouti & Bakker, 2011; Schaufeli & Taris, 2014; Van Vegchel,de Jonge, Bosma, & Schaufeli, 2005), yet these organisational approaches, and especially the climate responsible for the development of these work conditions, are rarely examined in the work stress intervention literature (Giga et al., 2003; Marine, et al., 2006; Richardson & Rothstein, 2008) resulting in a large gap between theory and practice. The PSC taxonomy for organisational intervention addresses this gap as it is supported by work stress theory and a significant research evidence base (Dollard & Bailey, 2014; Dollard & Bakker, 2010;

Dollard, Zadow, Pignata, & Bailey, 2016; Zadow & Dollard, 2016), and can be applied in the field as a practical tool for organisational stress intervention design, implementation, and evaluation.

One area in which we did not observe a positive impact of organisational interventions, irrespective of whether the interventions were high or low PSC, was in terms of reducing job demands. Yet research evidence suggests that low PSC leads to high levels of job demands (e.g. Bailey, Dollard, & Richards, 2015; Dollard & Bailey, 2014; Dollard, Opie, et al., 2012; Idris et al., 2012; Hall, Dollard, Winefield, Bakker, & Dormann, 2013; Yulita, Idris, & Dollard, 2014). A potential explanation is that complex job demands such as role conflict, work pressure, emotional demands, task obstacles, low role clarity, and interpersonal demands, may be perceived as an entrenched part of the job role and changes in these work conditions may take a longer time to manifest than the intervention duration. JD-R theory proposes that high demands require sufficient resources to offset the negative effects of the job demands (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker, 2004) and the changes in psychological health and productivity may be related to the increase in job resources balancing the job demands, rather than a decrease in demands during the intervention.

5.6.3 Practical Implications

Organisational intervention research is confusing for organisations and the complexity is regularly blamed on methodological problems such as a heterogeneous range of methods, tools and strategies (Egan et al., 2007). Our results have important practical implications for workplaces seeking to improve the psychosocial work conditions, psychological health, and productivity of their employees because a clear framework is provided that can be used for guidance in the development, implementation, and evaluation of organisational stress

interventions. The findings suggest that for practitioners, it is critical that organisational stress interventions include actions to target the climate for psychological health (PSC). This could be achieved in a number of ways. First, by actively involving senior management and employees in the development of the intervention. Dollard and Gordon (2014) promoted top management commitment and support for an organisational intervention through a written statement to employees from the chief executive officer endorsing the project, creating a tripartite health and safety committee in combination with an upward communication system and ensuring that action plans were part of an overall socially coordinated workplace stress reduction system incorporating management structures. *Building higher level controls involving key stakeholder groups (i.e., a committee) to proactively identify and mitigate psychosocial risk is recommended to develop and promote PSC (Dollard & Karasek, 2010).* A fundamental premise of a high PSC intervention is that participatory stakeholder workgroups developing action plans are part of an overall socially coordinated process connected to higher level committees and power structures (Dollard & Gordon, 2014).

Second, a vital ingredient (with the largest effect size reported here) is to develop and implement policies and procedures to address psychosocial work conditions and psychological health problems, and put into place strategies to make the intervention sustainable such as planned reviews, or ongoing evaluations. Notably the effect is evident even if the policies and procedures are only developed and not actually implemented which is important for practitioners working with organisations expecting short term results. The PSC domains (Dollard & Bakker, 2010) may be used as a guide to build policies and procedures using existing workgroup structures and organizational data (i.e., annual organization development survey, sick leave, and grievance data) to identify stress risks and generate action plans to modify policies, procedures, and norms, through capacity building workshops with inputs from employees and a tripartite health and safety committee (Dollard & Gordon,

2014). For economic and sustainability purposes, capitalizing on existing organisational development processes (such as existing organisational surveys, sick leave and grievance data) limits the need for additional data collection, which can be time consuming and expensive, and ensures the continuity of information over time (Dollard & Gordon, 2014). This surveillance data can be used to determine psychosocial risks and psychological health (e.g. as part of an ongoing employee opinion survey) to benchmark organisational and work group PSC, risks and health against wider industry, state or national data. Surveillance data can also provide targets and baselines for policy and procedure development, and to inform planned reviews and evaluations (see Bailey, Pignata, & Dollard, 2014). Examples of interventions to build PSC are described in a range of studies (see Bailey et al., 2014; Dollard & Gordon, 2014; Dollard & Karasek, 2010). Overall, addressing organisational PSC will enable employers to follow a broad framework to prevent adverse work conditions (through the increase in job resources), reduce the development of psychological health problems, and improve productivity.

5.6.4 Future Research

In this meta-analysis, we were able to apply the PSC framework post-hoc to existing studies to evaluate intervention *outcomes*. A major opportunity for future research is to enhance the evaluation of PSC during the intervention *process* itself. As acknowledged by Nielsen and colleagues (e.g. Nielsen & Abildgaard, 2013) process evaluation is of critical importance in intervention work, especially for determining the efficacy of an organisational intervention. With respect to PSC specifically, a high PSC intervention on paper may not always translate to a high PSC intervention in practice. The intervention process factors suggested by Nielsen and colleagues (2010) such as the impact of the intervention on control groups and whether hidden job crafting works against the planned intervention activities, whether the intervention

reaches the entire intervention group, and the role of organisational change such as mergers and downsizing could be assessed and examined as moderators. Nielsen and Miraglia (2016) argue that meta-analyses fail to address the complexity of organizational interventions including emerging mechanisms, participative and recursive processes, contextual elements, employees' expectations, perceptions, interpretations and actions. The author coding information was limited and yet valuable in providing a much greater level of detail than provided in the research article alone. For example, one author recommended to remove one intervention sample from the meta-analysis as the group failed to complete the intervention activities as specified. To further understand intervention complexity and its influence on intervention evaluation, future research could interview authors to gain a comprehensive understanding of the intervention and its impact, including the qualitative aspects of the intervention such as process factors that are not measured.

Organisational stress intervention studies can develop high PSC interventions using the framework provided (see Table 2) and measure PSC throughout the intervention using the PSC-12 (Hall, et al., 2010). Organisational stress intervention research with a wider range of intervention outcome measures would also be important to determine the breadth of the intervention impact and triangulate the evidence (e.g. injury rates, sickness absence, near miss reports, work stress compensation figures, hospital records, or levels of patient readmission or mortality rates) (Idris et al., 2012; Law et al., 2011). PSC is linked to psychosocial risks that can be detrimental to health, recent research has identified a link between PSC and musculoskeletal disorders, workers' compensation claims (Bailey, Dollard, McLinton, & Richards, 2015), organisation records of sickness absence rates (Australian Public Service Commission, 2015; Dollard & Bakker, 2010), and work injuries (Zadow, Dollard, McLinton, Lawrence, & Tuckey, 2017). As this body of research grows, meta-analytic examination of these non-self-report intervention outcome measures is warranted.

Most current meta-analyses have used data aggregated at the individual level. As a climate construct, PSC is usually assessed by aggregating individual perceptions at the organisation (Law et al., 2011) or team level (Dollard & Bakker, 2010; Dollard et al., 2012; Idris, Dollard, Coward, & Dormann, 2012). A multilevel meta-analysis incorporating organisational/ team level/ individual between group effects would provide evidence beyond individual explanations and would advance knowledge of organisational and team level influences, in particular cross level relationships between PSC at the level of the organisation or work team, and work conditions and psychological health at the individual level. The difficulty with individual level data is that even if extra-individual sources such as workplace psychosocial risks are examined, conclusions are influenced by individual explanations such as common method variance, perception, or mood differences as the reason for the link between work factors and psychological health. Incorporating organisational and team level effects in meta-analysis provides evidence beyond individual explanations.

5.6.5 Limitations

The inability to determine that a high PSC intervention influenced the reduction of job demands is not consistent with PSC theory and research and did not support our proposed hypotheses. One reason proposed above is that the impact of a high PSC intervention takes longer to influence job demands than the duration of the intervention. It is notable that despite four of the six high PSC intervention conditions showing decreases in job demands, none of the mixed effects analyses demonstrated a significant difference between the intervention and control groups. This could be related to the number of studies and participants which were generally lower for the job demands category compared to the other conditions, the wide range of different work demands included in the studies creating high levels of variance in effect sizes, or it is possible that there was greater opportunity for contamination of the

control groups with the intervention also influencing levels of demands in control groups. Examining the role of other moderators such as the intervention length, or process factors such as the extent of compensatory rivalry between groups (Nielsen, Randall, & Albertson, 2007) could be undertaken when there are a larger number of studies available. However, it should be noted that the number of independent samples obtained greatly exceeds the number of organisational interventions identified in previous meta-analyses (Marine et al., 2009; Richardson & Rothstein, 2008; Van der Klink et al., 2001; Van Wyk and Pillay-van Wyk, 2010).

5.6.6 Conclusion

Tighter profit margins, demanding timelines and global competition are leading to greater rates of workplace stress (NIOSH, 2016). Confusion arising from heterogeneous approaches to organisational stress interventions in terms of methods, tools and evaluation techniques, combined with the complexity of organisational processes, has led to inconclusive meta-analytic results for the efficacy of organisational stress interventions, despite an urgent need for organisations to have a guiding framework for organisational stress intervention. The key message from this study is that, to be effective in reducing psychological health problems, and improving job resources and productivity, organisational stress interventions need to target the climate for psychological health (psychosocial safety climate; PSC). The principles of PSC provide a guiding parsimonious framework to quantitatively develop, implement, evaluate, and review organisational interventions. This meta-analytic study finds that organisational interventions that use a combination of high PSC practices (including active senior management and employee involvement; policy, procedure and practice development and implementation) are more effective that organisational interventions that do not utilise

these practices. These findings provide initial results to build effective organisational intervention to prevent the adverse consequences of workplace stress.

5.6.7 Summary

Finally, in Chapter 5, this thesis examines how organisations can use PSC theoretical principles in practice, in organisational interventions to reduce psychosocial risks and improve workplace mental health and productivity. Organisational stress interventions are analysed meta-analytically to evaluate the efficacy of interventions that target the climate for psychological health, compared to other approaches (Zadow, Dollard, & Tuckey, in review). The results show that organisational interventions using high PSC delivery techniques including the involvement of senior management and employees, with policies and procedures developed and implemented, and sustainable strategies put in place to maintain the impact of the intervention over time, were more effective in improving psychological health, job resources and productivity measures compared to low PSC approaches. This research supports the PSC theoretical framework as a practical theory (Goldkuhl, 2006), demonstrating how PSC principles are applied in action, providing a guiding parsimonious structure for practitioners to use in the development, implementation and evaluation of future organisational interventions.

6 PSC from Theory to Practice: General Discussion and Conclusion

6.1 Overview

Modern work is characterised by work intensification, pressured technology-driven jobs, increased competition and the imperative to do more with less (Maslach, 2016). These conditions lead to workplace psychosocial risks, such as high work demands and low rewards or job control, which are deleterious to worker mental health (Dollard et al., 2016; International Labour Organization, 2016). Preventing the development of psychosocial risks in organisations, or building a strong workplace climate to protect the psychological health of employees, represents an opportunity to intervene and create mentally healthy work. The foundation of this program of research is PSC theory (Dollard & Bakker, 2010), a workplace climate that promotes psychosocially healthy work conditions and workplace psychological health. Research on workplace health and well-being has typically focused on individual or job level variables (Guediri & Griffin, 2016). Making workplace mental health the responsibility of the worker diminishes the role of the work organisation to improve managerial and organisational factors that influence work conditions and limits our power to create real change. PSC theory (Dollard & Bakker, 2010) directs attention to the development and influence of a work environment that nurtures and protects the psychological health of its valued contributors, the workers, who are an essential component of workplace service provision and productivity. In this sense, PSC theory (Dollard & Bakker, 2010) redirects our focus from dealing with the problems that emerge in workplaces such as psychosocial risks and work stress, to building a healthy workplace with systems in place to protect and promote the psychological health of workers.

This thesis broadens our understanding of how PSC relates to work conditions and psychological health by quantifying the meta-analytic relationships between PSC, work conditions, health, motivational outcomes and productivity; extends PSC theory to practice by exploring its role in applied injury management systems, including the rate and reporting of work injuries; and then examines how the PSC theoretical framework can be used in action through organisational interventions to improve work conditions and mental health. Clearly there is a strong need to examine how workplaces can be structured to build healthy work environments. This chapter will summarise and discuss the four key findings of this program of research, the broad theoretical contributions, practical implications, and future research that could be undertaken to advance theoretical and practical knowledge in this area.

6.2 Stakeholder Engagement

This thesis represents the culmination of extensive consultation with industry groups (many meetings with SA Health, hospital managers across the private and public sector in South Australia and across Australia), and discussions with the Australian Nurses and Midwifery Federation (ANMF), the South Australian Salaried Medical Officers Association (SASMOA), the Self Insured Employers of South Australia (SISA), SafeWork SA, and the Australian Patient Safety Foundation (APSF), the College of Physicians and the College of Psychiatrists in South Australia, and statisticians working with healthcare data. Feedback from academics around the world was also obtained following presentations at conferences for the *European Academy of Occupational Health Psychology*, the *European Association of Work and Organisational Psychology*, the *International Congress of Applied Psychology*, the *International Commission on Occupational Health*, and the *International Forum for Quality and Safety in Healthcare*. These responses stimulated a range of ideas that shaped the development of this program of research. These ideas include how PSC theory (Dollard &

Bakker, 2010) and research evidence can be evaluated meta-analytically using multilevel analysis; how PSC theory (Dollard & Bakker, 2010) can be applied in practice to injury management systems to reduce the number of work injuries employees experience, including how to enhance online injury management system operation by improving reporting rates; and how the PSC taxonomy can be applied to organisational interventions including the key ingredients a high PSC intervention would need to employ to effectively improve workplace psychological health, work conditions, and productivity. Feedback from industry stakeholders strongly promoted the use of meta-analytic data in this thesis, to quantify the relationships described by PSC theory (Dollard & Bakker, 2010), as senior managers required a clear synthesis using numerical data to provide the impetus for change in organisations and justify the extensive expenditure of resources to measure, monitor, and improve their organisation climate for the protection of psychological health. Through collaboration with stakeholders it is clear that the knowledge obtained during this program of research can be used by academics to advance theoretical knowledge, and by industry for practical purposes (e.g. to create tools, guidelines, intervention protocols and training materials, International Labour Organization, 2016), to build and sustain healthy workplaces.

6.3 Key Messages from this Program of Research

6.3.1 Major Empirical Findings

In specific terms this thesis expands current empirical knowledge by making four key findings. These four findings, provide synthesised statistical research evidence in support of the PSC theoretical model, extend understanding of how PSC operates in practice through injury management systems in workplaces, and sets out organisational intervention process principles that can be used to guide, implement, and interpret social action to build healthy work. The key findings are discussed sequentially in detail below.

The first new finding is that there is comprehensive evidence across studies, cultures and occupations to support PSC relationships with work conditions, health, motivation and productivity providing strong support for the PSC theoretical model. This claim is based on information documented in Chapter 2 and 3, and follows the first review of the PSC literature and evidence (Chapter 2; Zadow & Dollard, 2016) and the meta-analytic synthesis of the PSC individual and cross-level relationships (Chapter 3). The thesis presents the first review of the PSC literature and evidence in detail (Chapter 2), and a test of the strength and variability of the proposed relationships in the theoretical model (Chapter 3), synthesised statistically across studies, including Eastern (e.g. Iran and Malaysia) and Western (e.g. Australia) cultures and a variety of occupational groups (i.e., healthcare workers, manufacturing, mining, hospitality work). Moreover, Chapter 3 identifies meta-analytic relationships at the individual level and also multilevel relationships (with PSC measured at the work unit level). At the individual level (which is the level most meta-analyses use) PSC is positively related to job resources, motivation (work engagement and job satisfaction), productivity (high PSC relates to decreased work injuries, workers' compensation claims, absenteeism and presenteeism) and health (psychological and physical), and negatively related to job demands. The multilevel meta-analytic results show that work unit PSC is positively related to individual health and productivity. These findings summarise relationships across nineteen cross-cultural multi–occupational independent samples (19 studies, N = 24, 616) demonstrating that there is a broad evidence base in support of PSC theory (Dollard & Bakker, 2010). At the individual level job resources and motivational outcomes showed the strongest relationship with PSC which suggests that, across studies, PSC, has a slightly stronger role (although all relationships were significant) in enhancing positive work conditions (i.e., resources) (r = .39) and psychological states (i.e., motivation) (r = .38), than in improving negative job design (i.e., job demands) (r = -.28) and poor psychological and

physical health (r = -.25). These findings, the meta-analytic relationships in support of the PSC model (Dollard & Bakker, 2010), verify the validity of the PSC model as a theoretical basis for exploring the influence of a climate for the protection of psychological and physical health. These results provide the evidence and theoretical framework that form the foundation of the next study, linking PSC to psychological and physical work injuries, which gave rise to the second key finding.

The second new finding, is that the multilevel PSC theoretical framework may be expanded to understand injury management systems, outlined in Chapter 4; this finding also takes into account the need for research that extends beyond self-report measures. Using self-report and registered injury data across three hospitals, the findings show that PSC is related to work injury rates; low work unit PSC leads to higher rates of emotional exhaustion which is related to higher rates of work injuries (Zadow, et al., 2017). This project used self-report data (T2, 2013) from hospital employees working in three different hospitals (N = 214, across 18 teams). Data was gathered and then linked at the workgroup level to a database of registered organisational injury event data (T1, 2012; T2, 2013; and T3, 2014). The importance of this finding is that the results took into account both the injuries reported by workers, and the work injuries that were actually registered on the work site online risk management safety learning system. These results were over and above significant effects of physical safety climate on work injury rates. This new knowledge is important as it shows that the promotion of safety climates that focus only on physical injuries do not address all the causes of injuries at work, highlighting the need to consider a dual physical-psychological safety interpretation of work injuries, including attention to workplace PSC.

The third new finding, also in Chapter 3, identified that low team PSC leads to higher levels of emotional exhaustion and greater work injury underreporting (Zadow et al., 2017). This is a key finding as it has strong implications for the operationalisation of work injury

rates in safety research. Taken together with the previous findings, these results suggest that work teams reporting low PSC experience higher rates of emotional exhaustion leading to increased numbers of total work injury events, but also underreporting of these events. Without recognition of the role of PSC and emotional exhaustion, there may be a perception of improvement with the reduction of registered work injuries, while at the same time the number of underreported work injuries may be escalating. Failing to understand underreported work injuries means that efforts to improve safety based on inaccurate registered injury rates may be misdirected and subsequently ineffective.

The final key new finding, is that organisational stress interventions using high PSC delivery techniques are more effective in improving psychological health, job resources, and productivity compared to low PSC approaches. This represents a paradigm shift in the way organisational stress interventions are developed, managed, and evaluated. This key finding is evidence based, using meta-analytic data, and a fresh approach to evaluation. Using the PSC framework organisational interventions were reviewed (42 studies, N = 17, 834) to evaluate the efficacy of interventions based on the extent to which they embodied PSC principles and targeted the climate for psychological health, compared to other approaches (Zadow, Dollard, & Tuckey, in review). The results showed that organisational interventions using high PSC delivery techniques including the involvement of senior management and employees, with pro-worker psychological health policies and procedures developed and implemented, are more effective in improving psychological health, job resources, and productivity measures compared to low PSC approaches. This key finding extends the PSC theoretical framework to practice, evaluating how PSC principles are applied in action, and provides a guiding structure for practitioners to use in the development, implementation and evaluation of future organisational stress interventions.

6.3.2 Theoretical Contributions

Arising from the key findings, this PhD program of work makes four theoretical contributions to the knowledge base on PSC, from theory to practice. These new theoretical contributions provide a fresh new perspective in terms of the way work stress is conceptualised and managed, and how safety at work is perceived and measured, with implications for contemporary scientific theory. These four theoretical contributions are outlined in detail and include a paradigm shift in the way the management of workplace mental health is conceptualised, changes in work safety theory to consider the organisation climate for psychological health (i.e., PSC) along with PSC's role of underreporting, the role of PSC as a facilitator of job resources, and the extension of PSC theory to a practical theory.

6.3.2.1 Paradigm Shift in Work Stress Theory

First, the dissertation provides extensive research evidence to propose a paradigm shift in work stress theory and interventions to improve work stress, to focus attention on the preceding climate responsible for cultivating and developing adverse job characteristics, the PSC (Dollard & Bakker, 2010), rather than beginning with, and focusing on, individual work conditions articulated in current work stress theories (e.g. JD-R, Demerouti et al., 2001; JD-C, Karasek, 1979; ERI, Siegrist, 1996). When combining the results of both meta-analyses we learn that low PSC is consistently related to high work demands, and low job resources, health, motivation and productivity across studies, cultures, and occupations. This pattern suggests that the role of PSC needs to be taken into account when considering the development of poor workplace mental health (Chapter 3), and that when PSC is targeted in interventions, job resources, health, motivation and productivity improve more effectively than when work conditions are targeted instead (Chapter 5). These findings indicate that theoretical models of work stress need to consider the upstream influence of PSC as a precursor to working conditions.

This paradigm shift changes the way workplace mental health is conceptualised in two ways. First, the focus changes from the individual to the system of work (Zadow & Dollard, 2016). Second, attention and effort is directed towards prevention rather than addressing difficult work conditions and adverse mental health once manifested (Zadow et al., 2017). In terms of wider psychological theoretical perspectives, this thesis questions the expansion of theoretical models focused on individuals to consider contextual and organisational factors that precede and determine these individual conditions. This dissertation proposes that multilevel and system approaches need to be employed to understand the causes of the individual level variables, and how these individual level variables are embedded and contextualised within a wider system of influence. This position is consistent with the work of Mathieu and Taylor (2007) and Hackman (2003) promoting the infusion of meso-thinking in organisational research.

6.3.2.2. Extension to Work Safety Theory

The second theoretical consideration relates to the current gap in work safety theories (see Beus et al., 2016; Griffin & Curcuruto, 2016; Zohar, 2010) regarding the organisation climate for the protection of psychological health (PSC). Stemming from the finding that low PSC leads to higher levels of emotional exhaustion, greater numbers of work injuries, as well as higher levels of injury underreporting (Chapter 4) – it is proposed that to effectively improve emotional exhaustion and reduce injuries PSC should be targeted. Work safety theories have traditionally focused on physical safety climate, management systems, safety motivation and behaviour, the physical work environment, physical health and injuries (Beus et al., 2016; Griffin & Curcuruto, 2016; Zohar, 2010). The findings of this thesis indicate that theoretical models of work safety (see Christian et al., 2009; Clarke, 2006; Guldenmund, 2000; Neal & Griffin, 2004; Zohar, 2003) need to also consider the role of a climate for the protection of psychological health (PSC) (Chapter 4). In very specific terms, work safety

theory needs to consider the role of policies and procedures to support psychological health (Chapter 5), as important factors in the prevention of both physical and psychological work injuries and in the promotion of injury reporting. This thesis suggests that work safety theories are incomplete, even if the criterion of interest is physical injuries, without attention to an organisation climate for psychological health (PSC), and actions to build PSC (such as the development of policies and procedures to protect psychological health). Without theoretical attention to this psychosocial pathway to work injuries and reporting, injury management systems may not be developed to provide accurate safety information. Differences between theoretical models proposed by academics (based on predominantly self-report data) and the information used by managers to improve work injury rates in practice (based largely on registered injury data) will also create a fissure between theory and practice in the management of safety.

6.3.2.3 PSC as a Facilitator of Resources

The third theoretical contribution, arising from data obtained from both meta-analyses, relates to the relative influence of PSC on work conditions. In a synthesis of studies across cultures and occupations (see Chapter 3) PSC shows a slightly stronger relationship with positive work conditions (r = .39) and motivational outcomes (e.g. work engagement and job satisfaction) (r = .38) than with job demands (r = -.28) and poor health (r = -.25). Then in the subsequent meta-analysis (see Chapter 5) high PSC organisational stress interventions are significantly more effective in improving resources (d = .10) compared to control groups. Alternatively, there is no significant difference between the high PSC intervention and control groups in terms of job demands. Although the intervention effect size shows a reduction in demands following the intervention (d = -.12), the control groups also demonstrates a reduction in demands also (d = -.08) suggesting that the intervention effect is not over and above what would have occurred in the workplace naturally without

intervention action (Chapter 5). Together, these patterns of meta-analytic results refine our understanding of PSC theory (Dollard & Bakker, 2010) by identifying specific mechanisms and variables within the theoretical model that demonstrate the strongest relationships.

These findings suggest that PSC, and PSC interventions, have a slightly stronger role as a facilitator of job resources in work environments. Researchers acknowledge that higher levels of resources in work environments provide a basis for flourishing in the workplace and optimal performance (Gorgievski, Halbesleben, & Bakker, 2011) and are related to improved psychological health (i.e., reduced burnout) (Schaufeli, Bakker, & VanRhenen, 2009). In this thesis, high PSC work environments, and organisational interventions using high PSC approaches, promoted a greater numbers of work resources at the disposal of employees. From a theoretical perspective, these results clarify and extend our understanding of how the PSC model might operate to improve workplace psychological health. The significant influence of PSC on resources implies theoretical clarification of the process is required. Not just in terms of PSC theory but also extending current resource theories in occupational and organisational psychology to include PSC or develop psychological meta-theories (see Gorgievski, Halbesleben, & Bakker, 2011). Meta-theories are overarching principles that extract what is consistent across theories to predict phenomena (Pierce & Aguinis, 2013).

It is possible that PSC may describe the managerial and organisational conditions that promote the individual circumstances described in a range of job resource theories. High PSC environments, with supportive managers and organisational processes to protect psychological health, might improve a worker's ability to maintain, protect and retain resources (see Conservation of Resources theory, Halbesleben, 2006; Hobfoll, 1988, 2001), leading to opportunities for employees to invest resources in the protection of their psychological health and to enhance their own performance. This relationship was proposed by Dollard and Bakker (2010). Alternatively, high PSC workplaces may promote social

encounters that lead to the maintenance of greater resources, rather than removing or taking away resources (Resource Theory of Social Exchange, Foa & Foa, 1976). Finally, the theory of Selective Optimization with Compensation (SOC) (Baltes & Baltes, 1990) suggests that people will apply management strategies across the lifespan to maximise resources to meet their goals. In high PSC contexts, wherein managers are concerned about and supportive of psychological health, managers could potentially encourage and foster employee use of optimisation (investing in the means for workers to achieve goals) and compensation (investing in goal-relevant means to counteract resource losses); these processes, optimization and compensation have been linked to well-being and job satisfaction (Wiese, Freund, & Baltes, 2002). Taken together, high PSC environments might promote the managerial and organisational provision of job resources, and also might provide workers with opportunities to cultivate and develop greater resources, with both strategies leading to higher levels of job resources in their work environments. This theorising complements research describing PSC as a safety signal highlighting to workers that it is safe to use personal and organisational resources in the work environment (Dollard, Tuckey, & Dormann, 2012).

6.3.2.4 Extending PSC to Practice

The final theoretical contribution for this program of research is extending PSC theory (Dollard & Bakker, 2010) to practice. First, the PSC model was extended to applied injury management systems used in hospitals showing PSC, via emotional exhaustion, influences injury rates and the reporting of work injuries in the field (Chapter 4). Second PSC actions (as high PSC organisational interventions) were reviewed using meta-analysis (Chapter 5). For the first time, PSC was linked to work injuries and safety behaviour (reporting of injuries) (Chapter 4) and specific PSC actions (such as developing and implementing policies and procedures to support psychological health, high levels of senior management

participation, and the active participation of employees in the intervention implementation) (Chapter 5) were determined to be the most effective in improving psychological health, job resources, and productivity.

A number of researchers have highlighted the risk that holistic macro-concepts that comprise highly cited theories entail societal views that are supra-individual in nature (Blumer, 1969; Goldkuhl, 2006). In other words, the theories exist without any acting humans (Goldkuhl, 2006). It is proposed that the prediction of human action, often the main goal of organisational psychology theory, needs to be determined through the translation of the theory to actual practice, as human actions are performed within a practice and are determined by the practice they are part of (Goldkuhl, 2006). Theories that do not include action may have reduced power to impact human existence because action in the field allows researchers to see things, aspects, properties, and relations which would otherwise be missed (Crohen, 2001; Goldkuhl, 2006). Our findings, of the influence of PSC on workplace action (injuries and reporting) can be conceptualised as *referential pragmatism* (i.e., knowledge about action, Goldkuhl, 2006), and determining how PSC is operationalised in the form of a workplace intervention can be perceived as *functional pragmatism* (i.e., knowledge for action, Goldkuhl, 2006). The demonstration of referential and functional pragmatism applied to how PSC influences action, and how PSC can be applied in terms of action, support the evolution of PSC theory (Dollard & Bakker, 2010) to a practical theory. This program of research, evaluating how PSC principles influence injury management systems used in hospitals, and how PSC principles are applied in interventions, extends PSC theory to applied practice, examining how its influences every day activities in workplaces, and can be operationalised to action, transitioning PSC to a ‘practical theory’.

6.2.3 Practical Implications

Beyond the academic research environment, the findings outlined in this program of research have practical implications for a range of groups such as managers, business consultants, trade unions, workers, government agencies, health care institutions, community groups and employment agencies (World Health Organization, 2008). These stakeholders can use the thesis findings to develop materials (e.g. to create tools, guidelines, intervention protocols and training activities, International Labour Organization, 2016) to guide workplace practices. A range of broad practical implications arising from this program of research are outlined below.

The first practical implication arising from this program of research is that shifting management values and actions to the development of a strong climate for psychosocial safety will have positive implications for health, job resources, motivation and productivity (Chapter 2 and 3), and work injury prevention programs (Chapter 4). Throughout this thesis, through examination of the theory (Chapter 2), quantitative synthesis of the PSC research literature and evidence (Chapter 3), and work in the field surveying staff across three hospitals and reviewing extensive and complex injury management systems (Chapter 4), it is clear that focus on the improvement of PSC in the workplace is important. Yet, as observed throughout fieldwork in hospitals during the course of this thesis, evidence suggests that workplaces struggle to find time and resources to change and renew processes and require clear unambiguous advice. Best practice standards for organisational risk assessment (the Psychosocial Risk Management Excellence Framework in Europe (PRIMA-EF), and the Health and Safety Executive in the United Kingdom (HSE; Jordon et al., 2003) include the use of existing data, measuring psychosocial risk factors, establishing levels of risk (i.e., by benchmarking data with wider population data), developing interventions, evaluating the intervention, and re-examining the workplace data over time (Bailey, 2014; Bailey, Pignata &

Dollard, 2014; Dollard et al., 2016). The PSC hierarchy of control suggests that psychosocial hazards can be addressed at a variety of levels including senior management values, organisational development, leadership, job design, and at the individual work level (Bailey & Dollard, 2014). These suggestions outline fundamental areas that an organisation could target to build an organisation with high PSC. To bolster intervention success, examples of practices in the field would be useful to show managers the actions and approaches that they could undertake within these focal areas, to aid conceptualisation of what would need to be done.

Practical ideas were developed following discussions with workers, managers, unions, and government agencies, during the development of Chapter 4, to illustrate a range of practical steps that can be used by staff in workplaces to improve the four workplace PSC domains: *management priority*; *management commitment and support*; *organizational communication*; and *organisational participation* (Dollard & Bakker, 2010). These ideas with additional reference material to build PSC in workplaces are outlined in detail in Appendix A in the industry report. These practical suggestions were developed in collaboration with managers and staff across the three hospitals participating in the injury management system research study (Chapter 4).

Ideas include to demonstrate *management priority* through the development of protocols and procedures for the identification of psychosocial risks and protection of psychological health within the existing health and safety management system (i.e., see European Agency for Safety and Health at Work (ESENER), 2012, for a list of psychosocial hazards) or to build the assessment and monitoring of psychosocial risks and processes into human resource management practices (recruitment, induction, performance management, and training needs analysis). *Management commitment* to psychological health could include the promotion of appropriate internal (i.e., in house counsellors, psychologists, or peer

supporters) and external expertise (i.e., critical incident debriefing) and resources to support and protect the psychological health of staff or to encourage and reward employees who report psychosocial hazards (i.e., emotional demands, bullying, violence, work pressure) and psychological health matters or near miss incidents. *Promoting effective communication* could involve regular contact towards ensuring that employees: (a) are aware of any psychosocial risks, or developments in relation to psychosocial risk management; and (b) have the opportunity to respond and provide feedback about threats to well-being (i.e., a part of regular established meetings, via email, blogs). Training, information and guidance could be provided, including the opportunity for open feedback, in relation to psychosocial risks for staff and factors that can moderate these risks (i.e., potential job resources such as social support, control). Increasing *organisational participation* could involve using innovative strategies to encourage the participation and involvement of staff (i.e., social media, competitions) or to develop research partnerships with academic institutions to contribute new perspectives and assist with expertise and resources to promote effective participation processes. These ideas provide fresh working examples of activities that managers and workers believe could be realistically implemented in workplaces to improve PSC.

Another important practical contribution in this program of research is the development of process principles for organisational stress interventions based on theory and a significant research evidence base (Chapter 2, 3, 4, and 5). These steps include rating criteria for practitioners in the field or managers to assess whether an organisational stress intervention exhibits the characteristics of a high PSC intervention (see Table 5.2 in this thesis). Characteristics of a high PSC intervention include factors such as the participation of senior management, employees encouraged to participate actively in the implementation of the intervention, the development of policies and procedures (i.e., to deal with work stress, bullying/ harassment or work related violence), and whether procedures are put in place

(Chapter 5; Zadow, Dollard, & Tuckey, in review). Practitioners can also identify which characteristics of high PSC interventions are most effective in the management of workplace psychological health; for instance, which policies and procedures to address psychosocial work conditions and psychological health symptoms show the largest effect size (Chapter 5). The thesis findings have enormous significance for companies seeking to prioritise resources and hence identify a specific focus and anticipated range of improvement. For example, with the implementation of policies and procedures to support the organisational stress intervention aims the weighted meta-analytic mean effect size (d = -.46) (Chapter 5) indicates a considerable reduction in poor psychological health scores (i.e., anxiety, depression, emotional exhaustion, and psychological distress). Practitioners can use these scores – the PSC Implementation Index, see Chapter 5, Table 5.2 – in combination with measures of PSC, to development and benchmark the intervention process, with an expectation of improvement in psychological health.

6.2.4 Future Research

The program of research presented in the thesis focused on group level measures (organisation/ team) and individual measures (Chapter 3, 4). Future research could consider an extended four-level framework incorporating socio-political-economic, organizational, work group, and individual factors (see Dollard & Neser, 2013) to understand the political influences on PSC and how it is shaped in different socio-political-economic environments. For example, labour policies and their direct effect on PSC and worker health could also be assessed (see Dragano, et al., 2011; Dollard & Neser, 2013). PSC could also be measured in alternative ways in practice. In this thesis, PSC was measured using the PSC-12 (Hall et al., 2010) (Chapter 4) and in the intervention meta-analysis high PSC interventions were measured in terms of the characteristics of the interventions (i.e., senior management

participation) (Chapter 5). Future research could complete an evaluation of actual organisational policies, practices, and procedures for the protection of psychological health (as an indication of PSC), or assess whether monitoring or assessment of psychosocial hazards actually takes place in workplaces (Dollard, Bailey, et al., 2012). Considering the wider social-political context and its impact on PSC, and also how PSC is operationalised in practice, will advance understanding of how to address workplace mental health on a broader scale across countries, and also how it can be measured or estimated in work environments that do not have the capacity and resources to collate and benchmark PSC data. The Asia Pacific, the world's most populous region, has adopted Western-style working practices yet limited research has been undertaken in this region (i.e., Afsharian, Zadow, & Dollard, 2016; Idris et al., 2012) to understand the applicability of work stress theoretical models, and, in particular, the role of PSC, aside from Iran and Malaysia (Brough, Dollard, & Tuckey, 2014; Dollard, Schimazu, Nordin, Brough, & Tuckey, 2014). Understanding the influence of socio-political-economic contexts on PSC, and how PSC may be determined using alternative sources of information (e.g. existing policies), may assist in understanding the role and influence of PSC across this region.

In Chapter 4 the study used both registered and self-report injury data. The registered data was not entirely accurately representative of the injuries incurred on the job; workers self-reported (in the survey) additional psychological and physical injuries that they did not report to the organisation. Examining both types of data led to an understanding of injury underreporting in organisations where work groups with low PSC and high emotional exhaustion experienced more injuries, but were less likely to register them on the injury database. Critically, meta-analyses in the area of health and safety rely on self-report data, or do not distinguish between self-report and registered data. This is the case in the meta-analyses completed in this dissertation (Chapter 3 and 5) and in other meta-analyses (e.g.

Christian et al, 2009; Clarke, 2010; Nahrgang et al., 2011). Future meta-analytic investigations should differentiate between self-reported and registered safety, health, and productivity data (e.g. work injuries, absenteeism) to address the potential that, by collapsing the self-report and registered data in one group, the registered data will underestimate the effect and reduce the observed relationships, particularly in groups with low PSC and high levels of emotional exhaustion. Factoring underreporting, and the causes of underreporting, into theoretical models of safety and statistical reviews of the research will provide a clearer understanding of the relationships, and bring together the two data sources including the self-report (predominantly used in academic work) with the registered data (used in workplaces) bridging the chasm between theory and practice.

A limitation of this program of research was the inability to use longitudinal data. In Chapter 3 the meta-analysis combined cross sectional and longitudinal relationships as there were insufficient longitudinal studies available to analyse these categories separately. Then in Chapter 4, while the registered online data were collected over three years, the self-report data were restricted to one collection, limiting the ability to determine causal relationships and the consistency of relationships over time. Finally in Chapter 5, the organisational intervention data did not allow investigation of the effects of the intervention over a sustained period of time, which would determine the timing effects of a high PSC organisation intervention; for example if it the high PSC interventions had a faster effect on job resources (which may be easier to add to and hence improve in the short term) while the impact on job demands took longer to achieve (as changing entrenched practices may be more complex and time consuming) — the within time effects could account for the stronger relationship between PSC interventions and job resources. Without longitudinal research, it is difficult to determine whether the failure to find a significant difference between the intervention and control groups for interventions targeting job demands was due to the limited number of

studies, the wide range of complex job demands included creating heterogeneity in the scores, or if more time was required to see an effect. Future research could examine these relationships longitudinally to determine how the relationships between PSC, work conditions and work injuries, and PSC and organisational interventions work evolve over extended time periods. Longitudinal research would also assist to understand how "dynamic safety capability" (DSC), an organisation's capacity to proactively adjust its systems to manage safety in changing environments (see Griffin, Cordery, & Soo, 2016), applies to PSC.

A focus of this program of research was the two meta-analyses (Chapter 3 and 5). As explained these statistical reviews were important as communicating ideas to industry partners require evidence based data such as effect sizes, and these meta-analytic figures provided research evidence that managers could use to justify involvement in research and to expend resources to undertake activities to improve workplace practices. Nielsen and Miraglia (2016) argue that meta-analyses fail to address the complexity of organizational interventions such as participative and recursive processes, contextual elements, and employees' perceptions. In the organisational stress meta-analysis (Chapter 5), process evidence was improved by the inclusion of author coding, which permitted authors to provide qualitative evidence to describe the intervention in more detail. To further understand the complexity of work stress research, the role of PSC, and its influence on intervention evaluation, more qualitative research is required to elucidate details that are not explained in meta-analytic investigations. Further qualitative research to understand the meta-analytic findings in this thesis (Chapter 3 and 5) would shed more light on why these relationships exist and how they operate in practice.

6.4 Conclusions

Modern work can be pressured and difficult due to technological change, globalization, the growth of job insecurity and changing workforce demographics (Benach, 2016; European Agency for Safety and Health at Work, 2012; Griffin & Curcuruto, 2016; Maslach, 2016; Siegrist, 2016). Academics, organisations, unions, governments and communities have an opportunity to develop and promote theories to help build healthy, sustainable workplaces filled with flourishing workers. This current program of research proposes an alternative paradigm shifting approach, PSC theory (Dollard & Bakker, 2010), and links management and organisational protection of the psychological health of workers with healthy work conditions (in particular higher rates of job resources), improved mental health, and greater productivity. Extending PSC theory to practice, this thesis defines and synthesises what has been done (Chapter 2 and 3), the impact of poor PSC on injuries and their management systems (Chapter 4), and proposes a way forward (Chapter 5), an evidence based framework to intervene, to build psychologically healthy work. As academics, we have an opportunity to develop theories that can be understood and used by practitioners to change human lives. Kurt Lewin (1952) suggests that there is nothing so practical as a good theory. This program of research suggests that PSC theory (Dollard & Bakker, 2010) is a good, practical theory. Translating PSC theory to practice, this body of work provides the research evidence and practical framework to begin action, building psychologically healthy workplaces.

7 References

Afsharian, A., Zadow, A., & Dollard, M. F. (2016). Psychosocial Safety Climate from two different cultural perspectives in the Asia Pacific: Iran and Australia hospitals. In A. Shimazu, R. B., Nordin, M. F., Dollard, & J. Oakman. (Eds.). *2nd Asia Pacific Book on Psychosocial Factors at Work in the Asia Pacific: From theory to practice* (pp. 187-201). Springer International Publishing.

Aguinis, H., Gottfredson, R. K., & Culpepper, S. A. (2013). Best-practice recommendations for estimating cross-level interaction effects using multilevel modelling. *Journal of Management, 39,* 1490-1528.

Ahola, K., Salminen, S., Toppinen-Tanner, S., Koskinen, A., & Väänänen, A. (2013). Occupational burnout and severe injuries: An eight-year prospective cohort study among Finnish forest industry workers. *Journal of Occupational Health, 55*, 450-457.

Ahlberg-Hultén, G. K., Theorell, T., & Sigala, F. (1995). Social support, job strain and musculoskeletal pain among female health care personnel. *Scandinavian Journal of Work, Environment & Health, 21*, 435-439.

American Psychological Association (2016 March 10). Stress in America. The impact of discrimination. Retrieved from http://www.apa.org/news/press/ releases/stress/

Ângelo, R., & Chambel, M. (2013). An intervention with firefighters to promote psychological occupational health according to the job demands-resources model. *International Journal of Social Psychology, 28,* 197-210.

Arnold, K. A., Turner, N., Barling, J., Kelloway, E. K., & McKee, M. C. (2007). Transformational leadership and psychological well- being: The mediating role of meaningful work. *Journal of Occupational Health Psychology, 12,* 193–203.

Arnold, K. A., Turner, N., Barling, J., Kelloway, E. K., & McKee, M. C. (2007). Transformational leadership and psychological well- being: The mediating role of meaningful work. *Journal of Occupational Health Psychology, 12,* 193–203.

Australian Public Service Commission. (2015, November 12). Psychosocial Safety Climate. Retrieved from http://stateoftheservice.apsc.gov.au/2015/11/psychosocial-safety-climate/

Awa, W. L., Plaumann, M., & Walter, U. (2010). Burnout prevention: A review of intervention programs. *Patient Education and Counselling, 78(2),* 184-190.

Bagnara, S., Baldasseroni, A., Parlangeli, O., Taddei, S., & Tartaglia, R. (1999). Italy: A school of nursing. In M. Kompier & C. Cooper (Eds.), *Preventing Stress, Improving Productivity* (pp.297-311). London: Routledge.

Bailey, T. S. (2014). Psychosocial risk prevention: Best practice standards internationally and in Australia. In Dollard, M. F., & Bailey, T. S. (2014). *The Australian Workplace Barometer: Psychosocial safety climate and working conditions in Australia*. Samford Valley, Australia: Australian Academic Press. (pp. 281-288).

Bailey, T. S., Dollard, M. F., & Richards, P. A. M. (2015). A national standard for psychosocial safety climate (PSC): PSC 41 as the benchmark for low risk of job strain and depressive symptoms. *Journal of Occupational Health Psychology, 20*, 15–26.

Bailey, T. S., Dollard, M. F., McLinton, S. S., & Richards, P. A. M. (2013). Psychosocial safety climate, psychosocial and physical factors in the aetiology of musculoskeletal

disorders symptoms and workplace injury compensation claims. *Work & Stress, 29,* 190-211.

Bailey, T. S., Pignata, S., & Dollard, M. F. (2014). Programmes and interventions for psychosocial risk and worker well- being: The psychosocial safety climate (PSC) framework. In R. J. Burke & A. M. Richardson (Eds.), *Corporate wellness programmes: Linking employee and organizational health* (pp. 101–119). Cheltenham, UK: Edward Elgar.

Bakker, A. B., & Demerouti, E. (2007). The Job Demands-Resources model: State of the art. *Journal of Managerial Psychology, 22,* 309-328.

Baltes, P. B., & Baltes, M. M. (1990). Psychological perspectives on successful ageing: The model of selective optimization with compensation. In P. B. Baltes & M. M. Baltes (Eds.), *Successful ageing. Perspectives from the behavioral sciences* (pp. 1–34). Cambridge: Cambridge University Press.

Bambra, C., Egan, M., Thomas, S., Petticrew, M., & Whitehead, M. (2007). The psychosocial and health effects of workplace reorganisation. 2. A systematic review of task restructuring interventions. *Journal of Epidemiology and Community Health, 61(12*), 1028-1037.

Barling, J., Loughlin, C., & Kelloway, E. K. (2002). Development and test of a model linking safety- specific transformational leadership and occupational safety. *Journal of Applied Psychology, 87,* 488–496.

Beecher, H., & Dollard, M. F. (30 November, 2016). Psychosocial safety climate and better productivity in Australian workplaces. Costs, productivity, presenteeism, absenteeism. Retrieved from

http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/psychosocial-safety-climate-and-better-productivity-in-australian-workplaces

Benach, J. (2016, April). *Employment precariousness: The need to understand and change an emerging social determinant of health*. Keynote address presented at the 12th European Academy of Occupational Health Psychology Conference, Athens, Greece.

Berg, A., Hansson, U. W., & Hallberg, I. R. (1994). Nurses' creativity, tedium and burnout during 1 year of clinical supervision and implementation of individually planned nursing care: Comparisons between award for severely demented patients and a similar control ward. *Journal of Advanced Nursing Care, 20*, 742-749.

Berkout, A., Boumans, N. P. G., Van Breukelen, G. P. J., Abu-Saad, H. H., & Nijhuis, F. J. N. (2004). Resident-oriented care in nursing homes: effect on nurses. *Journal of Advanced Nursing, 45*, 621-632.

Berland, A., Natvig, G. N., & Gundersen, D. (2008). Patient safety and job-related stress: A focus group study. *Intensive and Critical Care Nursing, 24*, 90-97.

Biggs, A., Brough, P., & Barbour, J. P. (2013). Enhancing work-related attitudes and work engagement: A quasi-experimental study of the impact of an organizational intervention. *International Journal of Stress Management, 21*, 43-68.

Biron, C., Karankia-Murray, M., & Cooper, C. L. (2012). Organizational interventions for stress and well-being – an overview. In: Biron, C., Karanika-Murray, M., & Cooper, C. L. (Eds.), *Managing Psychosocial Risks in the Workplace: The Role of Process Issues*. Routledge Psychology Press.

Blau, P. (1964). Exchange and power in social life. New York: Wiley.

Blonk, R. W. B., Breenninkmeijer, V., Lagerveld, S. E., & Houtman, I. L. D. (2006). Return to work: A comparison of two cognitive behavioural interventions in cases of work-related psychological complaints among the self-employed. *Work & Stress: An International Journal of Work, Health & Organisations, 20*, 129-144.

Bloomfield, R., Chozos, N., Embrey, D., Henderson, J., Kelly, T., Koornneef, F., … , & Sujan, M. A. (2012). Using safety cases in industry and healthcare: A pragmatic review of the use of safety cases in industry – lessons and prerequisites for their application in healthcare. London, UK: Health Foundation.

Blumer, H. (1969). *Symbolic interactionalism: perspective and method.* Berkley, US: University of California press.

Bolier, L., Haverman, M., Westerhof, G. J., Riper, H., Smit, F., & Bohlmeijer, E. (2013). Positive psychology interventions: A meta- analysis of randomized controlled studies. *BMC Public Health, 13*, 119.

Bolier, L., Haverman, M., Westerhof, G. J., Riper, H., Smit, F., & Bohlmeijer, E. (2013). Positive psychology interventions: A meta- analysis of randomized controlled studies. *BMC Public Health, 13*, 119.

Bollen, K. A., & Long, J. S. (1993). Testing structural equation models. Newbury Park, CA: Sage.

Bond, F. W., Flaxman, P. E. & Bunce, D. (2008). The influence of psychological flexibility on work redesign: Mediated moderation of a work reorganization intervention. *Journal of Applied Psychology, 93*, 645-654.

Bond, S. A., Tuckey, M. R., Dollard, M. F. (2010). Psychosocial safety climate, workplace bullying, and symptoms of post- traumatic stress. *Organization Development Journal, 28,* 37–56.

Borenstein, M. J., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis.* Chichester, England: Wiley.

Borenstein, M. J., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2005). Comprehensive meta-analysis (Version 3) (Computer software). Englewood, NJ: Biostat.

Boumans, N. P. G., & Landerweerd, J. A. (1996). A Dutch study of the effects of primary nursing on job characteristics and organizational processes. *Journal of Advanced Nursing, 24,* 16-23.

Boumans, N. P. G., & Landerweerd, J. A. (1999). Nurses' well-being in a primary nursing care setting in the Netherlands. *Scandinavian Journal of Caring Sciences, 13,* 116-122.

Boumans, N. P. G., & van den Berg, A. A. (2000). Job innovation for direct caregivers in the care of persons with mental retardation. *Scandinavian Journal of Caring Sciences, 14,* 216-223.

Bourbonnais, R., Brisson, C., Vinet, A., et al. (2006). Development and implementation of a participative intervention to improve the psychosocial work environment and mental health in an acute care hospital. *Occupational Environmental Medicine, 63,* 326-334.

Bourbonnais, R., Brisson, C., Vinet, A., Vezina, M., Abdous, B., & Gaudet, M. (2006). Effectiveness of a participative intervention on psychosocial work factors to prevent mental health problems in a hospital setting. *Occupational Environmental Medicine, 63,* 335-342.

Bragard, I., Etienne, A., Merckaert, I., Libert, Y., & Razavi, D. (2010). Efficacy of a communication and stress management training on medical residents' self-efficacy, stress to communication and burnout: A randomized controlled study. *Journal of Health Psychology, 15*, 1075-1081.

Braithwaite, J., & Coiera, E. (2010). Beyond patient safety flatland. *Journal of the Royal Society of Medicine, 103*, 219-225

Bronkhorst, B. & Vermeeren, B. (2016). Safety climate, worker health and organizational health performance: Testing a physical, psychosocial and combined pathway. *International Journal of Workplace Health Management, 9*, 270-289.

Brough, P., Dollard, M. F., & Tuckey, M. R. (2014). Theory and methods to prevent and manage occupational stress: Innovations from around the globe. *International Journal of Stress Management, 21*, 1–6.

Bunce, D., & West, M. A. (1996). Stress management and innovation interventions at work. *Human Relations, 49*, 209-232.

Bussing, A., & Glaser (1999). Work stressors in nursing in the course of redesign: Implications for burnout and interactional stress. *European Journal of Work and Organizational Psychology, 8*, 401-426.

Byrne, B. (2001). *Structural equation modeling with AMOS: Basic concepts, applications and programming*. Mahwah, NJ: Erlbaum.

Campion, E. W. (2003). A death at Duke. *New England Journal of Medicine, 348*, 1083-1084.

Carr, J. Z., Schmidt, A. M., Ford, K., & DeShon, R. P. (2003). Climate perceptions matter: A meta-analytic path analysis relating to molar climate, cognitive and affective states and individual level work outcomes. *Journal of Applied Psychology, 4*, 605-619.

Caulfield, N., Chang, D., Dollard, M. F., & Elshaug, C. (2004). A review of occupational stress interventions in Australia. *International Journal of Stress Management, 11(2),* 149-166.

Cavanaugh, M. A., Boswell, W. R., Roehling, M. V., & Boudreau, J. W. (2000). An empirical examination of self- reported work stress among US managers. *Journal of Applied Psychology, 85,* 65–74.

Champoux, J. E., & Peters, W. S. (1987). Form effect size and power in moderated regression. *Journal of Occupational Psychology, 60,* 243–255.

Chan, D. (2014). Multilevel and aggregation issues in climate and culture research. In B. Schneider & K. M. Barbera (Eds.), *The Oxford handbook of organizational climate and culture* (pp. 3-22). Oxford, UK: Oxford University Press.

Chaplin, W. E. (1991). The next generation of moderator research in personality psychology. *Journal of Personality, 59,* 143–178.

Cheyne, A., Cox, S., Oliver, A., & Tomás, J. M. (1998). Modelling safety climate in the predictions of levels of safety activity. *Work & Stress, 12*, 255–271.

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

Cifre, E., Salanove, M., & Rogriguez-Sánchez. (2010). Dancing between theory and practice: Enhancing work engagement through work stress intervention. *Human Factors and Ergonomics in Manufacturing & Service Industries, 21,* 269-286.

Clarke, S. (2006). The relationship between safety climate and safety performance: A meta-analytic review. *Journal of Occupational Health Psychology, 11,* 315–327.

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,* 553–578.

Clarke, S. (2013). Safety leadership: A meta- analytic review of transformational and transactional leadership styles as antecedents of safety behaviours. *Journal of Occupational and Organizational Psychology, 86(1),* 22-49.

Clarke, S. P., Sloane, D. M., & Aiken, L. H. (2002). Effects of hospital staffing and organizational climate on needlestick injuries to nurses. *American Journal of Public Health, 92(7),* 1115-1119.

Conley, S., & Levinson, R. (1993). Teacher work redesign and job satisfaction. *Educational Administration Quarterly, 29,* 453-478.

Cox, S. J., & Cheyne, A. J. T. (2000). Assessing safety culture in offshore environments. *Safety Science, 34,* 111–129.

Cox, T., Karanika, M., Griffiths, A., & Houdmont, J. (2007). Evaluating organizational-level work stress interventions: Beyond traditional methods. *Work & Stress, 21(4),* 348-362.

Crawford, E. R., LePine, J. A., & Rich, B. L. (2010). Linking job demands and resources to employee engagement and burnout: A theoretical extension and meta- analytic test. *Journal of Applied Psychology, 95*, 834–848.

Cronen, V. (2001). Practical theory, practical art, and the pragmatic-systemic account of inquiry. *Communication Theory, 11(1),* 14-35.

Cropanzano, R., Rupp, D. E., & Byrne, Z. S. (2003). The relationship of emotional exhaustion to work attitudes, job performance, and organizational citizenship behaviors. *Journal of Applied Psychology, 88*, 160-169.

De Frank, R. S., & Cooper, C. L. (1987). Worksite stress management interventions: Their effectiveness and conceptualisation. *Journal of Managerial Psychology, 2,* 4–10.

De Jonge, J., & Dormann, C. (2003). The DISC model: Demand- Induced Strain Compensation mechanisms in job stress. In M. F. Dollard, H. R. Winefield, & A. H. Winefield (Eds.), *Occupational stress in the service professions* (pp. 43–74). Abingdon, UK: Taylor & Francis.

De Jonge, J., & Dormann, C. (2006). Stressors, resources, and strain at work: A longitudinal test of the triple-match principle. *Journal of Applied Psychology, 91*, 1359-1374.

De Jonge, J., Demerouti, E., & Dormann, C. (2014). Current theoretical perspectives in work psychology. In M. C. W. Peeters, J. de Jonge, & T. W. Taris (Eds.), *An introduction to contemporary work psychology* (pp. 89–113). Chichester, UK: John Wiley & Sons, Ltd.

De Lange, A. H., Taris, T. W., Kompier, M. A. J., Houtman, I. L. D., & Bongers, P. M. (2003). The very best of the millennium: Longitudinal research and the demand-control- support model. *Journal of Occupational Health Psychology, 8*, 282–305.

Delvaux, N., Razavi, D., Marchal, S., Bredart, A., Farvacques, C., & Slachmuylder, J. L. (2004). Effects of a 105 hours psychological training program on attitudes, communication skills and occupational stress in oncology: A randomised study. *British Journal of Cancer, 90,* 106-114.

Demerouti, E., & Bakker, A. B. (2011). The job demands- resources model: Challenges for future research. *SA Journal of Industrial Psychology, 37*, 1–9.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology, 86(3*), 499–512.

Dextras- Gauthier, J., Marchand, A., & Haines, V. (2012). Organizational culture, work organization conditions, and mental health: a proposed integration. *International Journal of Stress Management, 19*, 81–104

Dollard, M. F. (2006). Throwaway workers. *InPsych, 28(3),* 8412.

Dollard, M. F. (2012). Psychological safety climate: A lead indicator of work conditions, workplace psychological health and engagement and precursor to intervention success. In C. Biron, M. Karanika- Murray, & C. L. Cooper (Eds.), *Managing psychosocial risks in the workplace: Addressing process and context* (pp. 77–101). New York, NY: Routledge Psychology Press.

Dollard, M. F. (2016). Frontline healthcare workers project preliminary data (unpublished).

Dollard, M. F., & Bailey, T. S. (2014). Australian Workplace Barometer: Psychosocial safety climate and working conditions in Australia. Australia: Australian Federation Press.

Dollard, M. F., Bailey, T. S., & Hall, G. (2014). Surveillance system for psychosocial risk and testing the Australian Workplace Barometer theoretical model. In Dollard, M. F., & Bailey, T. S. (2014). *The Australian Workplace Barometer: Psychosocial safety*

climate and working conditions in Australia. Samford Valley, Australia: Australian Academic Press. (pp. 25-50).

Dollard, M. F., Bailey, T., McLinton, S., Richards, P., McTernan, W., Taylor, A., & Bond, S. (2012). The Australian Workplace Barometer: Report on psychosocial safety climate and worker health in Australia. Canberra, Australia: Safe Work Australia.

Dollard, M. F., & Bakker, A. B. (2010). Psychosocial safety climate as a precursor to conducive work environments, psychological health problems, and employee engagement. *Journal of Occupational and Organisational Psychology*, *83*, 579–599.

Dollard, M. F., & Gordon, J. A. (2014). Evaluation of a participatory risk management work stress intervention. *International Journal of Stress Management, 21,* 27-42.

Dollard, M. F., & Kang, S. (2007). *Psychosocial safety climate measure*. Adelaide, Australia: Work & Stress Research Group, University of South Australia.

Dollard, M. F., & Karasek, R. (2010). Building psychosocial safety climate: Evaluation of a socially coordinated PAR risk management stress prevention study. In J. Houdmont & S. Leka, (Eds.), *Contemporary occupational health psychology: Global perspectives on research and practice,* (pp. 208–234). Oxford, UK: Wiley- Blackwell.

Dollard, M. F., LaMontagne, A, D., Caulfield, N., Blewett, V., & Shaw, A. (2007). Job stress in the Australian and international health and community services sector: A review of the literature. *International Journal of Stress Management,14*, 417-445.

Dollard, M.F., & McTernan, W. (2011). Psychosocial safety climate: a multilevel theory of work stress in the health and community sector. *An International Journal for Epidemiology and Psychiatric Services, 20*, 1-7.

Dollard, M. F., & Neser, D. (2013). Worker health is good for the economy: Union density and psychosocial safety climate as determinants of country differences in worker health and productivity in 31 European countries. *Social Science and Medicine, 92,* 114–123.

Dollard, M. F., Opie, T., Lenthall, S., Wakerman, J., Knight, S., Dunn, S., Rickard, G., & McLeod, M. (2012). Psychosocial safety climate as an antecedent to work characteristics and psychological strain: A multilevel model. *Work & Stress, 26(4),* 385–04.

Dollard, M. F., Osborne, K., & Manning, I. (2012). Organization-environment adaptation: A macro-level shift in modelling work distress and morale. *Journal of Organizational Behavior, 34,* 629-647.

Dollard, M. F., Shimazu, A., Nordin, R. B., Brough, P., & Tuckey, M. R. (2014). *Psychosocial factors at work in the Asia Pacific.* Dordrecht: Springer.

Dollard, M. F., Skinner, N., Tuckey, M., & Bailey, T. (2007). National surveillance of psychosocial risk factors in the workplace: An international overview. *Work & Stress, 21,* 1-29.

Dollard, M. F., Tuckey, M. R., & Dormann, C. (2012). Psychosocial safety climate moderates the job demand- resource interaction in predicting workgroup distress. *Accident Analysis and Prevention, 45,* 694–704.

Dollard, M., Zadow, A., Pignata, S., Bailey, T. (2016). Stress management. In A. Farazmand (Ed.), *Global Encyclopaedia of Public Administration, Public Policy, and Governance*. Springer International Publishing (pp. 1-9). doi:10.1007/978-3-319-31816-5_2509-1

Dragano, D., Siegrist, J., & Wahrendorf, M. (2011). Welfare regimes, labour policies and unhealthy psychosocial working conditions: A comparative study with 9917 older employees from 12 European countries. *Journal of Epidemiology and Community Health, 65*, 793–799.

Dyer, C. (2002). Doctors go on trial for manslaughter after removing wrong kidney. *BMJ, 324*, 1476.

Edmonson, A. (1999). Psychological safety and learning behaviour in work teams. *Administrative Science Quarterly, 44,* 350–383.

Edwards, D., & Burnard, P. (2003). A systematic review of stress and stress management interventions for mental health nurses. *Journal of Advanced Nursing, 42(2),* 169-200.

Egan, M., Bambra, C., Thomas, S., Petticrew, M., Whitehead, M., & Thomson, H. (2007). The psychosocial and health effects of workplace reorganisation. 1. A systematic review of organisational-level interventions that aim to increase employee control. *Journal of Epidemiology and Community Health, 61(11),* 945-954.

Eisenberger, R., Huntington, R., Hutchison, S., & Sowa, D. (1986). Perceived organisational support. *Journal of Applied Psychology, 71*, 500–507.

Eurofound (2007 December 3) *Fourth European working conditions survey*. Retrieved from http://www.eurofound.europa.eu/publications/report/2007/working-conditions/fourth-european-working- conditions-survey

European Agency for Safety and Health at Work (2011). *Occupational safety and health culture assessment – A review of main approaches and selected tools*. Luxembourg: Publication Office of the European Union, 2011. doi:10.2802/53184

European Agency for Safety and Health at Work (2012). *Management of psychosocial risks at work: An analysis of the findings of the European survey of enterprises on new and emerging risks (ESENER).* Luxembourg: Publication Office of the European Union, 2011. doi:10.2802/92077

European Agency for Safety and Health at Work (2016, August 2). *Calculating the cost of work-related stress and psychosocial risks*. Retrieved from https://osha.europa.eu/en/tools-and-publications/publications/literature_reviews/calculating-the-cost-of-work-related-stress-and-psychosocial-risks

European Agency for Safety and Health at Work (2017, January 3). *Prevention of psychosocial risks and stress at work in practice 2002.* Retrieved from https://osha.europa.eu/en/tools-and-publications/publications/reports/104/view

European Risk Observatory (2014) *Calculating the cost of work-related stress and psychosocial risks*. doi: 62110.2802/20493

Evans, M. G. (1985). A Monte Carlo study of the effects of correlated method variance in moderated multiple regression analysis. *Organisational Behaviour and Human Decision Processes, 36,* 305–323.

Everly, J. G. S., & Lating, J. M. (2012). *A clinical guide to the treatment of the human stress response.* Springer Science & Business Media.

Ewers, P. Bradshaw, T., & McGovern, J. (2002). Does training in psychosocial interventions reduce burnout rates in forensic nurses? *Journal of Advanced Nursing, 37,* 470-476.

Feurstein, M., Berkowitz, S, M., & Peck, C. A. (1997). Musculoskeletal-related disability in US army personnel: prevalence, gender, and military occupational specialities. *Journal of Occupational and Environmental Medicine, 39,* 68-78.

Finnema, E., Dröes, R., Ettema, T, Ooms, M., Adèr, H., Ribbe, M., & van Tilburg, W. (2005). The effect of integrated emotion-oriented care versus usual care on elderly persons with dementia in the nursing home and on nursing assistants: A randomized clinical trial. International *Journal of Geriatric Psychiatry, 20,* 330-343.

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

Foa, E. B., & Foa, U. G. (1976). Resource theory of social exchange. In J. W. Thibout, J. T. Spence, & R. C. Carson (Eds.), *Contemporary topics in social psychology* (pp. 99–131). Morristown, NJ: General Learning Press.

Fredriksson, K., Bildt, C., Hägg, & Kilbom, A. (2001). The impact on musculoskeletal disorders of changing physical and psychosocial work environment conditions in the automobile industry. *International Journal of Industrial Ergonomics, 28,* 31-45.

Garrick, A., Mak, A. S., Cathcart, S., Winwood, P. C., Bakker, A. B., & Lushington, K. (2014). Psychosocial safety climate moderating the effects of daily job demands and recovery on fatigue and work engagement. *Journal of Occupational and Organizational Psychology, 87(4),* 694-714.

Giga, S. I., Noblet, A. J., Faragher, B., & Cooper, C. L. (2003). The UK perspective: A review of research on occupational stress management interventions. *Australian Psychologist, 38,* 158–164.

Gilbert, R., Salanti, G., Harden, M., & See, S. (2005). Infant sleeping position and the sudden infant death syndrome: systematic review of observational studies and historical review of recommendations from 1940 to 2002. *International Journal of Epidemiology, 34*, 874-887.

Goh, J., Pfeffer, J., & Zenios, S. A. (2015). The relationship between workplace stressors and mortality and health costs in the United States. *Management Science*, 608-628. http://dx.doi.org/10.1287/mnsc.2014.2115

Goldenhar, L. M., Williams, L. J., & Swanson, N. G. (2003). Modelling relationships between job stressors and injury and near-miss outcomes for construction labourers. *Work & Stress, 17(3)*, 218-240.

Goldgruber, J., & Ahrens, D. (2010). Effectiveness of workplace health promotion and primary prevention interventions: a review. *Journal of Public Health, 18(1),* 75-88.

Goldkuhl, G. (2006). Practice theory vs practical theory: Combining referential and functional pragmatism. Address presented at the *4th International Conference on Action in language, Organisations and Information Systems (ALOIS)*, Borås, Sweden.

Golembeiwski, R. T., Hilles, R., & Daly, R. (1987). Some effects of multiple OD interventions on burnout and worksite features. *The Journal of Applied Behavioral Science, 23*, 295-313.

Gorgievski, M. J., Halbesleben, J. R., & Bakker, A. B. (2011). Expanding the boundaries of psychological resource theories. *Journal of Occupational and Organizational Psychology, 84*, 1-7.

Grandey, A., Foo, S. C., Groth, M., & Goodwin, R. E. (2012). Free to be you and me: a climate of authenticity alleviates burnout from emotional labor. *Journal of Occupational Health Psychology, 17,* 1-14

Griffin, M. A., Cordery, J., & Soo, C. (2016). Dynamic safety capability: How organizations proactively change core safety systems. *Organizational Psychology Review, 6(3),* 248-272.

Griffin, M. A., & Curcuruto, M. (2016). Safety climate in organizations. *Annual Review of Organizational Psychology and Organizational Behavior, 3,* 191-212.

Grote, G. (2008). Diagnosis of safety culture: A replication and extension towards assessing "safe" organizational change processes. *Safety Science, 46*, 450–460.

Grote, G., & Kunzler, C. (2000). Diagnosis of safety culture in safety management audits. *Safety Science, 34*, 131–150.

Guediri, S., & Griffin, M. A. (2016). Organizational climate. In S. Clarke, T. M. Probst, F. Guldenmund, & J. Passmore (Eds.), *The Wiley Blackwell Handbook of the Psychology of Occupational Safety and Workplace Health* (pp. 272-298). Chichester, UK: John Wiley & Sons Ltd.

Günüşen, N. P., Üstün, B. (2010). An RCT of coping and support groups to reduce burnout among nurses. *International Nursing Review, 57*, 485-492.

Hackman, J. R. (2003). Learning more by crossing levels: Evidence from airplanes, hospitals, and orchestras. *Journal of Organizational Behavior, 24*, 905-922

Hakanen, J. J., Schaufeli, W. B., & Ahola, K. (2008). The job demands-resources model: A three-year cross-lagged study of burnout, depression, commitment and work engagement. *Work & Stress, 22,* 224-241.

Halbesleben, J. R. B. (2010). The role of exhaustion and workarounds in predicting occupational injuries: A cross-lagged panel study of health care professionals. *Journal of Occupational Health Psychology, 15(1),* 1-16.

Halbesleben, J. R., & Bowler, W. M. (2007). Emotional exhaustion and job performance: the mediating role of motivation. *Journal of Applied Psychology, 92,* 93.

Halbesleben, J. R. B., Osburn, H. K., & Mumford, M, D. (2006). Action research as a burnout intervention: Reducing burnout in the federal fire service. *The Journal of Applied Behavioral Science, 42,* 244-266.

Halbesleben, J. R., Wakefield, B. J., Wakefield, D. S., & Cooper, L. B. (2008). Nurse burnout and patient safety outcomes nurse safety perception versus reporting behavior. *Western Journal of Nursing Research, 30,* 560-577.

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

Hall, G. B., Dollard, M. F., Tuckey, M. R., Winefield, A. H., & Thompson, B. M. (2010). Job demands, work-family conflict, and emotional exhaustion in police officers: A longitudinal test of competing theories. *Journal of Occupational & Organizational Psychology, 83,* 237-250.

Hall, G. B., Dollard, M. F., Winefield, A. H., Bakker, A. B., & Dormann, C. (2013). Psychosocial safety climate buffers effects of job demands on depression and positive organisation behaviours. *Anxiety, Stress & Coping, 26,* 355–377.

Hallberg, I. R., & Norberg, A. (1993). Strain among nurses and their emotional reactions during 1 year of systematic clinical supervision combined with the implementation of

individualized care in dementia nursing. *Journal of Advanced Nursing, 18,* 1860-1875.

Hall, G. B., Dollard, M. F., Tuckey, M. R., Winefield, A. H., & Thompson, B. M. (2010). Job demands, work- family conflict, and emotional exhaustion in police officers: A longitudinal test of competing theories. *Journal of Occupational and Organizational Psychology, 83(1),* 237-250.

Harter, J. K., Schmidt, F. L., & Hayes, T. L. (2002). Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: A meta-analysis. *Journal of Applied Psychology, 87,* 268-279.

Hassard, J., Teoh, K., & Visockaite, G., & Cox, T. (2017). The cost of work-related stress: a systematic review. *Journal of Occupational Health Psychology,* in press.

Hätinen, M., Kinnunen, U., Pekkonen, M., & Kalimo, R. (2007). Comparing two burnout interventions: Perceived job control mediates decreases in burnout. *International Journal of Stress Management, 14*, 227-248.

Hausser, J. A., Mojzisch, A., Niesel, M., & Schulz-Hardt, S. (2010). Ten years on: A review of recent research on the Job Demand-Control-Support model and psychological well-being. *Work & Stress, 24,* 1-35.

Heaney, C. A., Israle, B. A., Schurman, S. J., Baker, E. A., House, J. S., & Hugentobler, M. (1993). Industrial relations, worksite stress reduction, and employee well-being: A participatory action research investigation. *Journal of Organizational Behavior, 14,* 495-510.

Heaney, C. A., Price, R. H., & Rafferty, J. (1995). Increasing coping resources at work: a field experiment to increase social support, improve work team functioning, and enhance employee mental health. *Journal of Organizational Behavior, 16*, 335-352.

Heron, R. J. L., McKeown, S., Tomeson, J. A., & Teasdale, E. L. (1999). Study to evaluate the effectiveness of stress management workshops on response to general and occupational measures of stress. *Occupational Medicine, 49,* 451-457.

Hobfoll, S. E. (1988). *The ecology of stress.* Washington, DC: Hemisphere.

Hobfoll, S. E. (1989). Conservation of Resources: A new attempt at conceptualizing stress. *American Psychologist, 44(3),* 513-524.

Hobfoll, S. E. (2001). The influence of culture, community, and the nested-self in the stress process: Advancing conservation of resources theory. *Applied Psychology: An International Review, 50(3),* 337-421.

Holman, D. J., Axtell, C. M., Sprigg, C. A., Totterdell, P., & Wall, T. D. (2010). The mediating role of job characteristics in job redesign interventions: A serendipitous quasi-experiment. *Journal of Organizational Behavior, 31,* 84-105.

Huang, Y., Ho, M., Smith, G. S., & Chen, P. Y. (2006). Safety climate and self- reported injury: Assessing the mediating role of employee safety control. *Accident Analysis & Prevention, 38,* 425–433.

Humphrey, S. E. (2011). What does a great meta-analysis look like? *Organizational Psychology Review, 1(2),* 99-103.

Hunter, J. E., & Schmidt, F. L. (2004). *Methods of meta-analysis.* SAGE Publications: California.

Idris, M. A., & Dollard, M. F. (2011). Psychosocial safety climate, work conditions and emotions in the workplace: A Malaysian population- based work stress study. *International Journal of Stress Management, 18,* 324–347.

Idris, M. A., Dollard, M. F., Coward, J., & Dormann, C. (2012). Psychosocial safety climate: Conceptual distinctiveness and effect on job demands and worker psychological health. *Safety Science, 50,* 19–28.

Idris, M. A., Dollard, M. F., & Winefield, A. H. (2010). Lay theory explanations of occupational stress: the Malaysian context. *Cross Cultural Management: An International Journal, 17,* 135-153.

Idris, M. A., Dollard, M. F., & Winefield, A. H. (2011). The effect of globalization on employee psychological health and job satisfaction in Malaysian workplaces. *Journal of Occupational Health, 53,* 447–454.

Idris, M. A., Dollard, M. F., & Yulita. (2014). Psychosocial safety climate, emotional demands, burnout, and depression: A longitudinal multilevel study in the Malaysian private sector. *Journal of Occupational Health Psychology, 19(3),* 291-301.

Innstrand, S. T., Espnes, G. A., & Mykletun, R. (2004). Job stress, burnout and job satisfaction: An intervention study for staff working with people with intellectual disabilities. *Journal of Applied Research in Intellectual Disabilities, 17,* 119-126.

International Atomic Energy Agency (2002). *Key practical issues in strengthening safety culture,* Report 15. Vienna, Austria: International Nuclear Safety Advisory Group (INSAG).

International Labour Organization (2016 April 28) *Work-place stress. A collective challenge.* Retrieved from http://www.ilo.org/wcmsp5/groups/public/—ed_protect/—protrav/—safework/documents/publication/wcms_466547.pdf

International Labour Organization (2014 December 16). *Improving health in the workplace: ILO's framework for action*. Retrieved from http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/publication/wcms_329366.pdf

Jackson, P. R., & Mullarkey, S. (2000). Lean production teams and health in garment manufacture. *Journal of Occupational Health Psychology, 5*, 231-245.

Jackson, S. E. (1983). Participation in decision making as a strategy for reducing job-related strain. *Journal of Applied Psychology, 68*, 3-19.

James, L. R., Demaree, R. G., & Wolf, G. (1984). Estimating within-group interrater reliability with and without response bias. *Journal of Applied Psychology, 69,* 85-98.

James, L. R., Gent, M. J., Hater, J. J., & Coray, K. E. (1979). Correlates of psychological influence: An illustration of the psychological climate approach to work environment perceptions. *Personnel Psychology, 32*, 563-588.

James, L. R., Hartman, A., Stebbins, M. W., & Jones, A. P. (1977). Relationships between psychological climate and VIE model for work motivation. *Personnel Psychology, 30,* 229-368.

James, L. R., Hater, J. J., Gent, M. J., & Bruni, J. B. 1978. Psychological climate: Implications from cognitive social learning theory and interactional psychology. *Personnel Psychology, 31,* 783-813.

James, L. R., & Jones, A. P. (1974). Organizational climate: A review of theory and research. *Psychological Bulletin, 81,* 1096-1112.

Jiang, L., & Probst, T. M. (2015). A multilevel examination of affective job insecurity climate on safety outcomes. *Journal of Occupational Health Psychology.* Advance online publication retrieved from http://dx.doi.org/10.1037/ocp0000014

Johnson, J. V., & Hall, E. M. (1988). Job strain, work place social support, and cardiovascular disease: A cross sectional study of a random sample of the Swedish working population. *American Journal of Public Health, 78,* 1336–1342.

Jordon, J., Gurr, E., Tinline, G., Giga, S. I., Faragher, B., & Cooper, C. L. (2003). *Beacons of excellence in stress prevention.* Manchester: Robertson Cooper and UMIST.

Kalliath, T. Brough, P., O'Driscoll, M., Manimala, M., Siu, O. & Parker, S. (2014). *Organisational Behaviour: A Psychological Perspective for the Asia-Pacific, 2nd Edition*. McGraw-Hill: Australia.

Kang, S. Y., Staniford, A., Dollard, M. F., & Kompier, M. (2008). Knowledge development and content in occupational health psychology: A systematic analysis of the Journal of Occupational Health Psychology and Work & Stress, 1996-2006. In J. Houdmont & S. Leka (Eds.), *Occupational health psychology: European perspectives on research, education and practice* (pp. 27-63). Maia, Portugal: ISMAI Publishers.

Kao, F. H., Cheng, B. S., Kuo, C. C., & Huang, M. P. (2014). Stressors, withdrawal, and sabotage in frontline employees: The moderating effects of caring and service climates. *Journal of Occupational and Organizational Psychology, 87,* 755-780.

Karasek, R. A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administration Science Quarterly, 224,* 285–307.

Karasek, R. A. (2004). An analysis of 19 international case studies of stress prevention through work reorganization using the demand/control model. *Bulletin of Science, Technology & Society, 24(5),* 446-456.

Karasek, R. B., Kawakami, C., Houtman. N., Bongers, I., & Amick, P. (1998). The Job Content Questionnaire (JCQ): An instrument for internationally comparative assessments of psychosocial job characteristics. *Journal of Occupational Health Psychology, 3,* 322–355.

Karasek, R., & Theorell, T. (1990). *Healthy work: Stress, productivity, and the reconstruction of working life.* New York, NY: Basic Books.

Kawakami N, Park J, Dollard MF, Dai J (2014) National status of psychosocial factors at work in Japan, Korea, Australia, and China. (pp 27–52). In M. F. Dollard, A. Shimazu, R. B. Nordin, P. Brough, M. R. Tuckey (Eds.), *Psychosocial factors at work in the Asia Pacific*. Dordrecht: Springer.

Kawakami, N., Araki, S., Kawashima, M., Masumoto, T., & Hayashi, T. (1997). Effects of work-related stress reduction on depressive symptoms among Japanese blue-collar workers. *Scandinavian Journal of Work, Environment & Health, 23,* 54-59.

Kines, P., Lappalainen, J., Mikkelsen, K. L., Olsen, E., Pousette, A., Tharaldsen, J., Tomasson, K., & Torner, M. (2011). Nordic Safety Climate Questionnaire (NOSACQ- 50). International *Journal of Industrial Ergonomics, 41,* 634–646.

Koivu, A., Saarinen, P. I., & Hyrkas, K. (2012). Does clinical supervision promote medical-surgical nurses' well-being at work? A quasi-experimental 4-year follow-up study. *Journal of Nursing Management, 20*, 401-413.

Kompier, M., & Cooper, C. L. (Eds.) (1999). *Preventing stress, improving productivity: European case studies in the workplace*. London, UK: Routledge.

Kompier, M. A. J., & Kristensen, T. S. (2001). Organizational work stress interventions in a theoretical, methodological and practical context. In J. Dunham (Ed.), *Stress in the workplace: Past, present and future* (pp. 164–190). London, UK: Whurr.

Kortum, E., Leka, S., & Cox, T. (2008). Understanding the perception of occupational psychosocial risk factors in developing countries: Setting priorities for action. In J. Houdmont & S. Leka (Eds.), *Occupational health psychology, European perspectives on research, education and practice* (vol. 3, pp. 191–228). Nottingham, UK: Nottingham University Press

Korunka, C., Scharitzer, D., Carayon, P., & Sainfort, F. (2003). Employee strain and job satisfaction related to an implementation of quality in a public service organization: A longitudinal study. *Work & Stress: An International Journal of Work, Health & Organisations, 17*, 52-72.

Korunka, C., & Vitouch, O. (1999). Effects of the implementation of information technology on employees' strain and job satisfaction: A context-dependent approach. *Work & Stress: An International Journal of Work, Health & Organisations, 13*, 341-363.

Kozlowski, S. W. J., & Iljen, D. R. (2006). Enhancing the effectiveness of work groups and teams. *Psychological Science, 7*, 77-122.

Kreft, I., & De Leeuw, J. (1998). *Introducing multilevel modelling*. London: Sage Publications

La Montagne, A. D., Keegel, T., Louie, A. M., Ostry, A., & Landsbergis, P. A. (2007). A systematic review of the job-stress intervention evaluation literature 1990-2005. *International Journal of Occupational and Environmental Medicine, 13,* 268-280.

La Montagne, A. D., Noblet, A. J., & Landsbergis, P. A. (2012). Intervention development and implementation: understanding and addressing barriers to organizational-level interventions. In: Biron, C., Karanika-Murray, M., & Cooper, C. L. (Eds.), *Managing Psychosocial Risks in the Workplace: The Role of Process Issues*. Routledge Psychology Press.

Landsbergis, P. A., & Vivona-Vaugan, E. (1995). Evaluation of an occupational stress intervention in a public agency. *Journal of Organizational Behavior, 16,* 29-48.

Larsson, S., Pousette, A., & Torner, M. (2008). Psychological climate and safety in the construction industry-mediated influence on safety behaviour. *Safety Science, 46,* 405-412.

Lavoie-Tremblay, M., Bourbannais, R., Viens, C., Vézina, M., Durand, P. J., & Rochette, L. (2005). Improving the psychosocial work environment. *Journal of Advanced Nursing, 49,* 655-664.

Law, R., Dollard, M., Tuckey, M., & Dormann, C. (2011). Psychosocial safety climate as a lead indicator of workplace bullying and harassment, job resources, psychological health and employee engagement. *Accident Analysis and Prevention, 43,* 1782-1793

Le Blanc, P. M., Hox, J. J., Schaufeli, W. B., Taris, T. W., & Peeters, M. C. W. (2007). Take care! The evaluation of a team-based burnout intervention program for oncology care providers. *Journal of Applied Psychology, 92*, 213-227.

Lees, S., & Ellis, N. (1990). The design of a stress-management programme for nursing personnel. *Journal of Advanced Nursing, 15*, 946-961.

Leigh, J. P. (2011). Economic burden of occupational injury and illness in the United States. *The Milbank Quarterly, 89*, 728-772.

Leiter, M. P., & Maslach, C. (2009). Burnout and workplace injuries. In P. L. Perrewe, J. C. Quick, & A. M. Rossi. (Eds.). *Stress and Quality of Working Life* (pp. 3-18). Charlotte, N.C: Information Age Publishing.

Leiter, M. P., Laschinger, H. K. S., Day, A., & Oore, D. G. (2011). The impact of civility interventions on employee social behaviour, distress, and attitudes. *Journal of Applied Psychology, 96,* 1258–1274.

Leka, S., Griffiths, A., Cox, T. (2003). *Work organisation and stress: Systematic problem approaches for employers, managers and trade union representatives*. Geneva, Switzerland: World Health Organisation.

Leka, S., Jain, A., Cox, T., & Kortum, E. (2011). The development of the European framework for psychosocial risk management: PRIMA – EF. *Journal of Occupational Health, 53*, 137-143. http://dx.doi.org/10.1080/02678373.2010.519918

LePine, J. A., Podsakoff, N. P., & LePine, M. A. (2005). A meta- analytic test of the challenge stressor- hindrance stressor framework: An explanation for inconsistent relationships among stressors and performance. *Academy of Management Journal, 48*, 764–775.

Levi, L. (2016). Foreword. In J. Siegrist & M. Wahrendorf, (2016). *Work Stress and Health in a Globalized Economy, The Model of Effort-Reward Imbalance.* (pp. 3-19). Switzerland: Springer International Publishing.

Lewin, K. (1952). *Field theory in social science: Selected theoretical papers by Kurt Lewin*. London: Tavistock.

Li, F., Jiang, L., Yao, X., & Li, Y. (2013). Job demands, job resources and safety outcomes: The roles of emotional exhaustion and safety compliance. *Accident Analysis & Prevention, 51*, 243-251.

Li, H., Wang, L. S., Lin, Y., & Lee, I. (2010). The effect of a peer-mentoring strategy on student nurse stress reduction in clinical practice. *International Nursing Review, 57,* 203-210.

Linzer, M., Poplau, S., Grossman, E., Varkey, A., Yale, S., Williams, E., Hice, L., Brown, R. L., Wallock, J., Kohnhorst, D. & Barouche, M. (2015). A cluster randomized trial of interventions to improve work conditions and clinician burnout in primary care: Results from the health work place (HWP) study. *Journal of General Internal Medicine, 20,* 1105-1111.

Litwin, G., & Stringer, R. A. (1968). *Motivational and organizational climate*. Cambridge, Massachusetts: Harvard University.

Liu, J., Siu, O., & Shi, K. (2010). The evaluation of an integrated stress management intervention program among Chinese health care workers. Web Society (SWS), 2010 IEEE 2nd Symposium, pp.501-506.

Loh, M. Y., Idris, M. A., Isahak, M., & Dollard, M. F. (in review). The physical and psychosocial safety climate impacts on health care workers' health.

Lökk, C. T. J., & Arnetz, B. B. (2000). Impact of management change and an intervention program on health care personnel. *Psychotherapy and Psychosomatics, 69,* 79-85.

Luria, G., & Yagil, D. (2010). Safety perception referents of permanent and temporary employees: Safety climate boundaries in the industrial workplace. *Accident Analysis & Prevention, 42*, 1423–1430.

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research, 39,* 99–128.

Majcjrzank, A., & Cotton, J. (1988). A longitudinal study of adjustment to technological change: From mass to computer-automated batch production. *Journal of Occupational Psychology, 61,* 43-66.

Makary, M. A., & Daniel, M. (2016). Medical error – the third leading cause of death in the US. *The British Medical Journal, 353,* i2139.

Marine, A., Ruotsalainen, J. H., Serra, C., & Verbeek, J. H. (2006). Preventing occupational stress in healthcare workers. *Cochrane Database of Systematic Reviews, 4*. doi:10.1002/14651858. CD002892.pub2

Maslach, C. (2016, April). *The challenge of burnout in contemporary society*. Keynote address presented at the 12th European Academy of Occupational Health Psychology Conference, Athens, Greece.

Mathieu, J., & Taylor, S. (2007). Framework for testing meso- mediational relationships in organizational behaviour. *Journal of Organizational Behavior, 28*, 141–172

McTernan, W. P., Dollard, M. F., & LaMontagne, A. D. (2013). Clinical and sub- clinical depression in Australian workplaces: An economic cost analysis of depression-related productivity loss attributable to job- strain and bullying. *Work & Stress, 27,* 321–338.

McVicar, A., Munn-Giddings, C., & Seebohm, P. (2013). Workplace stress interventions using participatory action research designs. *International Journal of Workplace Health Management, 6(1),* 18-37.

Melichor, M. E. W., Philipsen, H., Huyer Abu-Saad, H., Halfens, R. J. G., van de Berg, A. A., & Gassman, P. (1996). The effectiveness of primary nursing on burnout among psychiatric nurses in long-stay settings. *Journal of Advanced Nursing, 24,* 694-702.

Mikkelsen, A., & Gundersen, M. (2003). The effect of a participatory organizational intervention on work environment, job stress, and subjective health complaints. *International Journal of Stress Management, 10,* 91-110.

Mikkelsen, A., Saksvik, P., & Landsbergis, P. (2000). The impact of a participatory organizational intervention on job stress in community health care institutions. *Work & Stress: An International Journal of Work, Health & Organisations, 14,* 156-170.

Mimura, C., & Griffiths, P. (2003). The effectiveness of current approaches to workplace stress management in the nursing profession: an evidence based literature review. *Occupational and Environmental Medicine, 60(1),* 10-15.

Molleman, E., & Van Knippenberg, A. (1995). Work redesign and the balance of control within a nursing context. *Human Relations, 48,* 795-104.

Montano, D., Hoven, H., & Siegrist, J. (2014). Effects of organisational-level interventions at work on employees' health: a systematic review. *BMC Public Health, 14(1),* DOI: 10.1186/1471-2458-14-135.

Morse, G., Salyers, M. P., Rollins, A. L., Monroe-DeVita, M., & Pfahler, C. (2012). Burnout in mental health services: A review of the problem and its remediation.

Administration and Policy in Mental Health and Mental Health Services Research, 39(5), 341-352.

Naghieh, A., Montgomery, P., Bonell, C. P., Thompson, M., & Aber, J. L. (2015). *Organisational interventions for improving wellbeing and reducing work-related stress in teachers*. Cochrane Database of Systematic Reviews. doi 10.1002/14651858.CD010306.pub2

Nahrgang, J. D., Morgeson, F. P., & Hofmann (2011). Safety at work: A meta- analytic investigation of the link between job demands, job resources, burnout, engagement, and safety outcomes. *Journal of Applied Psychology, 96,* 71–94.

Neal, A., & Griffin, M. A. (2006). A study of the lagged relationships among safety climate, safety motivation, safety behaviour, and accidents at the individual and group levels. *Journal of Applied Psychology, 91,* 946–953.

Nielsen, K. (2013). Review Article: How can we make organizational interventions work? Employees and line managers as actively crafting interventions. *Human Relations, 66,* 1029–1050.

Nielsen, K., & Abildgaard, J. S. (2013). Organizational interventions: a research-based framework for the evaluation of both process and effects. *Work & Stress, 27(3),* 278-297.

Nielsen, K., & Miraglia, M. (2017). What works for whom in which circumstances? On the need to move beyond the 'what works?' question in organizational intervention research. *Human Relations, 70(1),* 40-62.

Nielsen, K., & Randall, R. (2012). The importance of employee participation and perceptions of changes in procedures in a teamworking intervention. *Work & Stress, 26,* 91–111.

Nielsen, K., Fredslund, H., Christensen, K. B., & Albertsen, K. (2006). Success or failure? Interpreting and understanding the impact of interventions in four similar worksites. *Work & Stress: An International Journal of Work, Health & Organisations, 20*, 272-287.

Nielsen, K., Randall, R., & Albertsen, K. (2007). Participants' appraisals of process issues and the effects of stress management interventions. *Journal of Organizational Behavior, 28*, 793-810.

Nielsen, K., Randall, R., Holten, A. L., & González, E. R. (2010). Conducting organizational-level occupational health interventions: What works? *Work & Stress, 24(3),* 234-259.

NIOSH (2016). National Occupational Research Agenda (NORA) National Total Worker Health® Agenda (2016–2026). A National Agenda to Advance Total Worker Health® Research, Practice, Policy, and Capacity. Retrieved from: http://www.cdc.gov/niosh/twh/nationalagenda.html?s_cid=3ni7d2twh05022016.

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.

Oosterholt, B. G., Van der Linden D., Maes, J. H. R., Verbraak, M. J. P. M., & Kompier, M. A. J. (2012). Burned out cognition—cognitive functioning of burnout patients before and after a period with psychological treatment. *Scandinavian Journal of Work Environment & Health, 38*, 358-369.

Owen, M. S., Bailey, T. B., & Dollard, M. F. (2016). Psychosocial safety climate as - an extension of ERI theory: Evidence from Australia. In J. Siegrist & M. Wahrendorf (Eds.), *Work stress and health in a globalized economy: The model of effort-reward imbalance* (pp. 189-217). Germany: Springer.

Parker, C. P., Baltes, B. B., Young, S. A., Huff, J. W, Altmann, R. A., LaCost, H. A., & Roberts, J. E. (2003). Relationships between psychological climate perceptions and work outcomes: A meta- analytic review. *Journal of Organizational Behavior, 24*, 389–416.

Parker, S. K. (2003). Longitudinal effects of lean production on employee outcomes and the mediating role of work characteristics. *Journal of Applied Psychology, 88*, 620-634.

Peterson, U., Bergström, G., Samuelsson, M., Åsberg, M., & Nygren, Å. (2008). Reflecting peer-support groups in the prevention of stress and burnout: randomized control trial. *Journal of Advanced Nursing, 63,* 506-516.

Pierce, J. R., & Aguinis, H. (2013). The too-much-of-a-good-thing effect in management. *Journal of Management, 39(2),* 313-338.

Pignata, S. (2011). Stress interventions: Their impact on psychological well-being and work attitudes in Australian university staff. School of Psychology, Social Work, and Social Policy, University of South Australia. Academic thesis.

Pignata, S., Biron, C., & Dollard, M. F. (2014). Managing psychosocial risks in the workplace prevention and intervention. In M. C. W. Peeters, J. de Jonge, & T. W. Taris (Eds.), *An introduction to contemporary work psychology* (pp. 393–413). Chichester, UK: John Wiley & Sons, Ltd.

Pousette, A., Larsson, S., & Torner, M. (2008). Safety climate cross-validation, strength and prediction of safety behaviour. *Safety Science, 46,* 398-404.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40(3),* 879-891.

PRIMA-EF (2008). Best Practice in Work-related Stress Management Interventions. Retrieved from: http://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjovPjL_9_MAhVG5qYKHTPtAq0QFggeMAA&url=http%3A%2F%2Fwww.who.int%2Foccupational_health%2Fpublications%2F09_Stress%2520Interventions.pdf&usg=AFQjCNHkbwLOxKvOZZOhVxSX-P5VOOaSOQ

Probst, T. M. (2010). Multi-level models of stress and well-being. *Stress & Health, 26,* 95-97.

Probst, T. M. (2015). Organizational safety climate and supervisor safety enforcement: Multilevel explorations of the causes of accident underreporting. *Journal of Applied Psychology, 100(6),* 1899-1907.

Probst, T. M., Brubaker, T. L., & Barsotti, A. (2008). Organizational injury rate underreporting: The moderating effect of organizational safety climate. *Journal of Applied Psychology, 93(5),* 1147-1154.

Probst, T. M., & Estrada, A. X. (2010). Accident under-reporting among employees: Testing the moderating influence of psychological safety climate and supervisor enforcement of safety practices. *Accident Analysis & Prevention, 42(5),* 1438-1444.

Probst, T. M., & Graso, M. (2013). Pressure to produce = Pressure to reduce accident reporting? *Accident Analysis & Prevention, 59,* 580-587.

Proctor, R., Stratton-Powell, H., Tarrier, N., & Burns, A. (1998). The impact of training and support on stress among care staff in nursing and residential homes for the elderly. *Journal of Mental Health, 7,* 59-70.

Productivity Commission. (2010). *Performance benchmarking of Australian business regulation: Occupational health & safety* [research report]. Canberra: Productivity Commission.

Randall, R., Griffiths, A., & Cox, T. (2005). Evaluating organizational stress-management interventions using adapted study designs. *European Journal of Work and Organizational Psychology, 14*, 23-41.

Randall, R., Nielsen, K., & Tvedt, S. D. (2009). The development of five scales to measure employees' appraisals of organizational-level stress management interventions. *Work & Stress, 23*, 1-23.

Redhead, K., Bradshaw, T., Braynion, P., & Doyle, M. (2011). An evaluation of the outcomes of psychosocial intervention training for qualified and unqualified nursing staff working in a low-secure mental health unit. *Journal of Psychiatric and Mental Health Nursing, 18*, 59-66.

Reichers, A. E., & Schneider, B. (1990). Climate and culture: An evolution of constructs. In B. Schneider (Ed.), *Organizational climate and culture* (pp. 5–39). San Franscisco, CA: Jossey- Bass.

Reid, J, H. (2011). Patient safety: staff safety - hand in hand? *The Journal of Perioperative Practice, 21, 3*63.

Reiman, T., Pietikainen, E., Oedewald, P. (2010). Multilayered approach to patient safety culture. *Quality and Safety in Health Care, 19*.

Richardson, K. M., & Rothstein, H. R. (2008). Effects of occupational stress management intervention programs: A meta- analysis. *Journal of Occupational Health Psychology, 13*, 69–93.

Rickard, G., Lenthall, S., Dollard, M., Opie, T., Knight, S., Dunn, S., Wakerman, J., MacLeod, M., Seiler, J., Brewster-Webb, D. (2012). Organisational intervention to reduce occupational stress and turnover in hospital nurses in the Northern Territory, Australia. *Collegian, 19*, 211-221.

Romig, M. C., Latif, A., Gill, R. S., Pronovost, P. J., & Sapirstein, A. (2012). Perceived benefit of a telemedicine consultative service in a highly staffed intensive care unit. *Journal of Critical Care, 27,* 9-16.

Runciman, W. B., Merry, A. F., & Walton, M. (2007). *Safety and ethics in healthcare*. Hampshire, England: Ashgate Publishing Limited.

Ruotsalainen, J. H., Verbeek, J. H., Marine, A., & Serra, C. (2015). Preventing occupational stress in healthcare workers. *Cochrane Database of Systematic Reviews*. doi 1002/14651858.CD002892.pub5

SafeWork Australia (2012). *The cost of work related injury and illness for Australian Employers, Workers and the Community: 2008-09*. Retrieved June 14, 2012, fromhttp://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/660/Cost%20of%20Work-related%20injury%20and%20disease.pdf

Sanderson, K., Tilse, E., Nicholson, J., Oldenburg, B., & Graves, N. (2007). Which presenteeism measures are more sensitive to depression and anxiety? *Journal of Affect Disorders, 101*, 65–74.

Sandström, A, Rhodin, I. N., Lundberg, M., Olsson, T., & Nyberg L. (2005). Impaired cognitive performance in patients with chronic burnout. *Biological Psychology, 69*, 271-279.

Schaufeli, W. B. (1995). The evaluation of a burnout workshop for community nurses. *Journal of Health and Human Services Administration, 18,* 11-30.

Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi- sample study. *Journal of Organizational Behavior, 25,* 293– 315.

Schaufeli, W. B., & Taris, T. W. (2014). A critical review of the job demands- resource model: Implications for improving work and health. In G. Bauer & O. Hamming (Eds.), *Bridging occupational, organizational and public health: A transdisciplinary approach* (pp. 43–68). Dordrecht: Springer.

Schaufeli, W. B., Leiter, M. P., Maslach, C., & Jackson, S. E. (1996). The Maslach Burnout Inventory - general survey. In C. Maslach, S. E. Jackson, & M. P. Leiter (Eds.), *Maslach Burnout Inventory* (pp. 19-26). Palo Alto, CA: Consulting Psychologists Press.

Scherbaum, C.A., & Ferreter, J.M. (2009). Estimating statistical power and sample size requirement for organizational research using hierarchical linear models. *Organizational Research Methods, 12,* 347-367.

Schimazu, A., Schaufeli, W. B., Miyanake, D., & Iwata, N. (2010). Why Japanese workers show low work engagement: An item response theory analysis of the Ultrecht Work Engagement Scale. *BioPsychoSocial Medicine, 4,* 1–6

Schneider, B. (1975). Organizational climates: An essay. *Personnel Psychology, 28,* 447-479.

Schneider, B., & Bartlett, C. J. (1968). Individual differences and organizational climate: I. The research plan and questionnaire development. *Personnel Psychology, 21*, 323-333.

Schneider, B., & Barbera, K. M. (2014). Introduction: The Oxford handbook of organizational climate and culture. In B. Schneider & K. M. Barbera (Eds.), *The Oxford handbook of organizational climate and culture* (pp. 3-22) Oxford, UK: Oxford University Press.

Schneider, B., Ehrhart, M. G., & Macey, W. H. (2013). Organizational climate and culture. *Annual Review of Psychology, 64,* 361-388.

Schneider, B., Wheeler, J. K., & Cox, J. F. (1992). A passion for service: Using content analysis to explicate service climate themes. *Journal of Applied Psychology, 77,* 705.

Schrijnemaekers, V. J. J., van Rossum, E., Candel, M. J. J. M., Frederiks, C. M. A., Derix, M. M. A., Sielhorst, H., & van den Brandt, P. A. (2003). Effects of emotion-oriented care on work-related outcomes of professional caregivers in homes for elderly persons. *Journal of Gerontology, 58B,* S50-S57.

Schulte, M., Ostroff, C., & Kinicki, A. J. (2006). Organizational climate systems and psychological climate perceptions: A cross-level study of climate-satisfaction relationships. *Journal of Occupational and Organizational Psychology, 79,* 645-671.

Selig, J. P., & Preacher, K. J. (2008). *Monte Carlo method for assessing mediation: An interactive tool for creating confidence intervals for indirect effects* [Computer software]. Retrieved January 15, 2014, from http://quantpsy.org/

Siegrist, J. (1996). Adverse health effects of high-effort/ low-reward conditions. *Journal of Occupational Health Psychology, 1,* 27-41.

Siegrist, J. (2016). A theoretical model in the context of economic globalization. In J. Siegrist & M. Wahrendorf, (2016). *Work Stress and Health in a Globalized Economy, The*

Model of Effort-Reward Imbalance. (pp. 3-19). Switzerland: Springer International Publishing.

Silva, S., Lima, M. L., & Baptista, C. (2004). OSCI: An organisational and safety climate inventory. *Safety Science, 42,* 205-220.

Singer, J. (1998). Using SAS PROC MIXED fit for multilevel models, hierarchical models, and individual growth models. *Journal of Education & Behavioral Statistics, 24,* 323-355.

Siu, O., Phillips, D. R., & Leung, T. (2004). Safety climate and safety performance among construction workers in Hong Kong: The role of psychological strains as mediators. *Accident Analysis and Prevention, 36,* 359-366.

Skogstad, A., Einarsen, S., Torsheim, T., Aasland, M. S., & Hetland, H. (2007). The destructiveness of laissez- faire leadership behaviour. *Journal of Occupational Health Psychology, 12,* 80–92.

Sluiter, J. K., Bos, A. P., Tol, D., Calff, M., Krijnen, M., & Frings-Dresen, M. H. W. (2005). Is staff well-being and communication enhanced by multidisciplinary work shift evaluations? *Intensive Care Medicine, 31,* 1409-1414.

Smith, G. S., Huang, Y. H., Ho, M., & Chen, P. Y. (2006). The relationship between safety climate and injury rates across industries: The need to adjust for injury hazards. *Accident Analysis & Prevention, 38,* 556-562.

Snyder, L. A., Krauss, A. D., Chen, P. Y., Finlinson, S., & Huang, Y. (2008). Occupational safety: Application of the job- demand- control- support model. *Accident Analysis & Prevention, 40,* 1713–1723.

Sorensen, O. H., & Homan, D. (2014). A participative intervention to improve employee well-being in knowledge work jobs: A mixed-methods evaluation study. *Work & Stress, 28,* 67-86.

Spangler, N. W., Koesten, J., Fox, M. H., & Radel, J. (2012). Employers perceptions of stress and resilience intervention. *Journal of Occupational and Environmental Medicine, 54*, 1421-1429.

Stratil, R., & Swincer, M. (2017, January 3). Work-related back pain study: measuring biopsychosocial risk factors 2012. Discussion paper. *WorkCover Corporation of South Australia.* Retrieved from https://www.rtwsa.com/__.../Back-pain-study-July-2012-measuring-biopsychosocial-risk-factors.doc.

Sutherland, V. J., & Cooper, G. L. (1992). Job stress, satisfaction, and mental health among general practitioners before and after introduction of new contract. *British Medical Journal, 304,* 1545-1548.

Taras, V., Kirkman, B. L., & Steel, P. (2010). Examining the impact of culture's consequences: a three-decade multilevel, meta-analytic review of Hofstede's cultural value dimensions. *Journal of Applied Psychology*, *95*, 405-439.

Taris, T. W., Kompier, M. A. J., Geurts, S. A. E., Schreurs, P. J. G., Schaufeli, W. B., de Boer, E., Sepmeijer, K. J., & Wattez, C. (2003). Stress management intervention in the Dutch domiciliary care sector: Findings from 81 organizations. *International Journal of Stress Management, 10,* 297-325.

Tsigos, C., Kyrou, I., Kassi, E., & Chrousos, G. (2016, March 10). *Stress, endocrine physiology and pathophysiology*. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK278995/

Tuckey, M. R., Bakker, A. B., & Dollard, M. F. (2012). Empowering leaders optimize working conditions for engagement: A multilevel study. *Journal of Occupational Health Psychology, 17,* 15–27.

Tuckey, M. R., Bakker, A. B., & Dollard, M. F. (2012). Empowering leaders optimize working conditions for engagement: A multilevel study. *Journal of Occupational Health Psychology, 17(1),* 15-27.

Uchiyama, A., Odagiri, Y., Ohya, Y., Takamiya, T., Inoue, S., & Shimomitsu, T. (2013). Effect of mental health of a participatory intervention to improve psychosocial work environment: A cluster randomized controlled trail among nurses. *Journal of Occupational Health, 55,* 173-183.

Van de Ven, B., de Jonge, J., & Vlerick, P. (2014). Testing the Triple- Match Principle in the technology sector: A two- wave longitudinal panel study. *Applied Psychology: An International Review, 63,* 300–325.

Van den Heuvel, M., Demerouti, E., & Peeters, M. C. W. (2015). The job crafting intervention: Effects on job resources, self-efficacy, and affective well-being. *Journal of Occupational and Organizational Psychology, 88,* 511-532.

Van den Tooren, M., de Jonge, J., & Dormann, C. (2011). The Demand- Induced Strain Compensation Model: Background, key principles, theoretical underpinnings, and extended empirical evidence. In A. Caetano, S. A. Silvia, & M. J. Chambel (Eds.), *New challenges for a healthy workplace in human services (*pp. 13–59). Mering: Rainer Hampp Verlag.

Van der Doef, M., & Maes, S. (1999). The Job Demand- Control (- Support) Model and psychological well- being: A review of 20 years of empirical research. *Work & Stress, 13,* 87–114.

Van der Hek, H., & Plomp, H. N. (1997). Occupational stress management programmes: a practical overview of published effect studies. *Occupational Medicine, 47(3),* 133-141.

Van der Klink, J. J., Blonk, R. W., Schene, A. H., & Van Dijk, F. J. (2001). The benefits of interventions for work-related stress. *American Journal of Public Health, 91(2),* 270.

Van Dierendonck, D., Schaufeli, W. B., & Buunk, B. P. (1998). The evaluation of an individual burnout intervention program: The role of inequity and social support. *Journal of Applied Psychology, 83*, 392-407.

Van Vegchel, N., de Jonge, J., Bosma, H., & Schaufeli, W. (2005). Reviewing the effort-reward imbalance model: Drawing up the balance of 45 empirical studies. *Social Science and Medicine, 60,* 1117–1131.

Van Wingerden, J., Bakker, A. B., & Derks, D. (2016). A test of a job demands-resources intervention. *Journal of Managerial Psychology, 31,* 686-701.

Van Wyk, B. E., & Pillay- Van Wyk, V. (2010). Preventative staff- support interventions for health workers. *Cochrane Database of Systematic Reviews, 3*. doi:10:1002/14651858.CD003541. pub2

Wakerman, J., & Davey, C. (2008). Rural and remote health management: "The next generation is not going to put up with this." *Asia Pacific Journal of Health Management, 3,* 13–18.

Wallbank, S., & Hatton, S. (2011). Reducing burnout and stress: The effectiveness of clinical supervision. *Community Practitioner, 84*, 31-15.

Wall, T. D., Corbett, J. M., Martin, R., Clegg, C. W., & Jackson, P. R. (1990). Advanced manufacturing technology, work design, and performance: A change study. *Journal of Applied Psychology, 75*, 691-697.

Weir, R., Stewart, L., Browne, G., Roberts, J., Gafni, A., Easton, S., & Seymour, L. (1997). The efficacy and effectiveness of process consultation in improving staff morale and absenteeism. *Medical Care, 35*, 334-353.

Wiese, B. S., Freund, A. M., & Baltes, P. B. (2002). Subjective career success and emotional wellbeing: Longitudinal predictive power of selection, optimization and compensation. *Journal of Vocational Behavior, 60*, 321–335. doi: 10.1006/jvbe.2001.1835

Winefield, H., Farmer, E., & Denson, L. (1998). Work stress management for women general practitioners: an evaluation. *Psychology, Health & Medicine, 3*, 163-170.

World Health Organization (WHO) (2008). *PRIMA- EF Guidance on the European framework for psychosocial risk management* (Protecting Workers' Health 9). Geneva, Switzerland: WHO.

Wu, S., Li, J., Wang, M., Wang, Z., & Li, H. (2006). Short communication: intervention on occupational stress among teachers in the middle schools in China. *Stress and Health, 22*,329-336.

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2007). The role of personal resources in the job demands- resources model. *International Journal of Stress Management, 14*, 121–141.

Yip, B., & Rowlinson, S. (2009). Job redesign as an intervention strategy of burnout: Organizational perspective. *Journal of Construction Engineering and Management, 135*, 737-745.

Yulita, Idris, M. A., & Dollard, M. F. (2014). A multi- level study of psychosocial safety climate, challenge and hindrance demands, employee exhaustion, engagement and physical health. In M. F. Dollard, A. Shimazu, R. B. Nordin, P. Brough, & M. R. Tuckey (Eds.), *Psychosocial factors at work in the Asia Pacific* (pp. 127–143). Dordrecht: Springer.

Zadow, A., & Dollard, M. F. (2016). Psychosocial safety climate. In S. Clarke, T. M. Probst, F. Guldenmund, & J. Passmore (Eds.), *The Wiley Blackwell Handbook of the Psychology of Occupational Safety and Workplace Health* (pp. 414-436). Chichester, UK: John Wiley & Sons Ltd.

Zadow, A. J., Dollard, M. F., McLinton, S. S., Lawrence, P., & Tuckey, M. R. (2017). Psychosocial safety climate, emotional exhaustion, and work injuries in healthcare workplaces. *Stress and Health*. Advance online publication. http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1532-2998/earlyview

Zadow, A. J., Dollard, M. F., & Tuckey, M. R. (2017). Psychosocial safety climate (PSC) as a meta-analytic framework for organizational stress intervention. In review.

Zadow, A.J, & Dollard, M.F., & Tuckey, M. R (May, 2015). *Organisational stress interventions*. 17th European Association of Work and Organisational Psychology Conference (Conference Proceedings). Paper presented in Oslo, Norway.

Zadow, A. J., Dollard, M. F., Tuckey, M. R., & Chen, P. (April, 2014). The dynamic role of psychosocial safety climate in frontline healthcare workplaces. In Andreou, N, J, A., Jain, A., Hollis, D., Hassard, J., & Teoh, K. *Looking at the past – planning for*

the future: Capitalizing on OHP multidisciplinarity. 11th European Academy of Occupational Health Psychology (Conference Proceedings). Paper presented in London, United Kingdom.

Zadow, A. J, Dollard, M. F., & Tuckey, M. R. (July, 2014). Organizational stress interventions in healthcare. In International Association of Applied Psychology (Ed.*) From Crisis to Sustainable Well-Being*. 28th International Congress of Applied Psychology. Paris: IAAP (Conference Proceedings). Paper presented in Paris, France.

Zadow, A. J., Dollard, M. F., & Tuckey, M. R. (September, 2014). *A meta-analysis of organisational stress interventions*. ICOH-WOPS (Ed.). Worker health: A basic human right for all. International Commission on Occupational Health: Work Organization and Psychosocial Factors (Conference Proceedings). Paper presented in Adelaide, Australia.

Zadow, A. J., Dollard, M. F., & Tuckey, M. R. (September, 2014). *Psychosocial and physical safety climate, health and safety performance in healthcare*. ICOH-WOPS (Ed.). Worker health: A basic human right for all. International Commission on Occupational Health: Work Organization and Psychosocial Factors (Conference Proceedings). Paper presented in Adelaide, Australia.

Zadow, A. J., Dollard, M. F., Tuckey, M. R., & Chen, P. (April, 2013). *Improving safety performance in healthcare using organisational stress interventions*. International Forum for Quality and Safety in Healthcare. Poster presented in London, United Kingdom.

Zadow, A. J., Idris, M. A., & Dollard, M. F. (April, 2016). Psychosocial Safety Climate theory meta-analysis. In K. Teoh, V. Dediu, Saade, N. J., & Hassard, J. *12th*

*European Academy of Occupational Health Psychology. (Conference proceedings). Occupational Health in Times of Change: Society and the Workplac*e. Paper presented in Athens, Greece.

Zapf, D., Dormann, C., & Frese, M. (1996). Longitudinal studies in organizational stress research: a review of the literature with reference to methodological issues. *Journal of Occupational Health Psychology, 1(2),* 145.

Zhang, Z., Zyphur, M. J., & Preacher, K. J. (2009). Testing multilevel mediation using hierarchical linear models: Problems and solutions. *Organizational Research Methods, 12(4),* 695-719.

Zimmerman, B. K., Haun, S., Dormann, C., & Dollard, M. (2009). Stress and reciprocity in service interactions: Main and moderating effects of psychosocial safety climate. In P. H. Langford, N. J. Reynolds, & J. E. Kehoe (Eds.), *Meeting the future: Promising sustainable organisational growth, 8th Industrial and Organisational Psychology Conference proceedings* (pp. 150–155). Sydney, Australia: Australian Psychological Society.

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

Zohar, D. (2000). A group-level model of safety climate: Testing the effects of group climate on microaccidents in manufacturing jobs. *Journal of Applied Psychology, 85,* 587-596.

Zohar, D. (2002). The effects of leadership dimensions, safety climate and assigned priorities on minor injuries in work groups. *Journal of Organizational Behaviour, 23,* 75–92.

Zohar, D. (2003). Safety climate: Conceptual and measurement issues. In J. C. Quick & L. E. Tetrick (Eds.), *Handbook of occupational health psychology* (pp. 123–142). Washington, DC: American Psychological Association.

Zohar, D. (2008). Safety climate and beyond: A multi-level multi-climate framework. *Safety Science, 46(3),* 376-387.

Zohar, D. (2010). Thirty years of safety climate research: Reflections and future directions. *Accident Analysis and Prevention, 42,* 1517-1522.

Zohar, D., & Luria, G. (2005). A multilevel model of safety climate: Cross- level relationships between organisation and group- level climates. *Journal of Applied Psychology*, *90*, 616–628

Appendix A

Industry Report (Names are Removed to Maintain Confidentiality)

Overview

This appendix describes the industry activities and reports that were completed as part of this thesis. This research activities in this thesis were specifically developed to promote industry and end-user informed research promoting an opportunity to engage meaningfully with industry and provide research outcomes that are informed, leading-edge and relevant to translate research evidence into accessible communication designed for external audiences outside of the academic community. Industry collaboration involved reporting information to seek support and investment in the project, and providing a report summarizing the research data for the managers of the three private hospitals involved in the data collection to provide them with an overview of features of work, work processes, and systems of work within their workplaces, to target action to eliminate or minimise psychosocial risks, and develop psychosocially healthy work systems. These industry activities and reports show detailed preliminary investigations that are subsequently expanded in the thesis (see Chapter 4).

The scope and material of the report was determined by the managers following consultation at the national management level, and with state and local managers. The industry partners were keen to have a report with specific information they could use to improve their systems. They felt that a practical report, written in language that they could understand, with very specific information tailored to their requirements, would enable them to use the research findings effectively. Both documents were written by Amy Zadow, PhD

Candidate, under the supervision of Professor Maureen Dollard and Associate Professor Michelle Tuckey.

This industry reports represent a critical industry collaboration to ensure that the academic work could be utilized by the hospitals to assist them to identify specific areas warranting further attention and improvement, to develop mentally healthy hospital work environments. The PhD candidate, Amy Zadow, spent more than twelve months building the industry relationships including organising multiple meetings with the industry partners to discuss the proposed research, and further meetings with SA Health, consumer engagement representatives, the Australian Nursing and Midwifery Federation (ANMF), the Self Insurers of South Australia (SISA) and a member of the South Australian Parliament. The research survey, piloted data collection processes, and statistical findings, provided the basis for the tools and methods used in the larger Australian Research Council project conducted with the Southern Local Health Network (2015-2017). A wide range of measures were used in the industry report and this exploratory work assisted to delineate important relationships that are elaborated and reviewed in more detail in the thesis (see Chapter 4).

Abstract

Industry collaboration is a crucial aspect of research work in healthcare. This appendix describes the industry engagement processes used in the development and reporting of this research project. The first section, work undertaken at the commencement of this project, shows the material developed to present a business case for industry support, highlighting the need for industry research examining psychosocial risk factors, and psychological health in healthcare. The second section summarises the results of a three month data collection process, with practical recommendations, in a format determined by the industry partner who was seeking results that could be immediately translated to practice. For the second report

participants were healthcare employees (N = 288) from three private hospitals. Results demonstrated that physical safety climate (at the organisational and team level) and psychosocial safety climate (PSC) (at the team level), were generally lower than the specified benchmark while emotional exhaustion and fatigue were generally higher, particularly among the clinical staff at one specific hospital and the non-clinical staff at another hospital (the names have been removed to protect confidentiality). Further statistical analysis using correlational data showed a strong relationship between these variables and reported near misses, musculoskeletal pain, and accidents and injuries. Engagement scores were in general positive and team psychological safety scores were high suggesting that employees were keen to invest effort and persist when difficulties arise, were enthusiastic, inspired, and engrossed at work, and felt safe to take risks to improve their learning and performance within their work group. Benchmark scores were provided at the item level for each hospital as requested by the management team. Recommendations for improvement were outlined. The exploratory data collected during this project identified particular areas (the erosion of psychological health, work injuries and reporting practices) requiring more detailed attention and this helped to direct research attention to this area which is expanded and elaborated in Chapter 4.

Introduction

SafeWork SA is responsible for providing work health and safety services across South Australia. In this role SafeWork SA administer Work Health and Safety Acts and Regulations, have inspectors who ensure that public safety standards are met and action is taken when breaches of law occur, and provide information, support and advice to industry, workers, and work, health and safety representatives (SafeWork SA, 2013). The following section was part of a report provided to SafeWork SA in July, 2012, to provide information to specify the importance of considering the role of psychosocial safety climate (PSC) and

psychosocial risk factors, in combination with physical safety climate, in work health and safety research, and provide recommendations for future research.

Workplace fatalities, injuries, and illnesses, both physical and psychological, result in estimated economic losses of approximately $57.5 billion dollars or 5.9% of Australia's gross domestic product (Safe Work Australia, 2009). Two separate bodies of research have examined different components of workplace health; the work stress literature has examined psychosocial risk factors and psychological health (i.e. Demand – Control Theory, Karasek, 1979; Demand-Control-Support Model, Karasek & Theorell, 1990; Job Demand-Resources Theory, Demerouti et al, 2001) while the safety climate research has predominantly demonstrated that safety climate is related to accidents and injuries related to physical health (Nahrgang, Morgeson, & Hofmann, 2011; Silva, Lima, & Baptista, 2006). Integrating these two paradigms is conceptually and methodologically complex as safety climate research is evident at the level of the organisation while models of work-related stress typically examine the individual and task conditions.

Recent research has identified an organisational measure influencing psychological workplace health, psychosocial safety climate (PSC) (Dollard & Bakker, 2010; Dollard & Karasek, 2010; Hall, Dollard, & Coward, 2010; Law, Dollard, Tuckey, & Dormann, 2011). Psychosocial safety climate, defined as policies, practices and procedures for the protection of worker psychological health and safety, is identified as a precursor to the individual and task conditions described in current models of work related stress (Dollard & Bakker, 2010), and as a moderator of the impact of adverse task conditions (Law et al., 2011; Dollard, Tuckey, & Dormann, 2011). A significant gap in the literature is the examination of the safety climate research together with the work stress literature. This research project will address this gap by integrating these two types of research, the safety climate research and the work stress literature, to examine the relationship between physical safety climate and

psychosocial safety climate and identify their unique and combined contribution to workplace conditions and safety outcomes. This will draw the knowledge bases together and generate an interdisciplinary approach to the management of physical and psychological workplace health.

Meta-analytic studies have demonstrated that physical safety climate is a robust leading indicator of safety outcomes across industries and countries (Christian, Bradley, Wallace, & Burke, 2009; Zohar, 2009). Recent meta-analytic research examining components of the Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2007; Bakker, Demerouti & Euwema, 2005; Bakker, Demerouti & Schaufeli, 2003) and safety outcomes has identified that safety climate predicts levels of accidents and injuries directly and via psychological health and safety compliance (Nahrgang, Morgeson, & Hofmann, 2011). Important longitudinal research has also identified a relationship between safety motivation, safety behaviour and accident levels (Neal & Griffin, 2006). Workplace safety research is plagued by lack of theory, weak methodology, and unclear conceptualizations of constructs, while studies of antecedents to safety have tended to focus on either individual differences or contextual factors but rarely both (Christian et al., 2009). It is critical that research is performed examining both individual and organisational factors, bringing together the disparate elements of the research into a clear conceptual framework. The identification of the contribution of psychosocial safety climate in the development of workplace accidents provides important information that can be used to influence the development of the work conditions well before the accidents occur. Initiating change at the level of the organisation rather than at the individual level offers an opportunity for wide-spread, cost effective intervention.

It is important to focus on the healthcare industry as the Australian health care system costs over $100 billion per year (nearly ten percent of gross domestic product) (Runciman,

2011). Despite extensive costs at least ten percent of admissions to acute care hospitals are associated with health-care associated harm (Runciman, Merry, & Walton, 2007). A study in the United States analysing the complete medical records of 4612 patients, established that overall only 54.9% received appropriate recommended care (McGlynn et al., 2003). Yet system based changes have not improved patient safety (Runciman, 2010). Patient safety is multidimensional and an understanding of the complex dynamic sociotechnical systems comprising healthcare is required (Braithwaite, Runciman, & Merry, 2009). Evidence suggests that aspects of safety climate can be targeted to improve patient safety (Clarke, Rockett, Sloane, & Aiken, 2002; Hofmann & Mark, 2006; Kudzielzki, McCorrick, Zurkowzki, & Herndon, 2011; Naveh , Katz-Navon, & Stern, 2005; Rosen, Singer, Shebei, Shokeen, Meterko, & Gaba, 2010; Singer, Schoutzu, Falwell, Gaba, & Baker, 2009; Squires, Tourangeau, Spence Laschinger, & Doran, 2010; Thomas, Sexton, Neilands, Frankel, & Helmreich, 2005; Vogus & Sutcliffe, 2007; Weaver, Wang, Fairbanks, & Patterson, 2012). Clear links have been established between staff psychological health and patient safety (Berland, Natvig, & Gundersen, 2008; Reid, 2011; Reiman, Pietikainen, & Oedewald, 2010). The research evidence indicates that safety climate and the psychological health of health care workers directly impacts upon levels of patient safety. A gap in the literature is the bringing together of the organisational level phenomena supporting psychological and physical health (psychosocial safety climate and physical safety climate) and the individual characteristics (work conditions and psychological health) to examine their unique and combined contribution to patient safety.

Arising from significant gaps in the research literature is the development of a total safety model to manage workplace health and safety. The model incorporates both physical/ bio-mechanical safety climate and psychosocial safety climate (Dollard & Bakker, 2010; Dollard, Tuckey, & Dormann, 2011; Law, Dollard, Tuckey, & Dormann, 2011).

Incorporating psychosocial risk factors, physical safety climate, psychological health, and safety outcomes for both hospital staff and patients within multi-layered organisations within the context of a total safety model will provide a deeper understanding of the factors that predict safety performance in individuals and organisations. Although relationships between psychosocial safety climate, physical safety climate, work conditions, psychological and physical health, and safety performance, have been demonstrated using meta-analysis (Christian, Bradley, Wallace, & Burke, 2009; Clarke, 2010; Nahrgang, Morgeson, & Hofmann, 2011), these variables have not been examined in combination as part of the same system in the research literature

SafeWork SA's purpose is to support the South Australian Strategic Plan (SASP) through the OHSW Research Strategy for South Australia (the Research Strategy), by conducting research aimed at preventing work-related injury and illness. The focus of the research is on the prevention of work-related injury. SafeWork SA (SWSA), as a SA Government Division within the Department of Premier and Cabinet, promotes safe, fair and productive workplaces in South Australia. This research will address the specified targets in the South Australian Strategic Plan 2003 – 2013, reflecting the targets in the National OHS Strategy 2002 – 2012, in particular supporting Target 2.11, the 40% reduction in workplace injury, and T 4.10, to obtain a substantial share of national available research grant funding. The project will assist SWSA to improve its performance as a regulator and promoter of safe work by working within a high risk industry, to identify risk factors and target interventions to improve safety climate and performance, and reduce work related injuries and compensation claims.

The research will directly address the SASP priorities including 1) the reduction of high incidence/ severity risks, 2) improving the capacity of workplace partners, stakeholders, government and community to manage OHS effectively to improve and influence outcomes,

3) preventing occupational disease more effectively, and 4) eliminating hazards in the design stage. The project will focus on the health services industry which is an identified national priority. Furthermore this project will address multiple recommendations in the OHSW Research Strategy for South Australia (Blewett, 2009) including: 1) the encouragement of growth in the capacity and capabilities of researchers through the collaboration with a range of researchers with a variety of perspectives and research expertise; 2) encouraging skill and knowledge development by allowing research projects to include exchanges between industry (public and private hospitals), universities (UNISA), government (SA Health and SafeworkSA) and unions (ANMF and SASMOA); 3) addressing a key project area, psychosocial risks, and 4) SWSA actively targeting ARC Linkage projects with multiple researchers and research organisations .

In 2008 to 2009 the total South Australian workers' compensation claims received by registered employers were 20, 361,000 and for self-insured employers the total was 7, 033, 000. The community services sector had the highest remuneration by industry with a total cost of more than $10 billion dollars. Of the total income claims psychological disorders were the second highest percentage of claims with 13.5% and musculoskeletal claims were the third highest percentage of claims with 12.6% of all claims. The average cost of income claims for psychological disorders was $25, 207. Musculoskeletal and psychological disorder claims had the longest duration with 53.5% of musculoskeletal claims exceeding 65 days and 51.1% of psychological disorder claims exceeding 65 days. It is important to note that numbers of claims and costs are likely to be significantly higher as claims are understated due to reporting lags and the exclusion of secondary mental disorders. Clearly psychological claims and musculoskeletal claims present a significant percentage of all claims and the severity of these claims is apparent as they take longer to resolve than other categories and have greater income costs than all but one other category of claims.

Claim statistics for total claims, psychological claims and musculoskeletal claims are outlined for Registered Nurses, Enrolled Nurses and Personal Care Assistants in Table 1. The total approximate costs of psychological claims for Registered Nurses (N = 21), Enrolled Nurses (N = 9) and Personal Care Workers (N = 18) was $482, 211. Prevention of just five claims in each employment category would save $163, 930 which would fully cover the cost of the project. This does not include musculoskeletal claims which current research has demonstrated are influenced by psychosocial factors (Bongers et al. 2006; Dollard et al., 2012). The total approximate costs of musculoskeletal claims for Registered Nurses (N = 70), Enrolled Nurses (N = 24) and Personal Care Workers (N = 136) was $2, 522, 874. Prevention of just four musculoskeletal claims in each category (only 12% of claims) in 2008 to 2009 would save $197, 176 also fully justifying the cost of the project.

These figures exclude the broader impact of the research with the findings anticipated to influence a range of other industries and potentially reduce a wider range of physical injuries. It is anticipated that the research will enable the development of interventions that can be applied across South Australia in numerous industry settings reducing work place injuries and associated claims. The research findings will also provide benefits beyond the reduction of workplace injuries and associated costs. Australian workers at high risk of depression have an annual productivity decrement of $12,700 (Whiteford et al., 2005). Findings will provide important risk assessment and intervention information to stakeholders to target interventions to reduce high social costs i.e. depression and CVD (Stansfeld et al., 2006) and organisational costs i.e. absenteeism, turnover, and reduced performance (Head et al., 2006).

Injury Type	Occupation	Number	Average Cost
All claims	Registered Nurse	180	$5, 105

(Registered)	Enrolled Nurse	114	$5, 474
	Personal Care Assistant	527	$5, 111
All claims (Self-Insured)	Registered Nurse	378	$5, 864
	Enrolled Nurse	211	$5, 602
	Personal Care Assistant	316	$4, 546
Mental Disorders (Registered)	Registered Nurse	*	*
	Enrolled Nurse	*	*
	Personal care Assistant	18	$ 8, 689
Mental Disorders (Self-Insured)	Registered Nurse	21	$9, 078
	Enrolled Nurse	9	$15, 019
	Personal Care Assistant	*	*
Musculoskeletal (Registered)	Registered Nurse	22	$10, 984
	Enrolled Nurse	*	*
	Personal Care Assistant	98	$10, 530
Musculoskeletal (Self-Insured)	Registered Nurse	48	$12, 587
	Enrolled Nurse	24	$15, 193
	Personal Care Assistant	38	$7, 381

Note. *Indicates that statistics for this category are not available

There is an urgent need to address the issue of work stress and its health and productivity implications in South Australian workplaces. Estimates from the Australian Workplace Barometer project are that 9% of serious depression is due to job strain (jobs combining high demands and low control), and workplace bullying (McTernan, Dollard, & LaMontagne, 2012). Other estimates are that stress-related lost productivity costs the Australian economy $14.8 billion p.a., or 1.78% of GDP (Medibank Private Ltd, 2008). Added to this, experts forecast increased work intensification and lean production systems where workers are required to cope with greater pressure and fewer resources (International Labour Office, 2010). Given these significant health, social and economic costs, work stress

needs to be addressed, particularly since the weight of evidence suggests that it is eminently preventable.

Prevention and reduction of work-related injury and illness is the main focus of this research project, consistent with South Australian Strategic Plan 2003–2013 objective to reduce workplace injuries by 40%. This research will measure the relationship between types of safety climate (psychosocial and physical), safety performance (safety compliance and participation), and safety outcomes (i.e., near misses, medically treated minor and compensated injuries/ illnesses, and incident data) within public and private hospitals in South Australia. An innovation of the project is studying worker and patient safety together as part of a total safety system. The ultimate outcome of the project is the development of a total safety system model incorporating surveillance of critical features of work specifically, work processes and systems of work, that can be designed to eliminate or minimise hazards or risks. This goal is consistent with the 'Healthy and Safe by Design' objective of the draft Australian Work, Health and Safety Strategy 2012-2022. The project will provide critical risk assessment and intervention information to target interventions to improve psychological, physical health, and safety performance in South Australian healthcare and other industrial sectors reducing the impact of workplace injuries. The safety climates for psychological safety as well as physical safety have been treated separately within the research literature. Integrating these two aspects of safety climate with work conditions, and safety performance is crucial to improve the psychological and physical health of workers and reduce injury, accidents and illness.

Recent benchmarking of occupational health and safety in Australian business regulation found that psychosocial hazards at work, such as bullying and harassment, that give rise to work related stress, are not given the same attention in OHS legislation and by OHS inspectors as physical hazards (Productivity Commission, 2010). This is a problem

because total health is a basic worker human right and poor psychological health has significant attendant costs including reduced well-being, performance, increased sickness absence and workers compensation claims. So far, relationships between these individual elements have not been examined in combination as part of the same system. Our aim is to better predict accidents and errors through the examination of psychosocial and physical elements of both hazard and behaviour pathways (see Figure 1).

We know from the literature that safety climate affects safety motivation, which is the most proximal determinant of safety behaviour (Neal & Griffin, 2006). Safety behaviour in turn affects accidents and errors, which in the context of our project represent worker and patient safety. This process is represented in the lower part of the model and is our first major hypothesis (H1). A novel aspect within the current project is examining psychosocial and physical safety climate together as predictors of this safety behaviour pathway (see Figure 1). Our project will add a hazard pathway to this existing knowledge. Psychosocial safety climate is a leading indicator of psychosocial hazards which in turn are major influences on well-being. We have established these links in our prior work (Dollard & Bakker, 2010; Dollard, Tuckey, & Dormann, 2012; Idris, Dollard, Coward, & Dormann, 2012; Law, Dollard, Tuckey, & Dormann, 2011; Tuckey, Bakker, & Dollard, 2012; Tuckey, Winwood, & Dollard, 2012). This pathway represents our second hypothesis (H2). Safety climate is also a trigger for this pathway, which has not yet been explored and represents a second innovative aspect of our project (H2). The project will also test three new relationships, not yet examined in the research literature, that link the psychosocial pathway to the existing safety climate knowledge base. First, we expect that hazards will undermine safety motivation (H3a). Recent meta-analytical research identifies that risks/ hazards predict safety behaviour (Nahrgang, Morgeson, & Hofmann, 2011). Research has also demonstrated safety motivation as a strong predictor of safety behaviour (Neal & Griffin, 2006). A gap in the literature is the

examination of the relationship between risk factors/ hazards and safety motivation. Second, poor psychological well-being will also undermine safety motivation (H3b). Meta-analytic research has demonstrated relationships between psychological safety climate and psychological well-being and psychological safety climate and safety motivation, yet the examination of the relationship between psychological well-being and safety motivation is a further gap in current research knowledge (Parker, Baltes, Young, Huff, et al., 2003). Third, well-being will have a direct effect on safety outcomes for healthcare workers and patients including errors, near misses, medically treated minor and compensated injuries/ illnesses and incident data (H3c). Relationships between psychological health and safety outcomes have been demonstrated (Clarke, 2010; Goldenhar, Williams, & Swanson, 2003; Oliver, Cheyne, Tomas, & Cox, 2002; Siu, Phillips, & Leung, 2004). These cross-links are a significant gap in the literature.

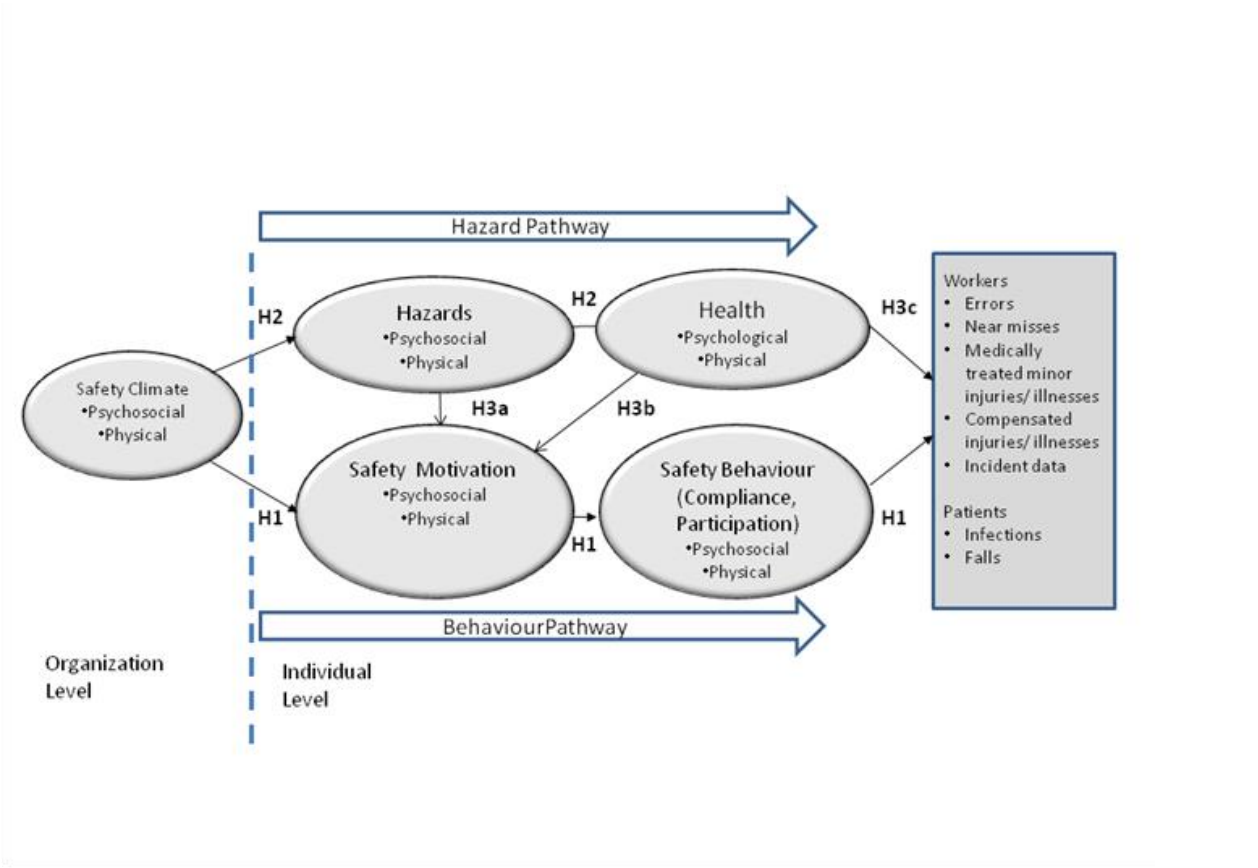

Figure 1. Total safety model.

This project will identify strategies to improve safety climate and safety outcomes, and develop a research partnership that will inform future state safety initiatives and create a total safety system model. This model will incorporate critical features of work, work processes, and systems of work. These workplace features are the target for national action to eliminate or minimise hazards by effective design as outlined in the draft Australian Work, Health and Safety Strategy 2012-2022. This project builds upon the findings of the Australian Workplace Barometer project to extend current knowledge of the development of workplace injuries.

The Australian Workplace Barometer project aims to provide science driven evidence of Australian work conditions and their relationships to workplace health and productivity, through the development of a national monitoring and surveillance system. The research has attracted funding from the ARC Discovery scheme 2008-2011, and the ARC Linkage Scheme 2010-2012 in collaboration with Safework SA and SA Health. The AWB tool is based on: (1) a sound theoretical basis for structure and content (i.e. extended JD-R theory); (2) appropriate length for valid assessment without compromising response rates; and (3) item content for international benchmarking (e.g. COPSOQ, Kristensen et al., 2005; JCQ-2, Karasek et al., 1998, www.jcqcenter.org, Dollard et al., 2007). The Australian Workplace Barometer project has built a high quality evidence base regarding 'the right climate' and work conditions, to assist employers, practitioners, and policy makers to prevent workplace psychosocial hazards through a national comprehensive monitoring system of psychosocial safety conditions and psychological health status.

Arising from the work of the AWB project is need for the development of a Total safety model to manage workplace health and safety and incorporate both physical/ bio-mechanical safety climate and psychosocial safety climate (Dollard & Bakker, 2010; Dollard,

Tuckey, & Dormann, 2011; Law, Dollard, Tuckey, & Dormann, 2011). A limitation of the current AWB data set is that it cannot assess the dynamic nature of components of this model such as psychosocial safety climate within organisations. A new research project to take place in hospitals is proposed incorporating the AWB tool to assess all the components of the total safety model including psychosocial risk factors, physical safety climate, psychological health, and safety outcomes for both hospital staff and patients within multi-layered organisations. A recent study of Australian hospitals has identified a relationship between organizational culture, leadership, and accreditation performance including safe work practices (Braithwaite et al., 2010). Hospital stakeholders report that the assimilation of disparate data sets and systems to maximise the efficiency of safe work practices and worker and patient safety is unique, practically achievable, and exhibits the potential to dramatically improve current injury and illness rates and associated costs.

This is a relatively low cost project. Prevention of just fifteen claims (31% of the psychological claims in the amongst nursing and personal care staff for 2008-09) would save $163, 930 which would fully cover the cost of the project. This does not include musculoskeletal claims which current research has demonstrated are influenced by psychosocial factors (Bongers et al. 2006; Dollard et al., 2012). Prevention of just sixteen musculoskeletal claims (only 12% of claims in 2008 to 2009) would save $197, 176 also fully justifying the cost of the project. Workplace injury encompasses direct and indirect costs. While the proposed research will reduce the known costs of injury at work documented in the WorkCover SA Statistical review 2008 -2009 such as income maintenance there are a range of other indirect costs that will also be affected by the research findings outlined in Table 2.

Table 2

Direct and indirect cost of injury for the workplace (Barnett, Hordacre, Spoehr, & Parnis, 2010)

***DIRECT* COSTS OF WORKPLACE INJURY**

Incapacity payments for lost earnings
Medical costs
Rehabilitation costs
Property damage
***INDIRECT* COSTS OF WORKPLACE INJURY**
Cost of investigation reports
Cost of replacement equipment
Time lost from work = lost productivity
Loss of skills, experience and knowledge
Absenteeism, turnover, workplace conflict
Cost of recruitment, replacement and training
Increased workload pressure and uncertainty for co-workers
Damage to the organisation's reputation as an attractive workplace

In summary, this project was designed to explore differences in climate levels in hospitals in terms of important contextual factors, to give insight into the development of health and safety outcomes, to assist industry partners to take action to improve workplace safety. These issues were addressed for the first time in this research. The proposed research questions are 1) how do physical and psychosocial safety climates work together to predict working conditions and health and safety outcomes? and 2) what strategies will improve psychosocial safety climate and physical safety climate, working conditions, and the health and safety of workers and the quality of patient care? The industry report following will address these questions with the initial pilot study examining these relationships.

Method

This section describes the methods used to conduct the research used in the industry report presented to the hospital management. Ethics approval was given by the University of South Australia and the hospital group ethics committee. The self-report data was obtained by PhD Candidate, Amy Zadow, with assistance from two Research Assistants, Ali Afsharian and Amber Rose Robey, who visited the hospitals and collected data using iPads and paper surveys. Employees completed the surveys in 2013. The initial response rate was 26 teams

(48% of team members completed the survey), with *N* = 288. Both clinical (operating theatres, maternity, day procedures, wards, palliative care and specialist areas such as oncology and allied health) and non-clinical teams (administration, catering, cleaning, and maintenance) participated. Executive managers and managers within each local hospital *(N* = 25) also completed a separate version of the survey which was modified for this purpose.

The survey data was re-identifiable. Participants completing the survey were asked to provide a code known only to the participant to enable the matching of responses over time. It was critically important that the longitudinal data was re-identifiable as this would allow the researcher to examine future processes as they evolve over time, taking account of effects both within and between people and within and between workgroup variability. The code was provided by the survey participants and was a code only known to the participant. It was generated using a combination of personal information only known to the participant (e.g. a combination of the first letter of their mother's and father's names and the day of the month that they were born). Previous research projects (Dollard, Opie, Lenthall, Wakerman et al., 2012) have used personal codes provided by participants and have strictly maintained anonymity and confidentiality using this approach.

The ethics protocol was approved by UniSA's Human Research Ethics Committee on the 4th of July, 2013 (‘Psychosocial and physical safety climate, health and safety performance in healthcare’ Application ID: 0000031349). This protocol was developed specifically for the Health Care group. Ethics approval was also provided by the hospital committee. A further ethics application incorporating private and public hospital groups constituting the complete Australian Research Council project was approved on the 29 September, 2013 (‘Dynamic interplay of physical and psychosocial safety in frontline healthcare workplaces in Australia and Malaysia’ Application ID: 0000031816). It was

determined that both protocols met the requirements of the National Statement on Ethical Conduct in Human Research.

Staff recruitment involved the following steps. The Work Health & Safety Facilitator would speak to staff in advance and make them aware of the purpose of the research and when the researchers are expected to attend the hospital. The research team attended the hospitals on the days specified and set up in an appropriate area (i.e. staff room). Participants were invited to approach the research team to participate in the research project. The researcher provided an information sheet to each potential participant (documented on the first page of each survey). The information sheet that was distributed with the questionnaires assured participants that participation in the study was voluntary, that personally identifying information would be protected, that the specific information that they provided would not be made available to their employer, and that participation in the study would not compromise their employment For the quantitative research a critical addition to current theoretical and empirical knowledge in the area is the analysis of differences in measures between organisations, work groups, and individuals. To detect differences between organisations a large sample was required. This sample size enabled cross sectional analysis of different senior management/ leadership structures and climate factors between-organisations, in combination with variation among work units (Scherbaum & Ferreter, 2009).

Measures

The measures used in the data collection are described below. This document was provided to the Health Care management team to assist them to interpret the industry report. These scale measures were included in entirety for the workers' survey (N = 263). Separate surveys for senior managers and team leaders incorporated only measures of psychosocial safety climate and physical safety climate (N = 25).

Psychosocial safety climate (PSC).

This was measured using the 12-item PSC scale (PSC-12; Hall, Dollard, & Coward, 2010) comprised of four sub-scales: management commitment, organizational communication, management priority, and organizational participation. Respondents were informed that "The next set of questions concern the psychological health and safety in your workplace. Positive psychological health includes feelings of belongingness, self-esteem, wellbeing, feeling enthusiastic about work, sense of purpose and fulfilment. Poor psychological health may be perceived as feeling stressed, worried, tired, detached, cynical, alienated, overextended, exhausted, distressed or sad. Please consider each question in relation to your whole organisation, and indicate your level of agreement" (note this prelude was included at the request of the organisation). An example item is: "Management shows support for stress prevention through involvement and commitment" (management commitment), and "Management clearly considers the psychological health of employees to be of great importance" (management priority). Items were rated on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). At the team level Cronbach's α was .96, and the intraclass correlation (ICC) was 21 while at the organisational level Cronbach's α was .96, and the ICC was 23.

Physical safety climate.

This was measured using the 12-item scale developed by Idris and colleagues (2012), comprising the same base 12 PSC items across four sub-scales, but with the item stem changed to "the next set of questions concerns physical health and safety in your workplace. Please consider each question in relation to your whole organisation". Words such as 'psychological' were replaced with 'physical'. Responses were on a 5-point scale, from 1 (strongly disagree) to 5 (strongly agree). Items such as: "Management shows support for

injury prevention through involvement and commitment" (management commitment) and "Management clearly considers the safety of employees to be of great importance" (management priority) (Hall, et al., 2010), were added to form a global scale (α = .97). At the team level Cronbach's α was .95, and the ICC was 11 while at the organisational level Cronbach's α was .95, and the ICC was 14.

Perceived organizational support.

We used the 6-item Perceived Organizational Support scale (Eisenberger et al., 2001), with slight modification to ensure respondents answered with reference to the work unit, e.g. ''In my team, management is willing to help me if I need a special favour''. This is the version used by Idris, Dollard, Coward, & Dormann (2011). Responses were on a 4-point scale, 1 (strongly disagree) to 4 (strongly agree). Cronbach's α was .87, and the ICC was 16.

Team psychological safety.

This was measured using the 7-item team psychological safety scale (Edmondson, 1999). An example item is ''No-one on this team would deliberately act in a way that undermines my efforts''. Responses were on a 4-point scale, 1 (strongly disagree) to 4 (strongly agree). Cronbach's α was .79, and the ICC was 11.

Job demands and resources.

Job demands were assessed by (1) psychological demands and (2) emotional demands. For psychological demands, there were six items on this scale each concerning an aspect of work pressure such as 'I have to work through my breaks and lunch/dinner in order to catch up at work'. Cronbach's α was .76, and the ICC was 16. For emotional demands, there were 4-items on this scale, with items such as 'my work places me in emotionally challenging situations'. Cronbach's α was .86, and the ICC was 22. For physical demands Cronbach's α was .76, and the ICC was 28. Job resources were assessed by (1) skill discretion and (2)

decision authority. Skill discretion was assessed with 6 items, with items such as 'I have an opportunity to develop my own special abilities'. Cronbach's α was .72, and the ICC was 34. Decision authority was measured using 4-items, for example 'My job allows me to make decisions on my own'. Cronbach's α was .51, and the ICC was 11. The demands and resources measures were all from the Job content questionnaire (JCQ 2.0), and were measured on a 4-point Likert scale from 1 (strongly disagree) to 4 (strongly agree). Certain items were reverse coded to reflect this Likert scale as required.

Work Engagement.

The Utrecht Work Engagement Scale – Shortened Version (UWES-9) was used to measure work engagement and its three components; vigour, dedication and absorption. All three subscales consist of three items measuring a different facet of engagement; vigour, e.g. 'At my work, I feel bursting with energy' (Cronbach's α was .51, and the ICC was 4); dedication, e.g. 'My job inspires me'(Cronbach's α was .07, and the ICC was 3); and absorption, e.g. 'I get carried away when I am working' (Cronbach's α was .30, and the ICC was 9). Like emotional exhaustion, these items were all measured on a 7-point scale from 1 (never) to 7 (every day). Cronbach's α, and the ICC for the entire work engagement scale was .73 and 6 respectively.

Safety engagement (safety motivation and safety behaviour)

Safety motivation was measured using a 3-item Likert scale designed to identify the extent to which participants believed that safety was an important aspect of their job. This scale was used by Neal and Griffin (2006). Questions were rephrased to focus on psychological health. Responses range from 1 (strongly disagree) to 5 (strongly agree), and include items such as 'I feel that it is worthwhile to put in effort to maintain or improve my psychological health'. Cronbach's α was .88, and the ICC was 12.

Safety behaviour was assessed using the safety behaviour instrument utilised in Neal and Griffin. These questions were restructured to assess safety behaviour relating to psychological health. This 3-item Likert scale asks participants the level to which they agree or disagree with statements such as 'I promote the management of psychosocial risks within the organization'. Responses range from 1 (strongly disagree) to 5 (strongly agree). Cronbach's α was .75, and the ICC was 2. Safety motivation and behaviour was combined to create a combined variable named total safety engagement (Cronbach's α was .76, and the ICC was 2).

Emotional exhaustion.

Emotional exhaustion was measured using the five-item scale from the Maslach Burnout Inventory (MBI) (Schaufeli, Leiter, Maslach, & Jackson, 1996). Participants responded on a 7-point scale, from 1 (never) to 7 (every day), to situations such as: "I feel tired when I get up in the morning and have to face another day on the job". Cronbach's α was.75, and the ICC was 8.

Demographic information.

Demographic questions included age, gender, employment status, hours worked last week, whether the staff member was a senior manager, team manager or employee, the team (e.g. oncology, catering), whether the worker worked for a labour hire agency, the amount of years the worker had worked for the current employer, the time period usually worked, and whether the worker was a member of a union or employee organisation that looks after employees interests (e.g. Australian Nursing and Midwifery Federation, Australian Medical Association)

Work injuries.

Self-report reported work injuries were defined as the number of safety accidents (i.e., accidents that have caused a physical injury) or an injury causing psychological or emotional

harm experienced in the last twelve months that were reported to the safety risk management system. Self-report unreported work injuries were identically defined, including both physical and psychological events but referred to those that were not reported to the safety risk management system database. Responses were on a 7-point scale from 1(none) to 7 (6 or more).

Near miss accidents.

Near miss accidents were measured using a single item "How frequently do you experience near-miss accidents (i.e. something that could have caused an injury but did not)? Participants responded on a 5-point scale from 1(never) to 5 (daily).

Musculoskeletal Injuries

To measure musculoskeletal pain participants were asked indicate how much muscular pain they had experienced over the past seven days. Three questions were asked; "how much were you bothered by back or neck pain?", "how much were you bothered by pain in your arms, legs, or joint areas like knee or hips?" and "how much were you bothered muscle soreness?" Responses were scored on a 4-point scale from 1 (not at all) to 4 (a lot). Cronbach's alpha was .89 and the ICC was 4.

Absenteeism.

This was assessed in relation to physical and psychological health. Workers were asked whether "in the past 4 weeks (28 days) how many days did you miss an entire work day because of problems with your physical health?" The same question was also asked where the word 'physical' was replaced with 'psychological'. Responses with were scored on a 5-point Likert scale from 1 (no days missed) to 5 (more than 5 days).

Patient care.

Conflict between patient and worker needs was assessed by a single item: “Have you experienced a situation where your patient’s needs outweigh the perceived benefits of complying with safety precautions?” Responses were scored on a 7-point likert scale from 7(more than 5 times per day) to 1 (never).

Bullying.

Two questions were asked in relation to bullying. Before the set of these questions a statement was provided as follows: ‘The next set of questions relate to the bullying you have experienced at work. Bullying is a problem as some work-places and for some workers. To label something as bullying the offensive behaviour has to occur repeatedly over a period of time, and the person confronted has to experience difficulties defending him or herself. The behaviour is not bullying if two parties of approximate equal “strength” are in conflict or the incident is an isolated event.’ The first question relating to bullying exposure asked “How often were you exposed to bullying from managers, supervisors, or colleagues in the past six months?” Responses were scored on a 5-point scale from 1 (never) to 5 (daily). The second question relating to bullying duration asked “If you have experienced bullying how long have you been exposed to bullying from managers, supervisors or colleagues?” Responses were scored on a 5-point scale from 1 (less than 1 year) to 5 (more than 10 years).

Workplace violence.

Two questions were asked in relation to workplace violence. The first question relating to violence exposure asked “How often were you exposed to violent behaviours from patients in the past six months?” Responses were scored on a 5-point scale from 1 (never) to 5 (daily). The second question relating to violence duration asked “If you have been exposed to violence from patients, how long have you been exposed to violent behaviours from

patients?" Responses were scored on a 5-point Likert scale from 1 (less than 1 year) to 5 (more than 10 years).

Fatigue

A 14 item fatigue scale (Chalder, Berelowitz, Pawlikowska, Watts, Wessely, Wright, & Wallace, 1993) was used to measure worker tiredness. An example item is "I feel sleepy or drowsy". Items were scored on a 4-point Likert scale from 1 (much worse than usual) to 4 (better than usual). Cronbach's α was .93, and the ICC was 8.

Emotional labour

Deep and surface acting were measured using the Emotional Labour scale (Brotheridge & Lee, 2003). Deep acting responses entailed three items including "I work hard to feel the emotions I have to show as part of my job". Cronbach's α was .71, and the ICC was 1. Surface acting responses also comprised three items including "I pretend to have emotions that I don't really have". Items were scored on a 5-point scale from 1 (never) to 5 (always). Cronbach's α was .72, and the ICC was 2.

Work regulatory focus

The Work Regulatory Focus scale (Neubert, Kacmar, Carlson, Chonko, & Roberts, 2008) was used to measure a promotion and prevention regulatory work focus. Three items were used to measure a promotion focus with an example being "I spend a great deal of time envisaging how to fulfil my aspirations". Cronbach's α was .84, and the ICC was .1. Three items were also used to measure a prevention focus with an example being "Fulfilling my work duties is very important to me". Cronbach's α was .81, and the ICC was 6. Items were scored on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree).

Emotional boundaries

Emotional boundaries were assessed using the scale developed by Hayward & Tuckey (2011). The 9 item scale was preceded by a statement as follows: 'One way that employees manage the emotional demands of their work is through the creation of an emotional space between themselves and their patients/s. Employees describe managing their feelings by manipulating "emotional boundaries" between themselves and their clients to control this emotional space. Please indicate the extent to which you agree with the following statements.' Participants responded on a 7-point Likert scale from 1 (completely disagree) to 7 (completely agree) with answers such as "In order to manage my feelings at work I utilise emotional boundaries to manage the emotional space between myself and my patients." Cronbach's α was .78, and the ICC was 16.

Results

This section of the chapter describes the content of the industry report that was provided to managers of the hospital group to provide them with an overview of features of work, work processes, and systems of work within their workplaces, to target action to eliminate or minimise risks, and develop psychosocially healthy work systems. For the hospital group, this research was anticipated to assist in the identification of strategies to improve psychosocial and physical safety climates to enhance the psychological and physical health of healthcare workers and their role in quality care. It was envisaged this will result in the dissemination of policies, procedures and educational material to improve workers' health and safety at work. It was outlined that strong organisational performance and the careful management of workplace psychosocial factors are linked. Due to its complexity, healthcare, requires the collaboration and engagement of employees to maximise clinical and financial outcomes. Accurate, innovative and evidence-based research data taking into account workplace psychosocial factors provides opportunities to inspire and improve existing services ensuring strong performance benefits for the organisation, employees and patients.

Managers were told that, in general, there are some good results for the hospital group reflecting the hard work of management and the commitment of staff to provide the best possible care for patients. Encouraging results were outlined first (see Table 3, 4, 5). In particular, engagement scores were in general positive and team psychological safety scores were high suggesting that employees were keen to invest effort and persist when difficulties arise, were enthusiastic, inspired, and engrossed at work, and felt safe to take risks to improve their learning and performance within their work group. Engagement is positively related to task and contextual achievement and negatively related to withdrawal behaviours so these scores are important for organisational performance.

Areas for improvement were then discussed in the report (see Table 3, 4, 5). Physical safety climate (at the organisational and team level) and psychosocial safety climate (at the team level), were generally lower than the specified benchmark while emotional exhaustion and fatigue were generally higher, particularly among the clinical staff at one particular hospital and the non-clinical staff at another hospital. Further correlational analysis (see Table 5) and statistical analysis using hierarchical linear modelling showed a strong relationship between these variables and reported near misses, musculoskeletal pain, and accidents and injuries (this is explored in more detail in the final paper presented in Chapter 4 of this thesis). Benchmark scores are attached for each hospital (see Table 3). Hospital management were told that these results represent great potential for improvement and a range of options for future action are outlined below. Tables were colour coded at the request of management for quick assessment of the statistical information. Red depicted areas of concern while green denoted areas that were above benchmark.

Table 3. Means, standard deviations, clinical and non-clinical scale scores and benchmarks (N = 265).

INDUSTRY REPORT JUNE 2014		Mean	Std. Deviation	CLINICAL	NON-CLINICAL	BENCHMARK	SOURCE
Physical Safety Climate Scale (Organisation)	1	3.61	0.79	39.91	35.33	47.99	Idris
(Idris, Dollard, Coward & Dormann, 2012)	2	3.19	0.92	30.25	36.81	47.99	Idris
	3	3.72	0.63	36.82	30.25	47.99	Idris
	Total	3.57	0.79	35.75	35.75	47.99	Idris
Physical Safety Climate Scale (Team)	1	3.87	0.72	47.13	45.45	47.99	Idris
(Idris, Dollard, Coward & Dormann, 2012)	2	3.50	0.98	39.79	47.15	47.99	Idris
	3	3.77	0.64	47.15	39.79	47.99	Idris
	Total	3.78	0.75	45.32	45.32		Idris
Psychosocial Safety Climate Scale (Organisation)	1	3.03	0.84	36.91	35.33	36.99	SafeWork
(Dollard & Bakker, 2010)	2	2.68	1.03	30.25	36.82	36.99	SafeWork
	3	3.07	0.75	36.82	30.25	36.99	SafeWork
	Total	2.98	0.86	35.75	35.75	36.99	SafeWork
Psychosocial Safety Climate Scale (Team)	1	3.42	0.86	42.20	39.47	36.99	SafeWork
(Dollard & Bakker, 2010)	2	2.93	1.10	33.26	39.50	36.99	SafeWork
	3	3.19	0.80	39.50	33.26	36.99	SafeWork
	Total	3.28	0.90	39.58	39.58	36.99	SafeWork
Organisational Support Scale (Eisenberger et al.,	1	2.67	0.57	16.54	15.38	17.17	Idris
1986)	2	2.53	0.65	14.52	16.75	17.17	Idris
	3	2.68	0.40	16.75	14.52	17.17	Idris
	Total	2.65	0.55	16.12	16.12	17.17	Idris

INDUSTRY REPORT JUNE 2014		Mean	Std. Deviation	CLINICAL	NON-CLINICAL	BENCHMARK	SOURCE
Team Psychological Safety Scale (Edmondson, 1999)	1	2.75	0.45	19.86	18.47	16.86	Idris
	2	2.67	0.55	18.22	19.82	16.86	Idris
	3	2.81	0.37	19.82	18.22	16.86	Idris
	Total	2.75	0.45	19.55	19.55	16.86	Idris
Psychological Demands (JCQ)	1	2.81	0.48	39.87	37.17	31.30	AWB
	2	2.96	0.56	43.29	38.29	31.30	AWB
	3	2.75	0.42	36.79	39.96	31.30	AWB
	Total	2.82	0.48	39.51	37.23	31.30	AWB
Emotional Demands (JCQ)	1	2.71	0.64	11.64	9.80	11.33	AWB
	2	2.90	0.64	11.98	10.75	11.33	AWB
	3	2.68	0.55	10.75	11.98	11.33	AWB
	Total	2.73	0.62	11.52	11.52	11.33	AWB
Physical Demands (JCQ)	1	2.43	0.61	12.37	11.86	10.60	AWB
	2	2.79	0.68	14.94	11.67	10.60	AWB
	3	2.24	0.62	11.67	14.94	10.60	AWB
	Total	2.44	0.65	12.47	12.47	10.60	AWB
Decision Authority (JCQ)	1	2.70	0.45	34.00	30.32	34.98	AWB
	2	2.76	0.46	34.32	33.52	34.98	AWB
	3	2.75	0.45	33.84	33.00	34.98	AWB
	Total	2.72	0.45	33.84	33.84	34.98	AWB
Skill Discretion (JCQ)	1	2.80	0.44	36.00	30.78	34.92	AWB
	2	2.93	0.40	35.34	34.66	34.92	AWB
	3	2.82	0.45	34.66	35.34	34.92	AWB

INDUSTRY REPORT JUNE 2014		Mean	Std. Deviation	CLINICAL	NON-CLINICAL	BENCHMARK	SOURCE
	Total	2.83	0.44	35.82	35.82	34.92	AWB
Emotional Labour (Surface Acting) (Grandey, 2000)	1	2.54	0.86	7.62	7.60	9	MEAN
	2	2.79	0.98	8.78	7.42	9	MEAN
	3	2.62	0.61	7.42	8.78	9	MEAN
	Total	2.60	0.83	7.85	7.85	9	MEAN
Emotional Labour (Deep Acting) (Grandey, 2000)	1	2.50	0.95	7.38	7.61	9	MEAN
	2	2.90	1.00	8.89	8.00	9	MEAN
	3	2.53	0.83	8.00	8.98	9	MEAN
	Total	2.57	0.94	7.73	7.73	9	MEAN
Emotional Boundaries (Hayward & Tuckey, 2011)	1	4.66	1.70	47.63	33.69	36	MEAN
	2	4.81	1.43	44.46	40.00	36	MEAN
	3	4.78	1.27	40.00	44.46	36	MEAN
	Total	4.71	1.56	45.66	45.66	36	MEAN
Safety Motivation (Neal & Griffin, 2006)	1	4.22	0.69	4.28	3.95	4.55	Neal
	2	4.56	0.50	4.57	4.53	4.55	Neal
	3	4.18	0.56	4.29	3.88	4.55	Neal
	Total	4.26	0.64	4.42	4.05	4.55	Neal
Safety Participation (Neal & Griffin, 2006)	1	3.80	0.75	3.76	3.73	3.80	Neal
	2	3.84	0.77	3.88	3.75	3.80	Neal
	3	3.64	0.62	3.62	3.70	3.80	Neal
	Total	3.76	0.73	3.79	3.72	3.80	Neal
Total Safety Engagement (Neal & Griffin, 2006)	1	4.01	0.65	24.91	23.12	25.05	Neal
	2	4.20	0.50	25.36	24.83	25.05	Neal

INDUSTRY REPORT JUNE 2014		Mean	Std. Deviation	CLINICAL	NON-CLINICAL	BENCHMARK	SOURCE
	3	3.91	0.48	24.83	25.36	25.05	Neal
	Total	4.02	0.60	24.65	24.65	25.05	Neal
Work Regulatory Focus (Prevention) (Neubert et al., 2008)	1	4.35	0.61	13.43	12.61	12	Neubert
	2	4.51	0.70	13.32	14.00	12	Neubert
	3	4.55	0.48	14.00	13.42	12	Neubert
	Total	4.43	0.60	13.47	13.47	12	Neubert
Work Regulatory Focus (Promotion) (Neubert et al., 2008)	1	3.51	0.81	10.77	10.22	12	Neubert
	2	3.43	0.86	9.82	11.33	12	Neubert
	3	3.56	0.69	11.33	9.82	12	Neubert
	Total	3.51	0.79	10.61	10.61	12	Neubert
Engagement (Schaufeli et al., 2002)	1	5.54	1.29	49.50	50.18	51.20	AWB
	2	5.83	1.13	49.38	59.46	51.20	AWB
	3	5.37	1.22	59.46	49.38	51.20	AWB
	Total	5.54	1.25	49.24	49.24	51.20	AWB
Vigor (Schaufeli et al., 2002)	1	5.36	1.39	15.93	16.24	15.87	AWB
	2	5.24	1.68	14.00	19.42	15.87	AWB
	3	5.10	1.48	19.42	14.00	15.87	AWB
	Total	5.28	1.46	15.46	15.46	15.87	AWB
Dedication (Schaufeli et al., 2002)	1	5.78	1.37	17.75	16.81	18.18	AWB
	2	6.11	1.11	17.48	20.25	18.18	AWB
	3	5.65	1.19	20.25	17.48	18.18	AWB
	Total	5.80	1.29	17.54	17.54	18.18	AWB
Absorption (Schaufeli et al., 2002)	1	5.52	1.51	16.13	17.09	17.16	AWB

INDUSTRY REPORT JUNE 2014		Mean	Std. Deviation	CLINICAL	NON-CLINICAL	BENCHMARK	SOURCE
	2	6.11	0.94	17.69	19.75	17.16	AWB
	3	5.35	1.40	19.75	17.69	17.16	AWB
	Total	5.57	1.42	16.38	16.38	17.16	AWB
Emotional Exhaustion (Schaufeli et al., 1996)	1	3.85	1.74	19.62	18.56	15.39	AWB
	2	4.67	1.65	25.04	19.48	15.39	AWB
	3	3.98	1.42	19.48	25.04	15.39	AWB
	Total	4.01	1.68	20.73	20.73	15.39	AWB
Fatigue (Chalder et al., 1992)	1	2.01	0.44	28.43	28.43	28	MEAN
	2	2.22	0.35	31.84	29.22	28	MEAN
	3	2.06	0.40	29.22	31.84	28	MEAN
	Total	2.05	0.42	29.26	29.26	28	MEAN
Musculoskeletal Scale (AWB)	1	2.16	0.90	6.32	6.32	6	MEAN
	2	2.55	1.03	8.54	5.36	6	MEAN
	3	2.15	0.93	5.36	8.54	6	MEAN
	Total	2.22	0.94	6.79	6.79	6	MEAN
How many patients did you care for on the last day-shift worked?	1	6.64	1.67	5.89	NOT APPLICABLE		
	2	6.69	1.49	6.22	NOT APPLICABLE		
	3	6.55	1.32	7.75	NOT APPLICABLE		
	Total	6.62	1.56	6.05	NOT APPLICABLE		
How frequently do you experience near-miss accidents (i.e. something that could have caused an injury but did not)?	1	4.11	0.78	3.84			
	2	3.75	0.87	3.64	4.00		
	3	3.94	0.83	3.92	3.91		
	Total	4.01	0.82	3.9068	4.1090		

INDUSTRY REPORT JUNE 2014		Mean	Std. Deviation	CLINICAL	NON-CLINICAL	BENCHMARK	SOURCE
Physical Accidents Reported on riskman	1	1.30	0.74	1.35	1.23		
	2	1.47	0.86	1.56	1.27		
	3	1.35	0.61	1.33	1.42		
	Total	1.34	0.74	1.2458	1.4319		
Physical Accidents not reported on riskman	1	1.19	0.61	1.21	1.16		
	2	1.36	1.34	1.53	1.00		
	3	1.10	0.30	1.10	1.09		
	Total	1.19	0.70	1.0945	1.2878		
Psychological Accidents reported on riskman	1	1.24	0.73	1.21	1.27		
	2	1.46	1.44	1.63	1.09		
	3	1.19	0.85	1.25	1.00		
	Total	1.26	0.90	1.1434	1.3736		
Psychological Accidents not reported on riskman	1	1.56	1.30	1.61	1.49		
	2	2.03	1.99	2.24	1.60		
	3	1.60	1.52	1.71	1.18		
	Total	1.64	1.47	1.4397	1.8399		
In the past 4 weeks (28 days) how many days did you miss an entire work day because of problems with your physical health?	1	4.62	0.75	4.60 (rarely)	4.62		
	2	4.38	1.14	4.39	4.36		
	3	4.66	0.85	4.60	4.60		
	Total	4.59	0.84	4.4865	4.6960		
In the past 4 weeks (28 days) how many days did you miss an entire work day because of problems with your psychological health?	1	4.85	0.49	4.83 (no days)	4.85		
	2	4.85	0.66	4.82	4.92		
	3	4.87	0.38	4.85	4.85		

INDUSTRY REPORT JUNE 2014		Mean	Std. Deviation	CLINICAL	NON-CLINICAL	BENCHMARK	SOURCE
	Total	4.86	0.49	4.7944	4.9176		
Have you experienced a situation where your patient's needs outweigh the perceived benefits of complying with safety precautions?	1	6.27	1.01	5.84 (3 times/month)	N/A		
	2	5.61	1.26	5.30	N/A		
	3	6.03	0.95	5.91	N/A		
	Total	6.11	1.06	5.9695	N/A		
How often were you exposed to bullying from managers, supervisors or colleagues in the past six months?	1	4.35	1.04	4.30 (rarely)	N/A		
	2	3.73	1.15	3.64	3.92		
	3	4.38	0.88	4.53	4.53		
	Total	4.26	1.05	4.1264	4.3876		
If you have experienced bullying how long have you been exposed to bullying from managers, supervisors or colleagues	1	4.25	1.31	4.10 (2-4 years)	4.38		
	2	3.90	1.51	3.93	3.83		
	3	4.43	0.75	4.39	4.39		
	Total	4.22	1.26	3.9734	4.4606		
How often were you exposed to violent behaviours from patients in the past six months	1	4.67	0.63	4.45 (rarely)	4.95		
	2	4.25	0.91	4.19	4.40		
	3	4.65	0.55	4.63	4.63		
	Total	4.60	0.67	4.5174	4.6875		
If you have been exposed to violence from patients, how long have you been exposed to violent behaviours from patients	1	4.40	1.26	4.70(rarely)	4.81		
	2	3.17	1.82	3.08	3.40		
	3	3.93	1.58	3.92	3.92		
	Total	4.0581	1.51351	3.7336	4.3826		

Table 4. Mean scores for the individual scale items (N = 265).

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
Job Demands						
1. My job requires working very fast.	3.18	3.00	3.37	3.25	2.96	3.27
2. My job requires working very hard.	3.39	2.98	3.48	3.33	3.12	3.33
3. I am not asked to do an excessive amount of work.	2.36	2.30	1.96	2.67	2.47	2.40
4. I have enough time to get the job done.	2.35	2.34	2.26	2.55	2.48	2.13
5. Some demands I face at work are in conflict with other demands at work.	2.61	2.52	2.54	2.67	2.64	2.73
6. I have to work through my breaks and lunch/ dinner in order to catch up work.	2.70	2.52	3.22	2.67	2.35	2.47
7. My job requires lots of physical effort.	2.99	2.66	3.21	2.58	2.69	2.73
8. I am often required to move or lift very heavy loads on my job.	2.41	2.39	3.04	2.67	2.25	2.13
9. My work requires rapid continuous physical activity.	2.69	2.51	3.04	2.50	2.31	2.80
10. I am often required to work for long periods with my body in physically awkward positions.	2.22	2.15	2.89	2.00	1.98	1.80
11. I am required to work for long periods with my head or arms in physically awkward positions.	2.09	2.15	2.78	1.92	1.96	1.73
12. My work is emotionally demanding.	3.18	2.43	3.15	2.83	2.83	2.40

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
13. My work places me in emotionally challenging situations.	3.06	2.45	3.12	2.67	2.77	2.47
14. My work requires suppressing my genuine emotion.	2.56	2.39	2.78	2.45	2.54	2.27
15. I have to act the way people think a person in my position should act.	2.84	2.54	2.96	2.73	2.91	2.60
Emotions						
16. I resist expressing my true feelings.	3.02	2.80	3.22	2.83	3.06	3.00
17. I work hard to feel the emotions I have to show as part of my job.	2.32	2.59	2.76	2.73	2.50	2.27
18. I pretend to have emotions that I don't really have.	1.83	2.14	2.37	1.82	1.85	2.13
19. I make an effort to actually feel the emotions that I need to display to others.	2.48	2.55	3.23	2.64	2.51	2.60
20. I try to actually experience the emotions that I must show.	2.59	2.52	3.00	2.64	2.53	2.73
21. I hide my true feelings about a situation.	2.77	2.71	3.19	2.45	2.77	3.20
Work Regulatory Focus						
22. At work I focus my attention on completing my assigned responsibilities.	4.43	4.25	4.39	4.67	4.51	4.60
23. Fulfilling my work duties is very important to me.	4.62	4.30	4.50	4.75	4.63	4.73
24. At work, I am motivated by my hopes and aspirations.	3.85	3.44	3.29	4.08	3.91	3.60

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
25. I spend a great deal of time envisioning how to fulfil my aspirations.	3.23	3.18	3.15	3.27	3.22	3.13
26. At work, I strive to live up to the responsibilities and duties given to me by others.	4.38	4.06	4.41	4.58	4.47	4.33
27. At work my priorities are impacted by a clear picture of what I aspire to be.	3.68	3.58	3.41	3.91	3.60	3.53
Psychosocial Safety Climate						
28(i). In my team (e.g. clinical manager, hospitality manager) management acts quickly to correct problems/issues that affect employees' psychological health.	3.76	3.44	2.79	3.67	3.48	2.93
28(ii). In my organisation (e.g. CEO, HR) management acts quickly to correct problems/issues that affect employees' psychological health.	3.13	3.04	2.54	3.36	3.16	3.17
29(i). In my team (e.g. clinical manager, hospitality manager) management acts decisively when a concern of an employees' psychological status is raised.	3.70	3.36	2.96	3.58	3.28	3.14
29 (ii). In my organisation (e.g. CEO, HR) management acts decisively when a concern of an employees' psychological status is raised.	3.23	2.98	2.56	3.36	3.14	3.23
30(i). In my team (e.g. clinical manager, hospitality manager) management shows support for stress prevention through involvement and commitment.	3.60	3.32	2.63	3.50	3.28	3.40

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
30(ii). In my organisation (e.g. CEO, HR) management shows support for stress prevention through involvement and commitment.	3.12	2.94	2.44	3.36	3.09	3.15
31(i). In my team (e.g. clinical manager, hospitality manager) psychological well-being of staff is a priority.	3.66	3.27	2.79	3.25	3.22	3.43
31(ii). In my organisation (e.g. CEO, HR) psychological well-being of staff is a priority.	3.13	2.90	2.52	3.18	3.02	3.46
32(i) In my team (e.g. clinical manager, hospitality manager) management clearly considers the psychological health of employees to be of great importance.	3.68	3.24	2.81	3.25	3.36	3.25
32 (ii). In my organisation (e.g. CEO, HR) management clearly considers the psychological health of employees to be of great importance.	3.13	2.90	2.54	3.18	3.29	3.31
33(i). In my team (e.g. clinical manager, hospitality manager) management considers employee psychological health to be as important as productivity.	3.39	3.21	2.46	3.08	3.11	2.73
33 (ii). In my organisation (e.g. CEO, HR) management considers employee psychological health to be as important as productivity.	2.87	2.80	2.23	2.82	2.93	3.15
34(i). In my team (e.g. clinical manager, hospitality manager) there is good communication here about psychological safety issues which affect me.	3.46	3.18	2.63	3.17	3.23	2.88

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
34(ii). In my organisation (e.g. CEO, HR) there is good communication here about psychological safety issues which affect me.	2.92	2.88	2.38	2.82	2.98	3.00
35 (i). In my team (e.g. clinical manager, hospitality manager) information about workplace psychological well-being is always brought to my attention by my manager/supervisor.	3.27	3.15	2.70	3.00	2.91	2.69
35(ii). In my organisation (e.g. CEO, HR) information about workplace psychological well-being is always brought to my attention by my manager/supervisor.	2.86	2.76	2.54	2.82	2.84	2.85
36(i). In my team (e.g. clinical manager, hospitality manager) my contributions to resolving psychological occupational health and safety concerns in the organisation are listened to.	3.48	3.33	2.85	3.50	3.37	3.07
36(ii). In my organisation (e.g. CEO, HR) my contributions to resolving psychological occupational health and safety concerns in the organisation are listened to.	3.13	2.94	2.58	3.18	3.14	3.08
37(i). In my team (e.g. clinical manager, hospitality manager) participation and consultation in psychological health and safety occurs with employees, unions, and health and safety representatives.	3.17	3.23	2.70	3.17	2.93	2.79

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
37(ii). In my organisation (e.g. CEO, HR) participation and consultation in psychological health and safety occurs with employees, unions, and health and safety representatives.	2.95	2.96	2.42	2.91	2.93	2.92
38(i). In my team (e.g. clinical manager, hospitality manager) employees are encouraged to become involved in psychological safety and health matters.	3.26	3.20	2.70	3.08	3.04	3.19
38(ii). In my organisation (e.g. CEO, HR) employees are encouraged to become involved in psychological safety and health matters.	2.87	2.92	2.50	3.00	2.89	3.21
39(i). In my team (e.g. clinical manager, hospitality manager) the prevention of stress involves all levels.	3.77	3.53	3.37	3.25	3.36	3.44
39(ii). In my organisation (e.g. CEO, HR) the prevention of stress involves all levels.	3.47	3.29	3.12	2.82	3.21	3.36
Job Resources						
40. My job requires that I learn new things.	3.40	2.87	3.44	3.33	3.36	2.87
41. My job involves a lot of repetitive work.	3.12	3.16	3.37	3.00	2.91	3.13
42. My job requires me to be creative.	2.85	2.44	3.11	2.83	3.02	2.06
43. My job requires a high level of skill.	3.51	2.84	3.52	3.17	3.34	2.31
44. I get to do a variety of different things in my job.	3.31	2.87	3.19	3.17	3.15	2.81
45. I have an opportunity to develop my own special abilities.	3.06	2.53	2.78	2.83	2.96	2.25

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
46. My job allows me to make a lot of decisions on my own.	2.96	2.65	3.00	2.83	2.96	2.38
47. In my job, I have very little freedom to decide how I do my work.	2.20	2.42	2.54	2.17	2.02	1.93
48. I have a lot to say about what happens in my job.	2.58	2.50	2.59	2.67	2.54	2.31
49. In my job I must supervise others.	2.99	2.38	2.96	2.83	2.87	2.31
50. In my organisation management takes pride in my accomplishments.	2.74	2.55	2.31	2.58	2.64	2.57
51. In my organisation management really cares about my well-being.	2.68	2.55	2.38	2.75	2.65	2.50
52. In my organisation management values my contributions to the organisation's well-being.	2.75	2.57	2.50	2.75	2.77	2.60
53. In my organisation management strongly considers my goals and values.	2.67	2.41	2.19	2.42	2.64	2.21
54. In my organisation management shows little concern for me.	2.20	2.50	2.52	1.92	2.15	2.31
55. In my organisation management is willing to help me if I need a special favour.	2.90	2.81	2.73	3.17	2.76	2.63
56. If you make a mistake in my team it is often held against you.	1.98	2.30	2.19	2.00	2.21	2.00
57. Members of my team are able to bring up problems and tough issues.	2.84	2.79	2.71	2.83	2.87	2.87
58. People on my team sometimes reject others for being different.	2.11	2.36	2.38	2.33	2.13	2.06

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
59. It is safe to take a risk in my team.	2.14	2.28	2.08	2.25	2.34	2.20
60. It is difficult to ask other members of my team for help.	1.89	2.42	2.29	1.92	1.85	1.75
61. No one on my team would deliberately act in a way that undermines my efforts.	2.86	2.76	2.56	2.92	2.83	2.53
62. Working with members of my team, my unique skills and talents are valued and utilised.	3.01	2.70	2.84	3.08	2.89	2.60
Engagement						
63. At my work I feel bursting with energy	5.27	5.22	4.77	6.17	5.13	5.00
64. At my job I feel strong and vigorous	5.48	5.31	4.69	6.42	5.18	4.87
65. When I get up in the morning, I feel like going to work.	5.18	5.68	4.56	6.83	5.17	4.94
66. I am enthusiastic about my job.	5.84	5.76	5.50	6.83	5.65	5.56
67. My job inspires me.	5.40	4.82	5.15	6.42	5.33	4.40
68. I am proud of the work I do.	6.48	6.18	6.78	7.00	6.17	6.20
69. I feel happy when I am working intensely.	5.78	5.89	5.63	6.83	5.52	5.67
70. I am immersed in my work.	5.93	5.95	6.44	6.92	5.51	5.64
71. I get carried away when I am working.	4.46	5.25	5.58	6.00	4.98	4.79
Safety Engagement						
72. I feel that it is worthwhile to put in effort to maintain or improve my psychological health.	4.35	3.85	4.46	4.42	4.17	3.81
73. I feel it is important to maintain the psychological health of myself and others at all times.	4.47	3.94	4.57	4.50	4.28	3.94

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
74. I believe that it is important to reduce the risk of harm to psychological health in the workplace.	4.52	4.05	4.68	4.67	4.41	3.88
75. I promote the management of psychosocial risks within the organisation.	3.96	3.74	3.81	3.67	3.80	3.64
76. I put in extra effort to improve the psychological safety of the workplace.	3.87	3.71	4.07	3.67	3.59	3.67
77. I voluntarily carry out tasks or activities that help to improve workplace psychological safety.	3.73	3.75	3.75	3.92	3.44	3.79
Emotional Exhaustion						
78. I feel emotionally drained from my work.	4.53	3.96	5.33	4.50	4.70	4.33
79. I feel used up at the end of the workday.	4.76	4.17	5.19	4.75	4.54	4.21
80. I feel tired when I get up in the morning and have to face another day on the job.	4.05	3.69	5.33	3.42	4.17	3.80
81. Working all day is a strain for me.	3.30	3.33	4.56	3.58	3.53	3.33
82. I feel burned out from my work.	3.00	3.46	4.63	3.00	3.28	3.33
Fatigue						
83. I have had problems with tiredness.	2.28	2.06	2.52	2.25	2.36	2.13
84. I need to rest more.	2.22	2.05	2.41	2.27	2.29	2.07
85. I feel sleepy or drowsy	2.18	2.06	2.44	2.18	2.11	2.14
86. I have problems starting things.	1.91	1.84	2.12	2.00	2.02	1.79
87. I start things without difficulty but get weak as I go on.	1.90	1.95	2.15	2.00	1.91	1.92
88. I am lacking in energy.	2.12	2.08	2.58	2.10	2.13	1.92
89. I have less strength in my muscles.	2.02	1.97	2.33	2.00	2.00	2.08

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
90. I feel weak.	1.96	1.94	2.23	2.00	1.96	1.77
91. I have difficulty concentrating.	1.93	1.92	2.19	2.10	2.15	1.77
92. I have problems thinking clearly.	1.93	1.95	2.15	2.10	2.09	1.85
93. I make slips of the tongue when speaking.	2.01	1.95	2.12	2.00	1.96	2.00
94. I find it more difficult to find the correct word.	2.00	1.95	2.08	2.00	2.07	2.08
95. My memory has been?	2.06	1.98	2.23	2.10	2.13	2.00
96. I have lost interest in the things I used to do	1.91	1.92	2.38	1.90	2.09	1.93
Musculoskeletal Pain						
97. How much were you bothered by back or neck pain?	2.26	2.24	2.93	2.00	2.38	1.93
98. How much were you bothered by pain in your arms, legs, or joint area like your knee or hips?	2.06	2.25	2.86	1.73	2.02	2.00
99. How much were you bothered by muscle soreness?	2.00	2.21	2.77	1.64	2.17	2.07
Physical Safety Climate						
100(i). In my team (e.g. clinical manager, hospitality manager) management act quickly to correct problems/issues that affect employees' physical safety.	4.01	3.67	3.11	3.82	3.78	3.79
100(ii). In my organisation (e.g. CEO, HR) management act quickly to correct problems/issues that affect employees' physical safety.	3.56	3.40	2.74	3.50	3.62	3.92

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
101(i). In my team (e.g. clinical manager, hospitality manager) management shows support for injury prevention through involvement and commitment.	4.00	3.74	3.25	4.30	3.87	3.87
101(ii). In my organisation (e.g. CEO, HR) management shows support for injury prevention through involvement and commitment.	3.68	3.50	3.00	3.78	3.80	3.77
102(i). In my team (e.g. clinical manager, hospitality manager) management acts decisively when a concern for an employee's physical safety is raised.	4.02	3.83	3.36	4.09	3.87	3.64
102(ii). In my organisation (e.g. CEO, HR) management acts decisively when a concern for an employee's physical safety is raised.	3.67	3.65	3.11	3.70	3.76	3.79
103(i). In my team (e.g. clinical manager, hospitality manager) management clearly considers the safety of employees to be of great importance.	4.01	3.85	3.30	4.00	3.91	3.80
103(ii). In my organisation (e.g. CEO, HR) management clearly considers the safety of employees to be of great importance.	3.69	3.69	2.96	3.30	3.86	3.93
104(i). In my team (e.g. clinical manager, hospitality manager) safety of staff is a priority.	4.10	3.97	3.63	4.00	3.91	3.73
104(ii). In my organisation (e.g. CEO, HR) safety of staff is a priority.	3.75	3.83	3.19	3.60	3.93	3.93

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
105(i). In my team (e.g. clinical manager, hospitality manager) management considers physical safety to be as important as productivity.	3.83	3.79	3.33	3.83	3.56	3.20
105(ii). In my organisation (e.g. CEO, HR) management considers physical safety to be as important as productivity.	3.40	3.65	3.00	3.45	3.44	3.54
106(i). In my team (e.g. clinical manager, hospitality manager) there is good communication here about safety issues which affect me.	3.92	3.69	3.22	3.67	3.78	3.80
106(ii). In my organisation (e.g. CEO, HR) there is good communication here about safety issues which affect me.	3.57	3.57	2.81	3.36	3.72	3.85
107(i). In my team (e.g. clinical manager, hospitality manager) information about workplace safety is always brought to my attention by my manager/ supervisor.	3.92	3.73	3.22	3.75	3.76	3.60
107(ii). In my organisation (e.g. CEO, HR) In my team (e.g. clinical manager, hospitality manager) information about workplace safety is always brought to my attention by my manager/ supervisor.	3.57	3.53	3.04	3.64	3.74	3.62
108(i). In my team (e.g. clinical manager, hospitality manager) my contributions to resolving safety concerns are listened to.	3.78	3.71	3.26	3.83	3.72	3.53

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
108(ii). In my organisation (e.g. CEO, HR) my contributions to resolving safety concerns are listened to.	3.43	3.49	3.00	3.64	3.67	3.62
109(i). In my team (e.g. clinical manager, hospitality manager) participation and consultation regarding safety at work occurs with employees, unions and health and safety representatives in my workplace.	3.67	3.70	3.26	3.67	3.57	3.80
109(ii). In my organisation (e.g. CEO, HR) participation and consultation regarding safety at work occurs with employees, unions and health and safety representatives in my workplace.	3.42	3.55	2.96	3.45	3.43	3.85
110(i). In my team (e.g. clinical manager, hospitality manager) employees are encouraged to become involved in workplace safety matters.	3.86	3.71	3.15	3.92	3.85	3.80
110(ii). In my organisation (e.g. CEO, HR) employees are encouraged to become involved in workplace safety matters.	3.63	3.49	2.85	3.82	3.77	3.77
111(i). In my team (e.g. clinical manager, hospitality manager) the prevention of workplace physical injury involves all levels.	4.01	3.88	3.81	4.00	3.89	3.87
111(ii). In my organisation (e.g. CEO, HR) the prevention of workplace physical injury involves all levels.	3.80	3.75	3.48	3.82	3.82	3.85
Emotional Boundaries						

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical
112. In order to manage my feelings at work I utilise emotional boundaries to manage the emotional space between myself and my patients.	5.28	3.69	4.75	4.22	4.67	4.70
113. I am aware when I need to engage an emotional boundary between myself and my patients.	5.80	3.86	5.21	5.56	5.26	5.50
114. In order to manage my feelings at work I flexibly engage emotional boundaries between myself and my patients.	5.32	3.80	5.21	4.89	5.02	5.30
115. I moderate my emotional boundaries to control how much of my emotional energy I invest in interactions with patients.	5.29	3.67	5.00	4.44	4.67	4.90
116. I moderate my emotional boundaries to enable me to invest my emotional self in interactions with patients.	5.21	3.68	5.08	3.89	4.58	5.56
117. I moderate how I use emotional boundaries to engage meaningfully with clients.	5.44	3.72	5.17	4.56	4.98	5.00
118. I moderate the emotional boundaries between myself and my patients so as to manage my energy levels.	5.15	3.63	4.96	4.00	4.63	4.90
119. I utilise emotional boundaries with patients to conserve my energy.	4.89	3.68	4.58	3.89	4.37	3.70
120. I utilise emotional boundaries with patients to protect me from becoming emotionally overwhelmed.	5.24	3.75	4.79	4.56	4.64	4.10

INDUSTRY REPORT JUNE 2014	Hospital 1 Clinical	Hospital 1 Non-clinical	Hospital 2 Clinical	Hospital 2 Non-clinical	Hospital 3 Clinical	Hospital 3 Non-clinical

Table 5. Correlations between the scale items, near-miss accidents and work injuries (N = 265).

INDUSTRY REPORT JUNE 2014	How frequently do you experience near-miss accidents (i.e. something that could have caused an injury but did not)?	Physical injuries reported on riskman	Physical injuries not reported on riskman	Psychological injuries reported on riskman	Psychological injuries not reported on riskman
1. My job requires working very fast.	-.278**	0.032	0.117	0.064	.219**
2. My job requires working very hard.	-.220**	0.018	0.122	0.009	.141*
3. I am not asked to do an excessive amount of work.	.237**	-0.036	-0.136	-.184**	-.353**
4. I have enough time to get the job done.	.256**	0.014	-.209**	-0.006	-.294**
5. Some demands I face at work are in conflict with other demands at work.	-.250**	0.102	.228**	0.054	0.128
6. I have to work through my breaks and lunch/ dinner in order to catch up work.	-.288**	0.017	.138*	0.08	.276**
7. My job requires lots of physical effort.	-.364**	.131*	.145*	0.094	0.1
8. I am often required to move or lift very heavy loads on my job.	-.381**	.168**	.221**	0.119	.144*
9. My work requires rapid continuous physical activity.	-.289**	.159*	0.109	0.11	0.134
10. I am often required to work for long periods with my body in physically awkward positions.	-.311**	.193**	.276**	.190**	.227**
11. I am required to work for long periods with my head or arms in physically awkward positions.	-.284**	.174**	.268**	.195**	.223**
12. My work is emotionally demanding.	-.257**	0.039	0.079	.159*	.283**
13. My work places me in emotionally challenging situations.	-.252**	.141*	.200**	.157*	.290**
14. My work requires suppressing my genuine emotion.	-.215**	0.02	0.083	.162*	.378**
15. I have to act the way people think a person in my position should act.	-.195**	-0.005	0.134	0.098	.342**
16. I resist expressing my true feelings.	-.197**	.132*	.146*	0.118	.319**

INDUSTRY REPORT JUNE 2014	How frequently do you experience near-miss accidents (i.e. something that could have caused an injury but did not)?	Physical injuries reported on riskman	Physical injuries not reported on riskman	Psychological injuries reported on riskman	Psychological injuries not reported on riskman
17. I work hard to feel the emotions I have to show as part of my job.	-.219**	0.111	.154*	0.11	.139*
18. I pretend to have emotions that I don't really have.	-.126*	0.104	.240**	.129*	.253**
19. I make an effort to actually feel the emotions that I need to display to others.	-.127*	0.127	0.103	0.08	-0.009
20. I try to actually experience the emotions that I must show.	-0.104	0.071	0.082	0.05	-0.058
21. I hide my true feelings about a situation.	-.214**	0.087	.212**	0.057	.247**
22. At work I focus my attention on completing my assigned responsibilities.	-.215**	-0.038	0.059	0.023	.152*
23. Fulfilling my work duties is very important to me.	-.173**	0.048	0.086	-0.027	0.124
24. At work, I am motivated by my hopes and aspirations.	0.079	-0.046	-.207**	0.043	0.005
26. I spend a great deal of time envisioning how to fulfil my aspirations.	-0.007	-0.039	0.035	0.039	.188**
27. At work, I strive to live up to the responsibilities and duties given to me by others.	-.177**	0.003	0.038	-0.023	.161*
28. At work my priorities are impacted by a clear picture of what I aspire to be.	-0.037	0.01	0.046	0.032	.152*
29(i). In my team (e.g. clinical manager, hospitality manager) management acts quickly to correct problems/issues that affect employees' psychological health.	.226**	-0.045	-.291**	-0.127	-.306**
29(ii). In my organisation (e.g. CEO, HR) management acts quickly to correct problems/issues that affect employees' psychological health.	.232**	-0.104	-.267**	-.180**	-.345**
30(i). In my team (e.g. clinical manager, hospitality manager) management acts decisively when a concern of an employees' psychological status is raised.	.185**	-0.052	-.277**	-.131*	-.313**
30(ii). In my organisation (e.g. CEO, HR) management acts decisively when a concern of an employees' psychological status is raised.	.189**	-0.096	-.241**	-.208**	-.374**

INDUSTRY REPORT JUNE 2014	How frequently do you experience near-miss accidents (i.e. something that could have caused an injury but did not)?	Physical injuries reported on riskman	Physical injuries not reported on riskman	Psychological injuries reported on riskman	Psychological injuries not reported on riskman
31(i). In my team (e.g. clinical manager, hospitality manager) management shows support for stress prevention through involvement and commitment.	.221**	-0.087	-.229**	-0.116	-.363**
31(ii). In my organisation (e.g. CEO, HR) management shows support for stress prevention through involvement and commitment.	.187**	-0.099	-.198**	-.163*	-.352**
32 (i). In my team (e.g. clinical manager, hospitality manager) psychological well-being of staff is a priority.	.225**	-0.062	-.213**	-0.12	-.368**
32(ii). In my organisation (e.g. CEO, HR) psychological well-being of staff is a priority.	.170*	-0.035	-.160*	-.162*	-.309**
33(i). In my team (e.g. clinical manager, hospitality manager) management clearly considers the psychological health of employees to be of great importance.	.202**	-0.039	-.220**	-0.113	-.316**
33(ii). In my organisation (e.g. CEO, HR) management clearly considers the psychological health of employees to be of great importance.	.199**	-0.007	-.170*	-.154*	-.365**
34(i). In my team (e.g. clinical manager, hospitality manager) management considers employee psychological health to be as important as productivity.	.207**	-0.078	-.234**	-0.095	-.330**
34(ii). In my organisation (e.g. CEO, HR) management considers employee psychological health to be as important as productivity.	.207**	-0.076	-.213**	-.173*	-.295**
35(i). In my team (e.g. clinical manager, hospitality manager) there is good communication here about psychological safety issues which affect me.	.223**	-0.062	-.229**	-0.099	-.312**
35(ii). In my organisation (e.g. CEO, HR) there is good communication here about psychological safety issues which affect me.	.217**	-0.047	-.230**	-.166*	-.301**
36(i). In my team (e.g. clinical manager, hospitality manager) information about workplace psychological well-being is always brought to my attention by my manager/ supervisor.	.176**	-0.054	-.170*	-0.068	-.279**

INDUSTRY REPORT JUNE 2014	How frequently do you experience near-miss accidents (i.e. something that could have caused an injury but did not)?	Physical injuries reported on riskman	Physical injuries not reported on riskman	Psychological injuries reported on riskman	Psychological injuries not reported on riskman
36(ii). In my organisation (e.g. CEO, HR) information about workplace psychological well-being is always brought to my attention by my manager/ supervisor.	.207**	-0.067	-.203**	-0.122	-.274**
37(i). In my team (e.g. clinical manager, hospitality manager)my contributions to resolving psychological occupational health and safety concerns in the organisation are listened to.	.141*	-0.057	-.207**	-.150*	-.369**
37(ii). In my organisation (e.g. CEO, HR) contributions to resolving psychological occupational health and safety concerns in the organisation are listened to.	.181**	-0.089	-.238**	-.206**	-.312**
38(i). In my team (e.g. clinical manager, hospitality manager) participation and consultation in psychological health and safety occurs with employees, unions, and health and safety representatives.	.187**	-0.038	-.208**	-0.068	-.301**
38(ii). In my organisation (e.g. CEO, HR) participation and consultation in psychological health and safety occurs with employees, unions, and health and safety representatives.	.221**	-0.049	-.219**	-0.121	-.246**
39(i). In my team (e.g. clinical manager, hospitality manager) employees are encouraged to become involved in psychological safety and health matters.	.191**	-0.001	-.187**	-0.069	-.297**
39(ii). In my organisation (e.g. CEO, HR) employees are encouraged to become involved in psychological safety and health matters.	.225**	-0.003	-.231**	-0.113	-.256**
40(i). In my team (e.g. clinical manager, hospitality manager) the prevention of stress involves all levels	.169**	-0.053	-0.122	-0.117	-.355**
40(ii). In my organisation (e.g. CEO, HR) the prevention of stress involves all levels.	.195**	-0.037	-0.128	-.155*	-.300**
41. My job requires that I learn new things.	-.230**	0.036	-0.046	0.068	0.103
42. My job involves a lot of repetitive work.	-.147*	0.063	.148*	0.012	.157*
43. My job requires me to be creative.	-0.01	0.028	-0.065	0.019	0.087

INDUSTRY REPORT JUNE 2014	How frequently do you experience near-miss accidents (i.e. something that could have caused an injury but did not)?	Physical injuries reported on riskman	Physical injuries not reported on riskman	Psychological injuries reported on riskman	Psychological injuries not reported on riskman
44. My job requires a high level of skill.	-.222**	0.024	-0.013	0.087	.162*
45. I get to do a variety of different things in my job.	-0.087	-0.028	-.219**	0.05	-0.01
46. I have an opportunity to develop my own special abilities.	0.084	0.05	-.182**	0.067	-.151*
47. My job allows me to make a lot of decisions on my own.	-0.018	-0.004	0.071	0.003	-.168*
48. In my job, I have very little freedom to decide how I do my work.	-0.071	0.074	0.132	0.06	.150*
49. I have a lot to say about what happens in my job.	0.093	-0.032	-.147*	-0.059	-.195**
50. In my job I must supervise others.	-.192**	0.033	-0.042	0.057	0.042
51. In my organisation management takes pride in my accomplishments.	0.082	-0.036	-0.094	-0.093	-.279**
52. In my organisation management really cares about my well-being.	.180**	-0.109	-.178*	-0.105	-.304**
53. In my organisation management values my contributions to the organisation's well-being.	.139*	-0.121	-.211**	-.139*	-.296**
54. In my organisation management strongly considers my goals and values.	.141*	-.149*	-.208**	-0.1	-.279**
55. In my organisation management shows little concern for me.	-0.12	0.03	0.121	0.101	.309**
56. In my organisation management is willing to help me if I need a special favour.	0.06	-.182**	-0.097	-0.126	-.229**
57. If you make a mistake in my team it is often held against you.	-.162**	0.051	0.134	.176**	.218**
58. Members of my team are able to bring up problems and tough issues.	.154*	-0.117	-.164*	-0.127	-.330**
59. People on my team sometimes reject others for being different.	-.182**	.132*	.170*	.215**	.202**
60. It is safe to take a risk in my team.	0.087	-0.026	-0.125	-0.041	-.138*
61. It is difficult to ask other members of my team for help.	-0.008	0.017	.193**	0.086	.202**

INDUSTRY REPORT JUNE 2014	How frequently do you experience near-miss accidents (i.e. something that could have caused an injury but did not)?	Physical injuries reported on riskman	Physical injuries not reported on riskman	Psychological injuries reported on riskman	Psychological injuries not reported on riskman
62. No one on my team would deliberately act in a way that undermines my efforts.	0.105	-.128*	-.261**	-0.083	-.149*
63. Working with members of my team, my unique skills and talents are valued and utilised.	0.063	-0.001	-.213**	-.132*	-.185**
64. At my work I feel bursting with energy	0.092	-0.043	-.152*	-0.04	-0.124
65. At my job I feel strong and vigorous	.164**	-0.08	-.224**	-0.018	-.215**
66. When I get up in the morning, I feel like going to work.	.165**	-0.088	-.195**	-.151*	-.289**
67. I am enthusiastic about my job.	0.108	-0.061	-.225**	-0.037	-.199**
68. My job inspires me.	.134*	-0.045	-.259**	0.027	-.152*
69. I am proud of the work I do.	0.023	-0.001	-0.062	-0.012	-0.079
70. I feel happy when I am working intensely.	.138*	-.139*	-.282**	-0.055	-.187**
71. I am immersed in my work.	0.03	-0.082	0.034	-0.046	-0.044
72. I get carried away when I am working.	0.051	-0.019	-0.045	-0.035	-0.018
73. I feel that it is worthwhile to put in effort to maintain or improve my psychological health.	-0.059	-0.037	0.01	-0.024	0.115
74. I feel it is important to maintain the psychological health of myself and others at all times.	-0.113	-0.017	0.034	-0.016	0.074
75. I believe that it is important to reduce the risk of harm to psychological health in the workplace.	-.133*	0.031	0.069	0.008	.166*
76. I promote the management of psychosocial risks within the organisation.	-0.022	0.041	-.156*	0.115	0.057
77. I put in extra effort to improve the psychological safety of the workplace.	0.046	0.019	0.022	0.112	0.113

INDUSTRY REPORT JUNE 2014	How frequently do you experience near-miss accidents (i.e. something that could have caused an injury but did not)?	Physical injuries reported on riskman	Physical injuries not reported on riskman	Psychological injuries reported on riskman	Psychological injuries not reported on riskman
78. I voluntarily carry out tasks or activities that help to improve workplace psychological safety.	.135*	-0.052	-0.104	0.056	0.061
79. I feel emotionally drained from my work.	-.247**	0.113	0.126	0.058	.270**
80. I feel used up at the end of the workday.	-.193**	0.105	.146*	0.025	.258**
81. I feel tired when I get up in the morning and have to face another day on the job.	-.227**	0.116	0.112	0.058	.228**
82. Working all day is a strain for me.	-.232**	0.104	0.132	0.069	.250**
83. I feel burned out from my work.	-.169**	0.086	.181**	0.078	.201**
84. I have had problems with tiredness.	-.128*	0.045	0.045	0.117	.150*
85. I need to rest more.	-.178**	0.084	0	0.056	.190**
86. I feel sleepy or drowsy	-.142*	0.055	0.032	-0.026	0.117
87. I make slips of the tongue when speaking.	-.181**	0.028	0.024	0.086	0.057
88. I find it more difficult to find the correct word.	-.149*	0.011	0.045	0.021	0.041
89. My memory has been?	-.127*	0.011	.143*	0.005	0.129
90. I have lost interest in the things I used to do	-0.088	0.063	.183**	0.05	.187**
91. How much were you bothered by back or neck pain?	-.255**	0.101	.262**	0.017	0.105
92. I have problems thinking clearly.	-0.084	0.025	0.135	0.038	.153*
93. How much were you bothered by pain in your arms, legs, or joint area like your knee or hips?	-.308**	.137*	.204**	0.044	0.094
94. How much were you bothered by muscle soreness?	-.258**	.134*	.203**	-0.015	0.107
95. I have difficulty concentrating.	-0.018	0.007	0.093	0.034	.150*
96. I have problems starting things.	0.012	0.055	0.048	0.049	0.066

INDUSTRY REPORT JUNE 2014	How frequently do you experience near-miss accidents (i.e. something that could have caused an injury but did not)?	Physical injuries reported on riskman	Physical injuries not reported on riskman	Psychological injuries reported on riskman	Psychological injuries not reported on riskman
97. I start things without difficulty but get weak as I go on.	-0.109	0.064	.139*	0.067	.272**
98. I am lacking in energy.	-.160*	0.008	0.089	0.003	.187**
99. I have less strength in my muscles.	-.166**	0.024	.171*	-0.012	.136*
100. I feel weak.	-0.114	0.011	.185**	0.021	0.071
101 (i). In my team (e.g. clinical manager, hospitality manager) management acts quickly to correct problems/issues that affect employees' physical safety.	.177**	-0.017	-.232**	-.169**	-.345**
101 (ii). In my organisation (e.g. CEO, HR) management acts quickly to correct problems/issues that affect employees' physical safety.	.302**	-.171*	-.351**	-.283**	-.306**
102(i). In my team (e.g. clinical manager, hospitality manager) management show s support for injury prevention through involvement and commitment.	.165**	-0.056	-.284**	-.144*	-.311**
102(ii). In my organisation (e.g. CEO, HR) management show s support for injury prevention through involvement and commitment.	.257**	-.131*	-.366**	-.258**	-.313**
103(i). In my team (e.g. clinical manager, hospitality manager) management acts decisively when a concern for an employee's physical safety is raised.	.147*	-0.024	-.193**	-.189**	-.327**
103(ii). In my organisation (e.g. CEO, HR) management acts decisively when a concern for an employee's physical safety is raised.	.238**	-0.085	-.251**	-.294**	-.358**
104(i). In my team (e.g. clinical manager, hospitality manager) management clearly considers the physical safety of employees to be of great importance.	.194**	-0.03	-.230**	-.148*	-.325**
104(ii). In my organisation (e.g. CEO, HR) management clearly considers the physical safety of employees to be of great importance.	.258**	-0.093	-.300**	-.234**	-.373**
105 (i). In my team (e.g. clinical manager, hospitality manager) safety of staff is a priority.	.209**	-0.033	-.268**	-0.092	-.267**

INDUSTRY REPORT JUNE 2014	How frequently do you experience near-miss accidents (i.e. something that could have caused an injury but did not)?	Physical injuries reported on riskman	Physical injuries not reported on riskman	Psychological injuries reported on riskman	Psychological injuries not reported on riskman
105(ii). In my organisation (e.g. CEO, HR) safety of staff is a priority.	.299**	-.163*	-.375**	-.174**	-.296**
106 (i). In my team (e.g. clinical manager, hospitality manager) management considers safety to be as important as productivity.	.197**	-0.043	-.207**	-0.089	-.289**
106(ii). In my organisation (e.g. CEO, HR) management considers safety to be as important as productivity	.271**	-0.082	-.219**	-.167*	-.297**
107(i). In my team (e.g. clinical manager, hospitality manager) there is good communication here about safety issues which affect me.	.211**	-0.025	-.286**	-.129*	-.338**
107(ii). In my organisation (e.g. CEO, HR) there is good communication here about safety issues which affect me.	.239**	-0.119	-.288**	-.260**	-.306**
108(i). In my team (e.g. clinical manager, hospitality manager) information about workplace safety is always brought to my attention by my manager/ supervisor.	.252**	-0.098	-.256**	-.174**	-.236**
108(ii). In my organisation (e.g. CEO, HR) information about workplace safety is always brought to my attention by my manager/ supervisor.	.309**	-.155*	-.308**	-.267**	-.200**
109(i). In my team (e.g. clinical manager, hospitality manager) my contribution to resolving safety concerns are listened to.	.158*	-0.094	-.263**	-.138*	-.284**
109(ii). In my organisation (e.g. CEO, HR) my contribution to resolving safety concerns are listened to.	.169**	-0.128	-.298**	-.343**	-.336**
110(i). In my team (e.g. clinical manager, hospitality manager) participation and consultation regarding safety at work occurs with employees, unions and health and safety representatives in my workplace.	.145*	-0.033	-.243**	-0.122	-.288**
110(ii). In my organisation (e.g. CEO, HR) participation and consultation regarding safety at work occurs with employees, unions and health and safety representatives in my workplace	.187**	-.141*	-.266**	-.282**	-.332**

INDUSTRY REPORT JUNE 2014	How frequently do you experience near-miss accidents (i.e. something that could have caused an injury but did not)?	Physical injuries reported on riskman	Physical injuries not reported on riskman	Psychological injuries reported on riskman	Psychological injuries not reported on riskman
111(i). In my team (e.g. clinical manager, hospitality manager) employees are encouraged to become involved in workplace safety matters.	.176**	-0.077	-.309**	-.262**	-.355**
111(ii). In my organisation (e.g. CEO, HR) employees are encouraged to become involved in workplace safety matters.	.203**	-.139*	-.335**	-.342**	-.314**
112(i). In my team (e.g. clinical manager, hospitality manager) the prevention of workplace injury involves all levels.	.179**	-0.106	-.306**	-.200**	-.276**
112(ii). In my organisation (e.g. CEO, HR) the prevention of workplace injury involves all levels.	.212**	-.202**	-.303**	-.334**	-.281**
113. Have you experienced a situation where your patient's needs outweigh the perceived benefits of complying with safety precautions?	.437**	-.181**	-.370**	-0.093	-.225**
114. How often were you exposed to bullying from managers, supervisors or colleagues in the past six months ?	.273**	-0.078	-.268**	-.251**	-.371**
115. If you have experienced bullying how long have you been exposed to bullying from managers, supervisors or colleagues	.251**	0.057	-0.043	-0.195	-0.186
116. How often were you exposed to violent behaviours from patients in the past six months	.243**	-.230**	-.184**	-.221**	-.257**
117. If you have been exposed to violence from patients, how long have you been exposed to violent behaviours from patients	.249*	-0.017	-0.173	-.243*	-.320**
118. In order to manage my feelings at work I utilise emotional boundaries to manage the emotional space between myself and my patients.	-0.106	0.025	0.044	0.015	0.111
119. I am aware when I need to engage an emotional boundary between myself and my patients.	-.155*	0.031	0.04	0.005	0.083
120. In order to manage my feelings at work I flexibly engage emotional boundaries between myself and my patients.	-.140*	0.042	-0.037	0.02	0.068

INDUSTRY REPORT JUNE 2014	How frequently do you experience near-miss accidents (i.e. something that could have caused an injury but did not)?	Physical injuries reported on riskman	Physical injuries not reported on riskman	Psychological injuries reported on riskman	Psychological injuries not reported on riskman
121. I moderate my emotional boundaries to control how much of my emotional energy I invest in interactions with patients.	-.177**	0.028	0.005	0.038	0.103
122. I moderate my emotional boundaries to enable me to invest my emotional self in interactions with patients.	-.154*	0.065	0.04	0.029	0.055
123. I moderate how I use emotional boundaries to engage meaningfully with clients.	-.155*	0.033	0.009	0.014	0.06
125. I moderate the emotional boundaries between myself and my patients so as to manage my energy levels.	-.161*	0.034	-0.028	0.05	0.084
126. I utilise emotional boundaries with patients to conserve my energy.	-.201**	0.054	0.018	0.013	0.074
127. I utilise emotional boundaries with patients to protect me from becoming emotionally overwhelmed.	-.217**	0.045	-0.015	-0.003	0.132
** Pearson's correlation coefficient significant 2-tailed					
Categories highlighted red represent the poorest result (note that some results are very similar).					

Discussion

The results were reviewed at length with the hospital management. Through collaboration arising from these discussions there were a series of general recommendations. It was suggested that recommendations were implemented gradually following careful consultation, the full support of management, and that a scheduled evaluation process was also implemented to ensure that the changes were working effectively. During the review of the results it was acknowledged that the hospital group were well advanced in the identification and management of levels of psychosocial risk having completed an extensive evaluation of these factors as part of this project.

Theoretical findings

The initial findings suggested that both physical and psychosocial safety climate (PSC) demonstrated a relationship with working conditions and health and safety outcomes potentially extending current theoretical models of safety to include a psychosocial pathway. The initial correlational findings suggest that the PSC items show a relationship with near miss injuries, and unreported psychological and physical injuries extending the PSC theoretical framework to work injuries. These early findings outlined in the initial industry report assisted to delineate specific areas of attention for the final paper on PSC, emotional exhaustion and work injuries, which was expanded and elaborated leading to the paper outlined in Chapter 4.

Practical Recommendations

These recommendations were presented to managers within the hospital group. Two intervention options were presented to build upon this work and address areas of concern in the psychosocial work environment. The first option involved developing the support of external experts to assist with the intervention. The second option involved utilizing internal

resources to develop intervention strategies. The options were discussed at length and management spent several months reviewing the data and options.

The first option, involving the use of external expertise, involved a limited short term intervention to improve levels of psychosocial and physical safety climate in one hospital. The researcher would apply for funding from SafeWork SA to undertake this intervention and the intervention would only take place if funding was secured. The intervention would be informed by the most effective intervention processes identified using meta-analytic review of the international literature (this has been completed and is outlined in Chapter 5 of this thesis). It was proposed that the researcher would be involved in implementing the intervention, the development of a follow up survey to evaluate improvement in a range of performance measures (near misses, accidents and injuries) and a report summarising progress and the intervention outcome (improvement in performance measures) to be provided to the hospital group. The SafeWork SA grant was anticipated to cover payments to employees completing interviews and surveys (so that they can be completed outside of normal work hours). The aim of the intervention would be a 40 % improvement in performance statistics (accidents and injuries).

Alternatively, the second option, given the expertise available within the hospital group was to undertake an internal intervention. It was recommended that the climate was addressed first as this will be directly influence the other variables. Following discussions with management and staff a range of options were proposed to build workplace psychosocial safety climate (PSC). It was suggested that activities were undertaken to address each specific domain of PSC as follows:

1. To demonstrate management priority of psychological health over productivity through the following:

a) To include protocols and procedures for the identification of psychosocial risks and protection of psychological health in the Health and Safety Management System (i.e. see European Agency for Safety and Health at Work (2012) for a list of psychosocial hazards).

b) To establish objectives and targets to facilitate the measuring and monitoring of psychosocial risks and psychological health amongst staff at each hospital.

c) To apply risk management processes to identify, assess and control psychosocial hazards (i.e. work pressure, emotional demands, bullying).

d) To build the assessment and monitoring of psychosocial processes into human resource management practices (recruitment, induction, performance management, and training needs analysis).

2. To show management commitment to the protection of psychological health by also considering the following options:

a) To use appropriate internal (i.e. in house psychologist) and external expertise (i.e. critical incident debriefing) and resources to support and protect the psychological health of staff.

b) To encourage and reward employees who report psychosocial hazards (i.e. emotional demands, bullying, violence, work pressure) and psychological health matters or near miss incidents and provide immediate supportive feedback.

c) To assess and support the psychological health of injured workers with complex physical injuries to promote faster recovery.

3. To promote effective communication about psychological health and safety through the development of these possible options:

   a) Establish effective consultation and communication processes with employers and relevant stakeholders regarding psychosocial risks and psychological health and ensure that stakeholders are aware of any developments in organisational psychosocial risk management (i.e. a part of regular established meetings, via email, blogs).

   b) To provide training, information and guidance in relation to psychosocial risks for staff and factors that can moderate these risks (i.e. potential job resources such as social support, control).

4. To increase levels of participation about issues related to worker psychosocial health and safety with the following:

   a) Encourage participation and involvement of stakeholders including employees, management, unions and health and safety representatives in the occupational health and safety process.

   b) Consider innovative strategies to encourage the participation and involvement of staff (i.e. social media, competitions)

   c) Develop research partnerships with academic institutions to contribute new perspectives and assist with expertise and resources to promote effective participation processes.

It was also recommended that the hospital management team review two documents available online to assist in the understanding of the development of a strong PSC and the management of workplace psychosocial risks. Recommended reference material included the European Agency for Safety and Health at Work (2012) report on the management of psychosocial risks at work and the SafeWork Australia (2012) report on the Australian Workplace Barometer. It was anticipated that these materials would assist management to interpret the research project results in more detail and provide material to plan the proposed intervention. Given that physical safety climate scores were also low, it was suggested that promoting the development of a strong physical safety climate would also be an effective focus. Resources to assist with the improvement of physical safety climate are more readily available. Reports recommended included 'The measurement and monitoring of safety' (The Health Foundation, 2013), 'Using safety cases in industry and healthcare December 2012' (The Health Foundation, 2012), and 'Occupational safety and health culture assessment – a review of main approaches and selected tools 2011' (European Agency for Safety and Health at Work, 2011). These reference materials would assist management to plan strategies to improve the physical safety climate in specific hospitals and groups requiring further attention.

Following these recommendations presented in 2014 the hospitals have implemented a range of strategies to improve work health and safety based on this report. The work spent developing the industry relationships was crucial in understanding how the research should be shaped and organised to have the most practical use for the organisation. Presenting the research findings in a way that industry could interpret and adapt quickly to practice was an important goal for this project. Ultimately we conduct research to improve human lives. This document demonstrates how presenting a strong case for change, building strong industry relationships, and feeding back the results in a practical, use-friendly way can assist to

develop research outcomes that are informed and relevant to translate research evidence into accessible communication designed for external audiences. An important goal of this research research was to produce outcomes that were practical, leading-edge and relevant to translate research evidence into accessible communication designed for external audiences beyond the academic community This exploratory data was then used to delineate particular areas of concern requiring further research attention leading to the expanded academic paper elaborated in Chapter 4 of this thesis.

References

Bakker AB & Demerouti E (2007). The Job Demands-Resources model. *Journal of Management. Psychology, 22,* 309-328

Bakker, A.B., Demerouti, E., & Schaufeli, W.B. (2003). Dual processes at work in a call centre: An application of the Job Demands-Resources model. *European Journal of Work and Organizational Psychology, 12,* 393-417

Bakker, A.B., Demerouti, E., & Euwema, M.C. (2005). Job resources buffer the impact of job demands on burnout. *Journal of Occupational Health Psychology, 10,* 170-80

Barnett, K., Hordacre, A., Spoehr, J., Parnis, E. (2010). *The role of the workplace in return to work.* Australian Institute for Social Research Discussion Paper prepared for WorkCover SA.

Berland, A., Natvig, G. N., & Gundersen, D. (2008). Patient safety and job-related stress: A focus group study. *Intensive and Critical Care Nursing, 24*, 90-97.

Blewett, V. (2009). *OHSW Research Strategy for South Australia 2009*. SafeWork SA document.

Bongers PM et al (2006). Epidemiology of work related neck and upper limb problems. *Journal of Occupational Rehabilitation, 16,* 272-295.

Braithwaite, J., & Coiera, E. (2010). Beyond patient safety flatland. *Journal of the Royal Society of Medicine, 103,* 219-225.

Brotheridge, C. M., & Lee, R. T. (2003). Development and validation of the emotional labour scale. *Journal of Occupational and Organizational Psychology, 76,* 365-379.

Chalder, T., Berelowitz, G., Pawlikowska, T., Watts, L., Wessely, S., Wright, D., & Wallace, E. P. (1993). Development of a fatigue scale. *Journal of Psychosomatic Research, 37,* 147-153.

Christian, M. S., Bradley, J. C., Wallace, J. C., & Burke, M. J. (2009). Workplace safety: A meta-analysis of the roles of person and situation factors. *Journal of Applied Psychology, 94,* 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,* 553-578.

Clarke, S. P., Rockett, J. L., Sloane, D. M., & Aiken, L. H. (2002). Organizational climate, staffing, and safety equipment as predictors of needlestick injuries and near-misses in hospital nurses. *American Journal of Infection Control, 30,* 207-216.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology, 86,* 499-512.

Dollard, M.F., & Bakker, A. B. (2010). Psychosocial safety climate as a precursor to conducive work environments, psychological health problems, and employee engagement. *Journal of Occupational and Organizational Psychology, 83,* 579-599.

Dollard, M. F., & Karasek, R. (2010). Building psychosocial safety climate: Evaluation of a socially coordinated PAR risk management stress prevention study. In J. Houdmont & S. Leka, (Eds.), *Contemporary occupational health psychology: Global perspectives on research and practice,* (pp. 208–234). Oxford, UK: Wiley-Blackwell.

Dollard, M.F., Skinner, N., & Tuckey, M.R., & Bailey, T. (2007). National surveillance of psychosocial risk factors in the workplace: An international overview. *Work & Stress, 21,* 1-29.

Dollard, M.F., Tuckey, M.R., & Dormann, C. (2012). Psychosocial safety climate moderates the demand-resource interaction in predicting work stress. *Accident Analysis & Prevention, 45,* 694-704.

European Agency for Safety and Health at Work (March 3, 2014). *Management of psychosocial risks at work. An analysis of the findings of the European Survey of Enterprises n new and emerging risks* (ESENER) 2012. Retrieved from https://osha.europa.eu/en/tools-and-publications/publications/reports/management-psychosocial-risks-esener

European Agency for Safety and Health at Work (March 3, 2014). *Occupational safety and health culture assessment – a review of main approaches and selected tools 2011*. Retrieved from http://www.respectautravail.be/fop/czechrepublic/en/publications/files/culture_assessment_soar_en.pdf

Goldenhar, L. M., Williams, L. J., & Swanson, N. G. (2003). Modelling relationships between job stressors and injury and near-miss outcomes for construction labourers. *Work & Stress, 17,* 218-240.

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

Hayward, R., & Tuckey, M.R. (2011). Emotions in uniform: How nurses regulate emotion at work. *Human Relations, 64,* 1501-1523.

Head, J. et al. (2006). Influence of change in psychosocial work characteristics on sickness absence: the Whitehall II study. *Journal of Epidemiology and Community Health, 60,* 55-61.

Idris, M.A., Dollard, M.F., Coward, J., & Dormann, C. (2012). Psychosocial safety climate: Conceptual distinctiveness and effect on job demands and worker psychological well-being. *Safety Science, 50,* 19-28.

Karasek RA (1979). Job Demands, job decision latitude, and mental strain. *ASQ, 24,* 285-308.

Karasek RA et al (1998). The job content questionnaire (JCQ): An instrument for internationally comparative assessments of psychosocial job

Karasek R., Brisson, C., Kawakami, N., Houtman, I., Bongers, P., & Amick, B. (1998). The job content questionnaire (JCQ): An instrument for internationally comparative assessments of psychosocial job characteristics. *Journal of Occupational Health Psychology, 3,* 322-355.

Karasek, R. A., & Theorell, T. (1990). *Healthy work: stress, productivity and the reconstruction of working life*. New York: Basic Books.

Kristensen, T.S., Hannerz, H., Høgh, A., Borg, V. (2005). The Copenhagen Psychosocial Questionnaire--a tool for the assessment and improvement of the psychosocial work environment. *Scandinavian Journal of Work Environment & Health, 31,* 438-449.

Kudzielzki, J., McCorrick, F., Zurskowzki, D., & Herndon, J. (2011). Patient safety climate among orthopaedic surgery residents. *The Journal of Bone and Joint Surgery, 93,* 1-6.

Law, R., Dollard, M. F., Tuckey, M. R., & Dormann, C. (2011). Psychosocial safety climate as a lead indicator of workplace bullying and harassment, job resources, psychological health and employee engagement. *Accident Analysis &Prevention, 43,* 1782-1793.

McGlynn, E. A., Asch, S. M., Adams, J., Keesey, J., & et al. (2003). The quality of health care delivered to adults in the United States. *The New England Journal of Medicine, 348,* 2635-2645.

McTernan, W. P., Dollard, M. F., & LaMontagne, A. D. (2013). Clinical and sub-clinical depression in Australian workplaces: An economic cost analysis of depression-related productivity loss attributable to job-strain and bullying. *Work & Stress, 27,* 321–338.

Medibank Private (March 1, 2014). *The cost of workplace stress in Australia 2008*. Available http://medibank.com.au/client/documents/pdfs/the-cost-os-workplace-stress.pdf

Nahrgang, J. D., Morgeson, F. P., & Hofmann, D. A. (2011). Safety at work: A meta-analytic investigation of the link between job demands, job resources, burnout, engagement, and safety outcomes. *Journal of Applied Psychology, 96,* 71-94.

Naveh, E., Katz-Navon, T., & Stern, Z. (2005). Treatment errors in healthcare: A safety climate approach. *Management Science, 51,* 948-960.

Neal, A., & Griffin, M. A. (2006). A study of the lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels. Journal of Applied Psychology, 91(4), 946-953.

Neubert, M. J., Kacmar, K. M., Carlson, D. S., Chonko, L. B., & Roberts, J. A. (2008). Regulatory focus as a mediator of the influence of initiating structure and servant leadership on employee behavior. *Journal of Applied Psychology, 93,* 1220.

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.

Parker, C. P., Baltes, B. B., Young, S. A., Huff, J. W., & et al. (2003). Relationships between psychological climate perceptions and work outcomes: A meta-analytic review. Journal of Organizational Behavior, 24(4), 389-389.

Parker, C. P., Baltes, B. B., Young, S. A., Huff, J. W., & et al. (2003). Relationships between psychological climate perceptions and work outcomes: A meta-analytic review. *Journal of Organizational Behavior, 24,* 389-389.

Productivity Commission. (2010). *Performance benchmarking of Australian business regulation: Occupational health & safety* [research report]. Canberra: Productivity Commission.

Reiman, T., Pietikainen, E., Oedewald, P. (2010). Multilayered approach to patient safety culture. *Quality Safety in Health Care*, 19.

Rosen, A. K., Singer, S., Shibei, Z., Shokeen, P., Meterko, M., & Gaba, D. (2010). Hospital safety climate and safety outcomes: Is there a relationship in the va? [; Research Support, Non-U.S. Gov't]. Medical care research and review. *MCRR, 67,* 590-608.

Runciman, W. B. (2010). Patient safety: Time for a transformational change in medical education. *Medical Journal of Australia, 193*, 2.

Braithwaite, J., Runciman, W. B., & Merry, A. F. (2009). Towards safer, better healthcare: harnessing the natural properties of complex sociotechnical systems. *Quality and Safety in Health Care, 18,* 37-41.

Runciman, W. B., Merry, A. F., & Walton, M. (2007). *Safety and ethics in healthcare. Hampshire.*, England: Ashgate Publishing Limited.

SafeWork Australia (March 1, 2014).*The cost of work related injury and illness for Australian Employers, Workers and the Community 2009.* http://www.abs.gov.au/AUSSTATS/abso.nfs/lookup/4/02.0main+Features20Jun+2011#endnote2 (Accessed 14/6/12)

SafeWork Australia (March 5, 2014). *The Australian Workplace Barometer report on psychosocial safety climate and worker health in Australia 2012.* Retrieved from https://www.safeworkaustralia.gov.au/system/files/documents/1702/the-australian-workplace-barometer-report.pdf

SafeWork SA (March 4, 2013). *About us.* Retrieved from https://www.safework.sa.gov.au

Schaufeli, W.B., Bakker, A.B. & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and Psychological Measurement, 66,* 701-716

Schaufeli, W.B., Leiter, M.P., Maslach, C., & Jackson, S.E. (1996). The Maslach Burnout Inventory-General Survey. In C. Maslach, S.E. Jackson, & M.P. Leiter (Eds.), *Maslach Burnout Inventory.* Palo Alto, CA: Consulting Psychologists Press.

Scherbaum, C.A., & Ferreter, J.M. (2009). Estimating statistical power and sample size requirement for organizational research using hierarchical linear models. *Organizational Research Methods, 12,* 347-367.

Silva, S., Lima, M. L., & Baptista, C. (2004). OSCI: An organisational and safety climate inventory. *Safety Science, 42,* 205-220.

Singer, S. J., Gaba, D. M., Geppert, J. J., Sinaiko, A. D., Howard, S. K., & Park, K. C. (2003). The culture of safety: Results of an organization-wide survey in 15 california hospitals. *Quality & Safety in Health Care, 12,* 112-118.

Singer, S., Shoutzu, L., Falwell, A., Gaba, D., & Baker, L. (2009). Relationship of safety climate and safety performance in hospitals. *Health Services Research, 44,* 399-421.

Siu, O., Phillips, D. R., & Leung, T. (2003). Age differences in safety attitudes and safety performance in Hong Kong construction workers. *Journal of Safety Research, 34,* 199-205.

Siu, O., Phillips, D. R., & Leung, T. (2004). Safety climate and safety performance among construction workers in Hong Kong. The role of psychological strains as mediators. *Accident Analysis and Prevention, 36,* 359-366.

Squires, M. A. E., Tourangeau, A. N. N., Spence Laschinger, H. K., & Doran, D. (2010). The link between leadership and safety outcomes in hospitals. *Journal of Nursing Management, 18,* 914-925.

Stansfeld S & Candy B (2006). Psychosocial work environment and mental health--a meta-analytic review. *Scandinavian Journal of Work and Environmental Health, 32,* 443-462.

The Health Foundation (March 6, 2014). *The measurement and monitoring of safety. Drawing together academic evidence and practical experience to produce a framework for safety measurement and monitoring April 2013.* Retrieved from http://www.health.org.uk/publication/measurement-and-monitoring-safety

The Health Foundation (March 6, 2014). *Using safety cases in industry and healthcare. A pragmatic review of the use of safety cases in safety critical industries – lessons and prerequisites for their application in healthcare.* Retrieved from http://www.health.org.uk/sites/health/files/UsingSafetyCasesInIndustryAndHealthcare.pdf

Thomas, E. J., Sexton, J. B., Neilands, T. B., Frankel, A., & Helmreich, R. L. (2005). The effect of executive walk rounds on nurse safety climate attitudes: A randomized trial of clinical units. *BMC Health Services Research, 5,* 28.

Tuckey, M. R., Winwood, P. C., & Dollard, M. F. (2012). Psychosocial culture and pathways to psychological injury within policing. *Police Practice and Research, 13,* 224-240.

Vogus, T.J., & Sutcliffe, K.M. (2007). The impact of safety organizing, trusted leadership, and care pathways on reported medication errors in hospital nursing units. *Medical Care, 41,* 992-1002.

Weaver, M. D., Wang, H. E., Fairbanks, R. J., & Patterson, P. D. (2012). The association between ems workplace safety culture and safety outcomes. *Prehospital Emergency Care, 16,* 43-52.

Whiteford HA et al (2005). The work outcomes research cost-benefit (WORC) project. Aust & NZ J of Psych, 39, A36.

Whiteford HA et al (2005). The work outcomes research cost-benefit (WORC) project. *Australian & New Zealand Journal of Psychology, 39,* A36.

Appendix B

Table 1. *Goodness-of-fit indices of confirmatory factor analyses for EE – PSC Phys*

	χ^2	df	$\Delta\chi^2$(df)	CFI	IFI	RMSEA
M0: Single Factor Solution	3113.64	377		.65	.65	.16
M1: Proposed 3 factor	1116.14	374	(3) 1997.50**	.90	.91	.08

$\Delta\chi^2$(df) indicates the change in χ^2 when compared with the null model for the variables of that scale
** indicates significant (p <.001) change in χ^2 between the proposed structure and the null model

Table 2. *Goodness-of-fit indices of confirmatory factor analyses for PSC & Phys*

	χ^2	df	$\Delta\chi^2$(df)	CFI	IFI	RMSEA
M0: Single Factor Solution	2280.73	252		.70	.71	.17
M1: Proposed 2 factor	901.98	251	(1) 1378.75**	.91	.91	.09

$\Delta\chi^2$(df) indicates the change in χ^2 when compared with the null model for the variables of that scale
** indicates significant (p <.001) change in χ^2 between the proposed structure and the null model

Appendix C

Author Contributions (Chapter 2)

Zadow, A., & Dollard, M. F. (2016). Psychosocial safety climate. In S. Clarke, T. M. Probst, F. Guldenmund, & J. Passmore (Eds.), *The Wiley Blackwell Handbook of the Psychology of Occupational Safety and Workplace Health* (pp. 414-436). Chichester, UK: John Wiley & Sons Ltd.

Amy Zadow wrote the first draft of the paper (80 %).

Professor Maureen Dollard supervised Amy Zadow, and provided guidance and revisions in the development of the paper (20 %).

Signatures

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Author Contributions (Chapter 4)

Zadow, A. J., Dollard, M. F., McLinton, S. S., Lawrence, P., & Tuckey, M. R. (2017). Psychosocial safety climate, emotional exhaustion, and work injuries in healthcare workplaces. *Stress and Health*. Advance online publication. http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1532-2998/earlyview

Amy Zadow approached the industry partner, designed the survey, completed the ethics applications, conducted the data collection and analysis, wrote the initial draft of the paper, and completed all revisions (65%).

Professor Maureen Dollard supervised the study, reviewed the written drafts providing theoretical and methodological guidance, and assisted with conducting the multilevel data analysis (20%).

Dr Sarven McLinton assisted with coding the registered injury data set and with data analysis (5%).

Associate Professor Michelle Tuckey supervised the study and reviewed the written drafts providing theoretical and methodological guidance (5%).

Peter Lawrence assisted with ethics, data collection, and interpretation of the results (5%).

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Author Contribution (Chapter 5)

Zadow, A. J., Dollard, M. F., & Tuckey, M. R. (2017). Psychosocial safety climate (PSC) as a meta-analytic framework for organizational stress intervention. In review.

Amy Zadow completed the coding, data analysis, and the first draft of this paper (65%).

Professor Maureen Dollard supervised the development of the paper, rated the articles, and provided feedback and revisions to strengthen the theoretical and methodological development of the paper (20%).

Associate Professor Michelle Tuckey supervised the development of the paper, rated the articles, and provided feedback and revisions to strengthen the theoretical and methodological development of the paper (15%).

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