

**Occupational Stress and Depression:
Insights from Traditional and Emerging Views**

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Declaration

I declare that this thesis is the product of my own work carried out under the supervision of Professor Don Byrne. I affirm that this thesis is in accordance with the Australian National University Guidelines for higher degree research.

Suzi Keser

1 December 2016

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I dedicate this contribution to you all.

Abstract

This thesis sought to develop the idea that the psychosocial occupational environment contributes to depression risk. The topic of occupational stress and depression was introduced by considering its impact on individual, workplace, economic and societal functioning (Chapter 1). The classic theoretical frameworks utilised to study this relationship were briefly described in Chapter 2 and the demand control/support model (DC/S model; Karasek & Theorell, 1990) was selected to guide the initial analysis. The evidence on the DC/S model and depression risk was subsequently reviewed with a focus on more recent research (Chapter 3). It was deemed that the risk of depression was inconclusive. The review also highlighted a paucity of data from within the Australian workforce. The subsequent three empirical surveys were considered an important contribution to knowledge about occupational stress and depression in the Australian context.

The first empirical study evaluated the DC/S model in a sample of Australian public service employees (Chapter 4). The main effects of control and social support were supported, which prompted interest in advancing knowledge about these specific associations. The social identity approach to stress and wellbeing in the workplace (van Dick & Haslam, 2012) was considered to offer unique insights into these relationships. The perspective was introduced together with an evaluation of the evidence linking social identification to workplace support and mental ill-health (Chapter 5). The chapter provided a solid basis from which to extend expectations for workplace control (Chapter 6). The critical analysis of evidence in these two chapters also raised conceptual and methodological issues within the social identity approach that were addressed in the subsequent studies.

To advance the testing of causal associations Study 2 (Chapter 7) examined predictions with a one-year longitudinal design. Ratings of high demands prospectively predicted depression ratings. The predictions for the main and mediating role of social identification were largely supported with cross-sectional data while longitudinal associations were not significant. Chapter 8 subsequently considered alternate explanations for the contemporaneous associations between social identification, decision latitude and social support, and depression. A final longitudinal study assessed the likelihood that reciprocal associations would best characterise the association between the assessed occupational stressor and depression ratings (Study 3, Chapter 9). The

reverse model was found to be the less false account of the data where baseline depression predicted six-month supervisor support and decision authority ratings. The normal causation model was best fitting for the association between social identification and occupational stressors, where social identification at baseline predicted six-month decision authority, co-worker and supervisor support ratings. Only the latter relationships remained significant in the final model. The thesis closed by highlighting the contributions made to evidence, knowledge about occupational stress and depression in Australia, theory, practice and philosophy, with suggestions for future research considered throughout (Chapter 10).

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Chapter 1. The Case for Researching Occupational Stress and Depression

It is a well-established idea that psychosocial occupational stress may pose a direct risk to health (Cox & Griffiths, 2010; Karasek & Theorell, 1990; Marmot, Siegrist, Theorell, & Feeny, 1999). The most robust evidence supporting this proposition has been attained with indicators of cardiovascular disease (Kivimäki et al., 2012). The evidence for other health outcomes is generally supportive (Nixon, Mazzola, Bauer, Krueger & Spector, 2011; van der Doef & Maes, 1998), however a number of methodological limitations preclude a conclusive understanding of the wider health risks associated with occupational stress, particularly for mental health outcomes such as depression (Bonde, 2008; Häusser, Mojzisch, Niesel & Schulz-Hardt, 2010; Netterstrøm et al., 2008). This thesis aims to refine knowledge about the processes through which occupational stress may affect depression risk.

This chapter presents the rationale for pursuing the enquiry through an overview of the purported impact of occupational stress and depression. First, claims about the impact on workplace productivity are described and complemented with estimates of the associated costs. The legislation concerning occupational stress is next reviewed. The implications for productivity, the economy and legislative system are underscored with prevalence data on occupational stress and depression. The burden of occupational stress and depression on the health of individuals, their families, and the community is also outlined. This depiction of the research context clearly supports the case for furthering knowledge about the relationship between occupational stress and depression. The complexities involved in the seemingly simple question of whether occupational stress leads to depression are touched on throughout this chapter and approached directly in Chapters 2 and 3.

In this chapter, occupational stress describes the noxious physiological and psychological reactions that emerge in response to an unfavourable balance between the demands of the occupational environment and the employees' capacity to respond to those requirements (The National Institute for Occupational Safety and Health [NIOSH], 1999). Unless otherwise stated, the research reviewed derives from or is consistent with the Demand Control Support model of occupational stress (Karasek & Theorell, 1990). Briefly, this implies that the constructs of high demands, low control and low support at work were either singularly or collectively used to represent the harmful aspects of the occupational environment. Finally, the term occupational stress (OS) will be used throughout this thesis although it is acknowledged that OS is also referred to as job or work/- related stress or strain.

The Presentation and Impact of Occupational Stress in the Workplace

Occupational stress and work performance. Occupational stress is considered to have major implications for performance at work (Karasek & Theorell, 1990; Motowidlo, Packard, & Manning, 1986). Prospective data has supported the assertion that high levels of occupational stress lead to sub-optimal work performance, as indicated by; supervisor evaluations of general performance (Hülshager, Jonas, & Günter, 2010), corporate records of objective sales (van Dyne, Jehn, & Cummings, 2002) and accuracy on computer tasks (Bond & Bunce, 2003; Flynn & James, 2009). Meta-analyses also reveal an abundance of research supporting correlations between OS (including emotional labour and job insecurity) and performance; variously ascertained through self-report, supervisor ratings, and objective output measures (Gilboa, Shirom, Fried, & Cooper, 2008; Hülshager & Schewe, 2011; Rosen, Chang, Djurdjevic, & Eatough, 2010). Taken together, the evidence raises that occupational stress can adversely affect the quantity and quality of employee output.

Strained interpersonal functioning is an intermediate factor worth highlighting. Bakker, van Emmerik and van Riet's (2008) data revealed that self-reported high OS ratings explained ratings of low team harmony and in turn low team performance as marked by objective sales three months later. Of more concern was the finding that employees reporting high OS were more likely to report engagement in counter-productive work behaviours such as violations of workplace codes of conduct (Tucker et al., 2009), sabotage, aggression and hostility (Chen & Spector, 1992). Notably, high OS has been implicated prospectively in both self-reported bullying perpetration and victimisation (Baillien, De Cuyper, & De Witte, 2011; Balducci, Cecchin, & Fraccaroli, 2012); a concern that has gained serious attention in Australian workplaces (Comcare, 2009; Commonwealth of Australia, 2012). Beyond strained relations within the workplace, high OS is linked to negative interactions with customers and stakeholders, which suggests compromised service delivery (Varca, 1999). The pertinent point emerging is that OS can compromise the overall effectiveness of the workplace as resources are diverted to the management of problematic workplace relations with less time and effort to invest in work tasks (Kahn & Byosiore, 1992).

Occupational stress and presenteeism. A notable extension to the discussion of the productivity loss associated with OS is the issue of presenteeism. Presenteeism refers to employees' attendance at work while sick (Aronsson & Gustafsson, 2005; Johns, 2010). Importantly this is now recognised as counter-productive to performance, productivity, and

health (Gosselin, Lemyre, & Corneil, 2013). A growing body of research reveals positive associations between high OS and presenteeism (Biron, Brun, Ivers, & Cooper, 2006; Caverley, Cunningham & MacGregor, 2007; Hansen & Anderson, 2008; Jourdain & Vézina, 2014) and prospective associations support the idea that OS precedes presenteeism (Demerouti, Le Blanc, Bakker, Schaufeli, & Hox, 2009; Gustafsson & Marklund, 2011). It has been estimated that presenteeism due to OS accounts for an annual loss of 2.14 working days and an annual cost of \$533 per employee (Medibank & KMPG Econtech, 2008). Another report estimated the cost of presenteeism as \$34.1 billion to the Australian economy (Medibank & KMPG Econtech, 2011) and OS was considered one of the major contributors to this financial burden.

Occupational stress and absenteeism. Another major concern proposed to result from OS is absenteeism; where employees do not attend scheduled work (Johns, 2002). Darr and Johns' (2008) meta-analysis on OS and absenteeism revealed a modest positive correlation. Prospective data has subsequently demonstrated the impact; via workplace records of short-term absences of up to five days (Magee, Stefanic, Caputi, & Iverson, 2011) and less than seven days (Rehkopf, Kuper, & Marmot, 2010) and longer-term absences of greater than seven (Rehkopf *et al.*, 2010) and fifteen days (Laaksonen, Pitkäniemi, Rahkonen, & Lahelma, 2010) and eight or more consecutive weeks (Clausen, Nielsen, Carneiro, & Borg, 2012). The latter associations are particularly concerning given that long periods of absenteeism are known to decrease the chance of return to work (Henderson, Glozier, & Holland, 2005). The associated financial burden is huge, with OS-related absenteeism estimated to cost Australian employers \$3.48 billion and the economy \$5.12 billion annually (Medibank & KMPG Econtech, 2008). With the cost of presenteeism, these figures represent the largest component of the financial burden of OS in Australia (Medibank & KMPG Econtech, 2008, 2011).

Occupational stress and compensation. The concern that has taken the particular interest of the Australian workforce however is the cost of OS-related compensation claims. The main form of injury associated with OS is variously termed (*work-related*) *mental disorder*, (*mental*) *stress* or *psychological injury* and is the most costly of the disease outcomes (Safe Work Australia [SWA], 2016). The latest report noted a median cost of \$ 21 100 per case during 2013-2014 which represented the highest figure for serious claims, with the next highest cost at \$ 15 700 for circulatory diseases (SWA, 2016). The high cost of OS-related psychological injury to employers is largely due to the frequency of OS-related

compensation cases, the cost of payouts to employees, fines and penalties accrued by employers (SWA, 2015) and the reduction in productivity associated with employees' absence from work (Medibank & KMPG Econtech, 2008). The associated premiums further add to this already high cost. In fact, the rising trend of OS compensable cases have led to increased premiums across 34 federal government agencies as well as in the Australian Capital Territory's private sector for the 2014/2015 financial period (Finity Consulting, 2014).

The true cost of OS-related compensation cases however is likely to be much higher when other occupational stressors and health outcomes are considered. This is noted as the compensation data for OS is typically estimated through employees' report of one element of OS; work pressure (SWA, 2015; 2016) and *mental disorders* is typically used as a proxy measure of OS (LaMontagne, Sanderson, & Cocker, 2010), even though mental disorder is only one of the possible health outcomes. For example, OS is also causally implicated in musculoskeletal injuries and disorders (Lang, Ochsmann, Kraus, & Lang, 2012) which is the leading type of accepted compensation claim in Australia (SWA, 2013; 2015; 2016). This breakdown highlights the huge costs that can amount in relation to OS that is left unmanaged.

Occupational stress and legislation. In Australia, OS and its compensation is largely managed under the *Work Health and Safety Act 2011* (WHS Act, SWA, 2011). Under federal, state and territory law¹, employers are required to provide and maintain for employees, as far as practicable, a working environment that is safe and without risks to physical and psychological health. While risks to health through physical sources of stress such as noise and chemicals are relatively well-established and integrated into mandatory regulations, guidelines for the management of psychosocial sources of OS; that is the health risk properties of the psychological and social environment at work (Stansfeld & Candy, 2006) are not as clearly defined (see WHS Regulations, SWA 2011). The recent harmonisation of workplace health and safety laws across Australia and the explicit recognition of mental health in the legislation (WHS Act 2011, section 4) underscore the growing efforts to identify and manage psychosocial OS within the Australian workforce.

¹ All Australian States and Territories have adopted the WHS Act 2011, except in Western Australia where consultation is ongoing and Victoria; which is the only state to not introduce the Act.

Prevalence of Occupational Stress

Despite the initiative to safeguard the health of employees, reports indicate that OS remains a major concern. To broaden the estimate from the compensation figures above, the Australian Bureau of Statistics (ABS, 2011) reported that 5.3% of employees, equivalent to over 600, 000 individuals, reported at least one work-related physical or mental injury or illness in the 2009-2010 financial year. In an annual survey on a representative sample of Australian adults (Australian Psychological Society [APS], 2015), a steady 32% of respondents across 2011 to 2015 identified workplace issues as a source of stress. In a more focussed enquiry on occupational stress, the APS (2013) reported that three in four respondents indicated that 'stress at work' affected their health. Similarly, the annual Lifeline Stress Poll in 2015 revealed that three quarters of employees cited their work as stressful and work was considered the number one cause of stress (Lifeline & ORIMA Research, 2015).

These estimates are not surprising as the contemporary Australian work environment is characterised by financial and mental pressure, job insecurity, constrained resources, long work hours, the use of new technology and continuing globalisation (Dollard & Winefield, 2002). Taken together with the inferred outcomes of absenteeism, presenteeism and compensation claims, clear knowledge about the way in which psychosocial OS leads to health risk is of current relevance, not just for employers but for employees too.

Occupational Stress and Il-Health

Occupational stress and wellbeing. Beyond penalties and productivity loss, the proposed effect of OS on poor wellbeing is widespread. For example, ratings of high OS have prospectively predicted common indices of strained employee wellbeing such as low job satisfaction (de Jonge et al., 2001), reduced participation in leisure activity (Kouvonen et al., 2005), fatigue (de Lange et al., 2009) and poor sleep quality (de Lange et al., 2009; Hanson, Åkerstedt, Näswall, Leineweber, Theorell, & Westerlund, 2011). The hindrance of OS to achieving an overall sense of wellbeing is regretful not only because of the inherent importance of employees' quality of work life (International Labour Organization, 2011) but also because indicators of poor wellbeing serve an intermediate role in serious health outcomes (Faragher, Cass & Cooper, 2005; Gangwisch et al., 2006; Wilmot et al., 2012).

OS is also linked to a range of health risk behaviours. For instance, compared to individuals reporting low or no OS, those indicating high OS are more likely to smoke,

smoke at a higher intensity (Kouvonen, Kivimäki, Virtanen, Pentti, & Vahtera, 2005) and report less self-efficacy to quit smoking (Ng & Jeffery, 2003). Employees' report of high rather than low OS has also been prospectively linked to poor diet by way of high fat and sugar intake (Wardle, Steptoe, Oliver, & Lipsey, 2000) and obesity (Brunner, Chandola, & Marmot, 2007; Nyberg et al., 2012; Wardle, Chida, Gibson, Whitaker, & Steptoe, 2011) and concurrently to low levels of exercise, sedentary behaviour (Diana, Hayan, Winters, & Liang, 2010) and high alcohol use (Frone, 2008; Jones et al., 2007). It is noted that associations between OS and health risk indices are not always consistent and vary as a function of gender, study population and research design (see Brisson, Larocque, Moisan, Vézina, & Dagenais, 2000; Jones et al., 2007; Diana et al., 2010; Hodgins, Williams & Munro, 2009). While the exact nature of relationships is yet to be fully understood, the evidence points to the idea that OS is vital to consider in the health and wellbeing of employees.

Occupational stress and family wellbeing. The purported impact of OS beyond the employee to the family setting exposes the widespread burden of this issue. The association is typically studied within the work-family conflict framework, where psychosocial OS is proposed to conflict (Greenhaus & Beutell, 1985), spillover (Small & Riley, 1990; Grzywacz & Marks, 2000) or interfere (Frone, Russell, & Cooper, 1992; Frone, 2003) with roles and relationships in the family domain. In turn this is expected to affect the wellbeing and health of family members. For example, both male and female employees who reported pressures and overload at work were more likely to experience subsequent conflict with their partner (Leach & Butterworth, 2012; Story & Repetti, 2006) and report lower marital satisfaction (Allen, Herst, Bruck, & Sutton, 2000) and cohesion (Robinson, Flowers, & Carroll, 2011). Employee ratings of high versus low or no pressure at work have also corresponded to higher ratings of conflict with their children (Rantanen, Kinnunen, Feld, & Pulkkinen, 2008) and adolescents (Crouter & Bumpus, 2001).

More concerning, reports of high OS have been linked to indicators of poor adjustment and mental disorder risk in children (Johnson, Li, Kendall, Strazdins & Jacoby, 2013) and adolescents (Crouter & Bumpus, 2001). This is reasoned to occur due to the presumed flow-on effects of OS on parents' mental health, parenting, the quality of relationship with children (Crouter & Bumpus, 2001; Strazdins, Shipley, Clements, O'Brien & Broom, 2010) and the crossover of mental strain from one parent to another and in turn to the child (Bakker et al., 2008; Frone, 2003). These various pathways illustrate that mismanaged OS can lead to the

immediate and protracted suffering of employees and their families across the lifespan. It is however the direct effect of OS on serious health endpoints that is of particular interest here.

Occupational stress and physical health conditions. The evidence is mixed for the direct risk of OS for serious health conditions. On the one hand, meta-analyses indicate strong evidence for the causal role of OS in musculoskeletal injuries (Lang, Ochsmann, Kraus, & Lang, 2012) and moderate evidence for gastrointestinal disorders (Nixon et al., 2011). More recent evaluations have revealed mixed evidence for dementia (Andel et al., 2012; Wang, Wahlberg, Karp, Winblad & Fratiglioni, 2012). In contrast, the risk of cancer from OS is considered unlikely, as determined by a meta-analysis of over 5500 incident cases of colorectal, lung, breast, and prostate cancer (Heikilä et al., 2013). A meta-analysis also did not deem OS as a direct risk factor for Type 2 diabetes (Cosgrove, Sargeant, Caleyachetty, & Griffin, 2012) although a later meta-analysis determined support (Nyberg et al., 2014). The evidence suggests that the strength of OS as a health risk factor may be dependent on the health outcome and studies factored.

The most conclusive evidence for OS as a risk factor for physical disease is for cardiovascular disease (Backé, Seidler, Latza, Rossnagel, & Schumann, 2012; Belkic, Landsbergis, Schnall, & Baker, 2004; Kivimäki et al., 2006, Kivimäki et al., 2012; Nyberg et al., 2013). To elaborate, OS defined as the joint effects of high workplace demands and low control at work, is a known predictor of heightened cardiovascular disease risk and is estimated to account for three per cent of the overall risk (Kivimäki et al., 2012). Given that only two workplace features are considered in this estimate (demands and control), the risk that OS poses to cardiovascular disease is likely to be greater when other work stressors are considered.

Occupational Stress and Depression

In comparison to the extensive study and subsequent clarity about the role of OS in cardiovascular disease risk, relatively less research has been conducted with mental health outcomes such as depression, although this literature is now rapidly growing. The accumulated evidence generally supports the idea that depression may result from OS; defined here as the design of the occupational environment in terms of high demand, low control and low workplace support, as articulated by the Demand Control/Support model (Karasek & Theorell, 1990).

Several limitations however preclude a clear understanding of the relationship between OS and depression (Bonde, 2008; Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010; Netterstrøm et al., 2008, Van der Doef & Maes, 1999). These include arguably the limited testing of the range of hypotheses with the outcome of depression and measurement issues such as the inadequate management of pre-morbid mental health. It is also contended that the understanding of OS-related depression could be significantly enhanced with further thought about the underlying psychological processes involved in OS. Such theoretical and methodological considerations are not unique to the study of depression but are relevant for OS and health research more broadly, even in advancing knowledge about well-established relationships in cardiovascular disease (Rosenthal & Alter, 2012; Steptoe & Kivimäki, 2012).

Investigation into the risk of OS for depression however is warranted for several reasons. First, depression is a prevalent and preventable health concern facing the Australian working population. Second, the condition is debilitating, with major implications for employees' health and functioning as an individual, employee, family and community member. Third, depression plays a prominent role in other health outcomes. Therefore, clarity about the role of OS in depression may also have important implications for knowledge about the aetiology of health more broadly. Fourth, the financial burden of depression is primarily carried by the workplace and economy, making it vital from a financial standpoint to consider whether and how OS contributes to depression. It is concluded that the prevalence, modifiable nature and far-reaching impact of OS and depression strongly justifies the enquiry into depression as an outcome of OS. The relationship between OS and depression will be the focus of this thesis. Unless otherwise stated, the term depression is used in the section that follows to refer to the psychiatric or clinical diagnosis of depression.

Prevalence of Depression

Depression is recognised as a common and serious health concern (WHO, 2008). In the working population, the 12-month prevalence of depressive disorders is estimated at 5.7% in Australia (Australian Bureau of Statistics, 2008), 6.4 per cent in the United States (Kessler, Merikangas, & Wang, 2008) and 3.4 per cent throughout Europe (Alonso et al., 2004). While these estimates vary, partly due to the different criteria used for depression, they illustrate that it is a significant health concern among the Western working population. In particular, women are approximately twice as likely as men to develop depression (American Psychiatric Association [APA], 2013).

Among the Australian working population, the prevalence of depression is relatively consistent across the ages of 18 to 65 (ABS, 2008), unlike the prevalence of other health conditions such as cardiovascular disease which predominately occurs within the older age bracket of from 55 years plus (ABS, 2013; Australian Institute of Health and Welfare, 2011). While the prevalence of depression is higher among unemployed individuals, depression is still one of the most common mental health problems faced by Australian employees (ABS, 2008). In addition, depression is one of the most manageable (Martin, Sanderson, & Cocker, 2009) and preventable (Mykletun & Harvey, 2012) mental health conditions. The study of this health outcome in this population is therefore justifiable.

The Impairment of Depression

General impairment to functioning. According to the latest Global Burden of Disease Study (World Health Organisation; WHO, 2008) depression is considered the leading cause of healthy years of life lost to disability. Depression is also projected to rise from being the third leading cause of the global burden of disease, after cardiovascular disease and cancer, to the leading cause by 2030 (WHO, 2008). These figures highlight that depression, characterised by a disturbance in mood (APA, 2013), can impact health and functioning in a more considerable way than other chronic conditions (Henderson, Henderson, Lavikainen, & McDaid, 2004, WHO, 2008).

The impact of depression is widespread. For example, it is well-recognised that depression is related to poor social functioning through conflict, relationships that are lower in quality than desired (Judd, Paulus, Wells, & Rapaport, 1996) and low social integration (Barnett & Gotlib, 1988). Depression is also a well-established predictor of marital strain, poor intimate relationships and divorce (Kessler, Walters, & Forthofer, 1998). Divorce in turn bears an effect of children's mental health and academic functioning, even into the child's own adulthood (Amato, 2001; Mooney, Oliver & Smith, 2009). Thus while symptoms of depression, such as loss of interest or pleasure in life, may occur and resolve within a discrete period (APA, 2013; Billings & Moos, 1984), the impact can be long-lasting and far-reaching.

In the area of occupational functioning, a large study found that depression had the greatest negative impact on time management and productivity compared to any other health problem and that it was equivalent to rheumatoid arthritis in its impact on physical tasks (Burton, 2004). The impact of depression on employees' capacity for productivity at work comes as no surprise given that the workplace demands qualities that are impaired by

depressive symptoms: concentration, attention, working memory, decision-making, motivation and interpersonal skills (APA, 2013; Goldman & Drake, 2006; Stewart et al., 2003; Wang et al., 2014). As the risk of repeated episodes of depression is high; documented at up to 80% (Teasdale et al., 2000), this condition presents an ongoing risk to quality of life.

Depression can also be life-threatening. The lifetime suicide risk in major depression is estimated at 3.5 % (Blair-West, Mellsop, & Eyeson-Annan, 1997). To add, it is estimated that mental health conditions are present in more than 90% of suicidal cases and in high income countries, depression is recognised as the strongest psychiatric risk factor for suicide (Cavanagh, Carson, Sharpe, & Lawrie, 2003; Gaynes et al., 2004; Gvion & Apter, 2012). In addition, it has been shown that compared to depressed individuals who attempted suicide, those who completed suicide were more likely to have experienced OS (DeJong, Overholser & Stockmeier, 2009; Heikkinen, Isometsa, Marttunen, Aro, & Lonnqvist, 1995), a relationship itself that justifies inquiry into depression as an outcome of OS.

Depression and comorbidity. The impairment associated with depression is even greater when comorbidity is considered. Depression often co-occurs with other mental health conditions such as anxiety (Mineka, Watson, & Clark, 1998; Kessler, Chiu, Demler, & Walters, 2005; Slade, Johnston, Oakley-Browne, Andrews & Whiteford, 2009) and substance use disorders (Kessler et al., 2005; Slade et al., 2009, Swendsen & Merikangas, 2000) as well as physical health conditions such as musculoskeletal injuries (Lépine & Briley, 2004; Miller & Cano, 2009), gastrointestinal disorders (Whitehead, Palsson, & Jones, 2002), diabetes (Anderson, Freedland, Clouse, & Lustman, 2001) and cardiovascular disease (Glassman, 2007; Musselman, Dwight, Evans, & Nemeroff, 1998; Wuslin & Singal, 2003). Compared to the prognosis expected for a single condition, comorbid depression is associated with a more severe and recurrent course of illness, poorer treatment compliance and outcomes, a higher risk of depression relapse, suicide risk and service use, reduced quality of life, greater role impairment (Kessler et al., 2005; Sartorius et al., 1996) including in the occupational setting (Baune, Adrian, & Jacobi, 2006; Waghorn, Chant, & Lloyd, 2006), and a reduced likelihood of returning to work (Stein, Cox, Afifi, Belik, Sareen, 2006). The significance of these associations is reflected by WHO data from over 60 countries which converged on the finding that depression incrementally worsened health and disability more than any other disease combination (Moussavi et al., 2007).

Depression is also important to examine given its significance in the aetiology of serious physical health conditions. Further to co-occurrence, depression is recognised as an independent risk factor for several chronic conditions such as obesity (Luppino et al., 2010), diabetes (Knol et al., 2006) and cardiovascular disease (Nicholson, Kuper, & Hemingway, 2006; Van der Kooy et al., 2007; Van Melle et al., 2004). In addition, given that depression and OS are both known independent risk factors for cardiovascular disease, their link may inform about potential precursory events to cardiovascular disease risk. As this example highlights, knowledge about whether and how OS leads to depression may shed light on the aetiology of OS and health more generally.

Depression and presenteeism. Depression is also known to attract huge costs. In fact, the financial burden of depression is largely carried by employers and the economy (WHO, 2008). It has been estimated that lifetime major depression costs the workforce over \$12 billion annually (Sanderson, Tilse, Nicholson, Oldenburg, & Graves, 2007). A major component of the economic effects of depression is in presenteeism. The cost of presenteeism due to mental disorders has been estimated to cost the Australian economy \$6.1 billion dollars (PricewaterhouseCoopers, 2014). *Depression* is also estimated to be the largest contributor (21%) to the productivity loss caused by presenteeism in Australia (Medibank & KMPG Econtech, 2011). It is important to highlight that the term *depression* is used loosely in its economic discussion to collectively refer to the common mental health concerns of depression, anxiety and general stress, as opposed to a discrete psychiatric condition. Nonetheless these figures highlight the extent to which psychiatric depression and its comorbid mental states can impact and cost the economy.

Depression and absenteeism. Another major cost of depression is through workplace absenteeism. In Australia, workplace absenteeism due to mental disorders is estimated to cost the economy 4.7 billion dollars annually. In Australia, *depression* or mental health problems rank as the third most cited reason for absence from work (Direct Health Solution, 2009). It is also well-recognised that mental health conditions are associated with a long duration of absence from work with a median time lost at work of 13.8 weeks in the 2012-2013 period. This figure was more than double the median time lost for all serious claims (SWA, 2016). These figures illustrate the means through which depression manifests in the workplace and its disruption to economic effectiveness.

Limitations to OS and Depression Cost Estimates

The financial burden separately associated with mental illness and OS is huge and relatively well-documented. The financial burden of depression as a direct result of OS has been more difficult to quantify. Although economic modelling of psychological phenomenon is an inherently difficult task, an important limiting factor is the complexity involved in the measurement of OS and depression. For example, while OS may lead to depression as well as reduced productivity (Karasek & Theorell, 1990), depression itself may negatively impact productivity and the experience of OS. This conundrum with causality is evident throughout OS research and worth noting here to highlight the outstanding information required to both progress knowledge in this field and build a strong business case for addressing OS-related depression.

A further point of caution in interpreting the associated financial costs is the lack of a common language across the economic and academic field of OS-related depression research. As mentioned earlier, the economic discussion of depression typically uses the term to refer to common mental health conditions whereas depression as discussed here, in the academic context, refers to the specific mental health condition associated with mood disturbance (APA, 2013). The economic research also employs the term depression as a proxy measure for OS. Whilst it is expected that OS leads to depression as well as common mental health concerns, these figures do not exclude the explanatory role of reversed relations or methodological inaccuracies in the measurement of OS and depression.

Costs of Occupational Stress-Related Depression

OS-related depression compensation claims. Work-related compensation claims are a financial marker that make it difficult to ignore the direct role of OS in depression. In Australia's first report on OS-related mental health claims, *Mental Disorders* was determined as the most frequent type of accepted claim of the diseases category. Further, the number of claims for *Mental Disorders* in 2010-2011 were found to have increased by 11% compared to the previous decade (SWA, 2013). *Mental Disorders* also attracted the highest median payout (\$21 100 in 2012-2013) and had increased by 36% from 2000-01. More strikingly, the median compensation was more than double that paid for all serious claims (\$8 900) during 2012-2013. The high cost of *Mental Disorders* claims arises from the lump-sum payment, cost of medical treatment and in particular, the lengthy period of absence from work (SWA, 2016). These

figures show that mental health related compensation claims are a large, costly and continuing concern. The extent of disability resulting from OS-related depression however is likely greater given that mental disorders such as depression have been given other official labels for injury and illness (Mykletun et al., 2006). A clear understanding of the association between OS and mental health is therefore essential for its appropriate (financial) management.

Direct costs of OS-related depression. More recently, studies have reported on the economic costs associated with depression using a more specific measure of the clinical syndrome. Using complex data modelling and figures from various published sources including clinical interview ascertained depression via the 2007 National Survey of Mental Health and Wellbeing, LaMontagne et al (2010) calculated that depression arising from job strain (the combination of reported high demands and low control) accounted for \$730 million (5.8%) of the total annual cost of depression to the Australian workforce. The process was detailed further in a one-year population based telephone survey, where it was demonstrated that job strain (as above) affected productivity via ratings of depressive symptoms (McTernan, Dollard, & LaMontagne., 2013). The annual cost associated with lost productivity due to depression was estimated at \$8 billion for employers as determined by participants' self-report on absenteeism and presenteeism and data on Australian wages. The data also clarified that most of this cost was accounted for by *mild* levels of depression. This data adds more direct evidence about the financial burden of depression, as a clinical syndrome, as well as an indication of the direct causal link between OS and depression risk.

Indirect Costs of OS-related depression. The true cost of OS-related depression to the workplace and economy of course far exceeds these figures. Indirect costs accumulate when OS-related depression results in turnover (see Medibank & KMPG Econtech, 2008) and early retirement (Glozier, 2008; Lagerveld et al., 2010). For example, turnover itself is estimated to account for between 90 and 200% of the average annual salary of the position affected resulting from the costs involved in re-staffing and re-skilling (Cascio, 2000). Depression is also recognised as a leading reason for early retirement (Karpanasalo et al., 2005; Olesen, Butterworth, & Rodgers, 2012). Similarly, OS as defined by low control and an imbalance between efforts and rewards received is also reported as an important factor in determining an early exit from the workforce (Siegrist, Wahrendorf, von dem Knesebeck, Jürges, & Börsch-Supan, 2006). This breakdown of outcomes illustrates that poorly managed OS-related depression can have far-reaching consequences across employment.

International Significance of OS-Related Depression

Concerns about OS and depression are widely experienced among industrialised nations. To illustrate, common mental disorders which notably includes depression in addition to anxiety disorders, are recognised as the leading cause of sickness absence and long-term work disability in most developed countries (Henderson, Harvey, Overalnd, Mykletun, & Hotopf, 2011). Common mental disorders are also one of the main reasons for claiming compensation in most developed nations (Glozier, 2008). To illustrate with figures, the cost to Europe of OS-related depression was estimated at €617 billion annually (Matrix, 2013). This figure was determined from the costs associated with absenteeism and presenteeism (€272 billion), loss of productivity (€242 billion), health care costs (€63 billion) and disability benefit payments (€39 billion). In the United Kingdom, the cost of work-related stress, depression, and anxiety was estimated at £3.6 billion or €4.3 billion, to compare with European estimates (European Agency for Safety and Health at Work, 2014). Figures from the United States are less direct although still informative: the economic burden of major depressive disorder was calculated as USD210.5 billion, with half of the cost attributed to the impact in the workplace (Greenberg, Fournier, Sistsky, Pike, & Kessler, 2015). In a separate report, OS was estimated to cost USD300 billion (Rosch, 2001). Although definitions and assessed consequences of OS and depression cases are not consistent across national surveys (Houdmont, Cox & Griffiths, 2010), these figures demonstrate the global significance of OS as a major workplace health and safety issue.

Practical Relevance of Researching OS-Related Depression

Clear information about whether and how OS leads to depression is relevant for a range of stakeholders. Firstly, employees stand to be better informed of the factors that may increase their risk for mental health conditions, particularly as employees can spend the largest portion of their waking hours at work compared to any other type of activity (Organisation for Economic Co-operation and Development [OECD], 2015). This information is relevant to a sizeable population. In Australia, workers represent 65% of the working age population, corresponding to close to 12 million people (ABS, 2016).

Second, while theory suggests and evidence demonstrates that OS may directly increase depression risk, the lack of clear evidence has flow-on effects to its management. To illustrate, interventions that target the awareness and management of symptoms of depression

remain as the most commonly practised approach to OS-related mental ill-health in Australia (Comcare, 2009; PricewaterhouseCoopers, 2010; Australian Public Service Commission [APSC], 2014). Thus, more direct evidence of the link between OS and depression could inform top-down approaches on issues such as liability and policy and procedures. Given the associations, the appropriate management of OS-related depression could also provide secondary benefits to co-workers, clients, family members, the community and economy.

There remains however insufficient enquiry into the link between work design and depression risk in Australia although large scale interest in this topic has grown more recently (e.g., Strazdins et al., 2011; Hall, Dollard, Winefield, Dorman, & Bakker, 2013; LaMontagne, Keegel, Vallance, Ostry, & Wolfe, 2008). The economic case for addressing OS-related depression has of late become a focal contribution to knowledge about the link between OS and depression (LaMontagne et al., 2010; McTernan et al., 2013). This thesis seeks to add to the business case by presenting direct evidence about Australian employees' experience of the occupational environment, depression and its association.

Summary

In sum, occupational stress-related depression is a large and growing concern in Australia and other developed economies. This chapter established the importance of clarifying the relationship through an overview of the purported impact of OS and depression. It was shown that OS and depression presents a serious risk to employees' health and functioning across the occupational, familial and interpersonal domains. The description of these facets was considered necessary to truly appreciate the human cost of poorly understood and managed OS and depression. The data also revealed that the workplace and economy bear a significant portion of the financial cost associated with depression; through presenteeism, absenteeism, compensation claims and the indirect costs associated with disruption to productivity, effectiveness, turnover and early retirement. Given that OS is proposed to play a major role in accounting for these costs, clear knowledge about its causal role in depression is considered vital to preserve the wellbeing of the workplace and society more broadly. The research context as depicted in this chapter presents a strong case for clarifying whether and how OS leads to depression risk. The chapter that follows describes the academic context in which this relationship may be studied.

Chapter 2. An Overview of Occupational Stress Academic Research

Occupational stress is a major subject for organisational practice as presented in Chapter 1 as well as academic research. This chapter establishes the conceptual framework that will guide the enquiry into the link between OS and depression. Importantly, the case for considering this relationship from an organisational perspective will be developed following a review of the theoretical, empirical, contextual, practical and philosophical considerations that are implicit in this line of research. The discussion shows that while a number of approaches to the study of OS and depression are plausible, a focus on the proposed occupational elements of OS would empirically advance its management. Karasek and Theorell's (1990) Demand-Control-Support model is subsequently selected as an appropriate model to determine the process through which OS may directly lead to depression.

Institutional Definitions of Occupational Stress

The most commonly cited definitions of OS have been put forward by international authorities involved in the regulation of occupational health and safety. The NIOSH (1999) definition of OS presented in Chapter 1 represents one of the most accepted definitions of OS. The World Health Organisation (2007) present an essentially similar definition referring to OS as a "pattern of reactions that occurs when workers are presented with work demands not matched to their knowledge, skills or abilities and which challenge their ability to cope" (p.13). These definitions share the overarching idea that OS emerges from a state of imbalance between the requirements of the occupational environment and the psychological attributes of the employee. The definitions vary sl

ightly on the specification of attributes involved in the imbalance. The WHO (2007) describe the attributes as employees' knowledge, skills and resources while NIOSH (1999) consider employees' needs rather than knowledge as key in addition to capabilities and resources. Both views have been cited by Australian regulatory institutions: the NIOSH (1999) view by the the Australian Safety and Compensation Council² (2005) and the WHO view (Leka, Griffiths, & Cox, 2003) by Comcare (2016).

Other definitions place greater emphasis on the role of the occupational environment in contrast to a state of imbalance. For example, the independent regulator of work-related

² The Australian Safety and Compensation Council has since 2009 been replaced by Safe Work Australia.

health, safety and illness in the United Kingdom define OS as the “adverse reaction people have to excessive pressures or other types of demand placed on them at work” (Health and Safety Executive [HSE], 2007, p.7). Similarly, the government body responsible for implementing laws within European member states define OS as a “pattern of emotional, cognitive, behavioural and physiological reactions to adverse and noxious aspects of work content, work organisation and work environment” (The European Commission [EC], 2000, p.3). The EC (2000) elaborate that OS manifests as high arousal and distress that is typically accompanied by a sense of difficulty coping. The definitions put forward by the HSE (2007) and EC (2000) do not necessarily negate the idea of an interactive process between the individual and the environment rather an emphasis is placed on the causal contribution of the occupational environment. Such definitions are typically influenced by respective political contexts (Calnan, Wainwright & Almond, 2000) but also reflect the prevailing academic model of OS which is reviewed next.

Model of Occupational Stress

As it stands there is no agreed upon definition of OS (Dewe, Driscoll, & Cooper, 2012; Mark & Smith, 2008). However, as LaMontagne, Keegel and Vallance (2007) state, it is widely accepted that OS is a product of individual, situational and structural processes. The conceptualisation as articulated by LaMontagne et al (2007) and LaMontagne and Keegel (2012) is presented first to provide an initial orientation to the proposed nature of OS. It is acknowledged that LaMontagne and colleagues (2007, 2012) largely base their view on a much earlier synthesis of the literature, as represented by the University of Michigan or ‘Michigan’ model of stress (Kahn & Byosiore, 1992). As depicted in Figure 1, the stress process is considered to originate to some degree with exposure to stressors. Occupational stressors are the physical and psychosocial working conditions, processes or events within the occupational environment that evoke a stress response (LaMontagne et al., 2007). Physical stressors describe aversive physical working conditions such as exposure to chemical or toxic substances, confined spaces, uncomfortable noise and temperature levels, and awkward working postures (Sonnetag & Frese, 2003). Psychosocial stressors may be understood as the interplay between the individual’s thoughts, feelings, and behaviours and the social organisation of work. This is represented by the content and organisation of work through workload, management processes (Theorell, 2007) and culture (Burton, 2010).

The unpleasant response to stressors is regarded as the state of perceived or subjective distress. Perceived distress may subsequently lead to adverse short-term responses. These responses can be physiological (e.g. elevated blood pressure), psychological (e.g. low mood) or behavioural (e.g. alcohol consumption). Prolonged distress and short-term responses increase the risk of chronic health outcomes that may similarly be physiological (e.g. coronary heart disease), psychological (e.g. depressive disorders) or behavioural (e.g. alcoholism) in nature. The link between occupational stressors and health outcomes is expected to occur both directly through the activation of the neuroendocrine system and indirectly through health risk behaviours (LaMontagne et al., 2007), as detailed in Chapter 1.

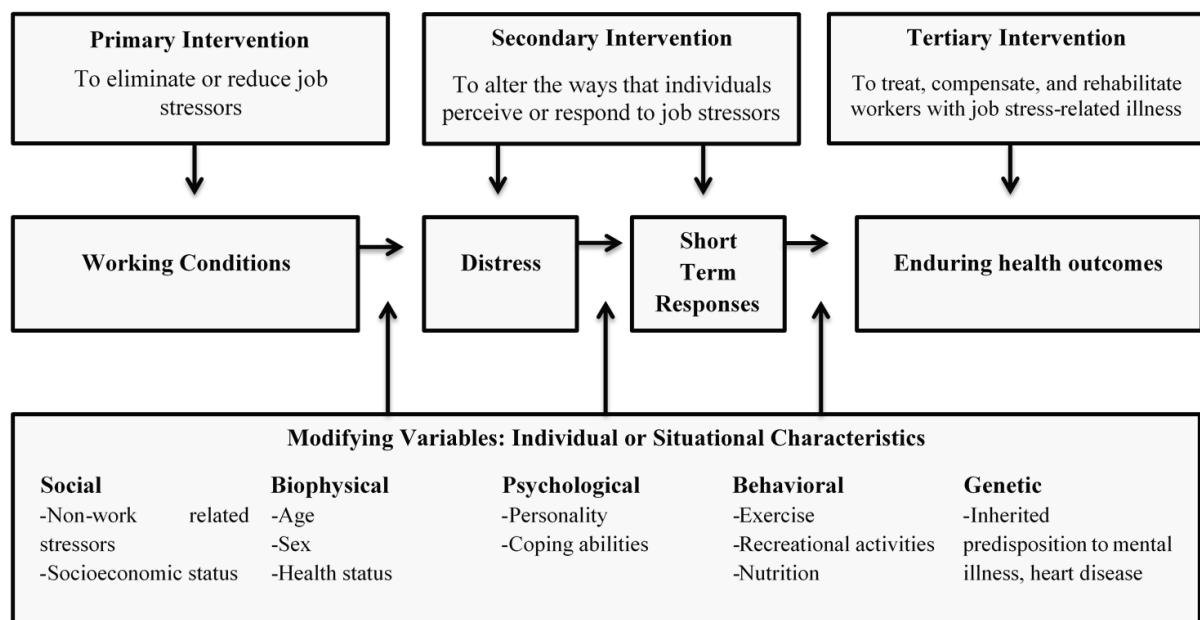


Figure 1. A Model of Occupational Stress. Adapted from “Reducing stress in the workplace (An evidence review: full report),” by A. D. LaMontagne, & T. Keegel, 2012, p. 40.

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Each of the steps in the stress process can be influenced by genetic, biophysical, psychological, behavioural, and social factors that serve to strengthen or weaken the influence of occupational stressor exposure (LaMontagne et al., 2007; LaMontagne & Keegel, 2012). For example, the psychological characteristic of negative affect; the propensity to experience negative emotionality and self-concept (Watson & Clark, 1984), is proposed to exacerbate the perception (Parkes, 1990) and actual experience (Booth, Murray, Marples & Batey, 2013) of occupational stressors as well as the expression of mental health related disorders (Watson & Clark, 1984). Furthermore, feedback loops can occur between

the various stages. For example, chronic health conditions may increase the vulnerability to experience poor working conditions (LaMontagne et al., 2007; LaMontagne & Keegel, 2012).

Three main points may be determined from this model. First, OS is not an illness rather a process through which physical and mental illness may arise. Relatedly, distress itself is not problematic, rather it is the progression into chronic health outcomes that is of concern. Finally, the OS process is subject to a wide range of influences that are considered to originate from within the individual or their external circumstances. Accordingly, this research field encompasses a variety of perspectives on the key causes of OS.

Individual Versus Organisational Approaches to OS

One way that conceptualisations of OS differ is the emphasis placed on either individual or organisational characteristics as the integral source of OS (Houtman, Jettinghoff & Cedillo, 2007). The *individual* approach, while acknowledging the role of the occupational environment, considers OS and its health consequences as primarily the result of individual attributes such as demographics, personality, attitudes, and coping. Research within this framework is concerned with advancing knowledge about individual risk and protective factors that influence the risk of OS and ensuing health consequences. A number of individual factors have generated a great deal of research attention. These include genetic factors such as gender (Nelson & Burke, 2002), acquired characteristics such as socio-economic status (Steptoe & Marmot, 2002; Steptoe et al., 2002) and dispositional attributes such as negative affect (Brief, Burke, George, Robinson and Webster, 1988), coping (Cooper & Payne, 1989; Dewe, O'Driscoll, & Cooper, 2010; Lazarus & Folkman, 1984; Harris, Daniels, & Briner, 2004), locus of control (Rotter, 1966; Spector, 1988), self-efficacy (Bandura, 1977; Jex & Bliese, 1999), hardiness (Kobasa, 1979; Moreno-Jiménez, Rodríguez-Muñoz, Garrosa-Hernández, & Blanco-Donoso, 2014) and a sense of coherence (Antonovsky, 1991; Bauer & Jenny, 2007; Feldt, 1997; Ryland & Greenfeld, 1991; Söderfeldt, Söderfeldt, Ohlson, Theorell, & Jones, 2000). There has also been growing interest in concepts such as resilience (Rees, Breen, Cusack, & Hegney, 2015), emotional intelligence (Bar-On, Brown, Kirkcaldy, & Thome, 2000; Ogińska-Bulik, 2005) and psychological acceptance (Bond & Hayes, 2002) and flexibility (Bond, Flaxman, Veldhoven, & Biron, 2010) and their protective capacity against OS.

In contrast, the *organisational* approach recognises the contribution of individual factors but emphasises the role of conditions in the occupational environment as key to OS (Houtman et al., 2007). Research from this viewpoint seeks to identify universally stressful features of work design, culture, and climate (Brief & George, 1991; Shain & Kramer, 2004). Prominent theories in this field include the demand-control/support model (Karasek, 1979; Karasek & Theorell, 1990) and effort-reward imbalance model (Siegrist, 1996) and concepts such as organisational justice (Blader & Tyler, 2003; Elovainio, Kivimäki & Vahtera, 2002), team climate (James, James, & Ashe, 1990; Schneider, Ehrhart, & Macey, 2013; Parker et al., 2003) and more recently the psychosocial safety climate (Idris, Dollard, Coward, & Dormann, 2012). It is also acknowledged that several models explicitly integrate the two approaches, such as Hart and Cooper's (2001) Organisational Health framework and Mark and Smith's (2008) Demands, Resources, and Individual Effects model. Nonetheless the current study of OS is still largely arranged around a focus on either individual or occupational characteristics.

Theoretical Considerations

An overview of the general notion of stress provides further insight into the *individual* and *organisational* approach to OS. At the outset it is acknowledged that this section does not provide an exhaustive account of the various stress concepts and theories. This complex parent construct is described only to the extent that it provides clarity and promotes insight into select relevant processes of OS.

There are three main perspectives on stress which have been termed the engineering, physiological (Cox, 1978) and psychological approach (Cox & Griffiths, 1995). The engineering approach considers stress as an external event that requires an adaptive response. This view originates in the engineering and physics concept of a substance breaking point: substances are said to have a certain limit when put under force with further force or stress resulting in damage (Young & Budynas, 2002). By extension, OS may be viewed as a noxious objective event or stimulus in the occupational environment that requires an adaptive response (Jex, Bheer, & Roberts, 1992). Accordingly, organisational models are more likely to be consistent with such a perspective given the focus on features of the occupational environment that are deemed inherently stressful.

In contrast to the view that stress is an external occurrence, the physiological approach describes stress by means of its occurrence within the individual (Cox, 1978; Cox & Griffiths, 1995). This approach was largely informed by the work of Selye (1950, 1956) who defined stress as the non-specific physiological response to stimuli that requires some form of energy or action. Selye (1956) was particularly influenced by Canon's (1929) claims about homeostasis and the natural tendency for resistance to external pressures. Selye's (1956) point of departure was the idea that stress was not simply adaptive but potentially harmful. Selye (1956) articulated the idea of a 'wear and tear' process of stress in his notion of the general adaptation syndrome (GAS).

The GAS comprises of three phases: 1) alarm; which is the body's initial mobilising reaction to environmental occurrences and signals the disruption to homeostasis, 2) resistance; whereby coping is enacted to restore homeostasis, and 3) exhaustion; when resources to respond to the stressor are depleted, leading to a susceptibility to illness. Of relevance, the theory suggests that stress is a natural reaction to a situation that demands increased output. The problematic nature of stress is construed as the result of the intense or chronic activation of the physiological system. This involves primarily two neuroendocrine systems: the sympathetic-adrenal medullary system and the hypothalamo-anterior pituitary-adrenal cortical system, with the immune system also later implicated (Selye, 1975; Segetstrom & Miller, 2004). The term distress was subsequently coined to denote the harmful physiological, psychological and behavioural markers of excessive or prolonged activation of the above systems, which is distinguished from positive or adaptive responses, termed eustress (Selye, 1975).

To address the confusion that subsequently arises from the various definitions of stress, the stress referred to in the engineering approach may be termed a stressor (Jex et al., 1992) and Selye's (1956, 1975) notion of (di)stress has since been represented by the term strain (Kahn & Quinn, 1970; Lazarus, 1966) in OS research. With this clarity, many of the ideas in the physiological approach are seen to be reflected in the concept of OS. As described in this chapter's working model of OS (Kahn & Byosiére, 1992; LaMontagne et al., 2007; LaMontagne & Keegel, 2012), psychological stressors and not just physical conditions are a central concept in OS. It is also generally agreed that the pathway to ill-health involves a state of distress which is aversive but not necessarily equivalent to ill-health. This is an

important point as lay views about work-related stress can mistakenly assume that any form of strain is harmful than simply unpleasant or even adaptive (Wainright & Calnan, 2002).

The idea is also shared that distress can progress into ill-health. Consistent with the GAS, a generic pathway to ill-health is proposed by OS models (e.g., DC/S model, psychosocial safety climate theory) as opposed to expectations for specific physical or mental health endpoints. The organisational approach also appears to have adopted the idea of stressor chronicity as a key mechanism of influence (e.g. DC/S model). By contrast, the study of positive or adaptive individual attributes such as hardiness have been viewed as consistent with the process of eustress (Kupriyanov & Zhdanov, 2014). It is thus considered that the physiological approach to stress has informed both assumed principles of OS and contributed to its diversity in the emphasis on either individual or environmental attributes.

A third major view of stress is the psychological approach which defines stress as the dynamic interaction between stimuli in the environment and individual responses (Cox & Griffiths, 1995). In other words, OS is viewed as the joint influence of the psychosocial occupational environment and individual attributes. Accordingly, this approach is considered to have addressed the conceptual limitations levelled at the engineering and physiological approach. Specifically, the approaches have been criticised for viewing people as passive recipients of environmental influences (Young & Budynas, 2002). It is rather claimed that stress is a process between the individual and their environment. This perspective has been further considered to encompass a transactional and interactional point of emphasis (Cox & Griffiths, 1995; O'Driscoll et al., 2012).

The transactional approach focuses on the cognitive processes and emotional reactions that guide individuals' interaction with their environment. The interactional approach focuses on the structural characteristics of the person's interaction with their environment. The former approach thus locates stress in the internal representation of problematic transactions between the person and their environment while the interactional approach focuses more on the dynamics arising from the occupational environment (Cox & Griffiths, 1995; O'Driscoll et al., 2012). The psychological models described next illustrate these ideas more clearly.

Transactional approach. Lazarus and Folkman's (1984) transactional model of stress represents one of the leading views of stress. The central component of stress is viewed

as the individual's evaluations of environmental stimuli, which are labelled primary and secondary appraisals (Lazarus, 1966). Primary appraisals refer to the subjective interpretation of stimuli in the environment as either harmful, threatening, challenging, beneficial or benign. Secondary appraisals denote the subsequent evaluation of one's coping capacity and traditionally centre on problem- and emotion-focused coping (Lazarus & Folkman, 1984; Lazarus, 2000). Accordingly, chronic stress is considered a result of repeated unfavourable appraisals (Folkman, 2008).

This view has guided the exploration of cognitive processes that link the employee to the occupational environment (Dewe et al., 2010). OS enquiries that stem from a transactional perspective are concerned with the function of primary appraisals such as the meaning given to encounters at work (Dewe & Trenberth, 2012; Hanton, Wagstaff, & Fletcher, 2012) and the difference between subjective and objective evaluations of stimuli in the occupational environment (Rehkopf, Kuper & Marmot, 2010). The more common approach though is the study of secondary appraisals and the moderating role of individual attributes, particularly coping (Dewe et al., 2010). Moreover, coping difficulty is recognised in institutional definitions of OS (EC, 2000; NIOSH, 1999; WHO, 2007). The individual approach to OS particularly emphasises the active role of the employee in shaping the stress experience.

Another influential derivative of the transactional view of stress is Hobfoll's (1989) Conservation of Resources theory. This paradigm raises the issue that Lazarus and Folkman's (1984) model over-emphasises cognitive processes at the expense of environmental or social influences and accordingly emphasises the equal contribution of individual's and their social context. The key mechanism of stress is regarded as the accumulation of individual and environmental losses known as a 'loss spiral'. Resource gain is said to offset the experience of conditions that may bring about resource loss. In the field of OS, the major investigative focus is on objective conditions within the occupational environment, such as workload, that lead to the loss of resources, such as time (O'Driscoll et al., 2012).

Interactional approach. A well-known conceptualisation of the psychological approach is the person-environment fit perspective (Caplan, 1983; Caplan & Harrison, 1993; French, Rodgers, & Cobb, 1974). This theory has been articulated to specifically explain stress arising in the occupational context (French, Caplan, & Harrison, 1982). In short, elevated health risk is claimed to result from either: a) a mismatch between the demands of

the occupational environment and the employee's attitudes and ability to meet those demands; or b) inadequate opportunities in the occupational work environment for employees to attain their physical and psychosocial needs; particularly those related to the application of knowledge and skills. This perspective also makes the distinction between fit as ascertained by employees' subjective and objective evaluations and considers the subjective component as particularly vital to (occupational) stress. The NIOSH (1999) and WHO (2007) definition of OS both appear to draw from the emphasis in this perspective on the misfit between job requirements and employee capabilities.

Karasek's (1979) demand-control model is also considered interactional (Cox, 1995; O'Driscoll et al., 2012; Mark & Smith, 2008) however the emphasis of the stress process is weighted on the structure of the occupational environment. This view proposes that OS results from the combined effect of high work demands and limited opportunities to influence tasks and procedures at work. The EC (1999) definition of OS incorporates this framework and the broader focus on employees' reactions to structural components of the occupational environment. OS theories that utilise a psychological perspective however have been criticised for lacking the essential focus on the interplay between the (occupational) environment and employee (Harris et al., 2004). Rather, as highlighted, there remains a focus on either individual or environmental factors.

Summary. A number of points are important to draw from this account. First, it is apparent that views about stress are wide-ranging. The various perspectives may be categorised according to whether stress is viewed as a property of the environment, individual or both. The latter psychological approach to stress is considered particularly influential to the conceptualisation of OS as evidenced by the position statements issued by leading authorities on this matter. Notwithstanding, the stimulus and physiological approach both contribute important insights into the proposed process of OS. The stimulus approach raises the potential of the direct impact of work design on health risk. The physiological approach draws attention to the pathway of chronic activation or taxing of the physiological system and accordingly the non-specific nature of health risk. The divergent views and contributions from the various research fields promotes a thorough analysis of the stress concept (Schuler, 1980). On the other hand, the limitation imposed is that this study area is bound by the absence of a unified definition of stress and by extension OS. As for stress, OS models tend to focus in detail on a select process. Accordingly, factors beyond the persuasion of theory are

important to consider to appreciate the implications of selecting the study model for this thesis.

With respect to terminology, it is considered helpful at this point to utilise the terms stressor and strain to refer to sources of stress and health risk respectively and ‘stress’ to instead refer to the broad area of study (McGrath, 1976; Jex et al., 1992). For the purpose of this thesis, unless otherwise specifically stated, the terms (occupational) stressors, strain and OS will be used in the same vein.

Empirical Considerations

The strength of the theoretical claims for stress and OS theories are briefly considered next. Evidence for the engineering approach has mainly arisen from research on the health effects of exposure to physical stressors relating to noise, space, and temperature levels. For example, exposure to high noise levels such as through aircraft or road traffic work is known to directly affect auditory and non-auditory health risk (Stansfeld, Haines, Burr, Berry, & Lercher, 2000; Stansfeld & Matheson, 2003). Well-documented non-auditory health risks include hypertension (Lee, Kang, Yaang, Choy, & Lee, 2009; Thompson, 1996), sleep disturbance (Öhrström, Rylander & Bjorkman, 1988) and annoyance (Fidell et al., 2011), while the evidence is less likely for actual disorders of mental health (Basner et al., 2014; Stansfeld et al., 2000). The research on psychiatric risk is limited although relationships appear dependent on individual factors such as appraisals (Cox, Griffiths, & Rial-Gonzalez, 2000; Stansfeld & Matheson, 2003). Thus, a competing interpretation is that the evidence for the engineering approach reflects the shared meaning attributed by the the majority of people assessed (Cox et al., 2000; Scott & Howard, 1970).

The clinical evidence for the physiological approach reveals that different stressors evoke different physiological response combinations (Goldstein, 2010; Greenberg, Carr & Summers, 2002; Mason, 1971), in contrast to the expectation of a unitary response system (Selye, 1956). Moreover, a recent study that statistically analysed Selye’s original data set (1936) found that while there was correspondence between the data for shrinking of the thymus and enlargement of the adrenal glands in rats, a range of other noxious conditions revealed no change in adrenal weight upon thymus involution or no change in either adrenal weight or thymus size (Nageishi, 2015). It was therefore concluded that the original data, when considered in its entirety, did not fully support the notion of a general non-specific

response to stressors. It is imperative then to determine the range of diseases that are directly affected by OS.

The psychological approach to stress, particularly Lazarus and Folkman's (1984) transactional view, has garnered support across a range of health and coping related scenarios, such as the adjustment to illness and health behaviour (Stanton, Revenson, & Tennen, 2007). The traction has led to an expanded focus on moderators such as stressor controllability and the chronicity and timing of stressor exposures particularly in the context of critical periods (Wethington, Glanz & Schwartz, 2015) as well as positive individual attributes and outcomes (Folkman, 2008). The transactional approach thus better accommodates the conditional findings of support seen in the engineering and physiological approaches. Research on the interactional view is typically undertaken in the context of OS investigations and is considered next in this context. In line with the key theme of this discussion, the evidence for OS models is presented according to its focus on individual or organisational aspects.

The individual and organisational approach to OS both present as empirically valid approaches to the study of OS. With regard to individual characteristics, a number of vulnerable groups have been identified: employees with a disability (Belin, Zamparutti, Tull, Hernandez, & Graveling, 2011), low socio-economic status (Marmot et al., 1991), poor health status and those living alone (Cox, et al., 2000) as well as employees who are young, ageing, migrants, women (Belin et al., 2011) and new mothers (Kelly, 1998). Moderating effects have been supported too for a range of cognitive risk factors. For example, employees endorsing a low rather than high sense of coherence; that is the view that events are comprehensible, manageable, and meaningful, were more likely to have rated the experience of a merger as negative and five years later report psychiatric medication prescription and hospitalisation (Pahkin, Väänänen, Koskinen, Bergbom, & Kouvonen, 2011). Mediation and moderated mediation relations have also been supported. For example, high self-efficacy was inferred to protect burnout risk one year later via the reduced likelihood of occupational stressors (Schwarzer & Hallum, 2008).

Following from Lazarus and Folkman's (1984) transactional view of stress, coping styles have been linked to stressor exposure and physical and mental health symptoms as revealed by meta-analysis (Dewe, Cox & Ferguson, 1993). Research of this nature has since focused on advancing the measurement of coping (Briner et al., 2004; Dewe et al., 2010)

such as through daily diary studies (Daniels & Harris, 2005) as well demonstrating interactive effects with other variables such as personality (Grant & Langan-Fox, 2006). Taken together, these enquiries illustrate empirical support for a variety of individual level variables and relationships.

The direct link between occupational characteristics and strain is also well-documented. Meta-analyses confirm associations between work design features such as long work hours and symptoms of general ill-health (Sparks, Cooper, Fried, & Shirom, 1997) and illness such as coronary heart disease (Virtanen et al., 2012). Meta-analysis also links various conceptualisations of job insecurity to employee ill-health, particularly indices of mental-ill health (Sverke, Hellgren, & Näswall, 2002). In addition to specific occupational features, reviews have confirmed the relevance of specific theories such as the DC/S model (Karasek & Theorell, 1990) to physical (Van der Doef & Maes, 1998) and mental ill-health (Häusser et al., 2010; Van der Doef & Maes, 1999). As for the individual approach, evidence has accumulated for a range of organisationally focused factors and processes that may explain health risk.

Not surprisingly, the most recent and comprehensive best practice guidelines for the management of OS -The European Psychosocial Risk Management- Excellence Framework (PRIMA-EF) - recommend a systemic approach whereby interventions are targeted at both individual and occupational characteristics (Leka & Cox, 2008). The PRIMA-EF is a product of practitioner knowledge, philosophical views and a theoretical and empirical synthesis of psychosocial risk management. A cited review of over 90 intervention studies on a variety of health outcomes showed that favourable outcomes were associated with both individual and organisational focussed approaches (LaMontagne, Keegel, Louie, Ostry & Landsbergis, 2007). This evaluation adds crude albeit suggestive evidence of the causal role of both individual and organisational factors in health risk.

A closer inspection of Lamontagne et al (2007) however revealed that the specific results for depression were not robust. While some support for organisational initiated changes were noted (e.g., Kawakami, Araki, Kawashima, Masumoto & Hayashi, 1997) the research was largely based on individual level interventions (e.g., Acceptance and Commitment Therapy; Bond & Bunce, 2000), including results that were not significant for depression while significant for other mental health indices (Pelletier et al., 1999) and studies that assessed related endpoints (e.g., depression-related absenteeism; Nieuwenhuijsen,

Verbeek, de Boer, Blonk & van Dijk, 2004) or general distress (Bond & Bunce, 2001; Nielsen, Kristensen & Smith-Hansen, 2002), leading to a less than satisfactory appraisal of the evidence for depression. To present this point more strongly, a focused review on OS-related depression interventions, which largely comprised of interventions focussed on the individual, concluded that the evidence was ‘very low’ (Furlan et al., 2011). A further review (Dietrich, Deckert, Ceynowa, Hegerl & Stengler, 2012) deemed only a single study on depression diagnosis, psycho-education and relapse prevention (Godard, Chevalier, Lecrubier & Lahon, 2006) as suitable for inclusion. A subsequent meta-analysis of randomised controlled trials however revealed good quality evidence for the reduction of depression symptomatology in workplace intervention research (Tan et al., 2014) although again the studies were largely focused on modifying individual factors. This breakdown of the evidence underscores the gap in knowledge about the link between occupational characteristics and depression risk.

In addition, LaMontagne and colleagues’ (2007) review revealed that while individual-focused approaches had a positive effect on general health risk, the benefits did not extend to organisational outcomes such as reductions in stressor exposure or sickness absence. By contrast, the management of organisational outcomes were considered effective in improving both individual and organisational outcomes. The potential for organisational interventions to influence wider OS-related outcomes builds the case further for an organisational approach to the study of OS and depression. It is apparent though that both the *individual* and *organisational* approach to OS are valid to pursue based on the availability of adequate theoretical models and empirical evidence. Accordingly, this next section considers the contextual, practical, legal and philosophical implications that result from studying one approach over the other.

Contextual Considerations

The concept of stress may be appreciated further through a view of the context in which it developed. As discussed by Wainwright & Calnan (2002), the popularity of Selye’s (1956) concept of stress emerged post World War II following the recognition of mental strain in soldiers and subsequent interest in the recruitment and training of psychologically resilient and maximally performing personnel. Viner (1999) opined that Selye’s view dominated as it provided practical and ideological support to the American military and later the industrial setting. Viner (1999) elaborated that Selye’s ability to establish alliances with the military and

his wider interest in informing the public about the notion of stress raised the profile of his view rather than peer-accepted scientific evaluation.

The history of ‘psychological’ approaches to OS progressed in a somewhat divergent manner. In the United States, there was a continuation of interest in maximising the performance of employees and in this context Lazarus (e.g., Lazarus, Deese & Osler, 1952 cited in Wainwright & Calnan, 2002) was recruited by the US air force to research the effects of stress on task performance. Such research into stress and performance sharpened the focus on stress as it developed within the occupational context. The regard for subjective perceptions and subsequent expectations of (work) roles as depicted in Role Stress Theory (Kahn, Wolfe, Quinn, Snoek, and Rosenthal, 1964) continued to shape the view on occupational stress in the United States during the 1960s and 1970s. The focus on individual attributes relaxed the political discourse on OS and supported its transition into corporate human resource management (Wainwright & Calnan, 2002).

By contrast in Scandinavia, the political context surrounding occupational stress in the 1970s and 1980s was overtly geared toward industrial democracy and work reform. Accordingly, the research agenda was guided by opinions about the health risks associated with occupational conditions with a view to improving working conditions (Wainwright & Calnan, 2002). Although this focus later shifted in relation to the changing economic climate, the epidemiological approach to evaluating the role of occupational characteristics in health risk had since been established (Wainwright & Calnan, 2002).

In Australia during the 1990s, OS was considered a huge and costly problem that occurred largely within the public sector, following the rising OS-related compensation cases (Dollard & Winefield, 1996). Toohey (1993 cited in Kendall, Murphy, O’Neill & Bursnall, 2000) in his review of the Commonwealth compensation system during 1991-1992 observed that a breakdown in interpersonal relationships at work was notably present in compensation cases and subsequently regarded OS as an issue relating to management rather than the individual. OS was also conceived of as form of communication about unsatisfying occupational conditions. In 1992 a national strategy was put in place to address OS via a number of initiatives that included: the formulation of a working definition of OS, adjustments to the compensation system, intervention research particularly concerned with the improvement of processes through which interventions were implemented and evaluated and the development of training materials for education (Dollard & Winefield, 1996).

The available data on workplace interventions at the time reflected a focus on individual rather than organisationally driven approaches (Caulfield, Chang, Dollard & Elshaugh, 2004). Not surprisingly then, the prevailing thinking as portrayed in the media was that OS was an organisational issue although with largely individual level solutions that were geared towards adapting to the occupational environment (Lewing & Dollard, 2001). It has been opined that efforts to advance the prevention of OS-related mental health in Australia have been prevented by the politics involved in defining OS and acknowledging mental health as a key issue in the workplace (Dollard & Winefield, 1996).

A decade forward, there appears to be the beginnings of a cultural shift in acknowledging mental health conditions within the workplace and furthermore the role of the occupational environment in both contributing to and curtailing this risk (APSC, 2014; PricewaterhouseCoopers, 2014). Significantly, the Labour government introduced across a five-year period from the 2011-2012 budget, the nation's largest investment in mental health reform. As part of this, the National Mental Health Commission was established to advise the government on best practices (Australian Government, 2011). In 2013, the National Mental Health Commission established the Mentally Healthy Workplace Alliance to specifically support mental health at work, in partnership with mental health promotion organisations such as beyond blue, the Australian Psychological Society, university research centres and business and community organisations. The program is concerned with raising awareness of and reducing the stigma associated with anxiety and depression and supporting new and existing mental illness and suicide prevention initiatives in the workplace (National Mental Health Commission, 2014). A concurrent priority as put forward in the Australian Government's National Occupational Health and Safety Strategy 2002-2012 is the reduction of the rate of workplace injuries and fatalities. This has been approached through priorities such as raising awareness of occupational health and safety, improving the organisation of the workers' compensation data and harmonising state and territory legislations (SWA, 2002).

It is opined that the separate political agenda on mental health reform, while progressive, may have also sustained the complacency in attending to organisational determinants of mental disturbance. This is illustrated by the growing number of and participation in programs that continue to target already unwell employees and promote the workplace as a setting for health and wellbeing initiatives rather than as a direct target of intervention (Comcare, 2009; PricewaterhouseCoopers, 2010; APSC, 2014). It is nonetheless

a stated priority to address organisational determinants of OS from an organisational perspective, as outlined by the national mental health organisation tasked with creating a targeted workplace program ('Heads Up' program; beyondblue, 2015). The uptake of the organisational approach in Australia has been initiated in a variety of ways, such as a recently commissioned literature review of workplace interventions in Australia (Harvey et al., 2014), figures for an expected return on investment (PricewaterhouseCoopers, 2014) and National Awards (e.g., Australian Psychological Society's Workplace Excellence Awards, Australian Psychological Society, 2016). Time will tell the extent to which these initiatives and those of the successive government impact on the view of OS in the contemporary Australian occupational environment.

This brief contextual and historical account of OS definitions highlights that the understanding of stress is not simply a theoretical or empirical venture rather one that is shaped by a history of political and practical interests, culture and ideologies. These influences in turn play an important role in sustaining the dominance of certain views of (occupational) stress including its leading cause. Despite the conceptual and empirical shortcomings associated with the available definitions of OS, it is observed that the conceptualisations utilised have served the purpose of explaining relevant issues of the time.

Practical Considerations

Given that research is ultimately intended to inform the management of OS, the practical implications that arise from the selection of the theoretical orientation is imperative to consider. Typically, the type of health promotion arising from research based on the individual approach are strategies that assist employees, particularly vulnerable workers, to cope with stressful work conditions. The workplace is consequently utilised primarily as a venue in which to deliver programmes such as stress management training (Martin et al., 2009; Murphy, 1984). This might include coverage about relaxation strategies, nutrition, exercise (Cook, Billings, Hersch, Back, & Hendrickson, 2007) and instruction about cognitive and emotional processes (McCraty, Atkinson, Lipsenthal, & Arguelles, 2009) including more recently mindfulness (Irving, Dobkin, & Park, 2009; Wolever et al., 2012). The workplace is also utilised as an access point to services for when employees' wellbeing is already compromised, via employee assistance programs as well as referrals to external health and support agencies (Murphy, 1984). Treatment itself may include Cognitive Behavioural Therapy which is consistent with the transactional view of stress (Lazarus &

Folkman, 1984), whereby individuals are guided to learn about appropriate appraisals and coping strategies. In contrast, the type of health promotion arising from research based on an *organisational* approach include structural modifications to processes such as participatory decision-making over work tasks (Bond & Bunce, 2001; Mikkelsen & Saksvik, 1999).

A useful classification of the practical implications that follow from various views on OS are *primary*, *secondary* and *tertiary* interventions (Cooper & Cartwright, 1997; Murphy, 1988). Figure 1 illustrates the relevance of these approaches to the OS process. In brief, primary interventions aim to prevent illness among healthy individuals and involve modifications to the psychosocial occupational environment. Accordingly, primary interventions are viewed as proactive. Secondary interventions attempt to modify an individual's response to stressors by training individuals who are already experiencing strain to be more robust in the face of such pressures and are thus considered ameliorative. Finally, tertiary interventions are reactive and intend to curb the effects of OS through the treatment of symptoms or illness (LaMontagne et al., 2007).

In practice, organisational or primary interventions that focus on the occupational environment are the least commonly practised approach to OS. Instead, individual focussed interventions, typically at the tertiary level, continue to prevail as the most commonly implemented OS intervention in Australia (Caulfield et al., 2004; Comcare, 2009; Harvey et al., 2014; LaMontagne et al., 2007). For example, the beyondblue National Workplace Program represents a leading initiative in the management of mental health in the workplace. The program has since 2004 reached over 100, 000 employee representatives across a variety of work settings and is mainly geared toward symptom recognition, stigma reduction and the assistance of already unwell staff (beyond blue, 2015). In light of this predominant practice, the author is of the view that evidence that would underpin organisationally driven interventions would enrich the management of OS and its health consequences, particularly in Australia.

Policy and Legal Considerations

The legal position on OS is viewed as a powerful influence on society's view on what does and does not constitute OS. In Australia, legislation and policy also reflect a growing emphasis on organisational determinants of health risk. For example, a breach of the WHS Act 2011 (described in Chapter 1) may be indicated by mental and not just physical ill-health

that is caused by the inadequate management of psychosocial and not just physical stressors. Prior to the current Act, health risk arising from the influence of psychosocial characteristics was vaguely protected under a general duty of care clause (Occupational Health and Safety Act 1991). A general duty of care clause still applies in other nations' legislation such as in the United Kingdom (Health and Safety at Work Act 1974) although regulations compiled in the last decade (The Management Standards for work-related stress; Health and Safety Executive, 2004; 2007) formally reinforce the significance of organisational factors in supporting legislative requirements. Given the growing reflection of this position in the legal arena, workplaces may be more inclined to entertain the contribution of work design features, adding to the viability of pursuing knowledge of this nature. In fact, this information is considered pressing as legislation must reflect scientific evidence (Cox, 1993) and there is a paucity of empirical evidence directly among Australian employees.

The legislation within the European Union is a prime example of the management of OS from a primary perspective. Following an organisational-based definition of OS (EC, 2000), there exists a strong regulatory focus on organisational contributors to OS. To highlight, the European social partner's framework agreement on work-related stress (2004) represents a large scale attempt to raise awareness of and guide the identification and management of critical occupational design issues in addition to employee factors. While the framework is autonomous and therefore does not carry the same weight as legislation, most participating nations have adopted to varying degrees the directives into their legislative systems (European Commission, 2011). Notably, provisions in the Swedish legislation specifically protect against work design aspects such as work overload, poor communication and insufficient resources to carry out work tasks (Swedish Work Authority [AFS in Swedish], 2015). Further, a formal working plan aims to increase this focus in the 2016-2020 period (Swedish Government Communication, 2015). The legislation in Sweden, through its explicit consideration of psychosocial factors, has long been regarded as superior for ensuring a safe work environment (Cox, 1993). This latter example highlights the potential that follows from conceptualising OS from an organisational perspective.

Philosophical Considerations

An important reflection is that research and the practical implications that follow implicitly endorses a philosophy about health (Shain & Kramer, 2004). The assumption underlying the *individual* approach is that health is largely the product of the individual and

in turn the responsibility of the employee. The *organisational* approach assumes that the occupational environment influences health in its own right, as occupational conditions are largely created or imposed by the workplace (Harris et al., 2004; Michie, 2002; Shain & Kramer, 2004). The emphasis on employee characteristics in research and practice reinforces the philosophy of health as being the cause and therefore the responsibility of the individual, largely at the expense of the workplace's contribution (Shain & Kramer, 2004).

From an ethical perspective, it is also questionable to focus on individual attributes while maintaining sources of strain. Firstly, the use of personal resources is often contingent on external resources (Shain & Kramer, 2004) and so beyond ignorance, it may be damaging to imply that distress and strain is largely a fault of the employee. Michie's (2002) discussion of interventions raised that the encouragement of deep breathing and re-appraisal of a strain eliciting situation such as high workload as challenging rather than threatening, may bring about some relief for employees but ignores the overarching issue of chronic psychological and physiological overload. Similarly, an approach that is limited to helping those already experiencing strain is analogous to administering a bandaid rather than dealing with the cause of the damage. Trubshaw and Dollard (2001) caution further that tertiary interventions may especially habituate employees to unacceptable employment conditions. Thus despite the evidence for the effectiveness of individual-level interventions (LaMontagne et al., 2007) their exclusive use may be counter-productive by masking the source of strain (Michie, 2002). The philosophy of the organisational approach is accordingly favoured.

The argument for a focus on organisational characteristics however hinges on the assumption that OS causes ill-health. It would be equally incorrect to focus on characteristics and processes that theoretically but realistically do not prevent the occurrence or trajectory of depression. This point underscores the significance of determining definitively whether OS as defined by occupational features directly causes depression. Without clear information about the connection between occupational features of OS and mental health, individual interventions may very well dominate and in turn philosophical views around responsibility may not be challenged (van Dick & Haslam, 2012). Therefore, if it is indeed the case that occupational characteristics directly increase the risk of ill-health then it is considered a major oversight not to investigate such ideas.

Summary

Prior to embarking on the investigation proper it was considered informative to recognise the underlying theory, context, empirical base, practical implications and philosophy implicit in the selected study of occupational stress. This discussion did not simply acknowledge but illustrated that OS and stress more broadly is a complex phenomenon with various conceptualisations and implications. The review of stress models provided depth to understanding the concept of OS and its various views. The review also alluded to the limitations of stress research that carry through to the study of OS, such as inconsistent terminology and divergent views about key processes. Given the lingering confusion of historical definitions of stress, the clarification on terminology was considered necessary to support a clear discussion about the topic. The concept of OS was considered per the major distinction as being predominately individual or environmental based. Both approaches were considered theoretically and empirically appropriate frameworks in which to conduct further research. However, the organisational approach was considered superior for advancing the practical management of OS as well as for upholding a historical and philosophical standpoint that favours a proactive and ethical approach.

Organisational Models of OS

Having established the organisational perspective as the framework of choice, the selection of an appropriate OS model is considered next. One difference observed among the various models is the view about the key psychosocial risk or protective factors involved in health risk. These factors may be broadly classed as relating to: physical design, role or task characteristics, interpersonal conditions, leadership, structural characteristics (Schuler, 1980), traumatic events, processes of change, work schedule and career stressors (Sonnentag & Frese, 2003). The demand-control/support model (DC/S model; Karasek, 1979, Karasek & Theorell, 1990) and effort-reward imbalance model (ERI model; Siegrist, 1996) are the most prominent of the specific conceptualisations.

Briefly, the DC model focuses on the imbalance between the demands at work and the control afforded in the occupational environment (Karasek, 1979). Workplace support is considered an additional key variable, such that low support is expected to further elevate the risk of ill-health and high levels of support to conversely mitigate the risk (Karasek & Theorell, 1990). The ERI model (Siegrist, 1996) contends that OS and its health

consequences arise primarily from the failed reciprocity between the efforts expended at work and the rewards received (payment, esteem and career opportunity which includes job security). The tendency for excessive work-related commitment and a high need for approval, termed over-commitment, is considered a key individual variable that directly influences strain as well as the perception of demands and coping resources such that the likelihood of reciprocity failure is heightened.

While the ERI model is an appropriate choice, the DC/S model is favoured for several reasons. First, data from the Whitehall II study on public servants revealed that both self-report and objective indicators of the DC/S model explained the larger portion of variance in depression (and anxiety) symptom ratings compared to that by the ERI model (Griffin, Greiner, Stansfeld & Marmot, 2007). This outcome led the researchers to infer that the DCS model may be relatively more precise in describing the relationship between the occupational environment and depression. It is recognised that other evaluations have instead concluded that the two models account for additive or complementary aspects of the occupational stress process (Rystedt, Deveraix, & Sverke, 2007; Tsutsumi, Kayaba, Theorell & Siegrist, 2000; Yu et al., 2013). However, when it is also considered that the most robust evidence for the causal role of high OS in cardiovascular disease has been obtained with the DC/S model (Kivimäki et al., 2012) its enquiry with depression is particularly appealing. Also, the ERI model isolates one component of personality which has attracted criticism for poor specification and unreliable findings (van Vegchel, de Jonge, Bosma, & Schaufeli, 2005) and is less consistent with the favoured philosophical and practical implications that follow. Finally, a lack of social support is a key factor implicated in depression risk (Bottomley et al., 2010; Cohen & Wills, 1985, as discussed in Chapter 5) and so its examination in the occupational context is especially relevant to understanding the illness.

It is acknowledged that since the DC/S model, further models such as the Job Demand Resource model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) have been put forward to more comprehensively integrate the proposed risk and protective organisational factors. For this research task it was considered appropriate to determine risk with the select few robust factors in the DC/S model.

Conclusion

This chapter illustrated the complexity of researching OS. Accordingly, it is acknowledged at the outset of this thesis that the study of OS and the parent concept of stress is bound by various contextual influences as well as a limitation of no unified definition. It is nonetheless apparent that the various definitions, regardless of their limitations, shape current discussions about OS. A key discussion point was the delineation between definitions that emphasise individual or organisational attributes. Given the important implications that arise from studying one approach over the other it was regarded imperative to bring to light the issues underpinning the overtly simple selection of a model. The consideration of the theoretical, empirical, contextual, philosophical and practical points persuaded the study of an organisational perspective. Models within the organisational perspective were considered to differ according to the specific organisational risk and protective factors and processes deemed as central to health risk. The DC/S model was established as appropriate to begin the investigation into depression risk. The chapter that follows articulates the specific predictions of the model, considers in some depth the evidence for the risk of depression and identifies the outstanding questions that will be addressed in the empirical studies.

Chapter 3: A Review of the Evidence for the DC/S Model and Depression Risk

This chapter summarises the evidence for the proposition that occupational stress, as conceptualised by the Job Demand Control/Support model (DC model, Karasek, 1979; DCS model, Karasek & Theorell, 1990) is a risk factor for depression. Following a description of the predictions, major reviews on the association between the DC/S model and general mental health risk are briefly discussed. The predominant focus of this chapter however is the summary of research on the DC/S model and the specific mental health outcome of depression. Three reviews of this kind (Bonde, 2008; Netterstrøm et al., 2008; Theorell et al., 2015) are described in some detail and subsequently updated. The capacity of the DC/S model to explain depression risk is determined via the analysis of evidence for each hypothesis.

The studies of this review reveal the most consistent support for the demands main effect hypothesis followed by the strain hypothesis. The evidence was mixed for the main effects of control and support while the buffer and iso-strain hypotheses were largely unsupported. These findings were mostly consistent with the conclusions of earlier reviews with regard to strain. The comprehensive nature of this review revealed several conditions associated with discrepant findings. This included the statistical formulation of study variables, the type of outcome measure employed, population sampled and the inclusion of other variables. The results were also compared to the conclusions reached in other reviews. The chapter concludes with a formulation for future research.

The DC/S Model

The Job Demand Control model (DC model; Karasek, 1979) and the extended Job Demand Control Support model (DCS; Karasek & Theorell, 1990) collectively here referred to as the DC/S model, is a major paradigm that was developed to predict and explain the influence of occupational characteristics on employee health and productivity. Karasek (1979) developed the idea from separate streams of research; that concerned with the health effects of workload and work hours (Dohrenwend & Dohrenwend, 1974; French & Kahn, 1962; Kahn, 1981; Theorell, 1976) and that stressing the importance of decision-making and skills for job satisfaction and performance (Hackman & Lawler, 1971; Hackman & Oldham, 1976; Hackman & Oldham, 1980). Karasek's (1979) ideas were further shaped by Sundbom's (1971) work on psychological strain as a product of challenging occupations. The

integration of ideas about job demands and job control advanced the notion that occupational stress was a function of the design of the occupational environment. Karasek and Theorell (1990) subsequently presented the revised Demand Control Support model following Johnson and colleagues' (Johnson, 1986; Johnson & Hall, 1988; Johnson, Hall, & Theorell, 1989) theoretical argument and empirical substantiation that workplace support was a further key factor for health risk. As discussed in the previous chapter, this conceptualisation firmly placed on the research agenda the notion that occupational characteristics and not just employee features could cause health disturbance.

The DC/S model considers three occupational characteristics as key to employee health- demands, control and support (Karasek & Theorell, 1990).

- **Demands** are distinguished as being either psychological or physical. Physical demands refer to physical aspects of the occupational environment such noise, temperature and space. Psychological demands describe the mental requirements of the job such as the quantity and pace of work or 'workload', role requirements and organisational constraints such as time pressures and conflicting demands. The term *demands* will be used herein to refer to psychological demands.
- **Control** refers to a two-component construct relating to skills and influence. **Skill discretion** refers to employees' opportunities to apply and develop their knowledge and skills and **decision authority** describes employees' opportunities to make decisions about their work. This notion of control is also termed decision latitude and the terms will be used interchangeably unless otherwise clarified.
- **Support** describes the overall level of helpful interactions from co-workers and supervisors. This includes instrumental support or practical assistance and emotional support or emotional integration and trust.

The central idea of the DC/S model is that health risk results from the joint effects of demands, control and support. Specifically, it is proposed that occupational conditions characterised by high demands and low control directly elevate health risk. Conditions of low workplace support are expected to further heighten the risk. These ideas are referred to as the strain and iso-strain hypothesis respectively. Other researchers (Ganster, 1989; de Lange et

al., 2003; van Vegchel, de Jonge, & Landsbergis, 2005) have proposed that the joint effects also operate via the buffer hypothesis in which high levels of control, and support when factored, are expected to buffer or reduce the health risks associated with high demands. The buffer hypothesis has also been termed the ‘multiplicative’ hypothesis (Ganster, 1989). The above propositions derive from basic main effects hypotheses whereby negative health outcomes are expected when the demands imposed by one’s work are high and the control afforded over one’s work and support available is low. The main effects hypothesis is also referred to as the ‘additive’ hypothesis when simultaneous support is obtained for the demand and control main effects in the DC model and all three main effects in the DCS model.

At this point, it is worthwhile clarifying the criteria used to denote support for the DC/S model. For the central idea of joint effects, Karasek (1979) considered support to be represented by the significance of either an interaction effect, ‘relative excess’ subtraction of terms or quadrant formulation of demands and control. In a somewhat similar arbitrary fashion, support for the DC/S model has been determined upon support of either the strain, buffer, single main effect or additive main effect hypothesis (deLange et al., 2003). By contrast, other researchers place a greater emphasis on clarifying the nature of the proposed relationship between stressors and health risk (deLange et al., 2003), highlighting that it is central to understanding OS (Häusser et al., 2010; Kain & Jex, 2010).

To elaborate, interactive effects would suggest that heightened health risk results from the combination of high demands and low control whereas evidence for only one main effect might indicate that joint effects are not necessary to meet the threshold for health risk. The subsequent expectation for interventions that assume an interactive or buffer effect would be for the health risk associated with high demands to be offset by high control. By contrast, the assumption of main effects might suggest that the provision of increased control will not necessarily attenuate the health risk of high demands. This illustrates that the distinction between the types of effects and variables involved is not purely a statistical nuance but one with important implications for intervention efforts.

To support clarity, this review will use the term strain to refer to the heightened health risk associated with the combination of high demands and low control and iso-strain to refer to the health risk associated with the additional condition of low support. The use of the term strain is not to be confused here with the concept described in Chapter 2 where in the context of stress research strain referred to a negative health endpoint. In that context, the job strain

described here would be considered a stressor. Returning to the discussion of stressors, the buffer hypothesis denotes the test of the reduction of health risk from high demands due to high control (in the DC model) and the additional condition of high support (DCS model). The main effects hypothesis will refer to the independent evaluation of health risk from high demands, low control or low support. Following convention, the thesis will base the weight of the DC/S model and the value of its further enquiry on the support of individual hypotheses.

Reviews of the DC/S Model and General Mental Health Risk

A large body of work has accumulated since the proposal in the late 1970's that occupational stress, as defined by the DC model and later by the DCS model, leads to both physical and mental illness. A number of reviews have since established the DC/S model as relevant to understanding mental ill-health (Bonde, 2008; de Lange et al., 2003; Häusser et al., 2010; Netterstrøm et al. 2008; Nieuwenhuijsen, Bruinvels, & Frings-Dresen, 2010; Stansfeld & Candy, 2006; Van der Doef & Maes, 1999). Mental ill-health in this context refers to a heterogeneous range of states that include: job dissatisfaction, burnout, poor sleep quality, low quality of life, unpleasant affect, non-specific distress, as well as more specific symptoms and disorders related to substance use, anxiety and depression.

The first major review on the DC/S model and poor mental health by Van der Doef and Maes (1999) determined the following: moderate support for the additive strain hypothesis, inconsistent support for the additive iso-strain hypothesis (equivalent number of supportive and non-supportive results) and weak evidence for the buffer hypothesis. This comprehensive review of 63 studies published between 1979 and 1997 was influential as it provided substantive evidence that the psychosocial occupational environment could lead to mental health disturbance and not just physical illness as revealed in a similar earlier review (Van der Doef & Maes, 1998). The conclusions however were drawn from predominately (86%) cross-sectional self-reported surveys that while typical at the time, limit confidence about causal relations. In fact, it was determined that the strain and iso-strain hypothesis was for the most part not substantiated by longitudinal evaluations.

Later reviews focussed on studies with higher methodological quality to substantiate inferences about causality. de Lange et al (2003) located 12 longitudinal studies on mental health conducted between 1979 and 2000 that met specified standards for design, time lag,

measures employed and statistical analysis performed including non-response analysis. de Lange et al (2003) obtained results that were consistent with Van der Doef and Maes (1999) regarding a weak iso-strain and interaction effect, modest support for strain and consistent main effects although the effect size was not surprisingly smaller. The results were informed by three studies on the additive strain hypothesis, two testing the additive iso-strain hypothesis and two studies concerned with the interaction between demand and control. A further six studies supported only the individual demands main effect, two studies the control main effect and four studies only the support main effect hypothesis. As with Van der Doef and Maes (1999) mental ill-health was considered as a single self-reported broad dimension. Upon inspection, most studies examined 'psychological distress' and only two studies specifically examined depression (Bromet, Dew, Parkinson, & Schulberg, 1988; Parkes, 1982) and revealed support for differing main effects. The breakdown of analyses for each hypothesis and the outcome of depression demonstrates the supportive yet limited information for the range of DC/S model propositions and specific mental health outcomes.

Stansfeld and Candy (2006) limited their review to studies that assessed the influence of the psychosocial occupational environment on the incidence of 'common mental disorders'. Ten of the eleven studies evaluated the DC/S model: six studies used non-specific distress rating scales such as the General Health Questionnaire, three employed a clinical interview for psychological distress (Marchand, Demers, & Durand, 2005) and depression (Shields, 1999; Wang, 2004) and one used the index of doctor-diagnosed depression (Ylipaavalniemi et al., 2005). Strong prospective support was determined for the strain hypothesis and moderate support for the individual main effects of demand, control and support. Gender differences were also found such that the demand effect size was smaller among women. This meta-analysis on studies conducted between 1994 and 2005 adds strong causal support for the DC/S model in mental health risk given the strict inclusion criteria with regard to sample size and population, management of baseline mental health and the use of a time lag of 12 months or greater. However, studies did not report on the buffer or iso-strain hypothesis. Furthermore, the support for the strain hypothesis was derived from the estimates of two studies assessing depression risk in which one showed significant effects (Shields, 1999) and the other non-significant results (Ylipaavalniemi et al., 2005). Taken together, although the estimates for strain were strong, the single positive study for depression limits confidence in conclusions about this specific health outcome.

More recently, Nieuwenhuijsen et al (2010) presented a systematic review of seven high quality prospective studies conducted between 1950 and 2008 on a range of OS models and “stress-related disorders”. Strong evidence was reported for the independent main effects of demands, control and support on general distress as measured by the General Health Questionnaire. Gender differences were noted such that supervisor support was significant for women only. In contrast to Stansfeld and Candy (2006), no gender differences were found for demands. The additive strain, iso-strain and buffer hypotheses were not considered. Of note, two of the three studies (Bültmann, Kant, Van Den Brandt, & Kasl, 2002; Stansfeld, Fuhrer, Shipley, & Marmot, 1999) that evaluated the DC/S model were already contained in Stansfeld and Candy’s (2006) earlier review and so caution is warranted in interpreting this review as suggesting a further accumulation of evidence.

Lastly, Haüsser et al (2010) updated Van der Doef and Maes’ (1999) original review with the examination of evidence in 83 studies on the DC/S model and psychological wellbeing conducted from 1998 to 2007. Consistent with Van der Doef and Maes (1999) the buffer hypothesis was determined as overall weak. However, further analysis advanced the idea that interactions may be more likely when the source of demands and control were qualitatively matched or satisfied the ‘match hypothesis’ (Cohen & McKay, 1984). Similar to Van der Doef and Maes (1999), the additive strain hypothesis was fully supported in 60% of studies and the iso-strain hypothesis, in half of the studies. Significantly, the review determined consistent support for the additive strain and iso-strain hypotheses in cross-sectional studies with large samples ($N = > 3000$) across the outcomes of job satisfaction, general psychological strain and emotional exhaustion (a component of burnout), suggesting to the authors an established association between the DC/S model and mental strain.

Longitudinal studies were reported to show similar results for general psychological wellbeing and lower support rates for job-related wellbeing outcomes. This prompted the view for no further need for the cross-sectional examination of the DC/S model main effects for psychological wellbeing, particularly after the increase in studies that evaluated the support dimension, which had been lacking during previous review periods. However, on closer inspection, longitudinal studies on depression were never fully significant and instead were non-significant (Plaisier et al., 2007; Totterdell, Wood, & Wall, 2006) or conditionally significant for a variety of reasons (de Lange, Taris, Kompier, Houtman, & Bongers, 2002, 2004; 2005; Paterniti, Niedhammer, Lang, & Consoli, 2002). Some examples of conditional evidence include support for only an increase and not a decrease in strain (de Lange et al.,

2002) and support that was dependent on a combination of gender and type of occupational stressor (Paterniti et al., 2002).

Summary. Taken together, several reviews impressed support for the DC/S model in general mental health risk (deLange et al., 2003; Häusser et al., 2010; Nieuwenhuijsen et al., 2010; Stansfeld & Candy, 2006; Van der Doef & Maes, 1999). More specifically, the reviews converged on the conclusion of a rather consistent modest to moderate additive strain effect and individual main effect of high demands, low control and low support. Limited or inconsistent support was determined for the iso-strain hypothesis and buffer hypothesis of both the DC and DCS model. Gender emerged as a factor associated with partial support although inconsistently, where the main effect of demands was weaker for women in one review (Stansfeld & Candy, 2006) and supervisor support was stronger for women in another review (Nieuwenhuijsen et al., 2010). The findings were largely determined in cross-sectional studies. The longitudinal studies showed attenuated yet significant support although for depression specifically, the results for longitudinal designs were less clear. The large sample sizes and heterogeneity of samples via cohort designs add weight to these conclusions.

These reviews have been influential in summarising the knowledge on the relationship between OS as defined by the DC/S model and general mental health risk. For the most part however, the narratives did not attend to depression risk in a strict clinical sense. Although this was not the intent of the reviews it is of this thesis. The specific focus on depression in contrast to mental health as a general construct is essential for several reasons. First, accurate claims about depression risk require its appropriate assessment. As illuminated in the analysis of Häusser et al (2010), longitudinal associations involving the endpoint of depression were not supported while prospective analyses overall were considered consistent with the supportive cross-sectional results. The relevance of this distinction may be illustrated by the point that there are qualitative differences between degrees of emotional endpoints in the same way that differences exist between various forms of physical ailments. As an example, in the same way that it is not sufficient to generalise all risk factors of a cold to that of influenza, it is also inaccurate to generalise expectations for symptoms of general distress to that for clinical states of depression. Although common features are shared such as unpleasant affect, depression is nonetheless characterised by a specific and persistent collection of cognitive, behavioural and physiological symptoms (APA, 2013).

Furthermore, it is important to distinguish depression from other psychiatric conditions. Although depression often co-occurs with psychological conditions such as anxiety disorders (APA, 2013), it is nonetheless a discrete mental health condition. Using another analogy, the grouping of depression, anxiety, stress and other unpleasant affect into a single index of mental health such as a mental health score on the GHQ is akin to examining risk factors associated with the broad illness category of cancer. While this is a reasonable level of analysis, it would be more informative to examine risk factors for specific cancers, such as skin or lung cancer. The importance of this distinction is underscored by the serious implications associated with depression as outlined in Chapter 1. In short, depression is the leading cause of disability throughout industrialised nations (WHO, 2008), attracts huge economic and productivity loss and costs (Medibank & KMPG Econtech, 2008; WHO, 2008) and is a unique risk factor for cardiovascular disease which is the current leading cause of death (WHO, 2008). The unique condition of depression therefore warrants its separate investigation as an outcome of OS.

It is acknowledged that the clinical syndrome of depression itself is a broad term that describes a range of diagnoses including: Dysthymia, Major Depressive Disorder, Bipolar disorder and Adjustment disorder with (Mixed Anxiety and) Depression (APA, 2013). For the purpose of this thesis, depression will be used to refer to symptoms relating to a mood disturbance, that are distinct from comorbid states relating to stress, anxiety, unpleasant affect and a general state of emotional distress. From here, research will be presented on the DC/S model and the specific health outcome of depression.

Reviews of the DC/S Model and Depression Risk

The evaluation of the accumulated evidence for the risk of depression from OS has since been carried out (Bonde, 2008; Netterstrøm et al., 2008). Netterstrøm et al (2008) reviewed 14 high quality prospective studies on OS and depression conducted between 1960 and 2007. Eight studies evaluated hypotheses from the DC/S model. The main effect of demands had a relative risk (RR) of 2.0 and was found as the most consistently supported hypothesis. The main effect of support was also consistently supported with results revealing an effect size that was similar across all studies (RR = .60). The main effect of control was inconsistent. It was also stated that there appeared to be support for the strain hypothesis as formulated by a quadrant. The results for the iso-strain hypothesis were not explicitly reported. The lack of reporting for strain and iso-strain and inconsistency in results for the

main effect for control leave the nature of joint effects unclear. Only one study (Plaisier et al., 2007) assessed the DCS model buffer hypothesis and determined non-significant findings. No consistent gender effects were found.

Over a similar review period, from 1966 to 2007, Bonde (2008) reported on 16 longitudinal studies that examined OS as a risk factor for psychiatric conditions. The majority of studies (56%, $N = 9$) were based on the DC/S model framework. Regarding main effects, the average risk across studies was reported as similar for demands, control and support, with no gender differences (the average weighted risk was 1.31, 95% CI [1.08, 1.59] for demands; 1.20, 95% CI [1.08, 1.39] for control and 1.44, 95% CI [1.24, 1.68] for social support). The strain hypothesis as modelled by a combination of demands and control was supported with overall risk more pronounced among men compared to women. In line with Netterstrøm et al (2008) the buffer hypothesis was not significant. Perhaps shedding light on the unclear support for the strain hypothesis noted in Netterstrøm et al (2008), further analyses by Bonde (2008) showed that of the six papers examining joint effects, only one study adjusted for main effects and found no effect of the combined term for the buffer hypothesis³ (Clays et al., 2007). This raises the contention about whether joint effects or specific main effects are key.

Bonde (2008) and Netterstrøm and colleagues' (2008) review converged on the finding that high demands and low support were moderate risk factors for depression. The results, adjusted for by demographics, were robust across samples and exposure and outcome measures, adding convincing evidence that elevated depression risk may be a consequence of OS as defined by the main effect predictions for demands and social support. Both reviews also deemed the strain hypothesis as largely supported. The supportive results were in line with that found for overall ill-health (Van der Doef & Maes, 1998), cardiovascular disease (Kivimäki et al., 2012) and general mental health risk (Van der Doef & Maes, 1999; deLange et al., 2003; Häusser et al., 2010; Stansfeld & Candy, 2006) and support the proposed general mechanism for health risk.

At the same time, the discussed profile of results for the unique outcome of depression revealed that support for the DC/S model was not robust across all hypotheses. The risk associated with control was most contentious; determined as approximately

³ Bonde (2008) referred to this interaction between (high) demands, (high) control and (high) support as the iso-strain hypothesis whereas here it is referred to as the buffer hypothesis in line with the terminology of other researchers concerned with clarifying the nature of DC/S model effects (de Lange et al., 2003; Ganster, 1989).

equivalent to demands and social support by Bonde (2008) and contradictory by Netterstrøm et al (2008). The central premise of joint effects was not supported by the buffer hypothesis and unclear through the lack of reporting of the relative risk for the strain hypothesis and results for the iso-strain⁴ hypothesis.

A variety of results were evident on inspection of the studies assessing the iso-strain hypothesis: full support (Niehammer et al., 1998), support among females only (Clays et al., 2007), men only (Paterniti et al., 2002), support for a single measure of a variety of OS variables (Wang, 2005), support for high demands and low social support only (Plaisier et al., 2007), support for high demands and low supervisor support although among women only (Rugulies, Bültmann, Aust & Burr, 2006), significance for low control and poor work relationships in a male only sample (Kawakami et al., 1992) and strain among men and co-worker support among women only (Shields, 2006). It is evident from the description of results that clear support for the iso-strain hypothesis is lacking. Netterstrøm et al (2008) concluded that support seemed apparent for the strain hypothesis and main effect of demand and support, which may suggest that iso-strain would also be supported. Bonde (2008) more explicitly impressed from the data that in a strict sense the DC/S model was not supported. It was elaborated that while evidence suggested little reason to doubt the influence of the occupational environment on mental ill-health in a general sense, it could not be considered with confidence that the associations were accounted for by the causal mechanisms proposed by the DC/S model.

Several methodological limitations preclude a conclusive understanding of the relationship between the DC/S model and depression risk. First, although two reviews were presented, the corroborating conclusions were in fact based on largely overlapping studies. Eight of the nine studies on the DC/S model reviewed by Netterstrøm et al (2008) were also examined by Bonde (2008). While it is acknowledged that the quality of studies is paramount to evaluating the strength of conclusions, a larger number of studies would assist in establishing more definitive conclusions about the DC/S model, particularly when individual hypotheses are considered. To add to this last point, a major omission noted in both reviews was the absence of reporting on the relative risk of the strain hypothesis and iso-strain hypothesis. Given that joint effects are the central premise of the model conclusions could be

⁴ The iso-strain hypothesis here is used to depict the heightened health risk associated with the combination of high demands, low control and low support.

better supported through clearer reporting on the range of hypotheses together with the use of more consistent terminology to describe these effects.

The results may also be limited by measurement issues. With regard to the assessment of occupational stressors, a number of large cohort studies (Michelsen & Bildt, 2003; Rugulies et al., 2006; Shields, 2006; Tokoyuma, Nakao, Seto, Watanabe, & Takeda, 2003; Wang, 2005) did not capture the full extent of the constructs defined in the DC/S model, as often one item or an abbreviated scale was used. This limitation may be especially relevant to conclusions about decision latitude and support, given the proposed sub-dimensions of skill discretion and decision authority and colleague and supervisor support, respectively. For example, support was widely represented across the studies via: emotional support that included private life support (Plaisier et al., 2007), team climate (Ylipaavalniemi et al., 2005), poor human relations (Kawakami, Haratani, & Araki, 1992), supervisor support only (Rugulies et al., 2006) and the originally specified composite measure of supervisor and co-worker support (Paterniti et al., 2002; Shields, 2006). These various conceptualisations obscure a clear understanding of the key strain-inducing aspect of social interactions in the occupational environment.

Regarding the measurement of depression, it is yet to be clarified whether results are consistent across outcome measures. Bonde (2008) and Netterstrøm et al (2008) noted the heterogeneity of outcome measures used for self-report and objectively measured depression. On the one hand, this may support the idea that evidence for the DC/S model is robust across various assessment methods: self-report, report of doctor-diagnosed depression, clinical interview and antidepressant medication prescription. However, the large variation noted in depression prevalence (2.5- 33%) raises question about the validity of particular instruments and the feasibility of combining the studies to appraise the evidence (Bonde, 2008).

Finally, alternate explanations for the reported associations between DC/S factors and depression risk still remain. Bonde (2008) noted that only a few studies controlled for minor psychiatric morbidity or negative affect at baseline. This is significant as earlier symptoms of depression are known as a strong predictor of subsequent depressive episodes (Keenan, Feng, Hipwell, & Klostermann, 2009). Bonde (2008) also noted that studies assessing the strain hypothesis did not adjust for the main effects of job demands and control. This omission leaves open the competing argument that main effects may be more relevant to depression risk than joint effects. Also, Netterstrøm et al (2008) revealed a strong likelihood for

publication bias in the evaluation of the demands hypothesis. Accordingly, publication bias presents as a potential explanation for the significance of results.

The above section demonstrated that despite the long tradition of research, the relationship between the DC/S model and depression is not yet conclusive. In light of the growing publication of studies that specifically focus on depression, an evaluation of the progress in clarifying the relevance of the model to depression risk is warranted. The objective of this next section is to update the knowledge base on the DC/S model and depression risk since Bonde (2008) and Netterstrøm et al (2008) although in a comprehensive manner as carried out by Van der Doef and Maes (1999) and Häusser et al (2010). Specifically, this A comprehensive assessment is favoured to determine the progress made in addressing limitations concerning adequate hypothesis testing, study design, measurement and generalisability and to develop insight into the nature of risk. The information required to research conclusiveness about the DC/S model and depression risk is subsequently discussed to guide further investigation before yet another decade of research lapses.

Research Questions

Largely in line with Häusser et al (2010) this review was concerned with six key questions:

1. What is the evidence for the DC/S model predictions? Specifically, is there support for the (a) strain; (b) iso-strain; (c) buffer, and; (d) main effects hypotheses?
2. What is the nature and quality of the evidence?
3. Are there consistent factors that distinguish between supportive and non-supportive studies?
4. How do the results compare to the accumulated research?
5. What progress has been made in clarifying the capacity of the DC/S model to explain depression risk?
6. What does the evidence suggest for further research?

Review of Research on the DC/S Model and Depression Risk from 2007 to 2013

Literature search methods. A systematic search of the scientific literature on the DC/S model and depression risk was undertaken using the PsycINFO and PubMed databases. The search period was set between January 2007 and July 2013 as Netterstrøm et al (2008) covered the period between 1960 to January 2007 and Bonde (2008), between 1966 to August 2007. The search terms entered were “(Job) Demand Control model” “(Job) Demand Control Support model” “demand” “control” “decision latitude” “skill discretion” “decision authority” “social support” “supervisor support” “co-worker/colleague support” “Karasek” “Theorell” “occupational/work/job stress/strain/iso-strain” “depression” “affective/depressive/mood+ disorder/symptoms”. Each keyword was entered in combination with one to three other keywords such that the search included reference to an independent variable together with a dependent variable (for example, “demand” “control” “depression”).

The search variables for depression were the same as that entered by Bonde (2008) and overlapped with Netterstrøm et al (2008) as that review was concerned with a range of mental disorders and not just depression. The exposure variables were more restricted in one sense as this review exclusively focused on the DC/S model while Bonde (2008) and Netterstrøm et al (2008) also considered other models of OS. In another view, the search terms were comparatively more detailed with the inclusion of each DC/S model study variable rather than generic terms such as ‘psychosocial stress’. For example, this search included “support” unlike Bonde (2008) and Netterstrøm et al (2008). The search was restricted to English language peer-reviewed studies.

According to MOOSE guidelines, Figure 2 presents the flow chart of the study selection. After reading 52 articles, 33 studies were included for analysis. Studies were excluded if they did not specifically assess DC/S model predictions. This included studies that grouped DC/S features into one index of OS together with non-DCS model predictions of interest (e.g., Butterworth et al., 2011), studies that considered DC/S model variables as moderators or mediators of other variables, studies that used related although not precise formulations of the hypotheses, such as social capital as a means to model support (e.g., Kouvonen et al., 2008), studies that assessed the DC/S model but examined only one variable and/or not the central idea of joint effects that factor demands (e.g., Joensuu et al., 2010; Sinnoki et al., 2009; Stoetzer et al., 2009) and studies that grouped a number of psychiatric diagnoses into a single index (e.g., Clark et al., 2012). For duplicate publications on the same

sample, the study with the better selection of measures was selected (Wang, Patten, Currie, Sareen, & Schmitz, 2012a (clinical interview determined depression) versus Wang et al (2012b, self-report depression via phone) or the study with additional analyses relevant to the DC/S model (e.g., Godin et al., 2009 over Clumeck et al, 2009) or studies testing a wider range of hypotheses (Smith & Bielecky, 2012 rather than Wang, Schmitz, Dewa, & Stansfeld, 2009). Two additional studies (Rau, Morling, & Rösler, 2010; Thielen, Nygaard, Rugulies, & Diderichsen, 2010) were located by scanning the reference list of the retrieved articles. In total, this review was based on 35 studies. It is acknowledged that relevant studies may have inadvertently been omitted given the use of only two databases although this risk was managed by conducting a comprehensive search of key terms and perusing references.

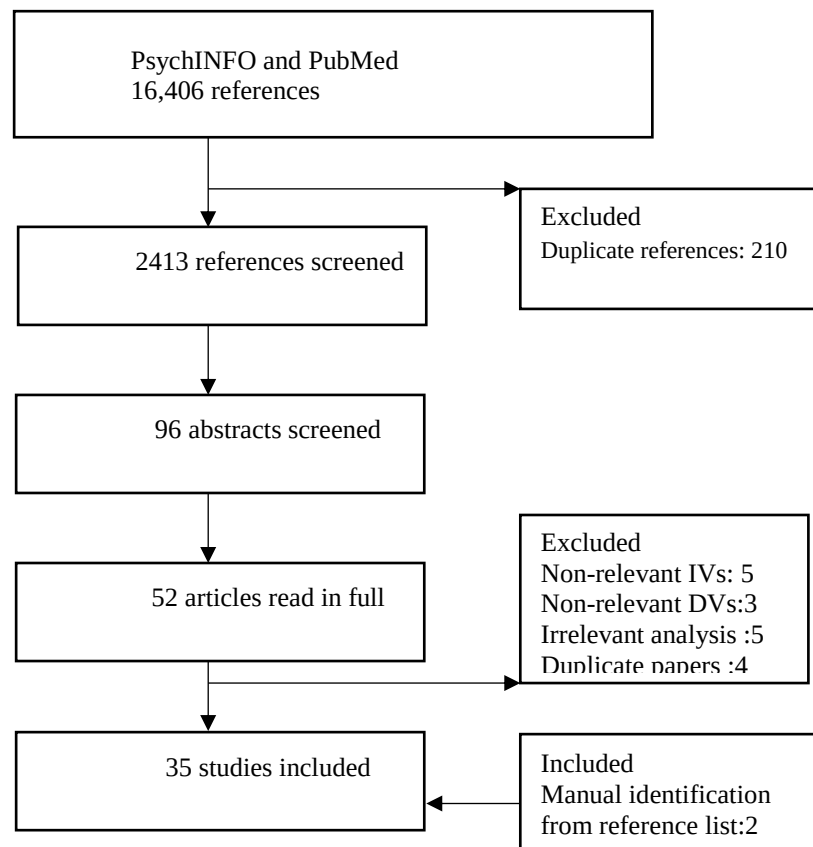


Figure 2. Flow Chart of Study Selection according to the MOOSE guideline

Results

Table 1 displays the descriptive information of the 36 studies included in this review. With guidance from MOOSE and STROBE guidelines, the studies were described according to the following characteristics: i) the authors and country in which the study was conducted ii) sample characteristics including the sample type (e.g., cohort or occupation-specific sample), gender distribution, average age, and response rate (initial and follow-up) where available; iii) study design (e.g., cross-sectional, longitudinal); iv) measurement instruments for the independent and dependent variables; v) hypotheses tested; vi) results with explanatory comments, and; vii) adjustments. Studies were also described according to bias of funding and conflict of interest; which was coded as one of the following: declaration of funding and no conflict of interest, declaration of funding only, declaration of no funding, and no declaration of funding.

Table 1

Characteristics of the Selected Studies for the Demand Control/Support Model and Depression Risk Review (September 2007 to July 2013)

Author (country) Declaration of Bias	Sample characteristics	Design	IV measure	DV measure	Results Strain Buffer Iso-strain <u>Main effects</u> D C S						Comments	Adjustments
Ahola & Hakanen 2007 (Finland) F	Dentists recruited from the Finnish Dental Association in 2003 (<i>N</i> = 2,555; 74% women, response rate _{T1} =71%; response rate _{T2} = 84%)	L 3 years	JCQ, albeit adapted 3-item demands	Rating scale BDI- Short version ≥ 4	±	-	/	-	-	/	Strain operationalised as a continuous quotient. Strain NS when burnout was considered as a covariate	Age, gender, marital status, burnout Participants excluded who had a BDI score> 4 at baseline
Andrea et al 2009 (Netherlands) ND	Subsample of the <i>Maastricht Cohort Study on Fatigue at Work</i> recruited through 45 companies and organisations (<i>n</i> = 3,707). Mostly male (75%). Mean age of 44. T1 Rr of 67% of baseline population. F/up Rr of 69%.	L 23 months	JCQ- Dutch Version	Rating scale HAD-D ≥11	/	/	/	+	±	±	Control and Support S after adjustment for demographics and health, NS when adjusted for occupational variables.	S = Health conditions living arrangements, emotional demands. NS =Gender, age, education, trauma, smoking, f/t work, job insecurity. Participants excluded if change in job or employer indicated, and scored ≥ 4 on the GHQ-12 at baseline.
Bonde et al 2009 (Denmark) F	Public service cohort from one town recruited through 698 workplaces (<i>N</i> = 13,437). Mostly women (78%), <i>M</i> age of 40. Managers excluded. T1(2002-05) Rr of 76%, T2 = 2006 or > first antidepressant prescription –	L ≥ 4 years	Average work unit scores of COPQES – Short form for municipality respondents. Adapted unspecified survey for	Redeemed first- time antidepressant prescription from the Danish Medicinal Product Registry	/	/	/	-	-	±	Support significant only for employees in the municipalities and not in the counties.	NS: Gender, year of survey. US: Age, marital status, education, occupational status. Participants excluded with an antidepressant prescription during

	whichever first. F/up Rr not reported.		county residents									the six months preceding follow-up
Chen et al 2011 (Taiwan) ND	Micro-electric engineers and managers ($N = 678$; 226 cases; 452 controls) recruited from an industrial park in 2007-08. Mostly male (80 %), single/widowed/divorced (57%), college graduates (57%) average age of 31. Rr not reported.	CS Case control	JCQ- Chinese version	BDI ≥ 17 for screening plus a psychiatrist's diagnosis using SCID- Axis I	/	/	/	+	-	+	ERI model also considered ^S	S: work hours, family support, life events, health behaviours. NS: Age, gender, marital status, shift work, occupation, education. Participants excluded with significant health conditions, substance use and mental health history
Cohidon 2010 (France) ND	Nationally representative <i>Decennial Health Survey</i> conducted during 2002-2003 ($N = 11,985$). Rr of 78% of households. Equivalent gender (48% female) average age between 40 to 49 years.	CS Scores taken thrice at a one month interval averaged	Unspecified survey	CES-D – French version ≥ 17 for men, ≥ 23 for women	/	/	/	$\pm$	$\pm$	+	Demand: time pressure S only for male clerks and service personnel and women manual workers, not managers. Control: lack of control over work processes only S and not opportunity for learning, variety of work, control over work processes, resources.	S = Age, living with a partner, major life events, alcohol use, serious chronic disease, smoking status. NS = occupational category
d'Errico et al 2011 (Italy) F	Cohort of 2,046 trade union workers from 206 companies in a single major business city during 1999-2005. T1 Rr of 60%; 51% gave consent to f/up; f/up Rr of 92%. Mostly male (77%) aged 35 - 44	L > 5 years Mean f/up of 2.5yrs	Unspecified survey; was designed for the particular study, largely similar to the JCQ	Antidepressant medication prescription (ADP) obtained through the Regional Health Population Register and Drug Prescription Register	-	/	/	$\pm$	-	/	Demand positively associated with depression risk for blue collar workers, negatively for white collar workers Strain: tertile split	S = Age, gender, occupational category NS = shift work, overtime, loud noise, psychological violence. Participants with ADP between 1997 and baseline excluded.

DeSanto Iennaco et al 2009 (USA) F	Industrial employees ($N = 7,566$) recruited from eleven aluminium manufacturing plants. T1 = 1996-98. F/up: 1998-2003. Mostly male (94%), average of 46 years, mostly high school educated (76%), employed for ≥ 2 years. Rr not reported.	L Median 4.7 yrs Inter-quartile 2-6yrs Historical cohort	JCQ- Whitehall II Version. Expert-ratings by a safety and hygiene manager at each plant location who was familiar with jobs and the department	Health insurance claims based on own doctor-diagnosed depression: MDD, Adjustment disorder with depression or depressive disorder.	/	/	/	$\pm$	-	/	Demands S after adjustment of demographics and smoking; NS after adjustment for industrial plant location. Low control NS. Control positively S at moderate levels in unadjusted model only. D and C modelled as tertiles	S= Age, gender, ethnicity, income, smoking, job grade NS = education, BMI, cholesterol. Participants excluded with a depression diagnosis claim at baseline and up to two years later.
Dragano et al 2008 (Germany) NF	Population based cohort study <i>Die Heinz Nixdorf Recall</i> recruited from three cities between 2000 and 2003, restricted to employees working ≥ 15 hrs/week. Rr of 56%. $N = 1,811$, age 45-66, 59% males.	CS	JCQ; administered via a computer assisted personal interview	CES-D 15 item version via pen and paper. Caseness according to non-specified gender-specific upper quartile cut-points.	$\pm$	/	/	-	+	/	Strain S in the unadjusted model with demographics, but NS when other ERI model considered D and C modelled by gender specific median split quartiles.	US: Gender, age, education, occupational status, work hours, social integration, chronic diseases, smoking, physical inactivity.
Edimansyah et al 2008 (Malaysia) F+NCI	Male automotive assembly workers ($N = 728$) from two plants in two states in 2005, employed ≥ 1 year. Mean age of 27 years. Rr of 69%	CS	JCQ- Malay version	Depression Anxiety Stress Scale- Malay version	/	/	/	+	-	$\pm$	Supervisor and not colleague support S Variables as continuous scores.	US: Age, marital status, education, income, employment tenure. Participants excluded with any psychiatric diagnosis made by medical referees from each plant.
Ertel et al 2008 (USA) F	Ethnically diverse employees ($N = 431$) from four extended care facilities in a single state between 2006 -07. Mean age of 42, mostly female (83%). Rr of 77%.	CS	JCQ- Interviewer-administered in English, Spanish, and Haitian Creole	CES-D 11 item version interviewer-administered in English, Spanish, and Haitian Creole	+	/	$\pm$	/	/	/	Iso-strain S only when employees indicated 'home demands', ie the presence of a child < 18 . Strain and iso-strain dichotomised at the median, quartiles	US: Age, gender, education, ethnicity, marital status, household income, wage, weekly work hours, pain and worksite.

Fandiño-Losada et al 2013 (Sweden) F+NCI	Subsample of the <i>PART population study</i> (n = 4,427) randomly selected from a county council register. T1 (1998-2000) Rr of 51 %. T2 (2001-2003) f/up Rr of 83 % f/up (n = 4710). Average of age 40, 55% females.	L 3 years	DCS Swedish version of a modified JCQ	Major Depression Inventory (MDI)	/	/	/	-	-	±	Support, modelled as social climate, S only for women. For men, high demands and low skill discretion instead predicted lower depression. Variables assessed in quartiles.	S: Income, living alone, social support, family demands, negative life events, occupational group. NS: education. Participants excluded with elevated MDI at baseline and who changed jobs at f/up.
Garbarino et al 2013 (Italy) NF	Male specialist police force unit workers (N = 292). T1 Rr of 99%. Average age of 35 yrs. T1 = 01/2009, T2 = 04/09, T3 = 07/09, T4 = 09/09	L 9 months	DCS: Italian version. Scores averaged over T1, T2 & T3	BDI ≥ 10 at T4	-	/	+	-	±	+	Control S only when ERI model considered. High strain defined as ratio of demand/control > 1. Iso: strain plus support (supervisor + co-worker).	S = Length of employment, emotional stability. NS = age, education, rank, origin, housing, marital status, children
Godin et al 2009 (Belgian) NF	<i>Belstress I Study</i> : subsample (n = 9,396) from 11 large companies or public administrations during 1994 to 1999. T1 Rr of 48%; f/up Rr not reported. Aged 35 to 59, average of 46 years, mostly men (71%) with low education (56%; ≥ 9 years education).	L > 5 yrs Mean f/up of 1,049 days (SD = 311).	JCQ	Workplace records of sick leave of ≥ 28 days due to own doctor-diagnosed depression; notated as 'clinical depression' or 'other'	-	/	/	-	-	-	Strain was S for men only, in the model adjusted for age but unadjusted for CES-D. Strain: median split, highest quartile. Non-work variables also considered. Only satisfaction with private life was S for women.	S = Age. NS = Education. Participants excluded with a baseline CES-D-11 > 90 percentile.
Gray-Stanley et al 2010 (USA) F	Direct support professionals across five community-based organisations (N = 323). Rr of 47%. Mostly female (83%), fairly well-educated, ethnically diverse.	CS	Caplan et al 1971 for work overload; Rizzo et al 1970 for role ambiguity; Vroom et al., 1960 for decision latitude; West & Savage,	CES-D 10 item	/	/	/	±	-	±	For demands: Work overload S only and not role ambiguity or role conflict. Support S only when considered as a single dimension when entered with controls and DC features; support NS when entered separately as co-worker and	S: Age, ethnicity, education, supervisory status. NS: Gender, marital status, ethnicity, living arrangements, caregiving responsibilities, organisational tenure

			1988 for support								supervisor S with locus of control in a third step	
Grynderup et al 2012 (Denmark) F+NCI	PRISME cohort subset of 3,046 public workers, mainly nurses, social workers and teachers (59%) from 376 small work units. T1 (2007) Rr of 45%. T2 (2009) F/up Rr of 77%. Mostly women (79%) aged 35 to 44 (36%).	L 2 years	Work unit mean scores of the COPQES	Common Mental Disorder Questionnaire for screening: score of ≥ 3 on ≥ 3 sx, followed by SCAN interview for depression and bipolar	/	-	/	-	-	/	High control associated with increased odds of 1.85 for depression, however confidence intervals included null. Variables considered in tertiles	S = Neuroticism, personal and family history of depression, traumatic life events, NS = Gender, age, income, education, living alone, alcohol, BMI, smoking. Excluded depressed individuals at baseline using SCAN
Hall et al 2013 (Australia) F	Australian Workplace Barometer Survey Population study based in two states in 2009. N = 2,343. Rr of 31%. Average age of 40 years, 48% female.	CS	JCQ Version 2.0	Patient Health Questionnaire, modified to presence of sx in the last month instead of the last two weeks	/	+	/	+	+	+	Demands: Psychological and emotional demands. Control: Skill discretion, decision authority and macro decision latitude. Support: supervisor + co-worker. Continuous scores.	No controls indicated
Horton & Lipscomb 2011 (USA) NF	Safety and Health of Working Women (N = 223). Recruited by community based staff from two rural poultry plants in one state. Mean age of 33 years. One third lived below the national poverty level, 99% African American, 56% had worked in plant for ≤ 1 year. T1 (2002-04) & T2 Rr not reported	L >3 yrs f/up data every 3-6 months > 2006	JCQ via interview	CES-D ≥ 16 administered by interview	/	/	/	-	-	-	Evaluated predictors of change in CES-D score over time, as did not want to exclude baseline population of 48% with CES-D ≥ 16 . Variables: tertiles.	S = Age, marital status, education, income, work tenure, physical health, NS = shift work, over-time work, pain, physical exhaustion, coping.
Inoue et al 2010	Japan Work Stress and Health Cohort: subset of 15,256 men age 18-67,	L	Japanese National Institute for	Workplace records of long term sick leave	-	/	/	$\pm$	+	-	Demands S as defined by role ambiguity but not job overload.	S = Education, neuroticism, occupational category

(Japan) F+NCI	average age of 41 years, employed in six manufacturing factories. T1 (1996 to 1998) Rr between 47-99%. F/up was July 1999 for one site, May 2002 for two sites, Dec 2002 for one site and March 2003 for two sites.	Mean of 5 years	Occupational Safety and Health Generic Job Stress Questionnaire	of ≥ 30 days due to depressive disorders							Variables: tertiles	NS = Age, marital status, chronic physical conditions. Excluded at baseline if scored ≥ 16 on Japanese CES-D and noted a history of mental disorder.
Kivimäki et al 2010 (Finland) F+NCI	Female nurses ($N=2,784$) with a mean age of 42 years, from 203 somatic illness wards in sixteen hospitals. T1 (2004) and T2 (2005) Rr not reported.	L 1 year	JCQ Hospital bed occupancy as a measure of demands taken three months prior to survey.	National absence register of long-term sickness absence of ≥ 10 days due to doctor-diagnosed depression	/	/	/	+	-	/	Self-reported demands (continuous scale) and bed occupancy S	S = Age, employment contract, hospital division and speciality, alcohol. NS = employment tenure, smoking, physical inactivity, BMI. Excluded participants with sickness absence due to any psychiatric disorder in the six months prior to baseline
LaMontagne et al 2008 (Australia) F+NCI	<i>Victorian Job Stress Survey</i> Population-based telephone survey of 1,101 employees (52% female, age 18-64) representative of the proportion of upper and lower white-collar and blue-collar groups, and urban and rural state employees in a single state in 2003. Rr of 66%.	CS	Abbreviated JCQ with 3-item demand Scale administered through telephone	Estimate from 1997 National Survey of Mental Health-12-month prevalence, which were determined by the CIDI.	+	/	/	/	/	/	Depression risk was higher for employees in lower occupational skill level jobs, particularly males. Strain: median split, quartiles.	S = occupational group US = Age
Lee et al 2012	Convenience sample of 200 Chinese migrant workers in Korea (69%	CS Survey admin-	Korean	CES-D Korean version	/	/	/	+	+	/		S = acculturation stress

(Korea) F	female; mean age of 53 years) recruited through community settings in 2009	istered in public places	Occupational Job Stress Scale	Interviews also offered for those with difficulty reading Korean								NS = Gender, age, job category, marital status, living with a spouse, employment tenure, job category
Magnusson-Hanson et al 2009 (Sweden) F	<i>Swedish Longitudinal Occupational Survey of Health</i> (SLOSH). Representative sample of 5,985 employees (55% females; mostly aged between 46 and 55 (29%)). T1 (2003-04) Rr not reported. T2 (2006) F/up Rr of 65%.	L 2- 3 years	Swedish Work Environment Survey (SWES)	Depression subscale of Hopkins Symptom Checklist 90 (SCL-90):	/	/	/	-	+	±	High demands actually associated with lower SCL-90 scores among men only. Control: only decision authority measured. Co-worker support S only for women. For women, high supervisor support actually associated with higher SCL-90 scores	S = Age, marital status, children, income, birth country. NS = Education, labour market sector. Baseline depression controlled for using Depression subscale of SCL-90
Mark & Smith 2012 (United Kingdom) ND	870 nurses (91% female) employed in the government health service. Mean age of 45 years. Rr of 22%.	CS Mail survey	JCQ	HADS-D > 11	/	- -	/	±	±	+	Demands reduced to NS when ERI model and coping were considered. Skill discretion S, decision authority NS. Support: co-worker and supervisor S. Buffer hypothesis assessed as demands x control and demands x control x support. Variables as continuous scales.	No adjustments reported.
Melchior et al 2007 (New Zealand) F	The <i>Dunedin 1972-1973 birth cohort</i> . Subsample (n = 891; 48% female; Rr of 91%) who completed the assessment in 2004-2005 at age 32 (Rr of 96%).	CS	JCQ via interview	New cases of Major Depressive Disorder via the Diagnostic Interview Schedule (DIS)	/	/	/	+	-	-	Variables considered in tertiles	S = Socio-economic position, negative affectivity, mental disorders in youth via the DIS for children at age 11-15 and DIS at age 18 and 21
Murcia et al 2013	National random sample of the French working	CS	Face to face interview,	Mini International Neuro-	/	±	/	±	+	-	Buffer and main effect of demands S for men only. Emotional demands S	S = Marital status, support outside work, negative life events

(France) F+NCI	population in 2006 (<i>SIP survey: Santé et Itinéraire Professionnelle</i>). $N = 7,709$; 51% female; mostly aged between 40 and 49 (32%); Rr of 76%.		unspecified instrument. D = 3 items C = 2 items S = 1 item	psychiatric Interview (MINI)							ERI model also assessed All main effects were S however in univariate models with adjustments	before age 18 and in past six months. NS = Age, occupational group
Rau et al 2010 (Germany) ND	Employees from the health, public and financial sectors ($N = 343$) recruited from workplaces that were offered an occupational safety risk analysis. Females: 62%, average age of 45 years. Year of study not reported.	CS Case-Control	Task Diagnostics Survey completed by job analysis experts Self-reported German FIT questionnaire	DIA-X-Munich Composite International Diagnostic Interview	/	-	/	+	±	/	Objective and self-reported demand S. Objective control NS. Self-reported control S. DC as continuous scores. Case defined as self-reported current or prior depression in current workplace,	S = Age NS = Gender Control group: Nil reported hx of dep or therapy and nil dep sx in past week or anxiety sx in past four weeks
Rodwell & Martin 2013 (Australia) F+NCI	Aged care nurses from a medium to large healthcare organisation ($n = 222$). Rr of 55%; 95% females; most over 40 years (81%).	CS	Demands and Support with the Caplan et al scale, Control: JCQ	CES-D short form	/	+ -	/	+	+	-	Iso-strain assessed as an interaction Variables considered as continuous scores.	Nil reported adjustments
Smith & Bielecky 2012 (Canada) F+NCI	Subsample of the <i>Canadian National Population Health Survey (NHPS)</i> . Participants ($N = 3,735$, 55% male) aged 25-60 (39% aged 45-60), with complete data at the 2000-01, 2002-03, and	L 2 years	Abbreviated JCQ in 2000-01 and 2002-03	CIDI-Short Form (CIDI-SF) for 12-month MD and self-reported diagnosis of MD 13-24 months prior to CIDI-SF	-	/	/	+	-	-	Continuous change scores analysed. Increase in demands from 200-01 to 2002-03 associated with increased depression risk at 2005-06.	S = Gender, health conditions, personal and family dep hy. NS = Age, education, marital status, children, physical activity, CIDI- SF defined sub-clinical depression.

	2004-05 cycle. Baseline Rr of 69%			assessment at 2004-05.								Excluded participants with a self-reported depression dx at 2000-01 & 2002-03. Adjusted for natural job variability and baseline DCS scores.
Stansfeld et al 2012 (UK) F	Subsample of the <i>Whitehall II</i> study of British public servants (<i>N</i> = 3,924) who provided data at T1 – T3 & T5. T1 (1988) Rr of 73%; T2 (1989) Rr of 79%; T3 (1991-93) Rr of 83%; T5 (1997-9) Rr of 79%. Age 35-55 years, mostly male (74%).	L ≈ 10yrs	Adapted JCQ at T1 and T3	CIDI for 12 month MDD	+	/	/	/	/	-	Repeated and increased job strain between T1 and T3 associated with increased depression risk at T5. Strain: Control subtracted from demands, highest tertile. Social support was NS after adjustment of GHQ	S = Gender, education, physical activity, physical health, employment grade, GHQ at T1, T2 and T3. NS = Age, marital status, smoking, alcohol, social network and support.
Strazdins et al 2011 (Australia) F	Subsample (<i>n</i> = 1975) of mid-aged (40-44) adults, equal gender proportion from the <i>Personality and total health cohort (PATH40)</i> in two cities. T1 (2000) Rr of 65%; T2 Rr of 93%.	L 4 years	Adapted JCQ- as used in Whitehall study via computer-assisted self-report	Goldberg Depression Scale (GDS)- 9 items via computer assisted self-report	/	/	/	+	+	/	A positive change in demand and negative change in control from 2000 to 2004 associated with higher depression risk.	US = Gender, education, rel'ship status, employment type, occupational group, negative life events in past six months, behavioural inhibition. Excluded those with GDS scores > 5
Takaki et al 2010 (Japan) F+NCI	Convenience sample of 2, 634 employees (63% females) recruited from fifty manufacturing, health-care or welfare organisations. Average age 42 years. Rr varied between 63 and 78%.	CS	JCQ-Japanese	CES-D Japanese	+	/	/	/	/	/	Strain: Demand/control as a continuous measure	US = Age, gender, income, smoking, alcohol, occupational status
Thielen et al 2010	Subset (<i>N</i> = 4,661) of the <i>Danish Longitudinal</i>	L 3.5 yrs	COPQES Postal survey	National register of	/	/	/	±	-	±	Demands and Co-worker support S for men only.	US = Gender, age, co-habitation, SES,

(Denmark) F	<i>Study on Work, Un-employment and Health</i> Cohort. A random sample of ten per cent of the population aged 40-50 years (52% male). T1(2000) Rr of 68%			Antidepressant medication prescription and purchase during 2000-03							Quantitative demands but not work pace S. Variables considered in quartiles.	alcohol, smoking, obesity, private life conflict and support, hx of mental and physical conditions, employment status and tenure. Demands adjusted for resources and vice-versa. Excluded participants reporting history of antidepressant use, hospitalisation to due affective disorders and/or elevated MDI scores at baseline.
Wang et al 2012a (Canada) F	Subsample (n = 2,752, 66% male) of a cohort obtained through random digit dialing in a single province. Mostly employees from the oil and gas and service industry and 15 government sector. T1(2008) Rr of 44%. F/up Rr of 77%. Average age 43 years.	L 1 year	JCQ via telephone	CIDI version 2.1 12 month MDD, mania and dysthymia	±	/	/	/	/	-	Strain S only in men who worked 35-40 hrs/week and not for men who worked < 35 or > 40 hrs Strain: highest quartile of demand/control ratio	NS = Age, education, marital status, work hours, occupational group and grade, income, co-morbid anxiety. Participants excluded with current or lifetime CIDI determined MDD at baseline.
Weigl et al., 2012 (Germany) F+NCI	Full-time junior doctors (N = 415) recruited through a medical board. Rr of 62%; F/up Rr of 51%. Average age of 31 years, 47.5% women.	L 33 months	German self-report of working conditions in hospitals (TAA-KH)	Spielberger State-Trait Depression Scale (STCS)	/	- -	/	-	+	-	Cumulative exposure of T1 (14 months from baseline) and T2 (19 months from baseline) continuous variables. Iso-strain measured as an interaction.	S = Partner status, professional tenure, free weekends NS = Age, gender, work hours. Participants excluded with baseline STCS caseness scores
Yang et al 2012	Subsample of the <i>Cardiovascular Risk in Young Finns Study</i> (n =	L > 7 yrs	Occupational Stress Questionnaire-	BDI-Modified and validated	+	/	/	/	/	/	Strain: demands - control	S = BMI,

(Finland) F	935). Full-time workers aged 24-39, 51% women, recruited in 1980 from the national population register. T1(2001) Rr of 83%. T2 (2007) f/up Rr not reported.	Mean of 6 years	Demands JCQ- control									NS = Age, education, occupational category, smoking

Notes. F= Declaration of Funding F+NCI = Declaration of Funding plus No Conflict of Interest. NF = Declaration of no funding. ND= No statement about funding or conflict of interest. T1= Time 1, T2 = Time 2...; Rr = Response rate; F/up = Follow-up; Age refers to age at baseline for longitudinal studies. *Measures.* JCQ= Job Content Questionnaire; DCS= Swedish Demand Control Questionnaire; COPQES = Copenhagen Psychosocial Questionnaire; BDI = Beck Depression Inventory; HADS-D = Hospital and Anxiety Depression Scale – Depression subscale; SCID-IV; Structured Clinical Interview for DSM-IV; CIS-R = Revised Clinical Interview Schedule; CIDI = Composite International Diagnostic Interview; MDI = Major Depression Inventory; MD = Major Depression; MDE= Major depressive episodes; MDD = Major Depressive Disorder; *Design.* CS = Cross-sectional; L = longitudinal; Yrs = years *Hypotheses.* Strain represents the assessment of strain via a combined term (i.e., a quadrant, ratio or subtraction term) that Iso = iso-strain hypothesis; D = Demands, C= Control, S = support; + = Hypothesis supported; - = Hypothesis refuted; ± = Hypothesis partially supported; / = Hypothesis not tested or reported. *Adjustments.* S = Significant; NS = Not significant; US = unspecified significance in multivariate models; dx; diagnosis; ERI model = Effort Reward Imbalance model; SES = Socio-economic status. One symbol in the buffer hypothesis column denotes the result for the DC model; the second symbol represents the additional test of the DCS model.

Description of the Studies

Sample. Study sample sizes ranged from 200 to 15,256 ($M = 7,725$, $SD = 4,171$). A large number of studies (17 out of 36) were conducted on gender proportionate samples; defined here as a male to female or female to male ratio in the order of 45:55 to 70:30. Samples otherwise consisted of largely male ($N = 7$) or male only samples ($N = 3$) or largely female ($N = 5$) or female only samples ($N = 3$). A large proportion of studies (42%) were based on cohorts. Occupations across a variety of industries were represented, especially those from the health care industry (nurses, doctors, support workers), industrial work and private and public sector enterprises. The samples were from nationally diverse countries such as the United Kingdom, Canada and Germany. Samples however were largely from Scandinavia ($N = 9$) and Asia-Pacific regions ($N = 9$).

Design. Fifteen studies were cross-sectional including one case-control study. Longitudinal design was employed in 58% ($N = 21$) of studies with the time lag ranging from nine months to up to approximately ten years. The majority of longitudinal studies evaluated cross-lagged associations, one measured cumulative exposure, and five studies analysed change scores; that is the effect of change in stressors on change in depression scores.

Theoretical model. Thirteen studies assessed predictions from the DC model and 23 studies (64%) assessed hypotheses from the extended DCS model.

Measurement of DC/S dimensions. The Job Content Questionnaire (JCQ; Karasek et al., 1998) was the most frequently employed instrument to measure demands, control and support. Twenty-four studies used the JCQ or a variation that was either abbreviated or modified via administration method (telephone or face-to-face interview). Ten studies used a range of other self-reported measures. This included two studies that used the average work unit scores of the Copenhagen Psychosocial Questionnaire (COPQES) instead of individual self-report data (Bonde, Munch-Hansen, Wieclaw, Westergaard-Nielsen, & Agerbo 2009; Grynderup et al., 2012). In addition to self-report surveys, two studies used job analysis expert ratings to measure demand and control (De Santo Iennaco et al., 2009; Rau et al., 2010) and another used hospital bed occupancy as a measure of demands (Kivimäki et al., 2010). Three studies utilised unspecified instruments (Cohidon, 2010; d'Errico et al., 2011; Murcia et al., 2013).

Measurement of depression. Fifty-six per cent of studies ($N = 20$) measured depression via a self-report scale. Eight studies used a version of the Centre for Epidemiologic Studies Depression Scale (CES-D), three studies used the Beck Depression Inventory (BDI), two studies used the depression subscale of the Hospital and Anxiety Depression Scale (HADS-D) and seven studies used a range of other survey instruments. Of the 16 studies that used ‘objective’ measures, ten used clinical interview (including two that also used a self-report scale for screening), three studies used workplace records of sickness absence due to doctor-diagnosed depression and three studies used national records of redeemed antidepressant prescriptions.

The prevalence of depression varied between 2.9% and 43.0 % across the 25 studies that provided data. Studies that used self-report measures revealed higher levels of and greater variation in depression prevalence (between 3.3% and 43.0%, $SD = 13.7\%$). With the exception of Rau et al (2010, who reported prevalence at 27%), studies that employed clinical interview showed a comparatively narrow range and lower prevalence of depression that ranged from 2.0% and 8.4%. The range was narrower still (2.5% to 4.6%) in studies that used antidepressant medication prescription or records of sickness absence due to depression. Studies that stratified prevalence by gender ($N = 9$) consistently found a higher prevalence for women compared to men.

Evaluation of the Quality of Studies

The results were classified according to whether studies were supportive, partially supportive and unsupportive. As reported by van der Doef and Maes (1999) and Häusser et al (2010), studies classified as fully supportive presented results that entirely confirmed the hypothesis examined. Studies characterised as partially supportive demonstrated expected results under particular conditions or for subsamples only. Unsupportive results referred to non-significant results obtained in multivariate analyses.

In line with general guidelines for evaluating the quality of studies (Stroup et al., 2000, Meta-analysis of Observational Studies in Epidemiology [MOOSE] guidelines; von Elm et al., 2008; Strengthening the Reporting of Observational Studies in Epidemiology [STROBE] statement), each study was described according to the following dimensions of quality: sample size, recruitment period and method, response rate, study design, directness of the measures, statistical analyses performed, consideration of confounds and relevance. The reporting of funding sources was also noted. The magnitude of results was not

considered as the purpose of this review was narrative and inclusive as opposed to meta-analytic. Funding was declared in the majority of studies (71%). No conflict of interest was specifically declared in 29% of the investigations examined.

The result for each hypothesis is summarised in Table 2. Overall, the strain hypothesis showed a slight tendency toward non-significance (58%). The iso-strain hypothesis was largely unsupported (71%) as was the buffer hypothesis (73% of studies were unsupportive). The demands main effect was most likely to be fully supported (38%), the control main effect, non-significant (52%) and the support main effect partially supported (36%).

Table 2

Support for the DC/S Model in Depression Risk, according to the Proportion of Full, Partial and Non-Significant Results

Hypothesis	Full Support N (%)	Partial Support ^a N (%)	Non-significant N (%)
Strain ^b	9 (21%)	9 (21%)	24 (57%)
Iso-strain	2 (8%)	5 (21%)	17 (71%)
Demand main effect	11 (38%)	8 (27%)	10 (35%)
Control main effect	9 (31%)	5 (17%)	15 (52%)
Support main effect	5 (23%)	8 (36%)	9 (41%)
Buffer ^c	2 (18%)	1 (9%)	8 (73%)

Note. ^a Partial support for the strain and iso-strain hypothesis here refers to partial support of either the quadrant formulation or all or one main effect term in combination with other fully significant results. For example, this would include studies that revealed full support for the demand main effect and partial support for the control and support main effect. This is considered distinct to the condition where one component is significant and another is non-significant, which is denoted as non-significant. ^b Strain is used to refer to either the examination of demand and control main effects or the quadrant formulation. ^c Buffer refers to the interaction of either demands and control or demands, control and support. Note that the *N* for the joint effects of strain and iso-strain present the number of evaluations and not studies as some studies tested both the single term and additive effect; the buffer hypothesis includes the total number of tests on either or both the DC and DCS model.

Evidence for the Strain Hypothesis

The strain hypothesis, that is the claim that the highest risk of ill-health results from the combination of workplace conditions of high demand and low control, was modelled in a variety of ways: as a quadrant, relative excess (subtraction) term, a ratio and through main effects. For ease of reporting results, this review distinguishes the additive main effects formulation from the ‘combined term’ formulation of strain. The ‘combined term’

formulation will be used to refer to formulations of demand and control other than additive effects whereby the variables demand and control have been combined into a new term.

Combined term formulation. The combined term strain hypothesis was tested in 13 out of 35 studies (37%). Thirty-eight per cent of studies (N =5) determined full support, 23% showed partial support (N = 3) and 38% (N = 5) returned non-significant results.

Full support. Three of the five fully supportive studies were based on large representative Western samples. Stansfeld, Shipley, Head, and Fuhrer (2012) prospectively studied a nationally representative sample of 3924 British public servants; Yang et al (2012) a prospective population-based cohort of Finnish employees (n = 935) and La Montagne et al (2008) a cross-sectional sample of 1,001 Australian employees who were representative of the 2003 Australian Bureaus of Statistics (ABS) figures for gender, age, occupational grade, and urbanicity within a single state. Two further cross-sectional studies were based on more demographic and occupation-specific samples. Ertel, Koenen, and Berkman (2008) sampled 431 ethnically diverse employees working in care facilities in the United States and Takaki et al (2010) a convenience sample of 2,634 Japanese employees recruited across 50 manufacturing, health-care, and welfare organisations.

An approximately even gender distribution was noted in two samples (La Montagne., 2008: 48% male, Yang et al., 2012: 49 % male). Stansfeld et al (2012) was based on a predominately male sample (76%) and Ertel et al (2008) and Takaki et al (2010) a predominately female sample (82% and 63% respectively). The baseline response rate for all studies was good, ranging from 63% (Takaki et al 2010) to 83% (Yang et al 2012). The follow-up response rate for Stansfeld et al (2012) was excellent, reported at between 79% and 83% across four intervals over approximately ten years. The follow-up response rate in Yang and colleagues' (2012) seven-year prospective study was not reported.

All studies used self-report surveys to measure strain. Four out of five studies used a variation of the Job Content Questionnaire (JCQ) that was either translated (Japanese; Takaki et al., 2010) or adapted by administration method (interview; Ertel et al., 2008), response scale (Stansfeld et al., 2012) or abbreviation (LaMontagne et al., 2008). One study (Yang et al., 2012) combined the JCQ measure of control with the Occupational Stress Inventory measure of demand although the validity of this combination of measures was not reported.

Strain was calculated in non-standard ways in all three large representative studies. The two longitudinal studies (Stansfeld et al., 2012; Yang et al., 2012) modelled strain using the 'relative excess' term whereby the score of control was subtracted from the score of demands. La Montagne et al (2008) calculated the population-attributable-risk of job strain by combining strain as reported in the sample with effect size estimates derived from international data. Strain was subsequently modelled as the highest tertile (Stansfeld et al., 2012), highest quartile (Ertel et al., 2008; LaMontagne et al., 2008), continuous ratio (Takaki et al., 2010) or subtraction term of demands and control (Yang et al., 2012). In the longitudinal studies Yang et al (2012) used linear regression. Stansfeld et al (2012) showed with logistic regression that compared to low strain, repeated and increased job strain between Time 1 (1988) and Time 3 (1991-93) predicted elevated depression risk approximately ten years later (1997-1999).

Depression was measured by clinical interview in two studies (Stansfeld et al 2012; LaMontagne et al., 2008) and with survey instruments in three studies (Ertel et al., 2008; Takaki et al., 2010; Yang et al, 2012). Stansfeld et al (2012) used the Composite International Diagnostic Interview (CIDI) to measure depression within the past 12 months. LaMontagne et al (2008) also used the CIDI to measure 12-month depression however the scores were extrapolated from the 1997 National Mental Health Survey. Yang et al (2012) used the Beck Depression Inventory while Ertel et al (2008) and Takaki et al (2010) used the Center for Epidemiological Studies Depression Scale (CES-D).

The fully supportive results remained significant after the adjustment of demographic, health and occupational variables. LaMontagne et al (2008) and Yang et al (2012) controlled for age, education and occupational skill level. Yang et al (2012) also controlled for Body Mass Index which was reported as the only significant confound. Takaki et al (2010) and Ertel et al (2008) controlled for additional factors although their significance was not reported. Stansfeld et al (2012) adjusted for the largest range of covariates. Age, marital status, smoking, alcohol, social network and support were non-significant while the significant factors were gender, education, physical activity and health, employment grade and scores on the General Health Questionnaire (GHQ). Apart from the control of the GHQ by Stansfeld et al (2012), no other study controlled for a history suggestive of depression.

Summary. Fully supportive results for the strain hypothesis were generalisable across a wide range of employees in Western nations (Australia, Britain and Finland). Support was

also obtained in demographic and occupational diverse samples (ethnically diverse Americans and Japanese white and blue-collar workers). The results were also consistent across a range of strain formulations and depression measures. Overall, Stansfeld et al (2012) showed the most robust support for the strain hypothesis however the results were generalisable to a largely male sample. While Yang et al (2012) confirmed supported in more evenly gender distributed prospective study, as with all the cross-sectional studies, adjustments were not made for prior depression.

Partial support. Partial support was obtained in 23% ($N=3$) of studies that examined the combined term strain hypothesis. Partial support occurred with dependence on other health and occupational variables as well as gender. Strain was no longer significant when burnout was included as a covariate (Ahola & Hakanen, 2007) or when the effort component of the Effort-Reward Imbalance model was simultaneously assessed (Dragano et al., 2008). Regarding gender effects, Wang et al (2012a) determined that strain was not significant for females. However, results were more complex for men: strain was significant for men who indicated work hours of between 35 and 40 hours per week but not for men who worked less than 35 hours or greater than 40 hours per week.

All partially supportive studies were based on large samples and two of the three studies assessed prospective relations and were population based. Dragano et al (2008) conducted a cross-sectional population cohort study on 1,911 older German employees (aged 45-66 years). Wang et al (2012a) examined over one year, a cohort of 2,752 Canadian employees who were predominately from the oil and gas service industry and government sector, recruited through random digit dialing. Ahola and Hakanen (2007) studied 2,555 dentists over three years who were recruited through the Finnish Dental Association.

The baseline response rate for partially supportive studies was reasonable, ranging from 44 % to 71%. The follow-up response rate was good: 77% for Wang et al (2012a) and 84% for Ahola & Hakanen (2007). Overall, studies adequately represented males and females: Two studies sampled a slightly greater proportion of males than females (59%, Dragano et al., 2008; 61%; Wang et al., 2012a) and one study sampled more females (74%; Ahola & Hakanen, 2007). While Dragano et al (2008) did not sample employees in the younger age bracket, the average baseline age of participants; 43 years (Ahola & Hakanen, 2007; Wang et al., 2012a) was similar across all studies.

Regarding the measurement of strain, all studies used an adapted version of the JCQ that was either abbreviated (Ahola & Hakanen, 2007) or administered via computer-assisted face-to-face (Dragano et al 2008) or telephone interview (Wang et al., 2012a). Strain was formulated in a variety of ways: as a continuous ratio (Ahola & Hakanen, 2007), the highest quartile of the ratio term (Wang et al., 2012a) and the highest quartile of the dichotomised scales obtained through median split (Dragano et al., 2008). One study used the CIDI to measure depression (Wang et al., 2012a) and two used rating scales (BDI; Ahola & Hakanen, 2007; CES-D; Dragano et al., 2008).

All studies controlled for demographic, health and occupational variables, which were typically non-significant when reported. Wang et al (2012a) found non-significant results for age and education, marital status, work hours, occupational group and grade and comorbid anxiety. Dragano et al (2008) found that except for age, no demographic, health or occupational covariate was significant. Ahola and Hakanen (2007) adjusted the analyses for gender, age and marital status but did not report the significance. All longitudinal studies excluded participants with elevated depression scores at baseline.

Summary. The large and representative samples, reasonable response rates, longitudinal design and adjustment for potential confounders particularly baseline depression, demonstrate that the findings regarding partial significance cannot be discounted as being due to poor methodological design. The single partially significant study that was dependent on gender showed that strain was non-significant for females and highly specific for males (Wang et al., 2012a). Partial results overall were based on a unique combination of health or occupational variables that were not examined in other partially supportive nor fully supportive studies.

Non-significant results. Non-significant results for the strain hypothesis were determined in five prospective studies. The samples were large and from nationally diverse samples. Inoue et al (2010) sampled 15,256 Japanese male employees across six manufacturing sites and d' Errico et al (2011) a cohort of 2,046 Italian trade union workers (77% male). Smith and Bielecky (2012) performed a secondary analysis of a sub-population ($n = 3,735$) from the Canadian National Health Population Survey. Godin et al (2009) sampled 9,396 employees, mostly males (71%), from 11 large companies and public administrations as part of the Belgian Belstress I study. Lastly, Garbarino, Cuomo, Chiorri and Magnavita (2013) sampled an Italian male specialist police force unit of 292 employees

with an average age of 35. The baseline response rate varied greatly, between 47% and 97%. Follow-up response rates were not reported except for d'Errico et al (2011) who reported a rate of 92% from the 51% who consented to follow-up. The follow-up period ranged from nine months (Garbarino et al., 2013) to up to six years (Inoue et al., 2010). Apart from the Canadian NHPS data which had a close to equal gender distribution, the samples were predominately male.

All studies used self-report scales to measure strain. One study used the Japanese version of the NIOSH questionnaire (Inoue et al., 2010) and all other studies used a variation of the JCQ. Godin et al (2009) administered the JCQ via computer-assisted interview, Smith and Bielecky (2012) used a validated abbreviated version and Garbarino et al (2013) a validated Italian version. d'Errico et al (2011) used the aggregated work unit score of an unspecified survey measure that was cited as similar to the JCQ. Strain was variously modelled as the highest tertile (d'Errico et al., 2011; Inoue et al., 2010), quartile (Garbarino et al., 2013) of the ratio of demand and control, or a continuous ratio score greater than one (Garbarino et al., 2013; Smith & Bielecky, 2012). Smith & Bielecky (2012) also considered change scores that accounted for the expected fluctuation in scores. Depression was measured with objective indices in four of the five studies. This was in the form of national register data on antidepressant medication prescription (d'Errico et al., 2011), workplace records of doctor-diagnosed sickness absence of 28 (Godin et al., 2009) and 30 days or more (Inoue et al., 2010) and clinical interview (CIDI-Short Form) in addition to self-reported diagnosis of depression (Smith & Bielecky, 2012). Garbarino et al (2013) used the BDI.

Four of the five prospective studies applied exclusion criteria to manage prior depression. Smith and Bielecky (2012) excluded participants with a self-reported depression diagnosis and Inoue et al (2010) excluded participants noting a history of mental disorder and who showed elevated scores on the Japanese CES-D. Godin et al (2009) similarly excluded those reporting elevated CES- D short form scores and d'Errico et al (2011) excluded participants with an antidepressant medication prescription up to two years prior to baseline. Garbarino et al (2013) controlled for emotional stability. Inoue et al (2010) additionally controlled for neuroticism and Smith and Bielecky (2012) for personal and family history of depression. The studies also controlled for a range of demographic, health and occupational variables with no consistent pattern of significance except for age and marital status, which were non-significant or negligible in all studies.

Although the five studies returned non-significant results they all showed trends in the expected direction. Garbarino et al (2013) reported a trend of an almost two-fold increase in elevated BDI scores. d'Errico et al (2011) found that exposure to high job strain was associated with a non-significant increase in the risk of antidepressant prescription among male blue-collar workers. Strain in this instance was evaluated simultaneously with other physical and psychosocial stressors. Inoue et al (2010) determined support for the strain hypothesis after adjustment for demographics but not when baseline depressive symptoms and neuroticism were factored. Similarly, Godin et al (2009) found that strain was significant for men only although non-significant when baseline depression (CES-D scores) was factored. Lastly, Smith and Bielecky's (2012) results were in the expected direction although the likelihood of null was included in the confidence intervals.

Summary. Studies yielding unsupportive results were of good methodological quality. Specifically, all examined prospective associations, all but one study (Garbarino et al., 2013) was conducted on large representative samples and all adjusted for occupational, individual and health variables, notably baseline depression. The results therefore cannot be discounted as due to poor methodological quality in this regard. Of note, all but one study (Garbarino et al., 2013) used measures other than self-report to index depression. Non-significant results however all showed a trend in the expected direction.

Summary of the evidence for the combined term strain hypothesis. In sum, the strain hypothesis as formulated by a combined term was fully supported in five studies, partially supported in three studies and non-significant in five studies. To facilitate an understanding of the evidence the results are summarised according to the methodological features common across a particular level of support. Samples that were population-based were more likely to have revealed results that were fully ($N = 3$) and partially significant ($N = 2$) than non-significant ($N = 1$). Studies that examined occupation or industry specific samples were more likely to have been non-significant ($N = 4$) rather than fully ($N = 2$) or partially significant ($N = 1$). Relatedly, the occupation or industry-specific samples all comprised of males only or mostly males. Thus similarly, samples with only or mostly males were more likely to be non-significant ($N = 4$) than significant ($N = 1$) or partially significant ($N = 2$). The mean sample size was larger in studies that were non-significant ($M = 6,145$, $SD = 6,133$) compared to partially ($M = 2,406$, $SD = 1,186$) or fully supportive studies ($M = 1,785$, $SD = 1,588$).

The follow-up period in the two fully supported longitudinal studies was up to seven (Yang et al., 2012) and ten years (Stansfeld et al., 2012). By contrast, non-significant and partially significant prospective studies had a shorter and wider follow-up duration, spanning nine months (Garbarino et al., 2013) and up to six years (Inoue et al., 2010). Studies employing cross-sectional design all returned either fully significant ($N=3$) or partially significant ($N=1$) results.

Regarding measurement, studies that assessed depression with measures other than self-report were more likely to be non-significant ($N=4$) than partially ($N=2$) or fully significant ($N=2$). Specifically though, studies that used clinical interview were more likely to be significant ($N=2$) or partially significant ($N=2$) than non-significant ($N=1$). Studies that used sickness absence due to depression and antidepressant medication prescription were all non-significant. Studies that employed self-report measures for both strain and depression were more likely to be fully ($N=3$) or partially significant ($N=2$) than non-significant ($N=1$). The formulation of strain varied greatly between studies. No obvious differences in results were apparent except that out of the five fully supportive studies three modelled strain in non-standard ways. All studies used self-report measures for strain except for d'Errico et al (2011) which used aggregated self-report scores to predict antidepressant medication and showed non-significant results. Studies that accounted for baseline depression were less likely to be significant ($N=1$) and more likely to reveal partial ($N=4$) or non-significant ($N=4$) results. No consistent variable accounted for partial support.

Evidence for the Iso-Strain Hypothesis

Combined term formulation. Two studies examined the iso-strain hypothesis as modelled by a combined term. One study showed fully significant results (Garbarino et al., 2013) and the other showed partial support (Ertel et al., 2008). Both studies used self-report measures for iso-strain and depression.

The fully supportive study was a nine-month prospective survey of 292 Italian male specialist force police officers (Garbarino et al., 2013). Iso-strain was modelled as the ratio of demand and control and the lower median of support; which was a composite of supervisor and colleague support. Ertel et al (2008) found partial support in a cross-sectional sample of over 400 mainly female (82%) ethnically-diverse employees working in care facilities in the USA. Iso-strain, modelled as the highest quartile of the mean split of demands, control and support was significant only when employees indicated 'home demands' that is, having a

child (under the age of 18) living at home. The results remained after adjustment for a large range of demographic, health and occupational variables in Ertel et al (2008) and further for emotional stability in Garbarino et al (2013). In short, the two studies based on demographic and occupation-specific samples were supportive after adjustments.

Evidence for the Additive Strain and Iso-strain Hypothesis

Twenty-nine studies evaluated the ‘additive’ hypothesis of the DC model and 20 studies assessed the additive hypothesis of the DCS model. The additive hypothesis, that is, joint effects modelled by simultaneous support of the main effect of demands and control (and when assessed, support) was largely non-significant. Sixty-five per cent of evaluations ($N = 19$) on the additive strain hypothesis returned non-significant results, followed by 21% ($N = 6$) that showed partially significant results and 14% ($N = 4$) that showed full support. The results for the additive iso-strain hypothesis were even more definitive, with 80% of studies being unsupportive ($N = 16$), 15% partially supportive ($N = 3$) and a single study revealing full support (Hall et al., 2013). To clarify, a non-significant result for the additive hypothesis refers to the absence of support for the simultaneous (full or partial) significance of the demand and control main effect in the DC model or the absent simultaneous (partial or full) support for the demand, control and support main effect. Partial support refers to conditional support for one to all main effects. Full support refers to the unconditional support for each main effect hypothesis of the DC/S model.

Three of the four fully supportive studies (Hall et al., 2013; Lee, Ahn, Miller, Park, & Kim, 2012; Rodwell & Martin, 2013) were based on self-report cross-sectional examinations. One longitudinal investigation also determined full support for the additive strain hypothesis using clinical interview for depression (Strazdins et al., 2011). Partially supportive studies equally comprised of three cross-sectional (Cohidon, Santin, Imbernon, & Goldberg, 2010; Mark & Smith, 2012; Rau et al., 2010) and three longitudinal investigations (Andrea, Bültmann, van Amelsvoort, & Kant, 2009; Garbarino et al., 2013; Inoue et al., 2010).

Most supportive results derived from cross-sectional studies ($N = 5$) although a greater number of cross-sectional studies ($N = 7$) showed non-significant results and so cross-sectional design did not clearly distinguish between supportive and non-supportive studies. Studies that employed longitudinal design were more likely to return results that were non-significant ($N = 15$) than fully ($N = 2$) or partially significant ($N = 2$). Except for Strazdins et al (2011) and Rau et al (2010), all studies that employed objective measures for independent

or dependent measures were non-significant. Given the variety of conditions in which partial support and non-significance emerged, the findings were considered best presented via the evidence for the individual main effects hypotheses.

Evidence for the DC/S Model Main Effects

The next section reviews the results for the main effect predictions of the DC/S model. This section is organised around the evidence for the main effect of demands, control and then support.

Evidence for the demand main effect. The hypothesis that high demands increases the risk of depression was evaluated in 81% of studies ($n = 29$). Full support was found in 11 studies (38%), partial support in eight studies (27%) and non-significant results in 10 studies (35%).

Full support. The 11 studies with full support were conducted across diverse national samples. Five studies were based on large population cohorts: the Finnish Maastricht Cohort Study on Fatigue at Work ($N = 3,707$, Andrea et al., 2009), the Canadian National Population Health Survey ($N = 3,735$, Smith & Bielecky, 2012), the Australian Workplace Barometer survey which represented a variety of job descriptions according to the Australian Standard Classification of Occupations ($N = 2,343$, Hall et al., 2013), the Australian Personality and Total Health Cohort (PATH40) of middle-aged adults (40-44 years; $N = 1,975$, Strazdins et al., 2011) and the New Zealand Dunedin 1972-73 birth cohort ($N = 981$; Melchoir et al., 2007). Three of the five population cohort studies were prospective investigations (Andrea et al., 2009; Smith & Bielecky, 2012; Strazdins et al., 2011) and all population studies had roughly equal gender distribution except for Andrea et al (2009) who sampled mostly males (75%). In the Finnish longitudinal study (Kivimäki et al., 2010) female nurses ($N = 2,784$) were studied. The follow-up period ranged from between one (Kivimäki et al., 2010) and four years (Strazdins et al., 2011). The baseline response rate was similar across the longitudinal studies (between 65% and 69%) and the follow-up response rate was between good (69%, Andrea et al., 2009) and excellent (93%, Strazdins et al., 2011). Kivimäki et al (2010) did not report the initial or follow-up response rate and Smith and Bielecky (2012) did not report the follow-up rate.

Sixty-four per cent of supportive studies ($N = 7$) were cross-sectional. Of these, all but one study (Rau et al., 2010) originated from Asian-Pacific nations: Taiwan (Chen et al.,

2011), Malaysia (Edminsayah et al., 2008), Korea (Lee et al., 2012), Australia (Hall et al., 2013; Rodwell & Martin, 2013) and New Zealand (Melchoir et al., 2007)⁵. All but two cross-sectional studies (Hall et al., 2013; Melchoir et al., 2007) were based on occupation-specific samples. Chen et al (2011) investigated 678 micro-electric engineers who were mostly male (80%) and either single, widowed or divorced (58%); Edimansyah et al (2008) sampled 728 young (mean age of 27 years) male automatic assembly workers, Lee et al (2012) sampled 200 mostly older female Chinese migrant workers in Korea (mean age of 53 years; 69% female) and Rodwell and Martin (2013) sampled 222 mainly female (95%) aged care nurses in Australia. Rau et al (2010) sampled 343 employees (62% female) from the German health, public and financial sectors. The response rate varied greatly from 31% (Hall et al., 2013) to 96 % (Melchoir et al., 2007) and three studies did not report this data (Chen et al., 2011; Lee et al., 2012; Rau et al., 2010).

All eleven supportive studies used self-report instruments to measure demands. Eight studies used a version of the JCQ including one (Smith & Bielecky, 2012) that did not report the validity for the abbreviated two-item measure. Other instruments used were the Korean Occupational Job Stress Scale (Lee et al., 2012), the German FIT questionnaire (Rau et al., 2010) and the Job demands scale by Caplan, Cobb, French, Harrison, & Pinneau (1980; Rodwell & Martin., 2013). In addition to rating scales, two studies employed objective measures: Rau et al (2010) used job analysis expert ratings and Kivimäki et al (2012) in their sample of nurses used hospital bed occupancy as a measure of demands, with both methods showing full support. Two longitudinal studies (Strazdins et al., 2011; Smith & Bielecky, 2012) analysed the effect of change in ratings of demands, whereby an increase in self-reported demands (Smith & Bielecky, 2012) and a negative change in self-reported demand (Strazdins et al., 2011) were associated with heightened depression risk.

Depression was measured with rating scales in six studies, clinical interview in four studies and sickness absence records in one study. A variety of validated rating scales were used: the BDI (Chen et al., 2011), CES-D (Rodwell & Martin, 2013; Lee et al., 2012), Goldberg rating scale (Strazdins et al., 2011), Depression Anxiety and Stress Scale (Edimansyah et al., 2008), Hospital Anxiety and Depression Scale (HADS-D; Andrea et al., 2009) and a modified Patient Health Questionnaire (PHQ; Hall et al., 2013). A number of

⁵ Although Melchoir et al (2007) is a prospective study, it is classified here as cross-sectional given the analysis of occupational characteristics at the final time point only. Accordingly, only the cross-sectional and not prospective relationship with depression was evaluated.

clinical interviews were also employed: the Structured Clinical Interview for DSM-IV (SCID-IV) following screening with the BDI (Chen et al. 2011), Diagnostic Interview Schedule (DIS; Melchoir et al., 2007) and two studies used the CIDI (Rau et al., 2010; Smith and Bielecky, 2012). Kivimäki et al. (2010) utilised national register records of sickness absence of 10 days or greater due to doctor-diagnosed depression.

The four longitudinal studies all controlled for common demographic, health and work variables. Smith and Bielecky (2012) also adjusted for natural variability in demand scores over time. All longitudinal studies additionally excluded participants with an elevated depression risk at baseline as variously determined by rating scales (General Health Questionnaire, Andrea et al., 2009; Goldberg rating scale; Strazdins et al., 2011), self-reported diagnosis of depression (Smith & Bielecky, 2012) and sickness absence due to a psychiatric disorder during the previous six months (Kivimäki et al 2010). Four of the seven cross-sectional studies also controlled for individual risk factors for depression such as neuroticism or history of depression (Chen et al., 2011; Edimansyah et al 2008; Melchoir et al. 2007; Rau et al., 2010). Three studies (Hall et al., 2013; Rodwell & Martin, 2013; Lee et al., 2012) did not report on the control of such individual risk factors.

Summary. Support for the demands main effects hypothesis was substantiated in four high quality studies that were based on large, representative, prospective and adjusted examinations and notably through the management of baseline depression through exclusion criteria (Andrea et al., 2009; Kivimäki et al., 2010; Smith & Bielecky, 2012; Strazdins et al., 2011). These results were obtained from a range of samples from Western nations. By contrast, the seven cross-sectional studies were primarily conducted in Asian-Pacific nations. Support was obtained across a variety of measures although all prospective studies used a version of the JCQ. Two of the four longitudinal studies (Smith & Bielecky, 2012; Strazdins et al., 2011) evaluated the hypothesis with change scores. Depression was assessed with objective measures in almost half of the total studies (45%), with clinical interview the most common (80%) method. The two studies that employed self-report and objective measures for demands and depression (Kivimäki et al., 2010; Rau et al., 2010) showed significant results for both methods.

Partial support. Partial support was determined in 27% ($N = 8$) of studies. Partial support occurred with respect to gender effects (Murcia, Chastang, & Niedhammer, 2013) the operationalisation of demands (Gray-Stanley et al., 2010; Inoue et al., 2010) and in concert

with other occupational factors (DeSanto Iennaco et al., 2009; Mark & Smith, 2012). Three studies determined partial support based on gender in combination with the above factors (Cohidon et al 2010; d'Errico et al., 2011; Thielen et al., 2010).

To detail, Murcia et al (2013) found a significant association between demand and depression for men but not women. The cross-sectional study was based on a large ($N = 7709$) representative sample of the French working population with roughly equal gender distribution. Demand was measured with a three-item unspecified survey administered via interview and depression was assessed with a validated brief clinical interview commonly used in epidemiological studies (MINI; Mini International Neuropsychiatric Interview). Adjustments were made for demographics and negative life events.

Two studies revealed partial significance based on the operationalisation of demands. Inoue et al (2010) found that in a large sample of Japanese male manufacturing employees ($N = 15,256$) that demand as measured by role ambiguity but not role overload was prospectively associated with workplace records of long-term sickness absence due to medically certified depression. Gray-Stanley et al (2010) showed the reverse whereby work overload but not role ambiguity or conflict was associated with higher CES-D rating scores in a cross-sectional survey of 323 mostly female (83%) direct support staff from five community based organisations.

Both studies used instruments not otherwise employed in studies contained in this review. Inoue et al (2010) used the Japanese version of the National Institute of Occupational Safety and Health Generic Job Stress Questionnaire and Gray-Stanley et al (2010) used the Role ambiguity scale (Rizzo, House, & Lirtzman, 1970) and an unpublished scale for work overload (Caplan, 1971). Inoue et al (2010) adjusted for demographic, health and depression risk factors and excluded participants reporting elevated CES-D scores at baseline. Gray-Stanley et al (2010) adjusted for demographic and occupational factors and not depression-specific risk factors.

Two other studies showed fully significant results that reduced to non-significance upon the consideration of other variables. DeSanto Iennaco et al (2009) determined in a cohort of 7,566 predominately male (94%) industrial employees that job demands; externally rated by one of eleven safety and hygiene managers at each work location, prospectively predicted doctor-diagnosed depression. The relationship was maintained after the adjustment of demographic, health and occupational variables and the exclusion of employees with a

depression diagnosis claim at baseline and two years earlier, although not when work location was factored. Mark and Smith (2012) found the association between self-reported JCQ demand and HADS-Depression reduced to non-significance after the adjustment of the ERI model and coping in a cross-sectional sample of 870 predominately female (91%) nurses.

Three studies determined more complex associations. Thielen et al (2010) found that only quantitative demands and not work pace prospectively predicted antidepressant purchase for men only in a gender equal sample of 4,661 participants aged 40 to 50 in the Danish Longitudinal Study on Work, Unemployment and Health. d'Errico et al (2011) also used antidepressant prescription to measure depression and revealed prospective support for the main effect of demands for blue-collar but not white-collar males in a cohort of 2,046 mostly male (77%) trade union workers. Cohidon et al (2010) determined even more complex relationships between gender, occupational status and the operationalisation of demands in a nationally representative cross-sectional sample of 11,985 French employees. Time pressure, but not frequent interruptions during work or multi-tasking was associated with higher CES-D scores for male clerks and service personnel and women manual workers but not managers.

Cohidon et al (2010) and d'Errico et al (2011) used an unspecified survey instrument to measure demands although d'Errico et al (2011) cited the survey as being similar to the JCQ. Thielen et al (2010) used the validated Copenhagen Psychosocial Questionnaire (COPQES). Cohidon et al (2010) controlled for demographic, occupational and health factors including major life events. In the longitudinal examinations, d'Errico et al (2011) excluded participants with an antidepressant prescription at baseline and Thielen et al (2010) excluded participants reporting a history of antidepressant use, hospitalisation due to mood disorders or elevated depression rating scores at baseline.

Summary. The most frequent partial result for demands related to gender effects that when obtained was more consistently than not (75%) non-significant for females. Support for males occurred among certain subsamples, typically from lower occupational grades (Cohidon et al., 2010; d'Errico et al., 2011) and so the demands main effect may be particularly relevant for low socio-economic status groups. All other partially supportive studies were derived from largely male or largely female employees from specific occupations and so the extent of gender effects is unclear. There was also a trend for the significance of only specific dimensions of demands, however the actual feature was not consistent and all such studies employed different self-report instruments to that typically

utilised. An equal proportion of studies employed self-report and objective measures for depression although all four prospective studies used objective measures. The non-significant results following the adjustment of the ERI model and coping (Mark & Smith, 2012) was a unique finding as no other study in this review considered coping. The only other relevant study that tested the Effort-Reward Imbalance model did not find demands to be conditional on effort rather both variables were significant (Chen et al., 2011). The reduction in significance in deSanto Ienacco et al (2009) following the adjustment of work location is considered tentative support for demands as location-related effects remain the alternate explanation.

Non-significant results. Ten studies, of which nine were prospective analyses, failed to support the demand main effect hypothesis. Six studies were based on large prospective Scandinavian population cohorts. These were the Danish Cohort of mostly women (78%) public service employees ($N = 18\,495$, Bonde et al., 2009), Danish PRISME⁶ cohort of mostly women (79%, $N = 3,046$, Grynderup et al., 2012), the Belgian Belstress study on mostly men (71%) aged 35 to 39 with low education ($N = 9,396$, Godin et al., 2009), a representative sample of 2,555 dentists recruited from the Finnish Dental Association (74% women, Ahola & Hakanen, 2007), the Swedish PART population study of 4,710 employees (Longitudinal study of mental health, work and relationship; Fandiño-Losada, Forsell, & Lundberg, 2013) and the Swedish SLOSH study of 5,985 employees (Swedish Longitudinal Occupational Survey of Health; Magnusson-Hanson et al., 2009). The latter two studies had a roughly equivalent gender distribution (55% women).

The three longitudinal studies conducted outside of Scandinavia were based on occupation-specific samples. These included a gender proportionate sample of German junior doctors ($N = 415$, Weigl, Hornung, Petru, Glaser, & Angerer, 2012), USA female poultry workers ($N = 223$, Horton and Lipscomb, 2011) and Italian male police officers ($N = 292$, Garbarino et al., 2013). The follow-up period ranged from nine months (Garbarino et al., 2013) to five years (Godin et al., 2009) although most studies conducted a follow-up at three years (Horton & Lipscomb; Fandiño-Losada et al., 2013; Magnusson-Hanson et al., 2009; Weigl et al., 2012). The follow-up response rate ranged greatly from 51% (Magnusson-Hanson et al., 2009; Weigl et al., 2012) to 84% (Ahola & Hakanen, 2007) and was not

⁶ PRISME = Psychological risk factors in the work environment and biological mechanisms for the development of stress, burnout and depression.

reported in four studies (Bonde et al., 2009; Garbarino et al., 2013; Godin et al., 2009; Horton and Lipscomb, 2011). The single cross-sectional study was on a large population cohort of 1,811 German employees, aged between 45 and 66 with a slightly greater representation of males (59%, Dragano et al., 2008). The baseline response rates also varied greatly from 45% (Grynderup et al., 2012) to 99% (Garbarino et al., 2013).

Demands were measured with self-report scales in all studies. The JCQ or an adaptation was most frequently used (70%). Weigl et al (2012) used the German self-report of working conditions in hospital scale (TAA-KH). Two studies used the COPSEQ but used the average work unit scores rather than individual scores to model objective demands (Bonde et al., 2009; Grynderup et al., 2012). Depression was measured in three studies with various objective measures: the national register for redeemed antidepressant medication prescriptions (Bonde et al., 2009), a clinical interview following a screening questionnaire (Grynderup et al., 2012) and workplace records of doctor-diagnosed depression (Godin et al., 2009). Most studies ($N=7$) used rating scales: two studies utilised the CES-D (Dragano et al. 2008; Horton & Lipscomb, 2011), two used the BDI (Short-form; Ahola & Hakanen, 2007; Garbarino et al., 2013) and a single study each used the Major Depression Inventory (MDI, Fandiño-Losada et al 2011), Symptom Checklist-90: Depression subscale (Magnusson-Hanson et al., 2009) and Spielberger State-Trait Depression Scale (Weigl et al., 2012).

All studies adjusted for demographic and occupational variables. Dragano et al (2008) and Horton and Lipscomb (2011) also adjusted for health indices but not for history of depression or individual psychological risk factors. Garbarino et al (2013) controlled for emotional stability. Apart from the above studies, all other (longitudinal) studies excluded participants with baseline depression as assessed by rating scales (Ahola & Hakanen, 2007; Fandiño-Losada et al 2011; Godin, 2009; Magnusson-Hanson et al 2009; Weigl et al 2012), antidepressant prescription (Bonde et al., 2009) or clinical interview (Grynderup et al., 2012).

Summary. The evidence for non-significant results derived from both large prospective cohorts and unique occupational samples. Depression was also measured with a variety of objective and self-report indices and all studies assessed demands via self-report. Prospective studies largely excluded participants with baseline depression nonetheless there was some lack of reporting of follow-up response rates.

Summary of the evidence for the demands main effect. The evidence for the demands main effect hypothesis was mixed. On the one hand, fully supportive evidence was gathered

from 11 studies with a pooled sample size of over 15,000 participants. Of greater weight, the evidence was derived from five adjusted prospective studies on representative Western samples. The results were also demonstrated in six medium to large sized cross-sectional surveys in a range of Asian-Pacific nations. At the same time, strong evidence against the demand main effect hypothesis was demonstrated in 10 studies with a pooled sample of over 45,000 participants. More importantly, the evidence was derived from nine longitudinal studies of which six were based on large representative samples. The additional studies were predominately occupation-specific samples from largely European nations.

It was observed that most studies (six out of eight) conducted in Scandinavian nations returned unsupportive results. All Scandinavian studies also measured depression with objective measures. However, of the 13 studies that used objective measures for depression, three were unsupportive and five each partially or fully supportive and so the use of objective depression measures per se does not appear to explain support. However, regarding specific measures, four out of six studies that used clinical interview revealed full support while studies that utilised records of antidepressant prescription never showed full support (two studies were partially supportive and one unsupportive). There was no discernable pattern for studies that used workplace records of sickness absence or studies that used objective measures for both demands and depression.

Studies that used self-report scales for both demands and depression overall did not show a discernable pattern of results. Six studies were fully significant, three were partial and seven were unsupportive. However, longitudinal self-report studies tended to be non-significant ($N = 5$) than fully significant ($N = 2$) and were never partial. In contrast, cross-sectional self-report studies were more likely to be (fully or partially) significant ($N = 6$) compared to non-significant ($N = 2$). Several cross-sectional supportive studies ($N = 3$) however did not adjust for baseline depression and so the weight of the evidence for fully supportive studies is somewhat limited in this regard. There were no further clear sample characteristics, design features such as time lag, or measurement features that were associated with the tendency for support of the demands main effect hypothesis.

Where partial support was found, the main effects for demands were most consistently not significant for females. The extent of partial support however was unclear given that most partially supportive studies included predominately male or female samples or did not evaluate gender differences. Partially supportive studies tended to use demand rating scales

other than the standard use of the JCQ. Partial association may be summarised as relating to gender, the operationalisation and measurement of demands and as occurring in the context of other occupational factors or a combination of these factors. Over-adjustment by way of the simultaneous assessment of effort (Mark & Smith, 2012) or poor inter-rater reliability (DeSanto Ienacco et al., 2009) remain too as alternate explanations for partial results.

Evidence for the Control Main Effect

Twenty-nine studies assessed the hypothesis that high levels of control predict reduced depression risk. Nine studies (31%) showed full support, five partial support (17%) and 15 studies (52%) did not support the main effect of control including one unexpected result. Studies are briefly presented given their earlier description.

Full support. Full support for the main effect of control was demonstrated in four high quality prospective studies. Magnusson-Hanson et al (2009) examined a Swedish sample of 5985 employees for up to three years; Strazdins et al (2011) a sample of 1,975 middle aged Australians over four years; Inoue et al (2010) a Japanese sample of 15,256 men over five years and Weigl et al (2012) studied a gender proportionate sample of 415 German junior doctors over approximately three years. Five additional supportive studies were cross-sectional surveys conducted on diverse non-Scandinavian samples: 1811 German employees (Dragano et al., 2008); 2,343 Australians from a variety of occupations (Hall et al., 2013); 222 Australian aged care workers (Rodwell & Martin, 2013); 200 Chinese migrant workers in Korea (Lee et al., 2012) and 7,709 French employees (Murcia et al., 2013).

A version of the JCQ was most frequently employed and utilised in one longitudinal study (Strazdins et al., 2011) and all but one cross-sectional survey. Murcia et al (2013) used an unspecified self-report measure. A variety of validated self-report measures were used in the remaining five studies. Seven of nine studies also used a range of self-report scales to measure depression while Murcia et al (2013) used clinical interview and Inoue et al (2010) workplace records of sickness absence of 30 days and greater due to depression.

All longitudinal studies accounted for baseline depression. Three studies excluded participants reporting elevated depression scores at baseline (Inoue et al., 2010; Magnusson-Hanson et al. 2009; Weigl et al., 2012) and Inoue et al (2010) also excluded participants reporting a history of mental disorder. Strazdins et al (2011) adjusted for negative life events and behavioural inhibition as a proxy for prior depression. All but two Australian cross-

sectional studies (Hall et al., 2013; Rodwell & Martin, 2013) controlled for demographic and occupational variables. Two studies also adjusted for health factors (Dragano et al., 2008; Inoue et al., 2010) and Lee et al (2012) factored acculturation stress in their sample of migrant workers. Only one of the five cross-sectional surveys adjusted for depression specific risk factors (negative life events; Murcia et al., 2013).

Summary. Support for the main effect of control was substantiated in four prospective studies with good methodological quality in terms of sample representation, the use of validated measures and adequate adjustments, particularly of baseline depression. Five cross-sectional studies supported the generalisability of results across diverse nations. However, the majority of cross-sectional studies (four of five) did not adjust for mental health risk factors. The results were based predominately (78%) on self-report associations.

Partial support. Partial support for control was obtained in five studies with no two studies showing the same pattern of results. Mark and Smith (2012) found that the skill discretion component of control and not decision authority was significantly related to depression ratings in a self-report survey on 870 mostly female (91%) nurses. Cohidon et al (2010) found conflicting and more complex relations with interactions between components of control, gender and occupational category. Self-reported lack of control over work processes; an indicator of decision authority, but not opportunities to learn or repetitive work; an indicator of skill discretion, was significantly associated with CES-D scores for French women managers and male professionals and technicians only. The measures of control were single items from an unspecified questionnaire. Rau et al (2010) found that self-report but not expert-rated control determined a higher risk of depression as assessed by clinical interview in a case-control cross-sectional sample of 343 German private and public sector employees.

Two longitudinal studies showed results that were dependent on other occupational factors. Andrea et al (2009) found that self-reported control predicted self-reported depression after the adjustment of demographic and health variables but not after further adjustment for occupational variables (emotional demands, conflict with supervisor and colleagues, job insecurity and full-time work). In contrast, Garbarino et al (2013) showed that control was significant only when the effort-reward model (and adjustments) were considered in a nine-month prospective survey on over 200 specialist police officers.

Summary. In sum, there was no consistent explanation for the partial support of the control main effect. The effects may be summarised as relating to the significance of only one

component of control, the measurement of control, and conditional support based on the consideration of other occupational features. Unlike the partial results for demands and strain, no clear gender differences were found. The studies were mostly (80%) based on self-report survey associations and an equal mixture of cross-sectional and longitudinal studies. Two of the three cross-sectional studies (Rau et al., 2010; Mark & Smith, 2012) omitted control for specific mental health indices and Cohidon et al (2010) used an unspecified survey to measure control. Although these omissions do not specifically explain the associations, the quality of the cross-sectional studies was weak in this regard.

Non-significant results. Fifteen studies did not support the control main effect. Eight samples were large prospective cohorts (Bonde et al., 2009; d’Errico et al., 2011; DeSanto Ienacco et al., 2009; Fandiño- Losada et al., 2013; Godin et al., 2009; Grynderup et al., 2012; Smith & Bielecky, 2012; Thielen et al., 2010). Three additional longitudinal studies were carried out on 2784 nurses (Kivimäki et al 2010), 2555 dentists (Ahola & Hakanen, 2007) and a unique sample of 223 women of mostly African American descent (55%) who were defined as being in poverty and working in poultry processing plants (Horton and Lispcomb, 2011). Seven of the 11 prospective studies sampled from Scandinavian nations, two studies were based in the USA (Horton & Lispcomb., 2011; DeSanto Ienacco et al., 2009), one in Canada (Smith & Bielecky, 2012) and one in Italy (d’Errico et al., 2011). The follow-up period ranged from one to five years (with a mean and median of three years).

Three cross-sectional studies were based on occupation-specific samples with skewed gender. Chen et al (2011) examined mostly male (80%) micro-electric engineers; Edimansyah et al (2008) young male car assembly workers and Gray-Stanley et al (2010) mainly female (83%) care staff. One further cross-sectional survey was based on a large nationally representative sample (Melchoir et al., 2007). The cross-sectional samples were largely from Asian-Pacific nations: New Zealand (Melchior et al., 2007), Taiwan (Chen et al., 2011) and Malaysia (Edimansyah et al., 2008), plus Belgium (Gray-Stanley et al., 2010).

Eleven studies used individual self-report surveys to measure control and all but one study (Thielen et al., 2010) used the JCQ or a variant. Bonde et al (2009) and Grynderup et al (2012) used the mean work unit score of the COPQES as opposed to individual self-report scores. DeSanto Ienacco et al (2009) used expert-ratings conducted by job safety managers across 11 workplaces. Job control was modelled as the whole ‘decision latitude’ construct in

all but two studies that instead used items consistent with one subscale: skill discretion (Thielen et al., 2010) and decision authority (DeSanto Ienacco et al., 2009).

Depression was measured with rating scales in five studies and objective measures in 10 studies. Rating scales were employed in half of the cross-sectional studies (Edimansyah et al., 2008; Gray-Stanley et al., 2010). Eight of the 11 longitudinal studies employed objective indices: three used clinical interview (following screening with a depression rating scale, Chen et al., 2011; Melchoir et al., 2007; Smith & Bielecky, 2012), one examined health insurance claims for doctor-diagnosed depression (DeSanto Ienacco et al., 2009), three analysed workplace records of sickness absence due to depressive disorders (Godin et al., 2009; Kivimaki et al., 2010; Inoue et al., 2009) and three used national register records of antidepressant prescriptions (Bonde et al., 2009; d'Errico et al., 2011; Thielen et al., 2010). All studies adjusted for demographics and health, occupational and depression risk factors. All longitudinal studies, except for Horton and Lipscomb (2011) also excluded participants identified at risk of depression at baseline.

Summary. The unsupportive results were largely derived from studies with good methodological quality. Eleven studies conducted prospective analyses on large representative samples with validated measures and appropriate adjustments. Thus, non-significant results cannot be explained through poor methodology in this regard. Of note, most longitudinal studies were conducted in Scandinavian nations and cross-sectional studies, on Asian-Pacific samples. The results also predominately derived from longitudinal studies that excluded participants with baseline depression and employed a range of objective indices of depression.

Unexpected finding. One Swedish population survey determined that control was positively rather than negatively associated with depression suggesting that low control was protective rather than a risk factor for depression. Specifically, Fandiño-Losada et al (2013) found that for males, ratings of low skill discretion were associated with a lower odds of reporting elevated depression ratings at the three-year follow-up.

Summary of the evidence for the main effect of control. Support for the main effect of control was mixed. On the one hand, support was obtained in four large prospective studies. On the other hand, non-significant results were demonstrated in 11 large prospective studies. Longitudinal designs were more likely to present non-significant results compared to cross-sectional designs. This appeared related to the greater use of objective measures for

depression in longitudinal studies. Studies that used objective measures for depression tended to be non-significant ($N = 10$) than fully ($N = 1$) or partially significant ($N = 1$). There was no clear pattern of results for specific objective indices except that studies using antidepressant purchase as an index of depression were consistently non-significant. Longitudinal self-report studies were only just more likely to be supported ($N = 4$) than unsupported ($N = 3$). Overall though studies that used self-report measures for control and depression were more likely to be fully supported ($N = 7$) than non-significant ($N = 5$) or partially significant ($N = 4$). There was no further discernable difference in results based on design. Partially supportive results also did not show any specific pattern. In sum, evidence for the main effect of control using objective measures for depression appeared unsupported while the evidence via self-report presented as suggestive although not as clearly among longitudinal evaluations.

Evidence for the Support Main Effect

Twenty-two studies assessed the hypothesis that low workplace support increases the risk of depression. Full support was obtained in five studies (23%) partial in eight studies (36%) and nine studies were unresponsive (41%); including one with unexpected results.

Full support. Five studies showed full support for the main effects support hypothesis. One study was longitudinal and conducted on a demographic and occupation-specific sample of 292 Italian specialist police officers (Garbarino et al., 2013). Four studies were large cross-sectional surveys based on nationally diverse samples from Taiwan (Chen et al., 2011), France (Cohidon et al., 2010), Australia (Hall et al., 2013) and the UK (Mark & Smith, 2012). Two of these cross-sectional studies were population-based (Cohidon et al., 2010; Hall et al., 2013) and two examined occupation and demographic specific samples: Mark and Smith (2012) examined nurses and Chen et al (2011) Taiwanese micro-electric engineers.

All studies measured support and depression via self-report. Two studies combined co-worker and supervisor support into one index of support (Chen et al., 2011; Mark & Smith, 2012), one study measured co-worker and supervisor support as separate constructs (Hall et al., 2013) and one study used an unspecified questionnaire that applied a single item to evaluate the level of co-operation for successful task completion (Cohidon et al., 2010). The JCQ or a derivative was used in all other studies. Depression was assessed with validated self-report scales except that Hall et al (2013) extended the reference point of the PHQ-Depression to one month from two weeks. Chen et al (2011) also used clinical interview. Apart from Hall et al (2013) and Mark and Smith (2012) studies adjusted for demographics,

occupational factors and depression vulnerability (emotional stability, Garbarino et al., 2013; life stressors, Chen et al., 2011; major life events, Cohidon et al., 2010) and two studies adjusted also for health factors (Chen et al., 2011; Cohidon et al., 2010).

Summary. Support for the main effects support hypothesis was predominately substantiated with medium-sized cross-sectional studies. The associations were based on self-report measures for support and depression including one study that also employed clinical interview. The methodological quality of studies presented limitations of the omission of adjustments in two studies, minor modification of depression scale without corresponding validity data in one study and limited longitudinal design. It was observed that supportive studies originated from nations other than Scandinavia.

Partial support. Partial support was obtained in six prospective and two cross-sectional study for reasons related to gender or other factored variables. Three longitudinal studies of equal gender proportion showed that support was dependent on gender. Fandiño-Losada et al (2013) found that self-reported inadequate social climate, a proxy for social support, predicted higher depression scores for women only after three years. Two studies demonstrated more specific relations between gender and support subscales. Magnusson-Hanson et al (2009) reported a negative link between co-worker support (but not supervisor support) and depression for females only after two to three years. Thielen et al (2010) also found that colleague but not supervisor support was significant but for men only in subsequent antidepressant purchase in a three-and-a half year study. Edimansyah et al (2008) also demonstrated subscale effects, with JCQ ratings of supervisor but not colleague support concurrently linked to DASS21 Depression in a young Malaysian sample of 728 male car assembly workers.

Support in four studies was dependent on the included adjustments or demographics. Andrea et al (2009) showed significant results after the adjustment of demographic and health factors but not when emotional demands were factored. Stansfeld et al (2012) demonstrated prospective support after all adjustments except for poor baseline mental health in the UK Whitehall cohort. For Bonde et al (2009), support ratings significantly predicted national records of redeemed antidepressant prescriptions however only for public service employees working in municipalities and not in the counties, with no clear explanations for this difference determined. Gray-Stanley et al (2010) found that support was concurrently linked to support workers' depression ratings when the complete construct with DC model variables

was employed but not when colleague and supervisor support were separately tested and when locus of control was factored.

All longitudinal studies either adjusted for (Magnusson-Hanson et al., 2009) or excluded baseline depression. The cross-sectional studies used self-report to measure support and depression. Self-report assessments were also carried out in half of the longitudinal studies (Andrea et al., 2009; Fandiño-Losada et al., 2013; Magnusson-Hanson et al., 2009). Self-report assessments of support were also employed in all longitudinal studies except that Bonde et al (2009) utilised average work unit score. Depression was determined objectively in three longitudinal studies via clinical interview (Stansfeld et al., 2012) and redeemed or purchased antidepressant prescriptions (Bonde et al., 2009; Theilen et al., 2010).

Summary. Partial support was obtained in two cross-sectional surveys and six longitudinal studies that were all conducted on Scandinavian samples excepted for Stansfeld et al (2012). Gender effects were frequent and appeared dependent on the subscale of support, with results suggesting that social climate or co-worker support was more likely significant for females' depression scores than males. The consideration of other occupational, mental health, or demographic characteristics also tended to result in non-significance, although the actual factors were never consistent typically as each study assessed a unique combination of factors. Studies employed a combination of self-report and objective indices of depression; with two studies using antidepressant medication prescription and one, clinical interview.

Non-significant results. Nine evaluations were unsupportive. Six studies were longitudinal with follow-up periods ranging from one (Wang et al., 2012a) to up to five years (Godin et al., 2009). Four longitudinal studies were based on large nationally diverse cohorts (Godin et al., 2009; Inoue et al., 2010; Smith & Bielecky., 2012; Wang et al., 2012a). Two longitudinal studies were based on smaller occupation-specific samples (Horton & Lipscomb., 2011; Weigl et al., 2012). Two cross-sectional studies were based on large nationally representative samples (New Zealand, Melchoir et al., 2007; France, Murcia et al., 2013). Nurses were sampled in a further cross-sectional survey (Rodwell & Martin., 2013).

The JCQ or a variant was most commonly used to measure support. Three studies used other scales (Inoue et al., 2009; Rodwell & Martin, 2013; Weigl et al., 2012) and one employed a single item (Murcia et al., 2013). Support was measured as a single index in all but one study that separately evaluated the dimensions of colleague and supervisor support (Inoue et al., 2010). Only Smith and Bielecky (2012) measured the effect of the *change* in

ratings of support on change to depression ratings over two years. Self-report was used in four studies to measure depression. Most studies employed objective measures: clinical interview in four studies (Melchoir et al. 2007; Murcia et al., 2013; Smith & Bielecky, 2012 [in addition to self-reported diagnosis]; Wang et al., 2012a) and workplace records of sick leave due to depression in two studies (Godin et al. 2009; Inoue et al. 2010).

All studies adjusted for demographics except for Rodwell and Martin (2013). All longitudinal studies excluded participants at baseline with either high depression rating scores (Godin et al., 2009; Inoue et al., 2010 [and participants indicating history of a mental condition]) or clinical interview-determined depression (Smith & Bielecky et al., 2012; Weigl et al 2012; Wang et al., 2012a). Three longitudinal studies additionally adjusted for occupational factors (Godin et al., 2009; Wang et al., 2012a; Weigl et al., 2012) and three also for occupational, health and additional mental health vulnerability factors (Horton & Lipscomb et al., 2011; Inoue et al., 2010; Smith & Bielecky, 2012). Cross-sectional studies also adjusted for vulnerability to depression through negative life events and emotionality (Murcia et al., 2013) or negative life events, neuroticism and clinical interview administered in youth (Melchior et al., 2007). Although the evidence was unresponsive, most studies reported results in the expected trend.

Summary. Unresponsive results were determined in nine nationally diverse samples that typically factored prior depression risk. Most studies were longitudinal (67%) of which most employed objective measures (67%) for depression; predominately clinical interview.

Unexpected results. One survey found that high supervisor support increased depression risk among women only (Magnusson-Hanson et al., 2009). The SLOSH study was well-executed through longitudinal design, a large sample size ($N = 5,985$), roughly even gender proportion (55% females) and adjustments for demographic and depression history.

Summary of the evidence for the main effect of support. Full support of the hypothesis largely derived from cross-sectional self-report studies. Cross-sectional studies that employed self-report measures for both support and depression tended to show full support ($N = 4$) than partial ($N = 2$) or non-significant ($N = 2$) results. By contrast, longitudinal self-report evaluations were typically non-significant ($N = 4$) or partially significant ($N = 4$) and none were fully significant.

The follow-up period did not appear to differ between fully or partially supportive and unsupportive studies. Self-report studies on large cohorts typically presented partial results. Studies that showed partial results also tended to assess a more complex range of variables than fully supportive and unsupportive studies. Partial results frequently arose in the context of gender. It appeared that co-worker support or climate was more likely significant for females' experience of depression than males'. Results were also frequently dependent or conditional on other variables included. Studies that used objective measures for depression never returned full support. Studies that utilised objective measures were also more likely to utilise longitudinal design. Thus, the measurement of depression as well as longitudinal design appears associated with a lack of support.

Evidence for the Buffer Hypothesis

Although the buffer hypothesis is equivalent to the strain and iso-strain hypothesis in terms of the proposed joint effects of demand and control/and support, the buffer hypothesis emphasises the buffering effect of high control/and high support on high demand as opposed to the heightened health risk associated with the combination of high demand and low control (and low support) jobs. Statistically too, the buffer hypothesis is modelled by an interaction term as opposed to combined term formulation or 'additive' strain and iso-strain main effects.

The buffer hypothesis was examined on 11 occasions in eight studies (22 % of analyses). Two studies were fully supportive (Hall et al., 2013; Rodwell & Martin, 2013), one partially supportive (Murcia et al., 2013) and six studies (Ahola & Hakanen, 2007; Grynderup et al., 2012; Mark & Smith, 2012; Rau et al, 2010; Rodwell & Martin, 2013; Weigl et al., 2012) were non-significant on eight tests of the buffer hypothesis. The buffer hypothesis of the DC model was examined in all six studies. Three of these studies (Mark & Smith, 2012; Rodwell & Martin, 2013; Weigl et al., 2012) additionally examined the buffer hypothesis of the DCS model and were all reported non-significant.

Full support. The two fully supportive studies of the demand/control buffer hypothesis were cross-sectional self-reported surveys on Australian samples (Hall et al., 2013; Rodwell and Martin, 2013). The response rates were somewhat low: thirty-one per cent for Hall et al (2013) and 51% for Rodwell and Martin (2013). Both studies used unique variations of measures. Hall et al (2013) used the JCQ together with the PHQ which was modified to a reference point of symptom presence in the past month rather than past two weeks. The validity of the modified PHQ was not reported. Rodwell and Martin (2013) used

the CES-D together with the “Caplan scale” to measure control and the JCQ to measure demands. Neither study reported adjustments.

Partial support. Murcia et al (2013) reported a borderline significant ($p = .06$) demand/control buffer hypothesis for men only in a large gender proportionate national cross-sectional sample of the French working population ($N = 7,709$). Murcia et al (2013) used an unspecified survey instrument administered via interview together with a brief validated clinical interview. Adjustments were made for demographics, support outside of work and negative life events.

Non-significant results. Studies that assessed the buffer hypothesis of the DC model are considered first. All non-significant studies were based on large samples within the European Union and predominately employees from the health care industry: dentists (Ahola & Hakanen., 2007), nurses (Grynderup et al., 2012; Mark & Smith, 2012), social workers (Grynderup et al., 2012), junior doctors (Weigl et al., 2012) and among other health sector employees (Rau et al., 2010). The response rates were low in two studies: 22% (Mark & Smith, 2012) and 45% (Grynderup et al., 2012), reasonable in one study (62%: Weigl et al., 2012), good in one study (71%: Ahola & Hakanen, 2007) and not available in Rau et al (2010). Three of the five non-significant studies were longitudinal with a follow-up period of two (Grynderup et al., 2012) and approximately three years (Ahola & Hakanen, 2007; Weigl et al., 2012) and follow-up response rates of 77%, 84% and 51% respectively.

All studies employed self-report measures of demand and control. However, Grynderup et al (2012) used the aggregated self-report score of participants’ work unit rather than individual scores and Rau et al (2010) additionally employed job expert ratings. Grynderup et al (2012) and Rau et al (2010) both measured depression using clinical interview while Mark and Smith (2012) and Weigl et al (2012) used validated self-reported scales and Ahola & Hakanen (2007) used an abbreviated although unvalidated version of the JCQ. Mark and Smith (2012) did not report adjustments and Rau et al (2010) controlled for age and gender although these were not significant. In contrast, the three longitudinal studies (Ahola & Hakanen, 2007; Grynderup et al., 2012; Weigl et al., 2012) adjusted for demographic and occupational variables and baseline depression. The adjustments did not explain the non-significance as results were even unsupported in univariate analyses.

All three studies that assessed the buffer hypothesis of the DCS model were unsupportive (Mark & Smith, 2012; Rodwell & Martin, 2013; Weigl et al., 2012). Two of

these studies (Mark & Smith, 2012; Weigl et al., 2012) also did not support the interaction between demand and control while Rodwell and Martin (2013) did. As described above, one study was longitudinal (Weigl et al., 2012) and two cross-sectional and all employed self-report measures.

Summary. Non-significance was the most frequent outcome for the buffer hypothesis. Fully supportive studies did not factor adjustments. All studies that employed self-report prospective design, objective measures for demands and control, or clinical interview for depression were unsupportive. In addition, every study that evaluated the buffer hypothesis of the DCS model was non-significant.

Discussion

The purpose of this review was to update knowledge about the capacity of the DC/S model to predict depression risk. This discussion is organised around the research questions that concerned the nature and quality of the evidence and areas for further research.

What is the Evidence for the DC/S Model Predictions?

The studies in this review indicated that the demands main effect was the most consistently supported hypothesis. Mixed evidence was determined for the control and support main effects hypotheses: the control main effect was overall less likely to be supported while social support was more likely to be supported but conditional on other factors. The strain hypothesis was more likely to be non-significant than significant and the buffer and iso-strain hypotheses were largely not supported.

Approximately one quarter of evaluations partially supported the demand and strain hypotheses. The control main effect was more likely to yield full than partial support (17%) whereas the reverse was apparent for the support main effect with close to 40% of evaluations establishing partial support. The iso-strain hypothesis was also more likely to be partially than fully supported although partial support was overall seldom found. The buffer hypothesis was never partially supported. Overall, conditional support occurred in relation to gender and other occupational and/or health factors although no single factor emerged as a clear explanatory variable. The most identifiable trend was that effects were less likely among males than females for strain and social support.

What is the Nature and Quality of the Evidence?

The conclusions were drawn from 13 studies that assessed predictions of the DC model and 23 studies on the DC/S model. Almost half of the total investigations were cohort and gender proportionate designs. Sample sizes were large; averaging over 7000 employees and ranging from between 200 to over 15,000 participants. Occupations were represented across a variety of industries and within public and private enterprise. The samples were predominately Scandinavian and from Asian-Pacific regions although a nationally diverse range of countries were also represented. Overall, conclusions were based on a considerable number of evaluations with large samples from a variety of occupational groups and nations.

Self-report and the JCQ specifically was the most typical form of stressor assessment. By contrast, the measurement of depression was more evenly ascertained through self-report (56% of studies) and objective means. The most utilised self-report depression measure was the CES-D however a wide variety of rating scales were also employed. Clinical interview was the most commonly administered objective instrument. Other indices were workplace records of sickness absence due to doctor-diagnosed depression and national records of redeemed antidepressant prescriptions.

Longitudinal studies were more likely than cross-sectional investigations to employ objective measures for depression. Prospective analyses were conducted in over half (58%) of the studies with a wide follow-up period ranging from nine months to approximately 10 years. The majority of longitudinal studies evaluated cross-lagged associations. Five studies analysed change scores; that is the effect of change in stressors on change in depression scores and one measured cumulative exposure. This shows that the hypotheses were evaluated with a range of assessment measures and analyses. Longitudinal studies also adjusted for depression history while cross-sectional results tended to omit such adjustments. Baseline cases of depression were excluded in all partially supported longitudinal investigations. Partially supported studies were also overall well-adjusted and conducted on large representative samples. In this regard, the partially supportive results may not simply be discounted as due to poor methodology and may rather reflect true associations.

Regarding the evidence for specific hypotheses, main effects were reported in 29 studies for demands and control and 22 studies reported on the social support main effect. Eleven evaluations of the buffer hypothesis were conducted in eight studies 43 tests of the

strain hypothesis were performed and 24 tests of the iso-strain hypothesis. This shows a substantial analysis of DC/S model hypotheses, particularly strain and less so for the buffer effect. Of the stressors, demands were assessed with the greatest variety of measures. Support for the hypothesis was also typically achieved in cohort studies and across a range of national populations and occupational groups. This demonstrates that the effect was upheld across a diverse range of participants and assessment method and supports the robustness of the demands main effect hypothesis. Support for the main effect of control and social support was largely substantiated through subjective experiences of stressors and depression. The JCQ was the most commonly employed instrument to define stressors although social support had the most varied conceptualisation.

Full support of the social support main effect was largely substantiated by cross-sectional self-report surveys. The evidence however was constrained by the omission of adjustments for depression history which are important to factor in OS and depression evaluations (Theorell et al., 2015). By contrast, the evidence suggesting an absent direct effect was informed by a larger number of longitudinal studies with wider sample representation and objective assessments of depression. In this instance, studies with arguably greater methodological rigour inclined towards an unsupportive social support main effect while supportive associations were open to alternate explanations. As for strain, the non-significant results nonetheless tended to occur in the expected direction. This may suggest that the effects of strain and support are less robust compared to that for demands.

Regarding joint effects, the evidence suggesting a non-significant buffer effect was largely derived from cross-sectional self-report surveys. Unsupportive results were determined in all studies that employed prospective design, objective measures for demands and control and clinical interview for depression. Unsupportive results were also obtained with large population samples. Thus, similar to the evidence for the support main effect, well-designed studies tended to disconfirm the buffer hypothesis. The largely non-significant iso-strain hypothesis was determined by a range of study designs that included; cross-sectional and prospective evaluations and self-report and objective assessments of depression and predominately self-report assessments of iso-strain. By comparison, the strain hypothesis was exclusively supported by self-report surveys and most frequently supported with assessments of the combined index of strain. Disconfirmatory evidence was commonly determined with

objective tools for depression and the analysis of separate main effects. These results are elaborated on next.

Are there Consistent Factors that Distinguish Between Supportive and Non-Supportive Studies?

No single design feature was identified that accounted for support of the overall DCS model. Rather, a number of factors were implicated in the support of specific hypotheses.

As noted above, the strain hypothesis was more likely supported when assessed as a single combined term of demands and control than when separate main effects were tested. This difference was marked: almost two-thirds of studies supported the combined term (64%; 36% fully) while 35% (14% fully) the simultaneous test of demand and control main effects. The results were clearer for iso-strain: all evaluations supported the combined term formulation while 20% supported the additive effect. While the latter results were more definitive, their strength is tempered by only two evaluations of the combined term compared to the thirteen with strain.

It was observed too that unsupportive results were determined with mostly male and occupation-specific samples, for the combined formulation of strain only. In addition, negligible effects were revealed for the covariates of marital status and age. Unsupportive results for this prediction might therefore reflect sample characteristics or be explained by limited variation in exposure.

For the support main effect only, cross-sectional surveys were typically supportive while longitudinal surveys were more typically non-significant or partially supported. Cross-sectional studies were also largely carried out on Asian-Pacific samples and longitudinal investigations on Scandinavian cohorts. Thus support of this main effect may be a function of either or both contemporaneous associations and the Asian-Pacific occupational environment, culture, or sample type. It was noted too that self-report surveys most frequently *fully* supported the hypothesis, in cross-sectional but not prospective evaluations. Longitudinal self-report surveys were instead non-significant or partially supportive and never fully supportive. Studies that employed objective measures for depression also never returned full support. Taken together, these results suggest that the experience of social support is linked more to concurrent than future depressive symptomatology and it remains plausible that social support at work is not causally implicated in depression risk. Interestingly, large cohort

studies were most likely to report partial support for the social support hypothesis. This could suggest that the effect of workplace support on depression is more likely complex than as straightforward as the risk for other stressors such as high demands.

Regarding the control main effect, it was observed that self-report studies were more likely to yield support than studies employing objective instruments for depression. This suggests that subjective experiences of low control and depression are meaningfully linked while the role of objective instances of control are less definitive. It may also suggest little value in further self-report evaluations. It was noted though that self-report longitudinal studies were unsupported to a similar degree ($N=3$) as they were fully supported ($N=3$). This indicates that while self-report associations between control and depression are likely, the causal relation pathway for (subjective) experiences is equivocal. Interestingly, as described above self-report longitudinal tests of the support main effect were more likely to be non-significant than significant. Thus, study results do not appear to differ by whether designs are cross-sectional or longitudinal per se but whether the assessment also concerns subjective or observed expressions of depression and the particular stressor implicated.

The objective assessment of depression, and most distinctly with clinical interview, showed a greater likelihood toward support of the demands and strain hypothesis and unsupportive results for the control and social support main effects. Given that clinical interview is considered a 'gold standard' depression screen (Cicchetti, 1994; Cohen, Norris, Acquaviva, Peterson, & Kimmel, 2007; Kessler & Üstün, 2004; Mitchell, Vase, & Rao, 2009), this could suggest that the evidence for demands and strain is most robust. Significantly too, it was noted that studies that excluded baseline cases of depression were more likely to be unsupported or partially supported than fully supported for the combined term strain hypothesis. This was not the case for the demands main effect whereas for the control main effect, the exclusion of baseline cases was observed most often in unsupportive than supportive studies. Taken together with the reduced likelihood of support upon the study of strain via main effects than the combined term, these results raise whether the combined analysis of strain may actually mask different processes of risk for demand and control.

A further minor observation of the results for demand was that partially supportive studies were more likely than fully supported studies to utilise stressor instruments not typically employed in the literature. This could suggest that while the original conceptualised notion of demands (Karasek, 1979; Karasek & Theorell, 1990) may be linked to depression

the relationship may be less straightforward for other facets of demands. Interestingly, the use of uncommon instruments was not implicated in the support of other hypotheses and so this design feature may be specifically relevant to the role of psychosocial demands in depression. With regard to partial support more broadly, it was noted that studies tended to factor in the main analysis a more complex range of variables than in studies yielding full or no support. This in part explains the conditional support and raises the query of whether the DC/S model captures key processes of occupational stress-related depression risk.

Conversely, the review showed that the demands main effect was largely supported irrespective of the use of self-report or objective indices of depression. Cross-sectional or longitudinal design in isolation also did not predict the likelihood of support for the demands, control and strain hypotheses, which reduces the likelihood that cross-sectional associations are spurious (except for social support which was most likely not supported or partially supported in longitudinal analyses). The time lag of assessments did not appear to affect the significance of results. This suggests that the follow-up period of between nine months and 10 years was not a significant design issue affecting confidence in results. The results also did not appear to vary across individual or occupational demographics, supporting the applicability of the DC/S model across the studied working age of employment.

How do the Results Compare to the Accumulated Research?

The results for the additive strain and iso-strain hypotheses contrasted Häusser and colleagues' (2010) largely ascribed support for the outcome of *psychological wellbeing*. The results here were also more likely to be partially than fully supported. The extent of this difference is highlighted by Häusser and colleagues' (2010) report that 60% of studies supported strain and 50% the iso-strain hypothesis (versus 30% and 20% respectively). The findings here were more consistent with de Lange and colleagues' (2003) review of the DC/S model and general ill-health where modest support for strain was determined from 43% of high quality longitudinal studies and 19% reported simultaneous support of the DCS model main effects. All reviews converged on the finding though that strain was more likely to be supported than iso-strain. This suggests that conditions of strain rather than iso-strain may be a more relevant risk factor for general ill-health.

The comparison to depression-specific reviews was not straightforward. The mixed support regarded here for the strain hypothesis contrasted Bonde's (2008) conclusion that associations were strongest and most consistent among men compared to women. While

gender differences were noted in this review they were not as a clear delineator of support. Netterstrøm et al (2008) did not report on the strain hypothesis and neither reviews provided comparative data for the iso-strain hypothesis as considered by additive main effects or a single combined term. Except for the report on a single (also unsupportive) study on the DCS model hypothesis (Netterstrom et al., 2008), joint effects as modelled by the buffer hypothesis have not previously been summarised for depression. The largely unsupported buffer hypothesis was consistent with other summaries on self-report physical (Van der Doef & Maes, 1998) and general mental health risk (Häusser et al., 2010; van der Doef & Maes, 1999). The data presented in this review more confidently extends this conclusion to the specific risk of depression. Taken together, the accumulated data suggests that: the (self-reported) health risk imposed by high occupational demands is not mitigated by occupational conditions of high control or support and the incremental health risk associated with conditions of high demands and low control remains equivocal and unlikely for iso-strain.

The finding here of a relatively robust demands main effect and mixed support for the control and support main effects was deemed consistent with the conclusion of Netterstrøm et al (2008). The results were somewhat at odds with Bonde's (2008) regard of approximately equivalent risk for high demands, low control and low support. It is thus considered likely that high workplace demands directly elevate depression risk while the direct effect of workplace control and support is equivocal.

Since writing this review, conclusions regarding the DC/S model and depression have been updated. Theorell et al (2015) determined as part of a narrative and meta-analytic review on occupational stressors and depression risk, that evidence was moderately strong for job strain and decision latitude and limited for demands, support and skill discretion. The conclusions in the current review were in line with the limited evidence reported for the social support main effect and contrasted the conclusions for other predictions, except for skill discretion which was not uniquely reported on in this review.

Several differences between the current review and Theorell et al (2015) are noted that may account for the discrepancies. The differences are summarised in Table 3. First, Theorell et al (2015) determined support from the least adjusted models whereas results here were classed as yielding full or partial support and non-significance and were thus narrative rather than meta-analytic. Conclusions are to be considered with this difference in mind. Second, the studies included in this review were similarly published up to 2013 although the

review period by Theorell et al (2015) commenced earlier in 1990. Theorell et al also limited the analysis to Western populations while the current review did not impose this restriction. Thirdly, Theorell et al (2015) excluded studies that used objective indices for depression other than clinical interview whereas the current review was less stringent and included other objective indicators. Accordingly, the conclusions may differ based on the definition of support, adjustments, culture, recency of investigation, and assessment of depression.

Table 3

Study differences between the current review on the DC/S model and depression and the Theorell et al (2015) meta-analysis on the work environment and depressive symptoms

Study Feature	Current Review	Theorell et al (2015)
Type of Review	Narrative, absence of strict inclusion criteria	Meta-analysis
Method for determining support	Studies were classed as either yielding full, partial or no support	Least Adjusted Model
Review Period	2007-2013	1990-2013
Study Population	No restriction imposed	Limited to Western Samples
Type of IV's Excluded	Studies examining only one variable of the DC/S model	Restriction not applied
Type of DV's Excluded	Studies that combined psychiatric diagnosis into a single index	Studies with objective indices for depression other than clinical interview
Evidence for strain	Mixed: combined term formulation was supportive, main effects models less likely to be supported.	Moderately strong (90% of the evidence derived from studies employing the combined term formulation)
Evidence for demands	Most consistently supported hypothesis	Limited
Evidence for decision latitude	Mixed: self-report surveys were largely supportive while the evidence was weak or limited when objective indicators of depression were employed, including clinical interview	Moderately strong (based only on self-report surveys and measures of clinical-interview depression)
Evidence for support	Limited	Limited
Evidence for skill discretion	N/A	Limited

IV = Independent variable. DV= dependent variable. N/A: The specific evidence for skill discretion was not collated for this review.

On closer inspection, the earlier studies included by Theorell et al (2015) were largely described as part of the narrative on early reviews. Regarding the current review period, studies were for the most part factored. Studies not located assessed outcomes of postpartum depression (Dagher, McGovern, Dowd, & Lundberg, 2011), disability pension attributed to depression (Mäntyniemi et al., 2012) and outpatients' initial psychiatric diagnosis (Wieclaw et al., 2008). Theorell et al (2015) similarly included reports on the Canadian National Population Health Survey (Ibrahim et al., 2009) and Whitehall II cohort (Virtanen, Stansfeld, Fuhrer, Ferrie, & Kivimäki, 2012) although the current review reported on a different cycle of the cohort. The current review also excluded a number of studies given their analysis on only one dimension of the DCS model (Kouvonen et al., 2008; Sinnoki et al., 2009; Stoetzer et al., 2009), included cross-sectional studies and significantly, supportive studies that may have likely met the moderate to high inclusion criteria for methodological quality (Strazdins et al., 2011; Rau et al., 2010). The selection of studies thus remains an explanation for the different results. Nonetheless, the inclusion of largely similar studies suggests that conclusions in this review were in part based on sufficiently sound methodology.

The conclusions for specific hypotheses might also be explained by design effects. The demands main effect may have attracted greater support here due to the wider inclusion of objective assessments of depression, demands, or both. Also, although the evidence for the decision latitude main effect was considered mixed, the largely supportive self-report associations were consistent with the moderate support deemed by Theorell et al (2015) in their analysis of mostly self-report associations. This review highlighted a weak or limited association when objective indicators of depression were employed, including clinical interview. This was at odds with Theorell and colleagues' (2015) homogeneity tests which showed that DC/S model results were overall comparable between interview and self-report questionnaires.

Although this review was simply narrative, clear disconfirmatory evidence for the control main effect was evident in studies that utilised objective indices for depression (including clinical interview), prospective design and representative samples. Homogeneity tests specifically for the control main effect prediction may shed light on this discrepancy. Interestingly, inspection of the studies overlapping with Theorell et al (2015) revealed mostly unsupportive results (Ahola et al., 2009; de Santo Iennaco et al., 2010; Fandiño-Losada et al., 2013). Only Magnusson- Hanson et al (2009) was regarded as significant although this study assessed decision authority and not the complete construct of decision latitude. The moderate

support determined might therefore be more representative of studies not considered in the current review including those conducted earlier.

The evidence was also at odds for the strain hypothesis which was determined here to be mixed and by Theorell et al (2015) moderate. For this hypothesis, only one study (Ahola & Hakanen, 2007) was common to both reviews and so the selection of studies may have accounted for the difference. On closer inspection, all but one of the 10 studies factored by Theorell et al (2015) assessed strain as a single combined term. Thus, the conclusion reached for the largely supported *combined term* formulation of strain is in fact consistent with Theorell et al (2015). This review notes though a low likelihood of simultaneous support of the main effects, rendering the strain hypothesis equivocal. While not specifically evaluated in this review, this point might aid the comprehension of the limited evidence cited for skill discretion (Theorell et al., 2015).

What Progress has been made in Clarifying the Capacity of the DC/S Model to Explain Depression Risk?

This was the first known review to describe the evidence for the range of DC/S model hypotheses and depression and to delineate whether results yielded full, partial or unsupportive results. This is a comparable report to Häusser et al (2010) and Van der Doef and Maes (1999) although this review reported exclusively on depression and of course on more recent studies. Consistent with Häusser et al (2010) this review noted a predominant interest in the extended DCS model. This review raised that the prediction of depression was frequently, or more correctly in about one quarter of studies and most frequently with the social support main effect, conditional on other factors. Factors implicated in discrepant or conditional support of the DC/S model were identified as: gender, other health or occupational variables, only specific dimensions of the studied stressor, the formulation of joint effects and the use of self-report or objective measures. Results were also noted to vary by hypothesis and the specific factors implicated.

Gender was a frequent conditional factor which was in line with mental health reviews (Häusser et al., 2010; van der Doef & Maes, 1999) and suggests a common mechanism for (mental) health risk. Previous depression-specific reviews have also implicated gender, such that the effects of job strain (Bonde, 2008; van der Doef & Maes, 1999) or demands (Stansfeld & Candy, 2006) were less likely for females compared to males.

This review added further evidence to these claims although revealed that gender often interacted with other factors to explain conditional support, suggesting more complex relations than originally speculated. For men, the data suggested that high demands and depression risk may be particularly relevant to those with low socio-economic status. The DC/S model was shown to be relevant across a wider than previously reported on cultural context (Bonde, 2008; Netterstrøm et al., 2008; Theorell et al., 2015) although it was observed that non-Scandinavian studies tended to be cross-sectional and supportive. As there was a comparative lack of longitudinal data, rather than reflecting differences across nationalities, this may simply reflect the research available in predominately non-US and - Western European nations.

Overall, this review revealed an increased rate of longitudinal investigations (58% vs 23 %; Häusser et al., 2010), attesting to the response made to calls for more sound design, albeit these evaluations were largely carried out in Western nations. The finding here that longitudinal investigations yielded *full* support of strain and the main effects suggest a more robust relationship than reported in earlier reviews where longitudinal investigation on the DC/S model had never previously revealed *full* support for depression (Häusser et al., 2010; van der Doef & Maes, 1999). In line with depression-specific reviews, self-report and objective measures of depression were employed approximately evenly. The findings in this review however refined the conclusion that depression risk was not dependent on outcome criteria (Bonde, 2008; Theorell et al., 2015). The description of studies here revealed that this conclusion was applicable to the demands main effect only.

More broadly, the evidence for the demands main effect is considered strengthened by this review. Compared to the previous depression specific (Bonde, 2008; Netterstrøm, 2008) and general mental health reviews (Häusser et al., 2010; Stansfeld & Candy, Van der Doef & Maes, 1999) the studies covered during the review period confirmed the hypothesis across a wider range of design conditions; through subjective and objective measures of demands and depression, cross-sectional and longitudinal design, and across a variety of representative samples from Western nations (Australia, Britain and Finland). Support was also obtained in diverse demographic and occupational samples, highlighting the relevance of the hypothesis across nations and occupational groups.

As for demands, the diverse assessment of the control main effect in depression risk and the way that results were summarised offered insight into its conflicting evidence.

Evidence for previously documented self-report relations (Bonde, 2008; Netterstrom et al., 2008; Theorell et al., 2015) were strengthened through a large number of surveys with adequate sampling and longitudinal design. At the same time however, a sizeable portion of self-report studies with similar design qualities were identified as unsupportive, relegating the self-report risk of low control in depression risk to equivocal. Unsupportive studies were also noted to have excluded participants with baseline indicators of depression and employed longitudinal design and objective assessments of depression. The lack of support on these more stringent design criteria may suggest that the relationship is not causal as purported or that the relationship may be more complex than captured by the prediction. The description of results in this way contributed new considerations in conclusions about depression risk.

The conclusions in this review for the social support main effect were predominately supported by large nationally diverse cross-sectional studies, adding to the generalisability of previously documented associations (Bonde, 2008; Häusser et al., 2010; Netterstrøm et al., 2008; Theorell et al., 2015). However, the trend revealed here for a lack of support in longitudinal studies that also utilised objective measures could suggest that previously documented self-report associations may be biased or that the introduction of objective measures such as antidepressant prescription or workplace records of sickness absence due to depression may have introduced bias.

This review made notable contributions to the appraisal of the strain hypothesis in depression risk. On the one hand, additional supportive evidence was put forward. It was considered though that the more recent supportive data was limited in several ways. As noted earlier, full support was largely based on cross-sectional investigations and studies that employed non-standard calculations of strain, limiting claims about causation and accurate assessment respectively. Furthermore, the clear finding of a reduced likelihood of support when evaluated with main effects than a single joint term as well as the mixed support for the control main effect challenges confidence in the conclusions reached thus far about the risks associated with strain. The reduced likelihood of full support upon the exclusion of baseline cases is also a limitation of the supportive data. This raises several possibilities; that the relationship is biased by depression history, that high strain may not be as robust in predicting new cases of depression compared to recurrent episodes or that the exclusion of participants with baseline history may be a too conservative assessment. These points present additional considerations to factor to support conclusiveness about strain and depression.

Evidence was also presented to support the same considerations for the iso-strain hypothesis. In fact, the review contributed clear evidence that the great majority of research did not predict depression risk. This was an important observation as the previously discussed depression specific reviews did not explicitly summarise risk according to the combined formulation of or simultaneous support of demands, control and support. Taken alongside the results reported in general mental health reviews (Häusser et al., 2010; van der Doef & Maes, 1999), it may be the case that depression as a distinct clinical syndrome is not a product of the incremental effect of these occupational stressors. Support for iso-strain was noted in unique samples and an Australian representative survey (Hall et al., 2013) and so the effects may be relevant in some instances. The buffer hypothesis was not of large interest. The unsupportive results add though to the largely refuted evidence for general health outcomes (Häusser et al., 2010; Van der Doef & Maes, 1999). Conclusions on the buffer effect continue to derive from self-report associations only.

Of interest, this review added Australian studies to the evaluation of evidence. The findings were consistent with international literature with regard to support for strain (Bonde, 2008; Netterstrom et al., 2008; Theorell et al., 2015). In contrast, the support of the iso-strain and buffer hypotheses (Hall et al., 2013; Mark & Smith, 2012) contrasted the largely non-significant associations previously noted (Häusser et al., 2010; Van der Doef & Maes, 1999). The evidence was determined in predominately representative samples (Hall et al., 2013; LaMontagne et al., 2008; Strazdins et al., 2011) although Strazdins et al (2011) was limited to a narrow demographic. This was a significant contribution to the generalisability of evidence, particularly of the strain hypothesis, as depression specific reviews did not include a single Australian study (Bonde, 2008; Netterstrom et al., 2008; Theorell et al., 2015).

The Australian evidence was associated with a number of limitations which are elaborated on given their relevance to the empirical analyses in this thesis. The evidence revealed severely limited prospective enquiries (only one study; Strazdins et al., 2011) and limited investigation on iso-strain (Hall et al., 2013; Mark & Smith, 2012). The lack of consideration of covariates of socio-demographics or depression history in all but one study (Strazdins et al., 2011) also leaves the largely self-report associations open to alternate explanations. Also, in one of the more representative studies (LaMontagne et al., 2008), the measure of depression was extrapolated from a national population survey 10 years earlier, that employed a version of the CIDI that has since undergone major revisions (Slade et al., 2009). The assessment of depression by another representative study (Hall et al., 2013) was

also modified. This illustrates that the best available evidence attracts criticisms relating to causality and validity. Also, Hall and colleagues' (2013) support for the iso-strain and buffer hypothesis were determined through univariate analysis and LaMontagne and colleagues' (2008) measure of population-attributable-risk was in part derived from international epidemiological data. This highlights that data from within the Australian workforce has increased since previous reviews yet the accumulation of robust evaluations among Australian employees remain.

What does the Evidence Suggest for Further Research?

Given some discrepancy in the conclusions for the DC/S model predictions across reviews, continued research is indicated together with reviews that seek to clarify the differences reported in the literature. The variety of ways that the DC/S model had been tested in more recent studies on depression raise a number of additional considerations to support conclusiveness. Despite the largely non-significant results for iso-strain, the theoretical and intuitive appeal of the hypothesis calls for its greater reporting in depression risk. Also, if conclusions about iso-strain are to be considered in comparison to strain, it would be appropriate to model the terms similarly, particularly as the single term formulation was mostly used in evaluations of strain and not iso-strain.

Resolve about the key component of occupational stress as defined by the DC/S model may be further supported through the simultaneous assessment of main effects and the single combined terms of strain and iso-strain. Assessments that use more accepted ways to model the combined term of strain in particular are also recommended to strengthen conclusions, particularly as fully supportive studies largely utilised non-traditional methods to model strain. The reporting and summarising of results that distinguish between joint effects and main effects would aid in clarifying the key occupational factors involved in depression risk. In particular, the data raises the clarity outstanding about whether the highest risk to depression is truly a result of the combined effects of high demands or low control or perhaps the more robust finding of the single demands main effect. This is a significant process to clarify as the central claim of the DC/S model pertains to the joint effects of stressors.

The steady increase in studies that utilise objective measures for depression and occupational stressors calls for clarity about the relative effects of subjective and objective experiences, specifically too as they vary by stressor. The mixed evidence for control and

support suggests further analysis of the main effects, including their subcomponent factors. Given the varying conceptualisations of social support in particular, more accurate claims about social support and by extension iso-strain could be supported by clearly articulated and consistent evaluations. Also, while self-report associations tended to support the control and support main effects, the unclear support for longitudinal self-report associations for control in particular, could shed further information about the significance of these associations.

The occurrence of partial support in approximately one quarter of studies including well designed cohort studies, suggests that future evaluations seek to understand factors that frequently impinge on proposed relationships. Theoretical guidance for predicting conditional support would be most informative. The notable occurrence of partial support also calls for a better understanding of the types of adjustments required to make an appropriate calculation of risk as well as to avoid Type II error. The reporting of the significance of adjustments would further assist in the understanding of partial results and moreover the key adjustments required to make sufficiently accurate claims about risk. Finally, the generalisability of results to specific nations such as Australia may be achieved through a wider assessment of the range of hypotheses, longitudinal enquiries, use of validated measures for depression and the inclusion of and report on adjustments.

Limitations

Several limitations of the narrative review are acknowledged. It was noted that conclusions were largely drawn from funded studies and so there may have been a bias in reporting supportive results. The funding of large scale studies, which are needed in this area however, is considered inevitable. The acknowledgment of this potential for bias was therefore considered important. A notable finding for the combined term strain hypothesis was that unsupportive evidence was drawn from a collectively larger sample base (approximately four-fold). Thus the support identified for the combined term strain hypothesis is tempered by the lack of support in collectively larger samples. As this review was descriptive and limited by further statistical analyses, meta-analyses may wish to weight by sample size the results for this novel distinction in the evaluation of strain.

Conclusion

This narrative of research on the DC/S model and depression risk contributed a comprehensive description of the available evidence that has not previously been put forward. This review revealed that of the model predictions the demands main effect was the most robust. The mixed evidence for control was clarified as resulting from the rather consistent support for self-report assessments and largely non-significant results from objective assessments of depression. Interestingly, for the social support main effect partial support appeared the most likely outcome. This review also revealed that conditional support for the hypotheses occurred in a sizeable proportion of studies and varied according to the hypothesis under investigation. It was clarified that gender was often associated with conditional support. Other reasons for conditional support were categorised into dependence on other health and occupational factors, support for only sub-dimensions of the stressor, the formulation of joint effects and type of instruments employed. The buffer hypothesis was largely not supported while the iso-strain and strain hypotheses were likely to be supported when considered as a combined term but not when separate main effects were assessed.

Areas for further research were identified as: clarifying whether the joint effects of strain or iso-strain outperform the prediction of demand, clarification of the literature's stance on the control main effect, cataloguing of the evidence for specific hypotheses, partial evidence and the performance of specific adjustments. Theoretical guidance about (the discrepancies in) the results could further assist in consolidating the comprehension of the evidence. The paucity of Australian research in the current and previous reviews was considered a major oversight to establishing the generalisability of the DC/S model to other industrialised nations. Taken together, the subsequent chapter seeks to contribute data on the various DC/S model hypotheses and depression risk among a sample of Australian Public Service employees.

Chapter 4 (Study 1). A Test of the Demand-Control-Support Model and Depression risk among Australian Public Service Employees

Study Purpose

The purpose of the current study is to evaluate the capacity of the Demand-Control-Support model to predict depression risk in an Australian sample. The hypotheses are guided by a combination of the DC/S model predictions and well as the appraisal of evidence gathered on the hypotheses to date. As summarised in Chapter 3, the demands main effect was expected to show the strongest support and evidence for the buffer hypothesis was considered unlikely. The control and support main effects were also expected to be significant in the cross-sectional self-report analysis. The strain and iso-strain hypotheses were expected to show conditional support when formulated as a quadrant and not a main effects model, as determined by the analysis of the evidence in Chapter 3. Taken together, the study seeks to test this set of expectations for the DC/S model and contribute evidence about the model in the Australian context.

Following the recommendations in the preceding chapter, the performance of adjustments was also described. This documentation was considered important for comparing results across studies and building clear conclusions about depression risk. The preceding chapter also revealed that gender was a factor implicated in the conditional support of all DC/S model hypotheses. The relevance of gender, particularly in the Australian context, was also unclear given the variety of ways that demographics were reported or managed. Accordingly, predictions about gender were not formulated but data on this variable were instead reported. The presentation of results by gender also followed the recommendation in the previous chapter about reporting about confounds to assist with the understanding of partial results and key adjustments required in the assessment of the DC/S model and depression risk.

Research on Australian Public Service Employees

In the context of limited Australian research, it is not surprising that only few studies have evaluated the DC/S model and mental health risk among Australian government employees. Targeted research of depression risk within the Australian Public Service (APS) is pressing for a number of reasons.

First, the Australian Public Service (APS) is one of Australia's largest employers and is representative of a large variety of occupations (Commonwealth of Australia, 2014). Knowledge about this occupational group may therefore have far-reaching relevance. Second, while it is expected that the DC/S model would be relevant to employees of the APS following; supportive data from the *Whitehall II* Cohort of British public servants (Stansfeld et al., 2008; 2012), evidence from the APS for general mental distress (Macklin, Smith, & Dollard, 2006) and depression among a sub-sample of government employees (Parslow et al., 2004; Strazdins, D'Souza, Lim, Broom, & Rodgers, 2004), information about OS and depression within the APS is overall lacking as described in the previous chapter. To inform the management of OS in Australia, it makes sense to derive estimates of risk from Australian employees. Third, compared to the private sector, compensation claims for psychological injuries or 'mental stress' are higher (SWA, 2013; SWA, 2016), suggesting that the APS cannot continue to afford ignoring the issue of OS among its employees. Fourth, the APS is the primary body concerned with policy development and regulation (Gallop, 2007) and taken together with the expanding investment in the mental health of APS employees (APSC, 2014), research directly within this population may increase the uptake of evidence-based recommendations within Australia.

Research Questions

This study examined the relationship between self-reported occupational stressors and depression by testing the demand-control-support model in a sample of Australian public service employees. This study is organised around the following hypotheses:

1. High psychological demands will be associated high depression ratings
2. Decision latitude and its subcomponents of skill discretion and decision authority will be negatively associated with depression scores
3. Social support and its subcomponents of co-worker and supervisor support will also be negatively linked to depression ratings
4. Depression scores are expected to be elevated when employees rate occupational conditions of both high demand and low control (strain), only when assessed as a quadrant and not by a main effects model.
5. Depression ratings are expected to be highest when employees report simultaneous occupational conditions of high demands, low control, and low support (iso-strain), only when assessed as a quadrant and not via main effects.

6. Despite model predictions and evidence from Australian studies, the interaction between demands and control (and support) is not expected to be significant, in line with the bulk of accumulated research.

Method

Participants

Participants were 497 employees recruited from three Australian Public Service (APS) departments and agencies based in Canberra, Australia. Usable data was submitted by 95.2 % ($N= 473$) of the sample.

Procedure

An APS Workplace Relations Network member was emailed a request to circulate to members of the APS Workplace Relations Network; a professional networking forum for APS Human Resources staff, an advertisement of the research. As a result, one large department (> 1000 employees), one medium-sized agency (251-1000 employees) and one small-sized agency (≤ 250 employees) agreed to participate. Participation involved the advertisement of the *Work and Wellbeing* online survey to employees (Appendix A) in return for a feedback report (Appendix B). The response rate to the survey was calculated as 11%, based on the published number of employees in each department (Australian Public Service Commission, 2009).

Two workplaces advertised the *Work and Wellbeing* study to employees via an email addressed from the Human Resources Manager and one workplace displayed the advertisement on the local intranet. After three weeks, workplaces issued a reminder notice using the same advertising medium. The advertisement informed about the study purpose and confidentiality and included a hyperlink to the full study details and online survey.

The hyperlink directed participants to the information page (Appendix C). Participants were informed that the study aimed to advance knowledge about the relationship between work and wellbeing. Confidentiality was explained as follows: identifying information such as employees' name or workplace was not required; responses would directly transfer into the researcher's password protected data file; workplaces would not be

directly informed of employees' decision to participate, and there was no intent to trace responses to specific computers. To participate, employees were required to select "Begin" and were informed that their submission of the survey was taken as their consent to participate. Participants were notified that they could withdraw from the study at any time should it lead to distress. This study was approved by the ANU Human Research and Ethics Committee (Protocol 2008/308).

Pilot testing

A convenience sample of four APS employees (two females, mean age = 28.5 years, $SD = 2.6$ years) tested the survey for comprehension and presentation. Further to minor style editing, ratings were emphasised to be in relation to employees' current job as it applied at that point in time and the supervisor was clarified as being the current direct supervisor. The revised survey took on average twenty minutes⁷ to complete by a novel sample of four APS employees (two females, mean age = 27.3 years, $SD = 3.3$ years).

Measures

The *Job Content Questionnaire* (JCQ; Karasek et al., 1985) was used to measure occupational demands, control and support. All items were measured on a four-point Likert scale with anchors of *strongly disagree* (1) and *strongly agree* (4). Items were added according to the JCQ scale construction formulae. The JCQ presents acceptable reliability and factor validity although the reliability of the psychological demands scale is known to be lower than other JCQ dimensions. The scales also possess good cross-cultural and predictive validity for illness (Karasek et al., 1998; Karasek & Theorell, 1990).

Psychological job demands. The five-item psychological job demands subscale, herein referred to as *demands*, measured employees' ratings of mental workload and pressure. Items included "I have to work very fast" and two reverse scored items including "I am free from conflicting demands others make". Cronbach's alpha ($\alpha = .84$) was significantly higher ($p < .05$) than expected based on; Karasek and colleagues' findings across a number of European workforces ($\alpha = .63$, Karasek et al., 1998; $\alpha = .68$, Karasek et al., 2007), results from the Whitehall II sample of British public servants ($\alpha = .67$, Stansfeld, Head, Fuhrer, Wardle & Cattell, 2003) and data from an Australian population survey ($\alpha = .67$, McTernan et

⁷ The survey also included self-report scales that measured other types of occupational demands and control although these were excluded from the analysis.

al., 2013) and community sample that included public service employees ($\alpha = .69$; Strazdins et al., 2004). Wright's (2008) study on Australian disability workers revealed similarly good rather than acceptable internal consistency ($\alpha = .73$) as did another Australian population survey ($\alpha = .74$, Hall et al., 2013) although a different version of the JCQ (2.0) was used.

Job control. Job control was measured with the nine-item *decision latitude* scale ($\alpha = .85$). The internal consistency was higher than that in an Australian population survey ($\alpha = .78$, McTernan et al., 2013), marginally higher than that obtained in a European workforce sample ($\alpha = .81$, Karasek et al. 1998) and on par with that in an Australian state public service sample ($\alpha = .85$, Noblet & Rodwell, 2009), an Australian community sample that included public service employees ($\alpha = 0.86$, Broom et al., 2006) and the Whitehall II sample ($\alpha = .84$; Stansfeld et al., 2003). Decision latitude consisted of two subscales: *skill discretion* and *decision authority*.

Skill discretion measured employees' ratings of their opportunity for skill use and development and consisted of six items, such as "My job requires that I learn new things" and one reversed item, "My job involves a lot of repetitive work". Cronbach's alpha ($\alpha = .80$) was similar to Karasek and colleagues' more recent report of the JCQ psychometric properties ($\alpha = .74$, Karasek et al., 1998; $\alpha = .79$; Karasek et al., 2007). *Decision authority* measured employees' perceived level of input into decisions about work tasks and pace. The subscale consisted of three items including one that was reverse scored; "I have very little freedom to decide how I do my work". Cronbach's alpha ($\alpha = .74$) was again similar to that obtained in Karasek and colleagues' more recent study ($\alpha = .68$, Karasek et al., 1998; $\alpha = .75$, Karasek et al., 2007).

Social support. Social support was an eight-item composite measure of co-worker and supervisor support. Cronbach's alpha ($\alpha = .91$) was slightly higher to that in an Australian call centre sample ($\alpha = .88$, Lewig & Dollard, 2003) and significantly higher compared to that obtained in the majority of reported studies, including among; a sample of Australian disability workers ($\alpha = .80$, Wright, 2008), British public servants ($\alpha = .79$, Stansfeld et al., 2003), a British birth cohort ($\alpha = .81$, Stansfeld, Clark, Caldwell, Rodgers & Power, 2008), Canadian population sample ($\alpha = .85$, Wang et al., 2012a) and Belgium employees from a variety of large organisations ($\alpha = .84$, Pelfrene et al., 2001).

Co-worker support. Co-worker support measured employees' ratings of the extent of practical and emotional support received from colleagues and consisted of four items such as 'People I work with are friendly'. Cronbach's alpha ($\alpha = .88$) was higher compared to studies on other national samples ($\alpha = .76$, European and American employees, Karasek et al., 1988; $\alpha = .82$, Belgian employees, Pelfrene et al., 2001). Cronbach's alpha however was on par with that obtained in an Australian population survey ($\alpha = .87$; Hall et al., 2013) although a three-item measure of co-worker support from the more recent JCQ Version 2.0 was employed, rendering the scale somewhat incomparable.

Supervisor support. The four-item subscale measured employees' ratings of the level of emotional and practical support received from the direct supervisor as well as the supervisor's capacity to support team functioning, represented by the item "My supervisor is successful in getting people to work together". The internal consistency of the scale ($\alpha = .93$) was higher than expected ($\alpha = .84$, Hall et al., 2013; $\alpha = .84$, Karasek et al., 1998; $\alpha = .88$, Veldhoven, Jonge, Broersen, Kompier, & Meijman, 2002) but consistent with the overall trend for this subscale to present the highest internal consistency of the JCQ subscales employed here (Karasek et al., 1998; Pelfrene et al., 2001; Veldhoven et al., 2002).

Depression. Depression risk was determined with the seven-item depression subscale of the Depression Anxiety and Stress Scale-Short form (DASS21, Lovibond & Lovibond, 1995a). The measure assessed the extent to which respondents experienced over the previous week the proposed core affective and cognitive symptoms of depression: depressed mood, poor self-esteem and a bleak future outlook. An example item was "I felt that life was meaningless". All items were responded to on a 4-point Likert scale ranging from 0 (*did not apply to me, or never*) to 3 (*applied to me very much, or most of the time*). The scale was treated as a continuous variable in line with the theoretical underpinning of the instrument which postulates and empirically demonstrates that normal and clinical levels of depression vary by magnitude rather than by a discrete category (Lovibond & Lovibond, 1995a). The dimensional approach to researching mental health conditions has been validated more broadly too (Andrews et al., 2007; Goldberg, 2000).

The DASS21 Depression was selected over the full-length version in the interest of a shorter administration time. Importantly, the DASS21 has a cleaner factor structure compared to the full version of the DASS (Antony, Bieling, Cox, Enns, & Swinson 1998; Clara, Cox, & Enns, 2001) and otherwise presents comparable psychometrics to the full 42-item version

(Antony et al., 1998; Henry & Crawford, 2005). The DASS Depression demonstrates good convergence with the Beck Depression Inventory (BDI; $r = 0.79$ in a clinical sample, Antony et al., 1998; $r = 0.74$ in a community sample, Lovibond & Lovibond, 1995b) and the Hospital Anxiety and Depression Scale -Depression subscale ($r = 0.66$; Crawford & Henry, 2003; Henry & Crawford, 2005). A higher convergence is not expected given that DASS Depression is concerned with distinguishing symptoms that are specific to depression while instruments such as the HADS and BDI include items such as poor concentration that overlap with other clinical states such as anxiety (Lovibond & Lovibond, 1995b). DASS Depression also presents reasonable divergence from the Beck Anxiety Inventory ($r = .54$, Lovibond & Lovibond, 1995b), with greater divergence again not expected given that affective states are considered to share etiological factors (Lovibond & Lovibond, 1995b). The DASS21 was considered an appropriate instrument given its validation in clinical and community samples (Henry & Crawford, 2005; Lovibond & Lovibond, 1995a; 1995b) including in occupational health care (Nieuwenhuijsen, Verbeek, Siemerink, & Tummers-Nijssen, 2003).

Cronbach's alpha ($\alpha = .94$) for the DASS21 Depression was somewhat higher than that obtained in representative community samples in Australia ($\alpha = .90$ [0.89, 0.91]; Crawford, Cayley, Lovibond, Wilson & Hartley, 2011), the United Kingdom ($\alpha = .88$, Henry & Crawford, 2005) and the United States ($\alpha = .91$, Sinclair et al., 2012). Despite the high item inter-correlation, the subscale was retained in its entirety given the absence of a definitive criteria for item redundancy ($\alpha = > .90$, Streiner, 2003; $\alpha = > .95$ Nunnally & Bernstein, 1994) and no consensus for the use of single or selected DASS21 items.

Controls. Negative affect, gender, age and education were treated as covariates.

Negative Affect. Negative affect (NA), a general disposition to experience negative emotionality and self-concept (Watson & Clark, 1984), was assessed with the 10-item trait version of the Positive and Negative Affect Schedule-Negative Affect subscale (PANAS-NA, Watson, Clark, & Tellegen, 1988). Respondents were required to indicate the extent to which items such as "distressed" were typically experienced, on a five-point Likert scale ranging from 1 (very slightly or not at all) to 5 (extremely). Cronbach's alpha ($\alpha = .91$) was somewhat higher than originally obtained by Watson et al (1988; $\alpha = .87$), a sample of APS employees ($\alpha = .85$, Mak & Mueller, 2001) and UK norms ($\alpha = .85$, Crawford & Henry, 2004).

NA is known to inflate relations between self-reported ratings of occupational stressors and mental health (Brief et al., 1988; Rydstedt, Johnsen, Lundh, & Devereux, 2013; Schaubroeck, Ganster & Fox, 1994; Spector, Zapf, Chen & Frese, 2000). Several reasons are suspected; only the main explanations are noted here. First, poor mental health is expected given the relatively stable tendency for individuals with high NA to experience greater negative emotionality and self-concept, regardless of the situation and even in the absence of stressors (Watson & Clark, 1984). Individuals with high NA are also expected to carry an elevated risk for poor mental health compared to individuals low on NA through a variety of indirect processes, including: i) greater stress reactivity (Watson & Clark, 1984; O'Brien, Terry, & Jimmieson, 2008; Kendler, Kuhn, & Prescott, 2004); ii) a more pessimistic view of the world, including of the occupational environment (Parkes, 1990; Ylipaavalneime et al., 2005; Watson, Pennebaker & Folger, 1987); and iii) a greater risk of negative life events including the heightened risk for actual exposure to poorer occupational conditions (Booth, Murray, Marples, & Batey, 2013; van Os, Park, & Jones, 2001). Although the precise mechanisms through which NA influences OS and affective outcomes is not definitive (Booth et al., 2013; Spector, Zapf, Chen, & Frese, 2000), it is regarded as an important adjustment given the potential to overestimate the contribution of the occupational environment and underestimate the role of personality.

Gender. Gender (male/female) was treated as a covariate as women are approximately twice as likely as men to experience depression (APA, 2013; Kuehner, 2003; Weissman et al., 1996). A recent review also determined that women were typically more likely than men to experience poorer psychosocial occupational conditions (Campos-Serna, Ronda-Pérez, Artazcoz, Moen & Benavides, 2013), with social inequality recognised as a factor that may contribute to gender differences in depression (Piccinelli & Wilkinson, 2000).

Age. Age was adjusted given the declining prevalence of depression within the older age bracket of the working population (50-64; Kessler et al., 2010, 55-64; ABS, 2008). In addition, some research has revealed that younger employees (aged under 35, Brisson et al., 1998; 18-24 years, Shields, 2006) are more likely than older employees to report poorer psychosocial occupational conditions. However, the direction and strength of the proposed effect of age on OS and health risk is contentious. On the one hand, a weakened effect is expected as older employees gain mastery of their environment (Karasek et al., 1990). On the other hand, a strengthened relationship is reasoned due to the accumulated effects of harmful

occupational conditions (Karasek & Theorell, 1990). Recently, Stansfeld et al (2012) showed support for the former claim such that the relation between occupational characteristics and depression was greater for employees younger than 50 years.

Education. Participants were requested to indicate their highest level of completed education (1 = Postgraduate degree; 2 = Bachelor's degree; 3 = Post-school diploma or certificate; 4 = Year 12 (college), 5 = High school, 6 = Uncompleted high school). Low socio-economic status, regardless of whether indexed by education, income, occupation or employment, is associated with an increased risk of depression (Anderson, Thielen, Nygaard & Diderichsen, 2009), although not always consistently (Bjelland et al. 2008; Lorant et al., 2003). Accordingly, education was used as a proxy for socio-economic status.

Occupational demographics. Descriptive information was obtained for employees' position title, position tenure (in years and months), workplace tenure (1 = less than one year; 2 = 1-5 years; 3 = 6-10 years; 4 = 11+ years) and supervisory responsibility (no/yes and if yes, number of employees supervised).

Administration Method

The survey (Appendix B) was administered through the ANU Polling Online (APOLLO) platform. The survey was conducted in August 2008 and was available for six weeks. The web-based method has been recognised as advantageous over traditional pen-and-paper surveys by way of data entry accuracy, efficiency of data collection and overall cost-effectiveness (Cobanoglu, Warde, & Moreo, 2001; Couper, 2000; Schmidt, 1997). In terms of measurement equivalence, there is no evidence of differential item functioning between the web-based and pen-and-paper administration of the DASS21 (Shea, Tennant, & Pallant, 2009) and PANAS (Howell, Rodzon, Jurai, & Sanchez, 2010). As far as known, an evaluation of the psychometric properties associated with the online administration method of the JCQ has not been conducted, however research with other OS instruments have presented comparable results for the pen-and-paper and web-based administration methods (AbuAlRub, 2004; Yang, Levine, Xu, & Lopez-Rivas, 2009).

Data Cleaning

Preliminary analyses were performed to test the assumptions of normality, linearity and homoscedasticity and to handle missing values and outliers. Analyses were conducted

using SPSS Version 17.0. Except for the variables negative affect and depression which had positive skew and kurtosis (NA: skew = 1.54, kurtosis = 2.33; depression: skew = 1.46, kurtosis = 1.37), all study variables were normally distributed as indicated by skewness and kurtosis values of less than 1 (Bulmer, 1979) and visual inspection of the variables' histogram and Q-Q plot (Tabachnick & Fidell, 2007). The significant Shapiro-Wilk statistic indicated violation of the assumption of normality although this is not unusual in larger samples of over 200 (Tabachnick & Fidell, 2007). Linearity was observed between all JCQ study variables and depression except for demands, which showed a scatterplot more consistent with an independent relationship. Heteroscedasticity was observed via residual scatterplots between NA and the JCQ subscales on depression. In addition to suggesting non-normality of one variable, this may also indicate greater measurement error at different levels of the predictor variable (Tabachnick & Fidell, 2007).

Univariate outliers with scores more than three standard deviations above or below the median were retained in favour of conversion to a less extreme value as each variable's five per cent trimmed mean was not significantly different from the mean ($p > .05$). Eight multivariate outliers were deleted in order to minimise distorted inferences as recommended by Tabachnick & Fidell (2007). Missing data was random and well below the five per cent threshold for the serious potential impact on data interpretation for study variables (Tabachnick & Fidell, 2007); the highest percentage of missing data (2.1%) was for the variable age. Missing values were replaced using the expectation maximisation method. Participants' job description; an open-ended question, was not used in the analysis other than for descriptive purposes due to the large portion of missing data (10.1 %). Multicollinearity did not pose a problem, with the Variance Inflation Factor below two for each study variable (Tabachnick & Fidell, 2007). The sample size was adequate ($N = > 214$) for detecting medium-sized effects with 95% confidence for the planned analyses.

Results

Descriptive Statistics

Table 4 summarises the demographic characteristics of the 475 Australian Public Service (APS) employees as adjusted for by missing data. Means and standard deviations and range where relevant was calculated for continuous variables and for categorical variables, frequencies and percentages were reported.

Individual demographics. The mean age of participants was 41.8 years ($SD = 11.6$ years, age range = 18 - 67 years) and the sample was predominately female (73.3%). Participants were well-educated as reflected by their highest degree earned (53.2 % had completed a tertiary degree; 25.7% a post-high school certificate or diploma; 19.8% college or equivalent and 1.3% had not completed college).

Occupational demographics. The majority of participants (44.4%) had worked in their current department or agency for between one and five years. The mean duration of participants' employment in their current job position was just under two years ($M = 23.7$ months, $SD = 34.0$ months, range = 1 month to 252 months or 21 years). A relatively large portion of the sample (41.7%) indicated supervisory responsibility, with a median of one and mean of 4.9 employees directly supervised (range = 1 to 45 employees; $SD = 6.6$ employees). Participants' job descriptions varied in length from a short title such as administration officer or policy officer, to a paragraph description of duties.

Demographic data was not available to determine the degree to which the sample was representative of participating workplaces. Nonetheless, this sample's median age (43 years) was similar to the median age of APS employees during the 2008-2009 period (42 years; APSC, 2009). This sample's education as indexed by the proportion of employees with a Bachelor's degree or higher was also on par (53.2%; compared to 53.8% in the APS during 2008-09). However, the sample consisted of significantly more females than that employed in the APS during the same period (73.3% versus 57.5%). Compared to APS employees at the time, this sample also consisted of; a comparatively larger proportion of employees with an organisational tenure of between one and five years (44.4% versus 28.8%) and a smaller proportion of employees with a tenure greater than 20 years (5.7% versus 19%; APSC, 2009).

Table 4

Demographic Characteristics of the Study Sample

Demographic Characteristics	Mean	SD	Range	N	Percentage (%)
Individual Demographics					
Age (years)	41.8	11.6	18 – 67		
Gender					
Male				127	26.7
Female				348	73.3
Education					
Tertiary Degree				253	53.2
Post-college certificate/diploma				122	25.7
College or equivalent				94	19.8
Uncompleted college				6	1.3
Occupational Demographics					
Workplace Tenure (years)					
< 1				153	32.3
1- 5				211	44.4
6-10				51	10.7
11-20				33	7.0
>20				27	5.6
Job Position Tenure (months)	23.7	34.0	1- 252		
Supervisory Responsibility				201	41.7
Number of employees directly supervised	4.9	6.6	1 - 45		

Study Variable Correlation Matrix

Table 5 displays the inter-correlations among the main study variables. The associations are described with reference to Cohen's (1988) criteria for scale relatedness.

Interrelations between covariates and study variables. A large positive correlation was observed between Negative Affect (NA) and DASS21 Depression ($r = .62, p < .05$). NA had a small significant negative correlation with all decision latitude and social support subscales ($p < .05$) and a non-significant relationship with demands. Gender was not significantly related to any of the study variables except for age ($r = -.11, p < .05$). Age

displayed a small significant: positive correlation with demands ($r = .17, p < .05$), negative correlation with colleague ($r = -.16, p < .05$) and supervisor support ($r = -.14, p < .05$), and a non-significant association with decision latitude ($p > .05$) and depression ($p > .05$).

Correlations between independent and dependent variables. Depression was negatively correlated with decision latitude ($r = -.36, p < .05$) and social support ($r = -.34, p < .05$). Correlations were of a similar medium-sized magnitude between depression and the decision-latitude and social support subscales ($r_s = -.28 - .33, p < .05$). Demands was not significantly related to depression ($p > .05$).

Interrelations between independent variables. A large positive correlation was observed between the decision latitude subscales of skill discretion and decision authority ($r = .64, p < .05$) and between the support subscales of supervisor and co-worker support ($r = .59, p < .05$), suggesting highly correlated yet sufficiently independent constructs (Cohen, 1998; Tabachnick & Fidell, 2007). Demands had a small-sized correlation with the decision authority subscale ($r = .18, p < .05$) while the correlation with the skill discretion subscale was medium-sized ($r = .33, p < .05$). The correlation between decision latitude and social support was medium-sized ($r = .41, p < .05$). The highest correlation between the subscales of decision latitude and social support was between supervisor support and decision authority ($r = .41, p < .05$). The correlation between demands and support was not significant ($p > .05$).

Table 5

Inter-Correlations among the Main Study Variables

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Gender ^a											
2. Age	.11*										
3. Negative affectivity	.08	-.12*									
4. Psychological demands	.03	.17	.05								
5. Decision latitude	-.04	.07	-.20*	.27*							
6. Skill discretion	.10	.09	-.16*	.33*	.88*						
7. Decision authority	-.07	.05	-.20*	.18*	.93*	.64*					
8. Social support	.03	-.16*	-.19*	-.06	.41*	.33*	.41*				
9. Co-worker support	.06	-.16*	-.14*	-.04	.33*	.26*	.33*	.86*			
10. Supervisor support	.00	-.14*	-.19*	-.06	.39*	.32*	.39*	.92*	.58*		
11. DASS21-Depression ^b	.06	-.19	-.62*	-.03	-.36*	-.32*	-.33*	-.34*	-.28*	-.31*	

^a Point bi-serial correlation for Gender (0 = male, 1 = female) ^bDASS21 = Depression Anxiety and Stress Scale- Short form, Depression subscale (Lovibond & Lovibond, 1995a). * $p < .05$.

Means and Standard Deviations of the Job Content Questionnaire Subscales

Table 6 displays the means and standard deviations obtained for the JCQ scales. No significant gender differences occurred on scale means or standard deviations. This was in line with Karasek et al (1998) for the demand and support variables and contrasted the report that women rated significantly lower levels of decision latitude, skill discretion and decision authority compared to men. In this study, womens' scores on decision latitude were on par with that reported by Karasek et al (1998)⁸ although skill discretion was significantly higher ($t(1398) = 2.94, p < .05$) and decision authority; significantly lower than the average national means ($t(1398) = 4.71, p < .05$). For men, the mean of decision latitude, skill discretion and decision authority were all significantly lower than the values reported by Karasek et al (1998). This shows that the absent gender difference for decision latitude in this study was not due to an increase in decision latitude reported by women, rather, a reduction in decision latitude experienced by men compared to an earlier period. For both men and women, the figures for demands were in line with Karasek et al (1998). In contrast, the mean values for co-worker support and supervisor support were significantly higher in this sample for both genders compared to the reported collapsed scores across gender (Karasek et al., 1998; $M_{Supervisor} = 12.20, SD = 2.92$; $M_{Co-worker} = 12.51, SD = 2.29$).

⁸ The figures took into account the corrected USA mean and standard deviation scores for decision authority and decision latitude that were published on the JCQ Center website (<http://www.jcqcenter.org/>) and so the comparative values reported here are not exactly as published in Karasek et al (1998).

Table 6

Means and Standard Deviations for the JCQ Scales and Subscales according to Gender

Variables	<i>M</i> (SD)	
	Males	Females
Demands	31.71 (6.14)	32.20 (6.89)
Decision latitude	66.19 (11.06)	65.02 (12.20)
Skill discretion	33.84 (5.58)	33.83 (5.96)
Decision authority	32.35 (6.66)	31.20 (7.47)
Social support	34.86 (5.71)	35.47 (6.88)
Supervisor support	17.31 (3.66)	17.41(4.35)
Co-worker support	17.55 (2.77)	18.05 (3.31)

Averages and Standard Deviation of DASS21 Depression

The DASS21 Depression had a mean value of 4.4, median of 2 and standard deviation of 5.2. No significant gender differences were found ($t(471) = 1.45, p = .15$).

Tobit Regression

The relationship between JCQ demands, decision latitude and social support and DASS21 Depression was analysed using Tobit regression. Tobit regression, first proposed by Tobin in 1958, is a maximum-likelihood technique based on the beta distribution. Unlike ordinary least squares regression and the underlying normal distribution, the Tobit model is flexible; accommodating skew, heteroscedasticity and other non-normal assumptions. The main assumption is that the dependent variable is continuous, interval-level, and bound between two known endpoints (Smithson & Verkuilen, 2006). Notably, the Tobit model takes into account censored data; that is, the lower and/or upper segments of the dependent variable that are not completely observed in the sample (Smithson & Merkle, 2013). Relevant to this study, the measure of depression was ‘left’ censored, with 134 (28.2 %) data points clustered at zero. Although the lowest possible score is zero on the DASS21, this does not necessarily indicate that absolutely no depressive symptoms are present, as variation in true symptomatology is expected at this score in the population. In other words, it is expected that the lower bound would be more normally distributed with repeated sampling (Smithson,

2006; Smithson & Merkle, 2013). In sum, Tobit regression is a form of multiple regression for censored data which allows the estimation of the nonlinear relationship between a set of independent variables and a censored dependent variable (Frone, 2003). Tobit regression was favoured over correction or transformation of the skewed measure of depression in multiple regression. Corrective practices can present biased estimates and may omit potentially relevant information (Austin, Escobar, & Kopec, 2000).

Tobit regression was performed with syntax developed for SPSS (M. Smithson, personal communication, 18 November 2008). Analyses were performed separately for men and women as results have varied with gender (see Chapter 3). Unlike ordinary least squares regression, tobit regression does not provide an overall F statistic to test the null hypothesis or change in model fit. Corresponding chi-square tests however may be computed from the log-likelihood statistics (Long, 1997; Smithson & Merkle, 2013). Overall fit is assessed via the chi-square tests and significance of individual parameter estimates (Frone, 2003).

Tobit model specification. Three separate models were tested for each gender. The first and second model examined the strain and iso-strain hypothesis respectively using the quadrant formulation. The third model evaluated the main and interactive effects. All analyses were adjusted for by age, gender, education and NA in the first step. Education was recoded from five to three categories, with the category of uncompleted college ($n = 6$) and college or equivalent ($n = 94$) collapsed into the highest education category of 'up to and including college education or equivalent'. The category of additional certification was retained and undergraduate and postgraduate study were collapsed into tertiary education. The adjustments explained greater variance in depression scores among females ($\chi^2(4) = -209.23, p < .05$) compared to males ($\chi^2(4) = -66.5, p < .05$). The education category of 'additional certification' presented the largest coefficient and showed the maximum discrimination between genders although NA was actually the only significant adjustment.

In the first model, strain was calculated as a dichotomous variable of strain versus no-strain. Strain was added using the upper quartile of demands and lower quartile of decision latitude. This formulation is recognised as an appropriate measure of strain (Courvoisier & Pengerger, 2010; Fransson et al., 2012; Karasek et al., 1998) and was selected to maximise the exposure contrast. According to this critereon, 29 participants experienced strain (6.1%). The strain variable was entered in the second step and significantly improved model fit from the

adjustments model for women only ($\chi^2(1) = -10.71, p < .05$). Strain did not improve model fit for males ($\chi^2(1) = -1.44, p > .05$).

In the second model, iso-strain was calculated as the variable of strain as above plus the lowest quartile of the total score of social support (co-worker plus supervisor support). Twenty-two participants accordingly reported iso-strain (4.6%). Iso-strain significantly improved model fit from the adjustment model for females only ($\chi^2(1) = -11.34, p < .05$). Iso-strain was not significant for males ($\chi^2(1) = -1.44, p > .05$).

A third model tested the sub-hypotheses of decision latitude, support and demand and to test the interaction effects. The subscales were deemed acceptable to enter separately as the bivariate correlations were below the threshold for unity and multicollinearity diagnostics were well within the criteria for independence (Variance Inflation Factor < 10; Tabachnick & Fidell, 2007). The adjustments were entered in the first step followed by the centered main effects of demand, skill discretion, decision authority, co-worker support and supervisor support in the second step. The two-way interaction between centered demands and decision latitude was entered in the third step and the three-way interaction between demand, decision latitude and support was entered in the fourth step. Bootstrapping was set at 2000. As the two-way and three-way interactions were not-significant ($p > .05$), the model was rerun as a two-step main effects model without the interaction steps and with normal rather than centred variables. These results are presented in Table 7.

The main effects model was significant for both men ($\chi^2(5) = -35.04, p < .05$) and women ($\chi^2(5) = -48.37, p < .05$). For men, a significant negative relationship was found between demands and depression which suggested a protective rather than harmful effect of high demands. The skill discretion and supervisor support subscales also showed a significant negative association with depression while the decision authority and co-worker support subscales were not significant. For women, the model revealed a non-significant association between demands and depression scores. Similar to men, skill discretion was significant while decision authority was not. In contrast to men, co-worker rather than supervisor support was negatively associated with depression.

Table 7

Multiple Tobit Regression for DASS21 Depression Ratings as a function of the Main Effects and Quadrant Formulation of JCQ Strain and Iso-Strain, by Gender after Adjustments

Variables	Females			Males		
	<i>b</i>	<i>SE</i>	95% CI	<i>b</i>	<i>SE</i>	95% CI
Demographics						
Age	.01	.03	[-.04, .06]	.01	.03	[-.06, .07]
Education						
≥ College	.29	.75	[-1.19, 1.78]	-.35	.79	[-1.90, 1.20]
Additional training	.86	.68	[-.49, 2.21]	.03	.99	[-1.92, 1.99]
Tertiary	1	1	Ref	1	1	Ref
Negative affect	.49*	.04	[.41, .58]	.52*	.07	[.39, .65]
Quadrant model						
Strain	3.05*	1.10	[.896, 5.20]	1.87*	1.66	[-1.39, 5.11]
Iso-strain	3.58*	1.35	[.939, 6.22]	1.87*	1.56	[-1.18, 4.91]
Main effects model						
Demands	.03	.04	[-.05, .12]	-.17*	.08	[-.31, -.01]
Skill discretion	-.10	.80	[-.26, .05]	-.22*	.11	[-.43, -.00]
Decision authority	-.14*	.06	[-.26, -.02]	.04	.07	[-.10, .18]
Co-worker support	-.28*	.12	[-.51, -.04]	.04	.19	[-.33, .41]
Supervisor support	-.02	.11	[-.23, .19]	-.27*	.13	[-.53, -.00]
Constant	1.55	.07	[1.41, 1.69]	1.21*	.11	[1.0, 1.41]

Note. The unstandardised tobit regression coefficients are reported. The quadrant models were run in separate analyses from the main effects model and all models were adjusted for by demographics (age, education and negative affect). * $p < .05$. JCQ = Job Content Questionnaire variables

Discussion

The main purpose of this study was to explore the role of occupational stress, as defined by the demand control/support model (Karasek & Theorell, 1990), in depression risk among a sample of Australian government employees.

Hypothesis 1: High Psychological Demands Increases the Risk of Depression

The first hypothesis that ratings of psychological demands would be positively associated with depression ratings was not supported. In fact, for men low demands were found to increase the likelihood of higher depression scores and the association was not significant for females. This was unexpected on theoretical and empirical grounds. In particular, the two depression-specific reviews on longitudinal studies (Bonde, 2008; Netterstrøm et al., 2008) which also largely included self-report studies concluded overall support for the demands main effect. The results were also in conflict with the significant positive association found in cross-sectional (Hall et al., 2013; Rodwell & Martin, 2013) and longitudinal research (Strazdins et al., 2011) on Australian population samples. The finding is also at odds with more recent studies that converge on the finding of the demands main effect as the most consistently supported DC/S model hypothesis in depression risk (Andrea et al., 2009; Melchoir et al., 2007; Rau et al., 2010; Kivimäki et al., 2010; Smith & Bielecky, 2012).

At the same time, recent self-report prospective studies have revealed non-significant relations too (Ahola & Hakanen, 2007; Dragano et al., 2008; Garbarino et al., 2013; Horton & Lipscomb, 2011; Magnusson-Hanson et al., 2009; Weigl et al., 2012). The reviews by Bonde (2008) and Netterstrøm et al (2008) also included self-report studies that revealed non-significant associations (Kawakami et al., 1998; Rugulies et al., 2006; Ylipaavalniemi et al., 2005). Finally, the outcome was consistent with the most recent review on depression risk (Theorell et al., 2015). However, the evidence that low demands may function as a risk factor for depression was not consistent with the prevailing view and evidence that health risk results from high demands. The results were nonetheless in line with a more recent Swedish prospective population survey which showed that high demand was protective for men and not significant in women's depression risk (Fandino-Losada et al., 2013).

While not in line with predictions, the idea that low demand heightens depression risk for males is plausible. It has been suggested that males derive a strong sense of identity from their work role (Blackmore et al., 2007) and so a minimal workload may be experienced as

threatening to self-esteem and subsequently mood. More broadly, the finding of gender differences lends support to the notion that occupational stressors may have different meanings to men and women and may therefore affect health risk differently (Blackmore et al., 2007; Sparks & Cooper, 1999; Tennant, 2001; Ylipaavalneimi et al., 2005).

A clear explanation for the lack of support for the proposed demands main effect is lacking. Several methodological explanations are considered next. First, visual inspection of the scatterplot between demands and depression revealed a curvilinear relationship which was confirmed with a small but significant effect in Tobit regression ($\beta = 0.01$, $p < .05$, results not shown). This implies that ratings of both low and high demands were associated with higher depression scores. In fact, Warr (1987, 1994) expected occupational stressors such as demand to link in a curvilinear manner with mental health outcomes such as depression and this has also attracted cross-sectional support (deJonge, Reuvers, Houtman, Bongers, & Kompier, 2000; Warr, 1990). Therefore, a plausible competing explanation may be that demand and depression are related in a curvilinear manner.

The curvilinear relationship was not supported in a more recent Australian sample of nurses (Rodwell & Martin, 2013). Also, curvilinear relations between stressors and mental health when found are generally of minor importance compared to linear relations (Rydstedt, Ferrie, & Head, 2006; Sonnetag & Frese., 2003). Indeed, the curvilinear relationship in the current study was negligible and the significant negative linear relationship was small. While the curvilinear association may not hold major statistical or practical significance, the consequence is that the strength of the relationship between demands and depression may be underestimated because of non-linearity (Tabachnick & Fidell, 2007). As Tobit regression takes into account non-normal relations (Smithson & Verkuilen, 2006) the explanation that a non-normal relation accounted for the lack of support is possible although not convincing.

An inaccurate correlation may also result from restricted variation in scores (Kristensen, 1995, 1996; Tabachnick & Fidell, 2007). While this is plausible particularly given the high indication of supervisory responsibility (42%) in this sample, adequate variation in demand scores were observed. The Australian context is also not a convincing explanation given that all reported Australian surveys reported significant associations between demands and depression ratings as predicted (Hall et al., 2013; Strazdins et al., 2011; Rodwell & Martin, 2013). A notable difference was that the current study applied adjustments while the majority of the Australian studies did not (Hall et al., 2013; LaMontagne et al.,

2008; Rodwell & Martin, 2013). Thus the unsupportive result in this study might challenge previously documented associations as being spurious although the univariate association between demands and depression was also non-significant, rendering this idea unlikely.

Interestingly, it was noted that both the demand and depression measure showed higher than expected reliabilities. The JCQ-demands scale in particular presented as a more unified construct ($\alpha = .84$) than typically found ($\alpha = .63$, Karasek et al., 1998; $\alpha = .68$, Karasek et al., 2007; $\alpha = .67$, Stansfeld et al., 2003; $\alpha = .69$, Strazdins et al., 2004). Similarly, although not to the same extent, the measure of depression showed higher reliability ($\alpha = .94$) compared to population norms ($\alpha = .90$, Crawford et al., 2011; $\alpha = .88$, Henry & Crawford, 2005). Although both demands and depression may have been perceived as more homogenous and consistent constructs than typically documented, the means through which this might influence the association is unclear, as there was sufficient variation in demand scores and censored regression was applied to manage the skew of depression.

This was the first known study to utilise the DASS21 and JCQ to assess OS. It is informative to consider here that the DASS differs from other measures of depression in its focus on symptoms that maximise discrimination from other states such as anxiety. Specifically, the measure does not include symptoms such as attention and concentration and appetite and sleep disturbance as they overlap with other disorders such as anxiety related conditions (Lovibond & Lovibond, 1995a, 1995b). This raises the idea that occupational demands may be less likely to vary with the assessed low mood and cognitive symptoms of disengagement or conversely that demands may be more strongly associated with the physiological components of depression that were not assessed. A priori clinical or physiological explanation for such a process however is not known.

Other research challenges the likelihood of such an interpretation. Edimansyah et al (2008) documented significant associations between JCQ-demands and DASS42 Depression although in a very different sample of male Malaysian trade employees. The data nonetheless weakens the explanation that the lack of support resulted from the specific measures employed. Even studies that utilised other self-report measures of depression such as the BDI (Garbarino et al., 2013), CES-D (Dragano et al., 2008; Horton & Lipscomb, 2011; Weigl et al., 2012) and HADS-D (Ahola & Hakanen., 2009) also demonstrated non-significant relationships with JCQ-demands. Thus, the lack of support may not necessarily be a result of the use of the DASS or its conceptualisation of depression or the specific combination of the

DASS and the JCQ. Caution is nonetheless indicated on this last point, as this is the first known study that employed the DASS21 and JCQ and furthermore in the Australian context and with a public service sample.

Another consideration for the non-significant association between demand and depression ratings is the use of the online administration method. Specifically, the web-based format may have affected the way in which demand or depression were rated. While Shea et al (2009) did not find evidence of differential item functioning between the web-based and pen-and-paper administration method of the DASS21. The lack of psychometrics for the web-based administration of the JCQ remains a criticism. However, as the other JCQ scales were significantly associated with depression scores, it is difficult to attribute the lack of support for only demands to the administration method and not a factor or combination of factors specific to the relation between demand and depression. The alternate explanation may be that high psychological work demands are not directly relevant to depression risk.

Hypothesis 2: High Decision Latitude Predicts Low Depression Risk

The second hypothesis that decision latitude, and its subcomponents, link negatively to depression was partially supported. As expected, low ratings of decision latitude were associated with high depression ratings. This was consistent with the described Australian research on depression (Hall et al., 2013; Rodwell & Martin, 2013; Strazdins et al., 2011) as well as other cross-sectional surveys (Dragano et al., 2008; Lee et al., 2012; Pelfrene et al., 2002; Pomaki, Maes, & ter Doest, 2004; Sanne, Mykletun, Dahl, Moen, & Tell, 2005) and adds weight to the idea that low decision latitude increases the risk of depression. However, when the individual components of skill discretion and decision latitude were considered separately, the experience of skill discretion and not decision authority was associated with depression ratings for men while the reverse was found for women. The results suggest that certain dimensions of control may be especially important in depression risk and furthermore it may differ by gender.

The finding that decision authority was significant for females was actually in line with a cross-sectional Canadian population survey (Blackmore et al., 2007) and representative Danish workforce survey (Rugulies et al., 2006). These results might support broader speculation that particular occupational stressors may have different implications for men and women within different occupational contexts (Blackmore et al., 2007). Thus, men's

sense of ability to apply their skills and women's opportunity to have input into decision making may play a significant role in the experience of depression among this sample of Australian government employees.

The results however contrasted a range of other findings. For example, among nurses, skill discretion but not decision authority was significantly associated with depression ratings (Mark & Smith, 2012). In the predominately male BELSTRESS cohort, Pelfrene et al (2002) found support for both dimensions of decision latitude while a Swedish population survey revealed a lack of support for both sub-dimensions of decision latitude (Fandiño-Losada et al., 2013). Edimansyah et al (2008), also using the JCQ and DASS, found in a male only sample that decision authority was not significant although the same was true for skill discretion. The results add to the variety of associations found within the literature. Moreover, the evidence generated gives weight to the position reached in Chapter 3; that the limited evidence determined for skill discretion (Theoreoll et al., 2015) may be explained by dependence on other factors including gender.

Hypothesis 3: Low Workplace Support Heightens Depression Risk

The third hypothesis that workplace support would negatively relate to depression ratings was also partially supported. Specifically, the results revealed that support from co-workers explained females' depression rating scores, whereas for males, only the sense of support from the supervisor was relevant. The significance only of co-worker support for females was in line results from the Canadian National Population Health survey (Shields, 2006) and the Danish SLOSH study (Magnusson-Hanson et al., 2009); although supervisor support was not significant for males either. The tendency for colleague support to be particularly important in females' health risk is also consistent with Fandiño-Losada et al (2013) who prospectively showed that 'social climate' significantly predicted depression scores for females only. The finding for males that the significance of supervisor but not colleague support was also compatible with Edimansyah et al (2008) in their sample of male automotive employees. The results however were in contrast to a large Danish prospective study (Rugulies et al, 2006) where supervisor support predicted elevated depression ratings among women only. Rugulies et al (2006) utilised a one and two-item constructed measure for colleague and supervisor support respectively which may have affected the validity of the measures and subsequent comparisons between scales. This relationship was nonetheless also found among Australian nurses (Rodwell & Martin, 2013).

The results of the current study are consistent with the overall idea that low support at work is a risk factor for depression. The evidence adds weight to the earlier Australian research on the DCS model (Hall et al., 2013; Rodwell & Martin, 2013) by demonstrating significant associations even after taking into account personal risk factors such as negative affect, gender and socioeconomic status. The data also points to the idea that the source of support might have different implications for males and females and importantly may play a different role in their experience of depression. Although this study supports the idea that collegial support is particularly important for females and supervisor support for males, the presence of contrasting findings within the literature underscores the caveat that the relative importance of occupational stressors might also differ by other factors including the actual workplace or employee groups sampled (Stansfeld et al., 1999; Stansfeld & Candy, 2006).

Hypothesis 4: Job strain Increases Depression Risk

The fourth hypothesis that strain would positively relate to depression ratings was partially supported as expected. The quadrant formulation of strain was significant for both genders and stronger for women. On the other hand, when the individual main effects and subcomponent hypotheses were evaluated strain was not supported as the demand main effect was not significant and the decision latitude main effect was partially supported. The finding that support differed by formulation was consistent with the majority of recent research that reported both results for depression risk (Ahola & Hakanen, 2007; Blackmore et al., 2007; Dragano et al., 2008; Inoue et al., 2010; Rodwell & Martin, 2013; Smith & Bielecky, 2012; see Chapter 3). The tendency for support of the quadrant formulation was consistent with reviews on depression risk (Bonde, 2008; Netterstrom et al., 2008; Theorell et al., 2015).

The results were also consistent with the available Australian research (LaMontagne et al., 2008; McTernan et al., 2013) including that risk from strain was higher for females (LaMontagne et al., 2008). The non-significant results for the additive strain hypothesis however contrasted the support found in all reported Australian studies that examined the main effect model (Hall et al., 2013; Rodwell & Martin, 2013; Strazdins et al., 2011). In context, the results are not unusual as surveys tend to report (Ahola & Hakanen, 2007; Andrea et al., 2009; Dragano et al., 2008; Fandino-Losada et al., 2013; Magnusson-Hanson et al., 2009; Weigl et al., 2012) more frequently than not (Lee et al., 2012) a lack of simultaneous support for the demands and decision latitude main effect.

While a lack of support for the additive strain hypothesis in depression risk was consistent with the trend in the literature, no study was located with this specific profile of results. In part, this owed to the fact that sub-hypotheses were evaluated too. When results for the complete decision latitude scale were considered, the support for the main effect of control and not demand was consistent with a variety of self-report surveys (Dragano et al., 2008; Murcia et al., 2013; Tsutsumi, Kabaya, Theorell, & Siegrist, 2001; Weigl et al., 2012). For the most part though, results contrasted the more common outcome of full or partial support of demands (Andrea et al., 2009; Kivimäki et al., 2010; Rau et al., 2010; Smith & Bielecky, 2012; see also Chapter 3), when the additive hypothesis was not supported.

The results challenge the central idea of the DC model; that the key risk to ill-health lies in the *joint* effects of high demand and low control (Karasek, 1979; Karasek & Theorell, 1990). Instead, the results suggest that a single occupational stressor may be sufficient to affect health risk. It could be argued that the coefficient for strain was larger than that for the decision latitude subscales and thus supportive of the central prediction however such results are not consistent with the theory. Specifically, the DC model does not expect health risk to arise from the combined conditions of demand and control and not from the individual effect of demand and only from a sub-dimension of low control. This study challenges the robustness of the prediction and indicates a need for clarity about the processes through which demands and control, including its components, combine to affect health risk.

Hypothesis 5: Iso-strain Heightens Depression Risk

The fifth hypothesis that iso-strain would lead to heightened depression risk was also partially supported as expected. As for the strain hypothesis, support was obtained only when iso-strain was formulated as a quadrant and not when it was evaluated as an additive main effects model. The supportive results for the quadrant formulation are difficult to compare to other studies as only a handful of studies employed this term and there were large sample differences. For example, Ertel et al (2008) reported a significant association between ratings of iso-strain and depression in a sample of ethnically diverse mostly female care staff, only when their home demands were factored, that is the presence of a child under 18 years. The results were also in line with a prospective survey of Italian specialist male police officers, where iso-strain ratings were significantly associated with depression ratings when formulated as a quadrant but not when considered as separate main effects (Garbarino et al., 2013). The results in this study were more in line with Garbarino et al (2013) in that the main

effect of demand was not significant, control was conditionally significant and support was fully rather than partially significant.

The results for the additive iso-strain hypothesis, while not in line with predictions or the fully or partially supportive evidence (Cohidon et al., 2008; Clays et al., 2007; Hall et al., 2013; Niedhammer et al., 1998; Pomaki et al., 2004; Sanne et al., 2005; Stansfeld et al., 1999), was consistent with the bulk of evidence on self-report depression risk (Andrea et al., 2009; Edimansyah et al., 2008; Fandiño-Losada et al., 2013; Gray-Stanley et al., 2010; Horton & Lipscomb, 2011; Mark & Smith, 2012; Rodwell & Martin, 2012; Rugulies et al., 2006; Smith & Bielecky, 2012; Stansfeld et al., 2012; Wang et al., 2012a; Weigl et al., 2012). The lack of support was also consistent with research that employed objective measures for depression (Bonde et al., 2009; Chen et al., 2011; d'errico et al., 2011; Godin et al., 2009; Inoue et al., 2010; Melchoir et al., 2007; Murcia et al., 2013; Thielen et al., 2010). Taken together with the results for strain, the evidence collectively suggests that elevated depression risk is not necessarily dependent on the incremental increase in stressors as defined by the DC/S model, instead the presence of individual stressors may be sufficient.

Accordingly, these results highlight the potential risk of losing important information and moreover presenting misleading information by artificially dichotomising and combining variables (McCallum, Zhang, Preacher, & Rucker, 2002). It is also important not to ignore that significant results may be difficult to obtain due to the limited representation of iso-strain in the sample. This remains a valid explanation for the results as only 22 cases (4.6%) in this study met criteria for conditions of iso-strain; that is, employees experiencing their work as high on demands, low on control and low on support.

Hypothesis Six: The Buffer Hypothesis is Not Supported

The sixth expectation regarding a lack of support for the buffer hypothesis was confirmed. While this was inconsistent with the supportive findings in Australian studies (Hall et al., 2013; Rodwell & Martin, 2012), the result was consistent with the majority of investigations on depression risk (Ahola & Hakanen, 2007; Grynderup et al., 2012; Mark & Smith, 2012; Weigl et al., 2012) and health outcomes more broadly (Van der Doef & Maes, 1998, 1999; Häusser et al., 2010). With regard to explanations about the discrepancy between the current and other Australian studies, it might be argued that this study carried out a more robust evaluation of the hypothesis as analyses were adjusted and main effects were taken

into account. This study adds weight to the idea that although expected, resources of job control and support do not offset the health risk of high demands and that the direct individual effect of low control and low support are stronger than their buffer effects.

Summary

In a strict sense, the DC/S model was not supported given the lack of evidence for the additive strain and iso-strain hypothesis, buffer hypotheses and support only for sub-dimensions of the control and social support main effects. The level of some support for the main effects of control and social support and strain and iso-strain is in line with the literature's tendency to affirm support of the DC/S model upon (partial) evidence for single hypotheses (deLange et al., 2003; Stansfeld & Candy, 2006). The lack of support for the model was predominately associated with the demands dimension which did not function as expected by way of: higher than expected reliability, an absent rather than positive correlation with negative affect and depression ratings, and a negative relationship with depression for men. Thus, while the DC/S model may appear largely disconfirmed, the lack of support from one hypothesis had subsequent implications for the remaining hypotheses. The capacity of the DC/S model to explain depression risk should be regarded with this in mind. The study also revealed that decision latitude and social support were important features associated with depression risk and that different dimensions might uniquely explain the experience of depression risk in men and women.

Demographics

This evaluation also shed light on confounders and their association with stressors and depression. Negative affect was strongly associated with depression ratings while socio-demographic variables of age, gender and education contributed little to the explanation of depression risk in this sample apart from an indirect association through stressors. The report of this information was considered important as Chapter 3 revealed inconsistencies about the relevance of demographics and a general lack of reporting about outcomes, particularly in the Australian context. The results are elaborated on next.

Negative affect. As expected, negative affect showed a large association with depression ratings. This was consistent with the view that personality is independently associated with depression and an important factor to account for when evaluating depression risk (Brief et al., 1988; Spector, 2006). The idea that NA increases the perception and experience of

stressors (Spector et al., 2000) was supported by the positive correlations between NA and decision latitude and social support. However, NA was not significantly correlated with demands. While this was consistent with the results of Spector et al (2000) the results contrasted the general expectation of a positive association across all stressors (Brief et al., 1988; Spector, 2006). While this result is unclear it is perhaps not surprising given that the measure of demands carried a higher than expected reliability and non-significant association with depression. The results weight to the unadjusted Australian cross-sectional research on depression (Hall et al. 2013; LaMontagne et al., 2008; Rodwell & Martin, 2013) and demonstrate that associations are affected by attenuation rather than significance for decision latitude and support.

Age. The non-significant association between the covariate of age and depression suggests that age is not likely to skew the relationship between OS and depression in this work population. This result was in line with representative studies regardless of whether depression was assessed through self-report (Andrea et al., 2009; Fandiño-Losada et al., 2013) or clinical-interview (Grynderup et al., 2012; Murcia et al., 2013; Smith & Bielecky, 2012; Stansfeld et al., 2012; Wang et al., 2012a; Yang et al., 2012). Of the occupational stressors, only workplace support showed a significant association such that older employees perceived less support. Together, these results build the idea that age is unlikely to significantly affect the assessment of occupational stress related depression risk in the working population.

Education. Employees' highest level of education was not significantly related to depression scores. This contrasted the expectation that low socio-economic status, for which education is an established marker, would be associated with a heightened risk of depression (Anderson et al., 2009; Marmot, Ryff, Bumpass, Shipley, & Marks, 1997). The results however were consistent with several representative studies (Andrea et al., 2009; Cohidon et al., 2008; Fandiño-Losada et al., 2013; Grynderup et al., 2012; Magnusson-Hanson et al., 2009; Smith & Bielecky, 2012; Wang et al., 2012a; Yang et al., 2012). The results were also in line with Australian normative data on the DASS21 which revealed a negligible association with education (Crawford et al., 2011; Lovibond & Lovibond, 1995b). Like this study, there was a small representation of males with lower than Year 12 (college) education. Accordingly, it may be that this public service occupational group is more representative of employees with a higher SES, resulting in limited variation in education scores to show

meaningful effects. Indeed, the highest education category of uncompleted high school was collapsed given that only six employees selected this category. Accordingly, the results might suggest that education level may not significantly affect depression risk for those with at least post-secondary education.

Gender. No significant gender differences were found in the reported level of demands, control and support at work which was also determined in more recent research (Grynderup et al., 2012). It is tempting to interpret these results as representing progress in closing the gender gap in the quality of occupational conditions. However, compared to earlier norms where women reported lower levels of decision latitude compared to men (Karasek et al., 1998), women's ratings were equivalent to that found a decade earlier while males in this sample in fact reported lower levels of decision latitude. Caution is indicated in generalising from this data that the experience of occupational conditions has worsened for men or improved for women as the sample represented a narrow range of employees, including that women indicating supervisory responsibility were overrepresented in this survey.

This caution is reinforced by a representative Australian study in which women reported lower levels of control compared to men, consistently from 2001 to 2008 (LaMontagne, Krnjacki, Kavanagh, & Bentley, 2013). Another representative Australian study found that women reported higher levels of strain compared to men (LaMontagne et al., 2008) and data from a small sample of the Australian Public Service revealed higher ratings of demand among women compared to men (Macklin et al., 2006; $N = 84$). A tentative revision may be that while women continue to be exposed to hazardous occupational conditions at a greater rate to men, in some occupational groups the risk is more equivalent. Another observation was that social support ratings significantly increased for men and women compared to norms a decade earlier (Karasek et al., 1998). The specific condition of workplace support may have therefore increased. The broader relevance of these gender outcomes among Australian employees is unclear as other relevant studies either controlled for gender (McTernan et al., 2013; Strazdins et al., 2011), tested a gender specific sample (Rodwell & Martin, 2013) or did not report values in a comparable form (Hall et al., 2013).

The non-significant association between gender and depression is addressed in some detail given the well-established finding that females are more likely than men to experience depression (APA, 2013). Like this study on predominately females (73 %), studies revealing non-significant gender effects were commonly based on samples with skewed gender

(Andrea et al., 2009, 75% male employees; Chen et al., 2011, 80% male engineers; Gray-Stanley et al., 2010; 83% of female nurses). At the same time, gender differences still presented in studies with skew (e.g., Stansfeld et al., 2012; 74% male) and non-significant results were noted in gender representative studies (Cohidon et al., 2008; Grynderup et al., 2012; Rau et al., 2010; Weigl et al., 2012). Accordingly, the sample's gender distribution may account for the absent gender effects although it may not necessarily be the key reason. It was also observed that with non-significant gender effects for depression were largely from non-Nordic nations: Korea (Lee et al., 2012), Taiwan (Chen et al., 2011) France (Cohidon et al., 2008; Niedhammer et al., 2006) and Germany (Rau et al., 2010; Weigl et al., 2012) and so the results may also relate to a specific cultural context.

The results could also reflect the measure of depression used. On inspection of Lovibond and Lovibond's (1995b) available data, gender equivalence was reported for the DASS42 Depression. Similarly, Crawford et al (2011) reported that gender differences were negligible in their Australian normative data on the DASS21; in line with the results found here. This could indicate that the DASS21 is not an accurate measure of depression and to interpret results cautiously.

However, unlike other self-report scales, DASS Depression is concerned with defining core and discrete symptoms of depression (that relate to depressed mood, loss of interest and pleasure in previously enjoyed activities, poor self-esteem and hopelessness). Vegetative symptoms such as sleep and appetite disturbance that typically overlap with other conditions such as anxiety disorders are excluded (Lovibond & Lovibond, 1995a; 1995b). Clinical manifestations of depression have been found to differ by gender. For example, females have reported more often than males, disturbances of appetite and sleep and fatigue (Frank, Carpenter, & Kupfer, 1988; Young et al., 1990; Silverstein, 1999) including insomnia (Zhang & Wing, 2006), which are symptoms not considered in the DASS Depression. Thus, one reason for the lack of gender differences may be the type of symptoms included.

It has been found more broadly that gender-specific response patterns on rating scales for depression do not seem to fully account for gender differences in levels of depression (Steer et al., 1989; Stommel et al., 1993, Piccinelli & Wilkinson, 2000). Non-significant gender associations have also been documented in OS studies with other depression-rating scales: CES-D (Cohidon et al., 2012; Lee et al., 2010; Niedhammer, Chastang, Barouhiel, & Barrandon, 2006), HADS-D (Andrea et al., 2009), Spielberger State-Trait Depression Scale

(Weigl et al., 2012) and clinical interview (SCID-I, Chen et al., 2011; SCAN interview, Grynderup et al., 2012; M-CIDI, Rau et al., 2010). This might suggest that the absent gender effect was not necessarily a sole property of the DASS21. Rather than a limitation, the data may be framed as informative about the similar reporting of depression between genders.

Strengths

The conclusions reached in this study are strengthened by several factors. First, the findings were generated using an adequately large sample size. The study was advantageous in its careful exploration of each DC/S model hypothesis which revealed substantial information about employees' experience of their occupational environment and depression. Adjustments were also performed which was a limitation identified in the majority of Australian research on this topic at the time (Hall et al., 2013; La Montagne et al., 2008; Rodwell & Martin, 2013). The reporting of results also informed about the relevance of covariates to managing alternate explanations. More broadly, the discussion attempted to understand rather than ignore discrepant results.

The presentation of alternate formulations of strain and iso-strain provided evidence to reinforce caution in assuming that stressor components affect health risk equivalently. The use of the DASS21 also facilitated the consideration of depression as a distinct affliction rather than as part of a spectrum of mental disturbance. The tobit regression technique allowed the measure of depression to be appropriately preserved as a continuous variable (Lovibond & Lovibond, 1995a; 1995b) which allowed a more accurate assessment of its relation to the proposed occupational stressors. This technique had not previously been applied to OS related mental health research. The study also held practical relevance by explicitly demonstrating an association between occupational stressors and an instrument routinely used in the assessment and management of mental disorders in Australia (Crawford et al., 2011; Davies, Hooke, & Page, 2006; Ng et al., 2007), including specifically in OS management (WorkCover New South Wales & Australian Psychological Society, 2013).

Limitations

Several limitations of the research are acknowledged. First, the generalisability of results to the wider Australian Public Service (APS) or Australian workforce is constrained by the over-representation of females and employees with supervisory responsibility. In addition, the external validity of results is limited by way of the small sample size ($N = 475$)

in comparison to the pool of over 10,000 employees from the sampled workplaces and from the APS more widely ($N = > 168,000$; APS, 2009). Generalisability may also be limited to well-educated employees as employees with a significantly adverse socio-economic status were not adequately represented in this study. A further methodological limitation was that occupational categories were obtained with an open-ended question. The variation in length and depth of descriptions and the significant portion of missing data (10.3 %) prevented an accurate description of the occupations sampled and therefore generalisability to other similar employees.

A novel consideration about generalisability in this study was that participants were volunteers. To elaborate, Wu and Weaver (1997) characterised on-line surveys as representative of volunteer samples as participants self-select into the study and are typically more interested, informed, and concerned about the survey topic than other individuals; generating results that are not representative of the larger population (Herrero & Meneses, 2004). In support of this idea was the significant portion of participants indicating supervisory responsibility (42%). Therefore, these findings may be more relevant to employees with occupational roles that include supervisory responsibility and who take interest in issues about wellbeing at work.

Regarding measurement, it is acknowledged that validity on the web-based administration of the JCQ is lacking and this method may have affected the results in some undetermined manner. However, this point should be considered in light of the fact that the administration of the JCQ more frequently than not varied in delivery method without corresponding validity data (see Chapter 3). When placed in this context, the online administration method is not necessarily weaker compared to other adapted means. In general, evidence including from the DASS21 (Shea et al., 2009) have not identified marked differences between online and pen-and-paper methods that would be limiting in this context (Baron & Siepmann, 2000). Nonetheless, information is outstanding on the comparability of the online and pen-and-paper assessments of occupational stressors and mental health and conversely potential effects on sample characteristics, responses, item functioning and social desirability.

Another measurement nuance worth noting is that depression was not assessed in the context of the complete administration of the DASS21. It may therefore be argued that the use of a single subscale may have resulted in an altered interpretation or rating of distress, which may have played a role in the high scale reliability and subsequent validity. However,

Lovibond and Lovibond (1995b) showed that the use of a single scale did not affect scores on the remaining scales and so is unlikely to have grossly affected the measure of depression or its association with other study variables. Nonetheless, the inclusion of the complete DASS21 subscales may assist in excluding this explanation as well as clarifying how OS affects depression similarly to and distinctly from other clinical states.

With regard to the analytic technique, it is important to acknowledge that Tobit regression is known to under-estimate standard errors (Greene, 2004). However, this is not considered a major limitation given that the objective was to investigate whether a relationship was likely to exist between certain occupational stressors and depression. Nonetheless, this is a limitation to acknowledge for research that seeks to draw inferences about the findings, particularly conclusions about the strength of associations.

The self-report method of assessment constrains conclusions about the proposed relationship between objective stressors and illness risk (Karasek, 1979, Karasek & Theorell, 1990). Moreover, the results are limited by the explanation of common method bias whereby the use of the same means to assess stressors and strain may instead reflect spurious relations (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). The effect of common method bias has been regarded as overstated too (Conway & Lance, 2010; Spector, 2006). Accordingly, the use of self-report was considered suitable for the current study. This was supported further by: the notion and evidence that self-report associations are in part derived from the objective environment (Kivimaki et al., 2010; Rau et al., 2010), the fact that objective indices are not without limitations too (Conway & Lance, 2010), that validated scales were employed and alternate explanations factored. The historic predominance of self-report research, especially within the Australian literature, not only supports the use of self-report in this study but enhances the ability to compare results to the accumulated knowledge. Nonetheless, it is important to reiterate that this evaluation is ultimately in relation to employees' perceptions of stressors and depression symptoms. To manage this limitation, effort has been made to discuss and interpret the results in light of other self-report findings while also drawing comparisons to results from objective measures where relevant.

A related limitation is the study's cross-sectional design which does not facilitate an assessment of the causal role of occupational stressors in depression risk. In addition to the risk of common method bias as discussed above, plausible counter-arguments may be made about the direction and cause of the relationship (Brief et al., 1988; deLange et al., 2004;

Kolstad et al., 2011; Stansfeld et al., 2008). While this study does not directly test causal relationships between the DC/S model propositions and depression, the evaluation informs about the types of occupational stressors that may be involved.

Conclusion

Despite the above limitations, this exploratory study provided valuable insights into the role of occupational stressors in depression risk among Australian public service employees. As expected, depression risk was not explained by the buffer hypothesis. Strain and iso-strain were supported only when evaluated as a single combined construct. The main effects suggested that women's experience of decision authority and support from co-workers and males' evaluation of the skill discretion afforded and offer of supervisor support were relevant to self-assessments of depression risk. These relationships support the continued pursuit of research to clarify the nature of these associations. This study also generates interest in understanding the conditions under which occupational stressors may affect depression risk. The next chapters describe a novel approach to evaluating OS, *the social identity approach to stress and wellbeing* (Haslam, 2004), which is presented to enhance the supported DC/S model predictions.

Chapter 5. The Social Identity Approach to Occupational Stress

The first empirical study revealed that workplace support was a key occupational characteristic associated with employees' experience of depression. On the one hand, this is not surprising. The result is in line with the prediction that isolation or low levels of workplace support increase health risk (Johnson & Hall, 1998; Karasek & Theorell, 1990) and is consistent with the broader view and empirical evidence that low support is a risk factor for disease (Caltabiano, Byrne, Martin, & Sarafino, 2002; Cohen, 2004; Holt-Lunstad, Smith, & Layton, 2010; House, Landis, & Umberson, 1988), particularly for the unique health outcome of depression (Bottomley et al., 2010; Cohen & Wills, 1985; George, Blazer, Hughes & Fowler, 1989; Kessler & McLeod, 1985; Patten et al., 2010; Spijker et al., 2004). The negative link between workplace support and depression is also consistent with the idea that social support functions as a protective factor in health risk (Caltabiano et al., 2002; Cohen, 2004; House et al., 1998; Johnson & Hall, 1998; Karasek & Theorell, 1990; Kessler & McLeod, 1985). Finally, the notion that support is beneficial for wellbeing presents as logical and intuitive (Jimmieson, McKimmie, Hannam, & Gallagher, 2010).

While these explanations bear strong theoretical and face validity, it is difficult to ignore the fact that empirically, as reviewed in Chapter 3, the majority of prospective research on the DC/S model actually fails to support the iso-strain, main effect, or stress-buffering hypothesis of social support in depression risk. This is not dissimilar to research with other health outcomes where the buffer effect is largely absent and evidence for the iso-strain and social support main effect is mixed (Häusser et al. 2010; Van der Doef & Maes, 1998, 1999; Viswesvaran, Sanchez, & Fisher, 1998). There are also limited documentations of workplace support interventions and when implemented, the evidence is mixed for the expected decrease in health risk (Boren & Alberts, 2011; Brun & Cooper, 2009; see LaMontagne, Keegel, Louie, Ostry, & Landsbergis, 2007 for a review).

The difficulty in empirically linking social support to depression risk suggests that the processes underlying employees' inclination towards support and the influence on health risk may be more complex than accounted for by DC/S model predictions. Furthermore, given that evidence in other stress and health domains is similarly unclear for main and stress-buffering associations (Schwarzer & Leppin, 1989; Thoits, 2011) and the effectiveness of social support interventions is uncertain (Hogan, Linden, & Najarian, 2002), an explanation that elaborates on social dynamics and stress more generally may be useful to consider.

The social identity approach to stress and wellbeing in the workplace (Haslam, 2004; Haslam & van Dick, 2011; van Dick & Haslam, 2012) is regarded as a stimulating perspective that can extend knowledge about the conditions under which support at work is likely to influence health risk. The paradigm is described next followed by the evidence for its propositions before closing with a discussion about the various philosophical, theoretical and practical implications that arise from pursuing this perspective. To put simply, the claim of interest is that workplace support is more likely to occur and affect health outcomes when employees identify with the support provider. It is considered that the social identity approach to stress and wellbeing offers theoretically sound predictions about factors that might impinge on the provision and uptake of support and impact on health risk as put forward by the DCS model. The available evidence is supportive although limited in number and scope: not a single study was located that directly evaluated the asserted connection between workplace identification, workplace support and depression, as related to this enquiry. It is concluded that the social identity approach to stress and wellbeing in the workplace raises the opportunity to refine thinking about workplace support and moreover offers novel and valuable insights into the broader view of occupational stress and its management.

The Social Identity Approach

The social identity approach to stress and wellbeing in the workplace (Haslam & van Dick, 2011; van Dick & Haslam, 2012) is a newly formulated paradigm that derives from the well-established social psychology models of social identity theory (Tajfel & Turner, 1979), self-categorisation theory (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987; Turner, Oakes, Haslam, & McGarty, 1994) and more recently, the integrated social identity model of stress (Haslam, 2004). At the core of this perspective is the view that group processes are central to human functioning. The framework, and social identity theory in particular, was originally introduced to account for intergroup dynamics, notably discrimination, conflict and prejudice (Tajfel & Turner, 1979). The joint consideration of social identity theory and self-categorisation theory, referred to as the social identity approach (SIA), has since critically shaped thinking about phenomenon such as leadership (Hogg, 2001; Reicher, Haslam & Hopkins, 2005), co-operation (Tyler & Blader, 2001), helping behaviour, trust, communication and collective action including performance, especially in the workplace (Ashforth & Mael, 1989; Ellemers, de Gilder, & Haslam, 2004). Following insights into issues of stress, health and wellbeing (Haslam, 2004; Haslam, Jetten, Postmes, & Haslam,

2009; Jetten, Haslam, & Haslam, 2012), the approach has progressively been applied to the topic of stress and wellbeing in the workplace (Haslam & van Dick, 2011; van Dick & Haslam, 2012). The main ideas of this approach are outlined next. At the outset it is acknowledged that the SIA is a sophisticated model of human functioning and the following section is by no means a comprehensive account of the framework. Rather, select ideas are presented so far as to facilitate an appreciation of the way in which the SIA can inform about OS and depression risk as defined by the DCS model and as relevant to this thesis.

Social Identity Theory

A profound notion put forward by social identity theory (SIT; Tajfel & Turner, 1979) is that individuals can under certain conditions define their sense of self in terms of their group membership. As Haslam and colleagues (2009a) elaborate, when people relate to meaningful social entities such as family and friends, work and recreational groups, community and spiritual associations and regional and national entities, group members are not necessarily considered as “others” or “them”, rather they are embraced as “us” or “we”. Accordingly, in the occupational context, individuals may view themselves as members of a work group or team, organisation, occupational category or profession. The SIT also takes the view that groups are not external, prescribed, or static features of the environment. Groups instead are said to structure people’s thinking, feeling, physiology and behavior through their capacity to be internalised and contribute to self-definition (Haslam et al., 2009a). Thus social identity refers to the self that is derived from an internalised membership to a social group (Tajfel, 1972; Tajfel & Turner, 1986) and social identification (SI) is the process through which information about social groups is related to the self (Ellemers et al., 2004).

The critical stimulus for self-definition in group terms is that groups provide the essential psychological needs for wellbeing: safety, a sense of belonging, self-worth, pleasure, meaning, purpose, direction, learning and achievement (Baumeister, 1986; Tajfel & Turner, 1979; Pratt, 1998, 2001). A point of departure from the traditional view on psychological needs is that rather than being realised through the individual’s striving of personal needs (Maslow, 1943, 1954) or contact with any other (Baumeister & Leary, 1995), needs are said to be fulfilled through selective self-definition in groups that support the individual to optimally navigate their social environment (van Dick & Haslam, 2012). To elaborate, social identities are considered to provide the lens through which individuals come to understand their self in the context of the larger collective (Jetten, Haslam, Haslam, &

Dingle, 2014) and achieve beyond their individually-focused capacities (Haslam et al., 2009a). In the occupational environment, it is contended that employees do not simply identify with a prescribed team or 'any old group', rather employees are motivated towards work group memberships that foster a positive and distinctive sense of self (Van Dick & Haslam, 2012). Thus, definition in group terms is expected over that of individual differences to the extent that self-enhancement is achieved (Haslam et al., 2009a). Implicit in this idea is that social identities differ in the degree to which they are internalised.

Self-Categorisation Theory

Self-categorisation theory (SCT; Turner et al., 1987; Turner et al., 1994) develops the ideas put forward by SIT with additional theorising about the antecedents and consequences of social identification. Briefly, the key conditions under which social identification is expected to occur include the perceiver's readiness to use the social identity and the relevance or (comparative and normative) fit of the group membership (Turner et al., 1994). Perceiver readiness describes the individual's orientation or readiness to use the identity. This is informed by previous experiences as well as current expectations and desires that are relevant or likely to confirm previous experiences. Comparative fit captures the extent to which similarities between individuals outweigh the differences between them and other categories. Normative fit describes the degree to which the group's presentation matches the perceiver's expectations.

To illustrate with an example, a novice psychologist working in a community mental health setting may be inclined to identify as a psychologist rather than as a graduate or female (comparative fit) if other psychologists were contributing information about a patient's diagnosis within a meeting and if this fit with her expectations of the role (normative fit). She perhaps may be less likely to view herself as a psychologist if a male senior psychologist was acting brashly toward another staff member in which case her identity as a female or graduate may be more relevant (normative fit). In addition, the dominant identity in use, or salient identity (e.g., female or psychologist) would also be informed by the extent to which the role as a female or psychologist provided positive distinctiveness, was relevant, central, and compatible with their goals, which could be informed by career or cultural history and vision (perceiver readiness). As alluded to, these conditions are interactive, fluid and context-dependent (Turner et al., 1994). It is acknowledged that a number of other conditions shape social identification, such as the permeability of group boundaries and stability and

legitimacy of groups and group norms (Ellemers et al., 1993; Turner, 1991). The above is a simple example of the types of conditions under which self-definition in group terms may emerge in the workplace.

A key consequence of self-definition in group terms is mutual social influence (Turner, 1991). This proposition has direct relevance to the current thesis. Turner (1991) explained that individuals were in a better position to influence and be influenced by others to the extent that they viewed themselves as sharing a salient social identity with members of the same group (in-group) compared to members of a different group (out-group). For this reason, social identity is considered the critical component of effective social interaction, such as in co-operation, helping, trust (Ellemers et al., 2004; Tyler & Blader, 2000), leadership (Ellemers et al., 2004; Hogg, 2001; Reicher et al., 2005) and support (Haslam, 2004). Returning to the example above, the novice psychologist would be more likely to respond to the support of those considered at the time to represent the in-group as opposed to the out-group. The social identity approach (SIA) to social support and stress is described next.

The Integrated Social Identity Model of Stress

Principles of the social identity approach have been used to formulate a novel analysis of individuals' understanding of and response to psychosocial stress (Haslam, 2004). The integrated social identity model of stress claims that the social context and specifically social identification is the crucial missing link to understanding the stress process. Building on the classic transactional model of stress put forward by Lazarus and Folkman (1984), social identity or one's psychological membership to a group is said to inform whether a stressor is perceived as threatening (primary appraisal) and whether an individual believes that they can cope (secondary appraisal; Haslam, 2004; Haslam et al., 2009a).

The SIA argues that social identity is a critical determinant of support (Haslam, 2004; Haslam et al., 2009a; Haslam, Reicher, & Levine, 2012). Specifically, it is proposed that shared social identity provides the basis for the a) provision and b) receipt of support from in-group members and consequently c) the favourable influence of support on strain. In other words, it is expected that individuals would be more willing to offer support to those with whom they feel psychologically connected. It is expected too that individuals would be more likely to receive support and be receptive to supportive acts to the extent that they identified

with the provider. Moreover, the support provided by an in-group member, that is from ‘one of us’ rather than ‘one of them’ is expected to have a superior effect on health and wellbeing.

This is because the act of support is experienced as genuine, meaningful and identity-affirming. van Dick and Haslam (2012) observed that shared identity is linked to positive social orientations such as a greater disposition to or ‘liking’ of others, a higher sense of trust (Platow, Haslam, Foddy, & Grace, 2003), the experience of more pleasant and rewarding interactions and a stronger motivation to co-operate (Turner et al., 1987). By contrast, the absence of shared identity is expected to manifest through the limited provision and receipt of support. Acts of support also face the risk of being misinterpreted and viewed as disingenuous (Frisch, Häusser, van Dick & Mojzisch, 2014; Haslam, Reicher, & Levine, 2011; van Dick & Haslam, 2012). Returning to the example above, should the novice psychologist identity as a psychologist be salient, she may be more likely to seek out the emotional and practical support of other psychologists rather than another health graduate. Despite the same message of support, such as to seek supervision or that the situation will be ‘okay’, the views of fellow psychologists are expected to shape her experience of the work stressor and the resulting strain given that her identity as a psychologist is considered a legitimate source of reality and thus a guide of her own cognitions, feelings and behaviour.

To explain this process further, the integrative social identity approach to stress (Haslam, 2004) emphasises the social dimension to appraisals. The classic view on primary appraisals suggests that one aspect of support, informational or appraisal support, provides individuals the opportunity to compare their reactions with others and in doing so aids the understanding of a potential stressor (Cohen & Wills, 1985; Lazarus & Folkman, 1984). The SIA to stress regards such primary appraisals as a product of the perspective of and interpretations made by the salient in-group. More specifically, social identification is said to provide individuals with the basis for a shared cognitive framework for forming primary appraisals of psychosocial experiences (Haslam, 2004; Haslam et al., 2005).

A sense of shared identity is also expected to lead individuals toward more favourable beliefs about coping capacity or secondary appraisals (Haslam & van Dick, 2011). In particular, salient social identification allows the mindset to shift from considering “how *I* can cope” to “how *we* can cope”. Relevant to the thesis is that social support then transforms to an interchangeable resource between members of the workgroup with whom one has identified with, as opposed to the responsibility of the individual or a close specific other

(Haslam, 2004; Haslam et al., 2005; Haslam & Reicher, 2006). This approach also emphasises that information about one's ability to cope derives from the beliefs, expectations, norms and values of the group. Accordingly, the more that internalised perceptions and experiences of the group are shared, the more that they come to represent individuals' reality (Tajfel & Turner, 1979). Put together, social identification provides individuals with a shared cognitive framework leading to prosocial interaction and social support that is experienced in a meaningful light with genuine flow-on effects to health status (Frisch et al., 2014).

In sum, the SIA claims that social identification; the phenomenon of defining self in terms of group membership, is a direct source of wellbeing. Moreover, social identification is said to form the basis of influence, including one's experience of support and strain, as put forward by the integrated social identity model of stress (Haslam, 2004). Specifically, social identity is expected to inform primary and secondary appraisals (Lazarus & Folkman, 1984). The social identity approach enriches the traditional perspective of stress and social support through the view that social identification underpins the dynamics of the provision, receipt and interpretation of support and subsequently the effect on stressors, illness and wellness. Social identification is thus expected to reduce strain both directly and indirectly through the experience of support. As such, the integrated social identity model of stress claims that far from being just another variable, group processes are an essential element of the experience of and reaction to psychosocial stress (Haslam, 2004; Jetten et al., 2012; Jetten et al., 2014).

The Social Identity Approach to Stress and Wellbeing in the Workplace

More recently, the social identity approach has been applied to the analysis of stress in the workplace by focusing on the way in which individuals appraise and respond to psychosocial stressors in the occupational environment (Haslam & van Dick, 2011; van Dick & Haslam, 2012). Based on the insights from the SIA to stress and wellbeing, it is put forward that higher levels of social identification with workgroups lead to lower levels of strain. This is founded on the expectation that social identification leads to a greater likelihood of positive primary and secondary appraisals. Lower levels of strain are also expected owing to a general sense of psychological wellbeing that arises from positive interactions with a meaningful social group and the associated sense of belonging. The occupational environment is thus expected to be less isolating and stressful for employees as shared identity leads to a shared perspective and thus a mindset where employees feel that they are working together rather than separately or against each other (van Dick & Haslam,

2012). Social identification within the workplace is expected to increase support and in turn reduce strain.

To clarify, not only is one's psychological connection to the workgroup expected to influence *perceptions* of support but *actual* acts of support too from fellow in-group members. Social identification therefore equips employees with the resource of working together or pooled effort and the possibility for collective action. The greater ameliorative effect of support on strain also occurs as the support received from in-group members is more likely to be experienced as beneficial and less liable to misinterpretation compared to when received by out-group members. To state in statistical terms, workplace support is expected to mediate the relationship between social identification and strain (van Dick & Haslam, 2012).

Simply put, these ideas represent a number of predictions that are directly relevant to the examination of occupational stress and health risk in this thesis:

1. Higher levels of social identification with workgroups reduces the risk of illness
2. Social identification with workgroups increases the likelihood of support from in-group members
3. Higher levels of identification with workgroups lowers health risk via workplace support

With regard to the DC/S model and depression risk, the expectation follows that higher levels of identification with work colleagues and the supervisor lead to a) higher levels of support and b) lower depression risk in part c) through the support experienced.

Evidence for the Social Identity Approach to Occupational Stress

The discussion above presented a number of bold claims. Accordingly, this next section reviews the available evidence for the association between social identification and stress outcomes at work. The core proposition relevant to this thesis is reviewed first, where i) workplace identification is expected to increase the likelihood for workplace support and subsequently lower depression risk. Given the limited investigation of this relationship, evidence for ii) other mental health endpoints are subsequently reviewed followed by that for the individual propositions that social identification iii) protects health risk and, iv) increases support. Methodological limitations are shared across several studies and accordingly are discussed at the end of this section to synthesise recommendations for further research.

Overall, the evidence supports the SIA approach in stress and wellbeing. However, for the most part support was derived in a piecemeal fashion: at the time of writing it remained to be directly tested in a single evaluation whether social identification facilitated higher support at work and subsequently lowered depression risk. The evidence is summarised in Table 8.

Table 8

Study Characteristics of the Reviewed Literature on Social Identification and Strain

Author/Research Location	Sample type	N	Study Design	Measures	Adjustments	Statistical Analysis	Results
Reicher & Haslam (2006) United Kingdom	Males from the general population, screened for medical, psychological and criminal history	15	Experiment	Social Identification: Observation and a three-item generated scale Observations of social support A generated seven-item depression scale	Nil apart from the initial screening of participants	ANOVA	Depression scores increased along observations of isolation and little supportive interactions. Observations and ratings of SI improved with depression ratings
Bizumic, Reynolds, Turner, Bromhead, & Subasic, (2009) Australia	School teachers (T) and students(S)	113T 693S	CS survey	SI: four-item generated scale School climate: three-item generated scale DASS21: for stress, anxiety & depression	Age, gender, workplace tenure	Hierarchical Regression Sobel plus bootstrapping for mediation	SI(school) S associated with depression ratings, after adjustments. Social climate mediated the relationship
Haslam, O'Brien, Jetten, Vormedal & Penna (2005, Study 2) United Kingdom	Male military bomb disposal experts and male and female (50%) bar staff	20	CS survey	SI: 2 item generated scale Support: 3-item generated scale of colleague support Perceived stressfulness of work: 3-item generated scale Burnout: 5 item generated scale	Nil	Sobel mediation	Work support mediated SI (workgroup) and burnout Bar staff rated bomb work as more stressful than did bomb disposal officers
O'Brien & Haslam (2003)	Female nurses	N/A	CS survey	N/A	N/A	N/A	Low SI (team and organisation) S associated with burnout

							Work support mediated the association between SI and burnout
Jimmieson, McKimmie, Hannam, & Gallagher, (2010) Australia	First year university students/part-time employees (72% female)	155	CS survey	SI: employment work team identification Co-worker support: 5 item unspecified measure of 'instrumental' support: Role stressors: adapted items from Caplan et al (1980) General Health Questionnaire (social dysfunction)	Nil	Hierarchical regression	SI negatively associated with GHQ scores. Co-worker support, role overload, role ambiguity had a NS relationship to GHQ scores
Sani, Wakefield, Borocho, & Gulyas (2012, Study 1) United Kingdom and Poland	Polish people recruited from the general public:100 living in the UK and 94 in Poland (56% females)	194	CS survey	SI: family identification, after Doosje et al (1998) Social contact: a generated social network index Centre for Epidemiology Scale-Depression (CES-D)	Age, education	Hierarchical regression	SI but not social contact with family was negatively associated with CES-D.
Sani, Wakefield, Borocho, & Gulyas (2012, Study 2) United Kingdom	Army unit members (32% females)	150	CS survey	SI: army, after Leach et al 2008 Social contact with army employees: generated scale Beck Depression Inventory for depression	Age, army rank	Hierarchical regression	SI but not social contact with workplace colleagues was negatively associated with BDI scores.
Haslam, Jettten, & Waghorn (2009) United Kingdom	Two teams of semi-profession theatre performers (40% female)	30	LT: 5 phases: T1: start of dress rehearsals T2:4 weeks after T1, rehearsals T3:T1+8weeks,	SI: work team, after Doosje et al 1995 Burnout; generated scaled used in Haslam & Reicher, 2006	Nil	ANOVA Sobel mediation	Baseline SI predicted work satisfaction, pride and organisational citizenship behaviour as assessed just after a performance and four-weeks post-performance (14 weeks

			after rehearsal T4:T1 + 10weeks, after performance T5:T1+14weeks, post-production	Citizenship/morale/pride: generated scales Informal observations of social support			from baseline). Associations were NS at other phases. SI and the above indices were negatively associated with concurrent burnout ratings
Haslam, Jetten, O'Brien, & Jacobs, (2004) Unspecified country of recruitment: either Australia or the United Kingdom	University students (75%) female	40	Experiment	Stressor: time pressured mental arithmetic task SI manipulation: Confederate described as either in-group (student) or outgroup member (stress disorder sufferer) Appraisal: Video- recorded message of stressor task as either stressful or challenging Distress: generated and combined scale of subjective stress and anxiety	Nil	ANOVA	Task was rated as more stressful than challenging when conveyed as such by a perceived in-group member, whereas ratings did not differ by message when delivered by the out-group member. Reports of post-task distress were lower when appraisals of challenge were perceived to be delivered by an ingroup rather than outgroup members
Platow et al (2007) Australia	University students (41%)	54	Experiment	Stressor: immersing hand in ice water SI manipulation: Confederate providing reassurance about the task; presenting as a student studying either the same degree (ingroup) or a different degree (outgroup) SI: science students, after Mael & Ashforth (1992) Pain: Galvanic skin response	Initial trial	ANCOVA	Reassurance about the ease of the task was associated with lower pain when delivered by a perceived ingroup but not outgroup member.

Frisch, Häusser, van Dick, & Mojzisch (2014) Germany	University students (54% females)	90	Experiment	Stressor: mock interview via a standardised Trier Social Stress Test Support: mock interviewer's non-verbal behaviour depicting emotional support or disinterest Stress: salivary cortisol and three visual stress scales	Nil	ANOVA	Emotional support buffered salivary cortisol levels only when participants rated a sense of identity with committee members. Results were NS for the visual stress scale.

CS= cross-sectional. LT = longitudinal. SI = Social identification. Support= Social support. S = significant. UK = United Kingdom. N/A: the data is not available. O'Brien and Haslam's (2003) stress report in a general hospital was not accessible and was cited in Haslam & Van Dick (2012).

Evidence that social identification influences support at work and subsequent depression risk. Reicher and Haslam (2006) generated perhaps one of the most unique forms of evidence for the idea that workplace social identification influences the support received from colleagues and subsequent depression risk. In conjunction with the British Broadcasting Corporation (BBC), 15 well-adjusted males assumed the role of either a guard or prisoner in a simulated prison environment over nine days. The focus of the experiment was to model a hierarchical institution and test key premises of the social identity approach with inequality although stress and health outcomes were also of interest.

In what may be likened to a simulated work environment, the guards' increase in depression ratings over six days occurred alongside observations of isolation and little supportive conversations and interactions. This took place as they struggled to carry out their assigned group task of maintaining authority and resisting the challenging behaviour of prisoners. Conversely, as the prisoners developed a sense of shared social identity, as gauged by observation and a two-item scale, they were observed to be working together in resisting the imposed psychosocial conditions, with improved depression ratings (Haslam & Reicher, 2006; Reicher & Haslam, 2006).

These associations were interpreted to confirm the key notion of the SIA to stress and wellbeing: that as a sense of shared social identity developed a greater level of support was provided and experienced by (prison) group members. Together with a sense of efficacy in collectively responding to stressors, the support was considered to have improved mental health. On the flipside, the guards' experience was said to depict the erosion of social identity as participants were exposed to collective stressors and performance loss, setting a path toward depression. Thus, it was inferred that participants' mental health developed as a consequence of their social identities; that is through self-definition as a 'prisoner' and 'guard' and namely through the intervening processes of support and collective self-efficacy (Reicher & Haslam, 2006; Haslam & Reicher, 2006).

These conclusions were supported by the careful selection of healthy participants, who scored better than average on formal physical and mental health assessments at intake. Thus, the explanation that mental health deteriorated due to a pre-existing personality disposition, mental health condition, or through biased stressor perceptions is less plausible. Another strength was the convergence of findings across self-report and observational data for social identity. The sample selection, experimental design and triangulation of measures

are a major contribution to the examination of social identity principles in health risk and provide supportive evidence for the idea that depression emerges from a lack of social identification and support. The fact cannot be escaped however that the pathway of interest; where workplace identification was expected to account for higher levels of support and subsequent lower depression risk, was not directly assessed or statistically analysed. Instead it was inferred namely from concomitant observations of social dynamics and depression ratings (Haslam & Reicher, 2006; Reicher & Haslam, 2006). It is recognised that results can be generalised on the grounds of a robust theory (Haslam, Jetten, & Waghorn, 2009; Reicher & Haslam, 2006) however a more direct test would serve to better substantiate the claim, particularly in the realm of traditional OS research.

A more direct analysis of the relationship was performed on a sample of school teachers (and students; Bizumic, Reynolds, Turner, Bromhead, & Subasic, 2009). A contemporaneous association was demonstrated between school identification and depression ratings using the Depression Anxiety and Stress Scale. This relationship held even after factoring employees' age, gender and workplace tenure. Further analyses supported the notion that social climate; defined as shared values and trust, created the conditions for workplace identification and lower depression levels. However, the closely related although independent claim that workplace identification enhances workplace relations and consequently attenuates health risk (Haslam, 2004; Haslam & van Dick, 2011; van Dick & Haslam, 2012) was not considered. The finer detail about the direction of the association is discussed later in the section on theoretical implications. The study is considered here however to describe the best available evidence for the ideas of interest.

Attesting to the infancy of this line of enquiry, no further study was located that directly examined the proposition that social identification at work increases workplace support and subsequently reduces depression risk. Consequently, the evidence considered next evaluates the relationship between workplace identification and support with other mental health endpoints. In the same vein as the DC/S model, the social identity approach to stress and wellbeing at work is a general rather than disease-specific model of stress and ill-health. Thus, the review of the evidence for other health outcomes is expected to provide insights into expectations for depression risk.

Evidence that social identification affects workplace support and subsequent indices of strain. Haslam, O'Brien, Jetten, Vormedal, and Penna (2005) surveyed 20 male

military bomb disposal experts and bar staff and found that colleague support mediated the relationship between employees' identification with their occupational group and ratings of burnout. O'Brien and Haslam (2003, cited in van Dick & Haslam, 2012) also found in their report on a hospital survey, that burnout was negatively linked to nurses' identification with their work team and organisation, and mediated by (low) support. The results were viewed as evidence that burnout risk resulted from a weak psychological connection to the workplace and through which employees experienced greater isolation and felt unsupported (van Dick & Haslam, 2012). To add, the studies reviewed thus far also found supportive results for strain as indexed by burnout ratings, cortisol levels (Haslam & Reicher, 2006) and job (dis)satisfaction (Haslam et al., 2005). The evidence therefore appears to support the generalisability of the SIA as a model of occupational stress-related illness.

Interestingly, in the reported study on school identification, Bizumic et al (2009) identified a significant association between social identification and social climate on the one hand and teachers' depression ratings. Associations were not significant though for the indices of stress and anxiety, even in simple correlations. The non-significant associations were reasoned to relate to power as results for all mental health dimensions were significant in the larger sample of students ($N = 693$ students versus 113 teachers). Nonetheless the discrepant findings may challenge the assertion that SI affects general health risk.

Jimmieson et al (2010) took a related although slightly different interest in examining whether team identification would bolster the buffering effect of co-worker support on work demands and general mental distress. In a sample of 155 university students who were mostly part-time employees, ratings of work team identification were negatively associated with the assessed subset of General Health Questionnaire scores (representing social dysfunction). However, GHQ scores were not significantly associated with ratings of co-worker support, work role overload or role ambiguity and while a three-way buffer effect was found, the association was complex and not as predicted. Jimmieson et al (2010) interpreted the results to suggest that in certain contexts, employees' psychological connection to their workgroup may play a more pivotal role in wellbeing compared to objective acts of support received at a specific point. The authors suggested instead an alternate predicament; that social identification may affect health risk to a greater extent than social support.

Evidence that social identification with workgroups decreases health risk. Sani, Wakefield, Boroch, & Gulyas (2012, Study 2) reported results that echoed the above

sentiment in a sample of 150 members of an army unit. Army unit identification but not social contact covaried with ratings on the Beck Depression Inventory. Sani et al (2012) did not find this surprising, explaining that the mental health benefit of social engagement was not simply about social contact (measured as attendance at army-related social events and the amount of contact with other employees), but more so about the internalised meaning of the group relationship. Sani et al (2012, Study 1) replicated the findings in a general population sample (Polish adults; 100 from the UK and 94 from Poland), showing that social identification but not social contact with family was negatively associated with CES-D (depression) scores.

Taken together with the findings of Jimmieson et al (2010), the evidence may support a refined or alternate explanation that social identification and not objective instances of support are key to health risk. However, Sani et al (2012) considered the closely related construct of social contact and not social support and so the extrapolation is cautionary. In addition, the SIA to stress and wellbeing claims that social support is a mediator. Like Jimmieson et al (2010) however, the mediating role of social contact would not be supported by Sani and colleagues' (2012) data given the lack of association between social contact and depression ratings. This demonstrates that the argument and empirical evidence for the association between social identification, support and mental health risk is not consistent. By contrast, the evidence was largely supportive of the premise that social identification at work reduces depression (Bizumic et al., 2009; Haslam et al., 2005; Haslam & Reicher, 2006; Sani et al., 2012) and mental health risk more widely (Haslam & O'Brien, 2003; Haslam & Reicher, 2006; Jimmieson et al., 2010).

A major drawback of the reviewed literature is that while the evidence is suggestive, causal relations have seldom been assessed. Of closest relevance, the hypothesis that social identification causally affects mental health risk was investigated in a five-wave prospective evaluation with two small ($N=30$) teams of young theatre performers (Haslam et al., 2009b). Participants' baseline identification with their work team prospectively predicted work satisfaction, pride and organisational citizenship behaviour (OCB) at demanding phases of group activity, that is; following dress rehearsals (for OCB only), just after a performance and four-weeks post-performance (14 weeks after baseline). In separate analyses, social identification and the indices were negatively associated with *concurrent* burnout ratings.

However, the *prospective* association between social identification and burnout was not reported. Instead, contemporaneous associations revealed that employees who experienced a greater sense of identification with their work team rated lower levels of burnout compared to employees who indicated low levels of identification. This trend was significant only during demanding phases of group activity; that is during dress rehearsals and just after the performance. Thus, on closer inspection, while the study was prospective the hypothesis of interest; that low social identification causes (rather than is an associated consequence of) burnout was not directly considered and was instead supported by indirect associations between job-specific mental health variables. The results were also viewed as consistent with the idea that (workplace) identification buffers work demands namely through its capacity to facilitate support (Haslam et al., 2009b). The actual receipt of support was inferred from informal observations. Moreover, this explanatory pathway was not directly tested. Therefore, it is considered imperative to review more closely the evidence for this dimension of the hypothesis.

Evidence that social identification increases social support and reduces subsequent strain. A growing body of work beyond the field of occupational stress suggests that people are more likely to receive and benefit from support to the extent that shared group membership is salient. For example, in a cognitive experimental task, the effectiveness of informational support in attenuating distress varied as a function of the support provider's group membership (Haslam, Jetten, O'Brien, & Jacobs, 2004). In detail, prior to performing a fairly difficult and time pressured mental arithmetic task, a small sample of mostly female university students ($N = 40$) watched a video-recorded message of an individual who was described as either an in-group (university student) or out-group member (stress disorder sufferer). The confederate claimed to have completed the exercise and described it as either stressful or challenging. As predicted, reports of post-task distress were lower when appraisals of challenge were perceived to be delivered by a fellow student compared to when delivered by a stress disorder sufferer. The task was also rated as more stressful when conveyed as stressful rather than challenging by a perceived in-group member while distress reactions did not differ between the message-type when delivered by the perceived out-group member. These results present clear evidence that distress is not simply influenced by supportive interactions but is sensitive to underlying psychological group memberships.

Experimental studies with other health indices have reported similar findings. Platow et al (2007) found that participants who were tasked to immerse their hand in ice water showed lower pain (physiological arousal as indexed by galvanic skin response) when they received reassurance about the ease of the task from a perceived in-group member (a student of the same university degree) compared to when the support was provided by an out-group member (a student studying a different degree). This conditional stress buffering effect of social support was also found using salivary cortisol (but not with an accompanying visual stress scale). Frisch, Häusser, van Dick, & Mojzisch (2014) administered to students a standardised social evaluative stress test which involved a mock interview with committee members. Committee members' non-verbal behaviour was manipulated to represent emotional support, for example through smiling and nodding versus sighing and frowning. It was found that emotional support only buffered against strain when participants indicated a sense of social identity with committee members. The relationship was supported by a manipulation check that confirmed that either personal or social identity was salient.

Taken together, the results plausibly demonstrate that social support modulates strain through shared group membership. The strength of the findings however is tempered in that the buffering effect of support was not found using an alternate measure of pain (Platow et al., 2007) or a subjective rating of stress (Frisch et al., 2014). The results might also be explained respectively by high ceiling effects and the use of a novel visual analogue stress scale. Alternatively, the results might suggest that the stress buffering effect is not equivalent across psychological and physiological measures. Direct knowledge about whether workplace social identification enhances the experience of workplace support and mitigates the risk of depression as outlined by the DC/S model would thus be an important and novel contribution to the evaluation of these claims.

Methodological Limitations of the Data

The accumulated evidence on this topic bears a number of methodological limitations that relate to measurement, analysis, design and sample size. First, more often than not, the measurement of mental health was uniquely generated from validated scales but were not actually validated measures themselves. This was the case for all measures of burnout (O'Brien & Haslam, 2003; Haslam et al., 2005; Reicher & Haslam, 2006; Haslam et al., 2009b). In turn this affects the accuracy of claims about burnout. Indeed, the single reviewed prospective study found unsatisfactory reliability for the burnout measure in two phases of

testing (Haslam et al., 2009b). Similarly, the reliability of a generated perceived stress scale was found to be below tolerable limits (Haslam et al., 2004). The scale was then combined with two other validated anxiety scales that were adapted to refer to the recall of anxiety during the experimental task. A valid assessment of clinical distress is consequently difficult to ascertain from such generated or adapted measures. This also muddies attempts to make clear inferences about the aggregate data on certain health outcomes.

Depression however was typically evaluated with validated measures: the Beck Depression Inventory (Cameron, 1999; Rosenthal et al., 2014); CES-D (Sani et al., 2012); DASS21 (Bizumic et al., 2009). Depression was also assessed with a four-item generated scale (Haslam et al., 2005) and seven-item generated scale (Reicher & Haslam., 2006). To detail, Reicher and Haslam (2006) reported in their experiment, daily average depression scores that on visual inspection appeared to vary to an upper limit of 2.5 units on a seven-unit scale. The problematic nature of using scales without specified properties is that the clinical significance of elevated scores are unclear. This point may be considered minor in demonstrating the significance of SI in depression risk particularly as results did not differ between studies that used validated or generated scales (Haslam et al., 2004). At the same time, this leaves the best available evidence in the OS domain open to challenge about construct validity and clinical relevance. Given the availability of validated clinical measures, further research on this topic would benefit from the use of such instruments to support more accurate claims about health phenomenon.

As alluded to earlier, the evidence for the role of work identification in the experience of workplace support and depression tended to be inferred from the data rather than empirically evaluated and supported. For example, Haslam et al (2005) reported correlations between ratings of depression, work identification and colleague support. The simple correlation between social identity and depression was explained via the protective role of support however further analyses such as a mediation was not tested. Also, in the noteworthy simulated prison experiment, Reicher and Haslam (2006) inferred through self-report and informal observation data that a change in the guards' identification led to the change in stress outcomes. However, on closer inspection, the data revealed that the guard's depression did not *significantly* increase. Furthermore, the role of social identity in depression was not directly analysed apart from analyses that separately showed significant differences between prisoners and guards' sense of identity and depression levels over the study period. Thus

while the interpretation of the data is theoretically sound, clear empirical data is lacking for the key notion that social identification modulates the link between workplace support and clinical levels of depression.

In addition, the two prospective or multi-wave analyses did not account for reversed relations. To explain, in their analysis on theatre performers, Haslam et al (2009b) did not adjust for the alternate explanation that initial distress lead to subsequent low identification and/or support. Also, Haslam and Reicher (2006) noted associations between observations of support and social identity on Day 2 which were subsequently linked to stress and burnout on Day 6, however earlier measures of strain were not accounted for as an explanation of subsequent distress levels. These additional analyses would provide evidence to address other plausible explanations, notably that distress leads to low levels of identity and subsequent support or that distress precedes low support which in turn affects the inclination toward social identification. Thus, while the data is supportive, caution needs to be exercised around attributing associations to the uni-directional pathway of social identification causally affecting social support and subsequent depression risk.

A further consideration was the wide operationalisation of the social support concept. Experimental studies assessed informational support (Haslam et al., 2004), non-verbal gestures (Frisch et al., 2014) and reassurance (Platow et al, 2007) or observed supportive interactions, for example conversations with content that suggested co-ordination, positivity and collective efficacy (Reicher & Haslam, 2006) although these were not based on a standardised scoring system. Only one study used a validated scale, although the measure of instrumental co-worker support was also reported to be in an adapted form (Jimmieson et al., 2010). In addition, other studies tested related concepts such as social climate (Bizumic et al., 2009) or social contact (Sani et al., 2012). Haslam et al (2005) also constructed an overall scale of social support.

On some level these differences are trivial, particularly given that different types of support (e.g., instrumental, informational and emotional) tend to correlate highly (Cohen & Wills, 1985; House and Kahn 1985; Schwarzer & Leppin, 1991) and are considered to naturally co-occur (Cohen & Wills, 1985). It may also be argued that the varied operationalisations demonstrate the broad relevance of social identification to social dynamics. At the same time, a clear understanding of the type of social engagement that is affected by social identification in the workplace would ultimately guide intervention efforts

and expectations. More immediately, the use of standardised measures as more typically utilised in the assessment of social identification would assist with replication and an accurate interpretation of the accumulating evidence on this topic.

An arguably major drawback of the accumulated research on social identification, mental health and occupational stressors is the largely correlational and cross-sectional evidence. It is acknowledged that the experimental approach is particularly advantageous in providing strong support for causality. However, whether social identification has the capacity to influence more chronic and sustained mental health outcomes rather than acute or momentary reactions of depression (Reicher & Haslam, 2006) or general distress (Haslam et al., 2004; Frisch et al., 2014) is uncertain. Collectively, the enquiries reviewed impede clarity about the proposed causal sequence particularly in the face of plausible alternate explanations. For example, the contemporaneous relations between social identification and depression (e.g., Bizumic et al., 2009; Sani et al., 2012) may equally be explained by the ‘gloomy’ perception mechanism (deLange et al., 2005) or by personality (Brief et al., 1987), where poor mental health is considered to increase the likelihood of a greater negative experience of social dynamics and strain. Also, while the single prospective study on theatre performers clarified that stress ratings after the final performance did not cause low identification at baseline (Haslam et al., 2009b), more critical explanations were not considered such as the ‘gloomy’ perception mechanism or conversely the ‘rosy’ perception explanation (de Lange et al., 2005); where initial levels of low stress lead performers to a greater orientation toward resources such as social support and identification.

The sample sizes of the reviewed studies ($N=15$; Reicher & Haslam, 2006 to $N=150$, Sani et al., 2012) also halt a robust assessment of alternatives. With exception, Bizumic et al (2009) supported the notion that SI was a consequence of social support although did not report on the original proposed relationship of SI as an antecedent to support as put forward by the SIA to stress and wellbeing (Haslam, 2004). In fact, strictly speaking, research for the most part did not specifically evaluate the central claim of a mediation relationship, although a stress-buffering effect of social identification was also articulated in the SIA approach to stress (Haslam et al., 2004). On closer inspection of the studies reviewed, social identification was variously assessed as; a main effect only (Sani et al., 2012), a moderator of support, buffer of workplace demands (Jimmeison et al., 2010) and a buffer of physiological stress reactions (Frisch et al., 2014; Platow et al., 2007) in addition to the proposed indirect effect

on depression through social support (Haslam et al., 2004; Haslam et al., 2005). The various formulations and research questions make it difficult to compare and synthesise results.

Lastly, the omission of adjustments in all but two analyses (Bizumic et al., 2009; Sani et al., 2012) is regarded as problematic for making accurate claims about the place of social identification in health risk above and beyond traditional risk factors. This is important as demographics such as female gender have well-established links with heightened depression risk (APA, 2013). Thus far from trivial, the study of the SIA to stress and wellbeing may very well be progressed by methodological improvements and a cohesive theoretical integration of the key and various relationships between SI, workplace support and health risk, based also on the emerging data.

In sum, the limitations of the evidence can be summarised as relating to issues of measurement, analysis, design and the management of alternate explanations. These aspects have been discussed in some detail to illustrate the gap in knowledge about the role of social identification in occupational stress research. Moreover, this discussion was considered important to support the serious uptake of the SIA within the traditional OS domain, which after decades of evaluation, is characterised by rigorous testing. The preliminary evidence obtained and the insights offered by the social identity approach compel further enquiry into whether social identification enhances the likelihood that workplace support reduces depression risk. Prior to embarking on this empirical exercise it was considered sensible to consider the implications of pursuing these ideas. The various theoretical, philosophical, empirical, practical and legal implications that arise from examining this research question are discussed in light of its integration with the DC/S model.

Philosophical Considerations

The social identity approach can be viewed as sharing the perspective of the DC/S model in largely locating the source of strain and disease in sociological processes (Haslam & van Dick, 2011; Karasek & Theorell, 1990; van Dick & Haslam, 2012). Consequently, both frameworks view the amelioration of strain and promotion of health as primarily a task of primary prevention. More specifically, both approaches indicate for change universally stressful socio-structural conditions and cultural factors; through the re-organisation of work (Karasek & Theorell, 1990) and specifically (work) group processes (Tajfel & Turner, 1979). The joint consideration of the models in the prediction of social support also brings to light an

emphasis on health risk as the result of social conditions which are ‘more or less’ optimal (van Dick & Haslam, 2012).

While both models emphasise social-contextual features and not individual dysfunction and pathology as the central process of disease, the theories present different although not incompatible interpretations of the key features involved. The DC/S model considers heightened health risk as a consequence of high demands, low control and low support and the SIA defines the ‘cure’ as social identification with relevant and meaningful workgroups (Jetten et al., 2012). The SIA is viewed to enhance the DC/S model perspective by suggesting that access to psychological and material resources (such as manageable demands and adequate support and control) can be facilitated through the formation of sustainable groups (Haslam, Eggins, & Reynolds, 2003). In fact, Karasek and Theorell (1990, p.70) contemplated that social support might affect wellbeing and health through a sense of identity; described as the degree of social cohesion and integration to the overall work group and indexed by trust and social and emotional integration between co-workers, the supervisor and others. The SIA posits though that rather than simply an afterthought to knowledge about stress or its management, group processes are essential to its understanding (Haslam, 2004; Haslam et al., 2005; Haslam & van Dick, 2011; van Dick & Haslam, 2012).

Theoretical Considerations

Accordingly, the SIA refines expectations of the DC/S model for the effect of workplace support in health risk. Rather than assuming that the key health effect depends primarily on the receipt of objective practical and emotional support (Johnson & Hall, 1988; Karasek & Theorell, 1990), the SIA considers the active component as the internalised psychological connection to the group (Haslam, 2004; van Dick & Haslam, 2012). Haslam et al (2005) illustrate this well by pointing out that social support is not a free-floating variable that is imparted to people at random nor is it accepted to arise when people are observed to ‘belong’ to a group or category. Instead, support is expected to be perceived, received and effective only when individuals experience a meaningful and self-defining link to the support provider’s perceived group membership. This view adds a fluid perspective to the classic view of strain by emphasising a social and dynamic process among group members.

An advantage of the SIA is that it provides an additional theoretical lens in which to interpret the (lack of) support in evaluations of the DC/S model in health risk. To illustrate,

the non-significant results between support and depression described in Chapter 3 may suggest a number of processes: a lack of employees' identification with work groups; that workgroups may not be providing employees with important psychological needs such as stability, direction and meaning; that group life is not fostered in workplaces and therefore may not be salient, relatedly that personal rather than social identification is salient, that prospective associations tend to be unsupported due to the dynamic versus fixed nature of social identification and support, and that objective measures of support may not provide an appropriate insight into the employees' psychological relationship to the group. Also, the emerging finding that the psychological connection to the group and not mere social contact is key to mental health (Jimmieson et al 2010; Sani et al., 2012) suggests that objective or group averaged indices of support (e.g., Bonde et al., 2009) as advocated in DC/S model research (Karasek et al., 1985; Kristensen, 1995) may be problematic representations of support. These ideas highlight that the inclusion of the SIA in the study of OS generates a number of hypotheses and explanations that could advance the evaluation and understanding of the association between workplace support and (mental) health risk.

The SIA and DC/S model may also be viewed as presenting competing expectations about the central component of OS. As noted above, on the one hand, the DCS model argues that ill-health arises from the combination of low support, low control and high demands (Karasek & Theorell, 1990) whereas the SIA presents the case that social identification is the central component of OS (Haslam, 2004; Haslam & Dick, 2013; van Dick & Haslam, 2012). More specifically, the DC/S model predicts that support directly affects health risk and buffers the effects of high demands. The SIA similarly claims a direct and buffering effect of support on health risk however the effect of support is proposed to be contingent on social identification (Haslam, 2004; Haslam & van Dick, 2011; van Dick & Haslam, 2012).

Both models similarly articulate multiple pathways for the effect of support on depression risk through a direct and buffering role. It is considered that the precise mechanism through which workplace social support (and social identification) affects health is yet to be clarified. To elaborate, the DC/S model expects health risk to be affected by main, buffer and additive effects of support in conjunction with work demands and control. Despite the accumulated evidence that suggests a largely absent buffer (Häusser et al., 2010; Van der Doef & Maes, 1999) or additive iso-strain effect (see Chapter 4), the DC/S paradigm has not been revised to accommodate such empirical findings. Research on the SIA approach and

depression has also revealed limited support for the buffering effect of workplace identification and support (Jimmeison et al., 2010; Sani et al., 2012) which indicates a convergence on claims about strain. Following the reverse and reciprocal relations found between stressors and strain in research on the DC/S model (e.g., deLange et al., 2005; Strazdins et al., 2011), the SIA may be expanded by a more complete account of stress and wellbeing in the workplace that includes such relationships.

The consideration of the SIA within the realm of OS raises further questions about stress mechanisms. To elaborate, the DC/S model considers health risk to result from prolonged exposure to occupational stressors (Karasek, 1979; Karasek & Theorell, 1990), although the necessary duration of exposure for illness to develop is not yet clear (de Lange et al., 2004; Dorman & Zapf, 2002). The query then follows as to whether it is chronic exposure to low social identification that affects strain, and if so, the necessary exposure time for health risk to be affected. The largely cross-sectional evidence on the SIA precludes such an analysis and the experimental evidence while advantageous in clarifying causality, prevents a more complete assessment of the idea that strain is a consequence of chronic exposure to low identification. The BBC Prison study (Haslam & Reicher, 2006; Reicher & Haslam, 2006) revealed that after a duration of six days, two participants who were in the condition of declining identification withdrew from the experiment, suggesting that even a short duration of this type of exposure may be sufficient to bring about strain.

It is considered that the SIA also presents an alternate perspective on the mechanisms involved in stressor to strain relations. The SIA takes the position that social identification is dynamic and fluid and its effect on outcomes considered context-dependent (Tajfel & Turner, 1979; Turner et al., 1994) as opposed to static. Accordingly, it is contemplated whether the SIA may be more consistent with the expectation that risk is not as crucially dependent on the duration of exposure rather the presence of other contemporaneous dynamics such as salience, fit, and the legitimacy and permeability of group boundaries (Ellemers et al., 1993; Turner, 1991).

The SIA's emphasis on concurrent factors might also account for the general lack of support of prospective data for the main effect of workplace support in depression risk (Andrea et al., 2009; Bonde et al., 2009; Godin et al., 2009; Inoue et al., 2010; Smith & Bielecky, 2012; Stansfeld et al., 2012; Wang et al., 2012a; Weigl et al., 2012). Instead, it might be that group dynamics that are consistent over time account for the chronic or stable

nature of social identification and the resultant effect on health. Alternatively, the SIA may suggest that malleable factors such as social identification are powerful enough to shape or modulate the experience of stressors and its effect on health. These points are raised here to caution that while relationships between the DC/S model and social identification on the one hand and depression on the other may be statistically significant, their theoretical foundations may suggest different underlying processes or mechanisms of health risk.

In sum, the examination of the social identity approach to stress and wellbeing within the occupational stress domain and specifically in the context of the demand-control-support model presents a number of avenues for theoretical advancement. This involves clarification about the processes involved in workplace support and the relevance of exposure duration in comparison to other psychosocial processes in health outcomes. The study of both models raise the opportunity to refine ideas contained in the individual theories as well as thinking about OS more broadly.

Practical Implications

The practical recommendations that arise from considering the SIA in addition to the DC/S model are briefly touched upon here. The SIA contributes the idea that the quality of group life forms an essential component of the assessment and management of OS (Haslam & van Dick, 2011). Accordingly, the SIA cautions the assumption that support and mental health will improve simply through the encouragement of verbal or objective acts of support or social contact and physical proximity (Johnson & Hall, 1998; Karasek & Theorell, 1990). Interventions might be rather geared toward the promotion and maintenance of meaningful psychological connections to other employees and social exchanges that foster group identification (Haslam et al., 2003; Haslam et al., 2009a; Jetten et al., 2012), that in turn, are expected to create the conditions for resources such as support to naturally emerge and influence stress and wellbeing outcomes.

The SIA also brings to light the complexities of social dynamics, for example the view that workgroup identification is not fixed and may be responsive to a range of socio-cultural conditions that can affect the way in which support is experienced and the influence on health risk. Overall, The SIA is considered to contribute a theoretical framework that not only enhances the prediction of workplace support and mental health but also guides the

effective delivery of interventions at work through its discussion about group dynamics and influence (Haslam et al., 2003).

Legal, Political and Economic Implications

The recommendations that emerge from SIA about the management of OS carry legal, economic and political implications that are important to acknowledge (Haslam & Reicher, 2006; Jetten et al., 2012; Haslam & van Dick, 2011). Within the legislative arena, the discussion about social identity as a stressor and a means to prevent or reduce OS leads to the question of whether a lack of social identification or poor group life is a psychosocial hazard. Similar to workplace demands, control and support, it is certainly plausible that social identification can be conceived of in this way given that a psychosocial hazard is defined as an aspect of the organisation, design or content of work and the social, management and organisational conditions that have the potential to cause psychological or physical harm (Cox & Griffiths, 2005; WHO, 2010).

This conceptualisation could shift the notion of social identification from an ancillary (albeit vital) factor for promoting resources at work to that of an occupational hazard; which requires organisational responsibility for its prevention and management (International Labor Organization, 2001). Moreover, the legal obligation for employers to manage health and safety in Australia (SWA, 2012) together with the enforced penalties (SWA, 2016) suggests that low social identification at work or its mismanagement could be associated with serious consequences. In this view, at the least, social identification could assist in preventing breaches to legislation and costly outcomes. Clearly this is a significant leap from discussing about whether social identification may increase support and reduce subsequent depression risk. While the ideas still require empirical testing, such flow-on implications and areas of contention are considered important to acknowledge at the outset of the empirical assessment.

The SIA shares a similar conundrum with other OS models whereby the proposed change of socio-cultural or occupational features is embedded in macro-level processes of politics. Specific to the SIA, the uptake of the research findings may be constrained by larger issues relating to social change and power; as a shared versus individual experience of stress is more likely to influence unfavourable conditions in the workplace and consequently the workforce (Haslam & van Dick, 2011; Reicher, Haslam, & Hopkins, 2005; Turner, 2005; Haslam, 2014). This wider implication has a bi-directional effect on the value of this

evaluation which on the one hand may result in the limited engagement in such research and thus little value in its enquiry or conversely, its investigation may hold great potential to empirically support significant change to OS management (Haslam et al., 2009a; van Dick & Haslam, 2012). The latter scenario prompts the investigation.

Ethical Considerations

Prior to embarking on this investigation, it is considered sensible to factor any associated risks. As for the buffer hypothesis of the DC/S model, the proposed and demonstrated strain buffering properties of social identification may inadvertently provide an empirical basis to maintain unjust or exploitive occupational conditions including specifically the manipulation of social relations and groups (Carrette, 2003; McDonald & Bubna-Litic, 2012). Furthermore, given its base in subjective psychological experiences, evidence from the SIA is considered particularly vulnerable to justifying the target of individual factors or perceptions rather than to group conditions or dynamics. For example, Jenkins (2008, p.115) critiques that the SIA is a process that largely occurs “inside people’s heads”. McDonald and Bubna-Litic (2012) elaborate that the SIA attributes external factors such as politics, economics and socio-cultural conditions to an issue of the employee’s psyche, leading to employee responsibility at the expense of changes to the broader socio-cultural system.

To minimise the risk of misuse or misinterpretation of the SIA, the philosophical standpoint is reiterated that stress is considered a socially constructed rather than a pre-determined aspect of individual pathology (Haslam, 2004). The SIA consequently locates the amelioration of stress in the creation of salient, fulfilling, and sustainable groups that in turn naturally provide members with the psychological and material resources to manage stress effectively and appropriately (Haslam & Reicher, 2006; van Dick & Haslam, 2012).

Another point to bear in mind is that identification with groups is not always healthy and may even be harmful. One reason may relate to the content of identities such as norms and values which may not be health-promoting or may lead to poor self-esteem (Jetten et al., 2014). In the work context for example, social identification may instead operate as a stressor and pose a threat to wellbeing if employees identify with groups that are seen in some way as inferior to others (Branscombe, Schmitt, & Harvey, 1999; Haslam et al., 2009; Jetten et al., 2012). Also, certain workplaces or work teams may foster norms, work ethics or a culture not conducive to health, such as workaholism (Avanzi, van Dick, Fraccarolia, & Sarchielli,

2012). Over-identification with a single workgroup, organisation or work identity may also pose a risk to health if it encourages individuals to invest heavily or exclusively in that one group membership at the expense of others (Ashforth et al., 2008; Avanzi et al., 2012; van Dick & Haslam, 2012). Highly identified employees may be particularly vulnerable to strain if the workgroup collectively fails or changes (van Dick & Haslam, 2012). Accordingly, it is acknowledged that the content, conditions and treatment of the social identity shapes the potential for benefit or risk to health (Jetten et al., 2014).

This reflection on whether social identification might be harmful is not a unique consideration of the SIA but rather an extension of the general caveat about the benefits of social relations (Cohen & Wills, 1985). It is opined that the various benefits that arise from examining workplace social identification outweigh the potential harm associated with group processes. For the purpose of this thesis it is emphasised that the intent of considering SIA is to ultimately enhance the primary management of stressors that may affect depression risk in a theoretically grounded, viable and creative way.

Conclusion

The main purpose of this chapter was to introduce the SIA to the study of OS and specifically to enhance the prediction of social support in the DC/S model. The social identity approach to stress and wellbeing brought to light several philosophical, theoretical, empirical, practical, ethical and political considerations that stimulated further thinking about OS. The discussion raised the compatibility of the two perspectives on the key role ascribed to socio-cultural factors rather than individual dysfunction and the importance of social relations in stress and health. The SIA broadened thinking by suggesting that group life is essential to the conceptualisation of social support and stress more broadly.

The large research activity on the DC/S model also prompted the SIA to stress and wellbeing in the workplace to articulate a clearer view on the relevance of chronic exposure to poor social identification as a mechanism of influence as well as competing explanations. The review of SIA research showed that despite a sound theoretical base and preliminary evidence suggesting that workplace identification increases social support at work and subsequently reduces depression risk, there is considerable need for more direct and rigorous evaluations of the idea. It was identified that the precision of assessment may be enhanced specifically through prospective investigations, the use of specific measures of depression,

larger sampling and more robust analyses including the management of confounds. Attention to these measurement issues, which are also raised in the early research on the DC/S model, would position the SIA to be a well-received perspective of occupational stress. This chapter convincingly illustrated that the consideration of the SIA with the DC/S model provides a sound platform from which to advance knowledge about OS and depression risk. The subsequent chapter develops several ideas within the SIA to support a current evaluation and is followed by the empirical study that also seeks to address the identified limitations.

Chapter 6. Conceptual Developments to the SIA to Stress and Wellbeing at Work

The previous chapter presented the SIA to stress and wellbeing in the workplace as an emergent view of occupational stress and furthermore as a model to enhance the understanding of workplace support as put forward by the Demand Control/Support model. The current chapter is concerned with developing a number of ideas within the SIA. The notion that social identification influences workplace support is explicitly proposed to pertain to both instrumental and emotional support, as defined by the DC/S model. The key idea developed in this chapter is that social identification also influences workplace control as defined by the DC/S model. With regard to the specific health outcome of depression, the novel idea is elaborated on that social identification impacts depression risk to a greater extent than it does other health outcomes. With respect to occupational stress risk, it is clarified that while the direct effect on depression may be greater than that for other health outcomes, equivalent health risk is expected via the pathway of workplace support (and control). To appreciate the key driver of this process, the proposed multidimensional nature of the social identity construct is discussed. Also, the various targets of social identification at work are brought to light and a suitable level of analysis for the subsequent empirical study is considered. For ease of discussion, the *social identity approach to stress and wellbeing in the workplace* in this chapter is referred to as the SIA.

Theoretical Developments on Social Identification and Social Support

The merging of the SIA with DC/S model predictions for workplace support and health risk raise the opportunity to refine predictions about social identification and support. Social support in the DC/S model is defined as the “overall levels of helpful social interaction available on the job from both co-workers and supervisors” (Karasek & Theorell, 1990, p.69). The concept is detailed as being represented by instrumental and socio-emotional support which is reflected in the associated instrument developed (Karasek et al., 1985). Socio-emotional support is described as the degree of social and emotional integration and trust among employees including in the workgroup.

As a side point, this bears a striking similarity to the idea of social identification as representing one’s psychological connection to a group membership (Tajfel, 1979). Nonetheless the actual measure of support through items such as, “People I work with are friendly” and “My supervisor pays attention to what I am saying” reflect the classic view of

emotional support as involving expressions of care, trust, and opportunity for emotional expression (Cohen, 2004). For the purpose of this analysis, social identification and social support as defined by the DC/S model are considered distinct concepts.

The social identity approach discusses that social identification is especially likely to affect informational and instrumental support (Haslam, 2004). In other words, SI is expected to guide the understanding of potential stressors as well as tangible resources or aid from others, respectively (Cohen & Wills, 1985). Consistent with the definition adopted by Karasek and Theroell (1990), it is explicitly expected that social identification influences not just instrumental or informational aid but emotional dimensions of support too.

Social Identification may Influence Workplace Control and Subsequent Health Risk

Theoretical considerations. Theoretically, social identification at work is expected to influence not only workplace support but occupational stressors and resources more broadly (Haslam & van Dick, 2011; van Dick & Haslam, 2012). Accordingly, it is speculated that social identification could enhance DCS model predictions beyond workplace support. It is proposed that social identification a) positively predicts decision latitude and in turn b) increases the likelihood that decision latitude affects health risk. In line with the theorising for social support (Haslam, 2004; van Dick & Haslam, 2012), this hypothesis captures the idea that health is i) protected from high decision latitude and its proposed precursor of high workplace identification and conversely ii) at risk via low social identification and subsequent low decision latitude.

These expectations derive from a number of theoretical arguments. As noted above, the SIA (Haslam & van Dick, 2011; van Dick & Haslam, 2012) suggests that social identification structures the experience of organisational stressors. The approach asserts that the “capacity for an organisational stressor to induce stress will vary as a function of its relevance to an organisational identity that is currently salient” (van Dick & Haslam, 2012, p.167). This claim is concerned with predicting the perceived stressfulness of the occupational environment and anticipates that relevant group memberships shape the experience. Evidence to support this premise was inferred from a study on bomb disposal officers and bar attendants who were asked to rate both the stressfulness of bomb handling and bar service (Haslam et al., 2005). As expected, the bomb disposal officers reported the task of bomb-handling as minimally stressful while bar service workers reported the task as

highly stressful. It was explained that participants' respective professional identity accounted for the differences in stress ratings of the same task. Although a reasonable account, an equally plausible explanation could be that bomb disposal operators simply had greater skills and experience compared to bar staff or the general population.

The theoretical rationale for the current prediction for workplace control certainly follows from the view that social identification influences the stressfulness of occupational characteristics. However, the supportive evidence noted above is not considered a clear representation of the proposition within occupational stress, particularly as it may be inferred that skill discretion accounts for the reduced perception of strain. As the task at hand is to put forward the theoretical backbone of this novel claim, it is considered important to clarify the position on the underlying rationale. The mechanism through which SI may affect workplace control and specifically decision latitude is supplemented by the line of reasoning in a subsequent proposition of the SIA.

A key proposition relevant to the current theorising about control is that put forward for workplace support, which was extensively discussed in the preceding chapter. To restate, social identification with a workgroup is expected to lead to greater support from those group members and that support is assumed to exert a greater influence on strain compared to when identification with support providers is low (Haslam & van Dick, 2011; van Dick & Haslam, 2012). These processes of mediation are also considered directly relevant to workplace control such that social identification at work could also lead to greater control and that control may exert a greater influence on strain than when identification with group members is low. Beyond a superficial substitution of terms, the prediction is considered consistent with the underlying processes of social identification too: namely, that shared group membership motivates positive interactions including the motivation to co-operate (Turner, 1991) and co-ordinate behavior in a way that is consistent with that identity (Haslam & Reicher, 2006; van Dick & Haslam, 2012).

Accordingly, it is plausible that the components of decision latitude: the opportunity for skill use and development (skill discretion) and the influence over work tasks (decision authority) may be part of these collective goals. Moreover, given that the interactions of group members that promote skill use and development and decision-making capacity are likely to be interpreted in the spirit intended, health risk is expected to be affected to a greater extent than when identification with others is low. The superior influence on health risk is

also expected as the shared cognitive framework afforded by social identification empowers a collective response to stressors that can be more effective than individual efforts (van Dick & Haslam, 2012). Conversely, a low sense of shared identity may result in the actions of others that appear to support skill use and input being ineffective and construed as disingenuous. This highlights that the dynamics of decision latitude may be a largely social process.

The expectations for workplace control are also considered consistent with ideas put forward by the integrative social identity approach to stress (Haslam, 2004), which underpins the SIA to stress to wellbeing at work. Building from the classic transactional model of stress (Lazarus & Folkman, 1984) and through the same processes specified for social support (Haslam, 2004), social identification could influence control and subsequent health risk through the appraisal process. To reiterate, social identity is hypothesised to influence primary appraisals through group-informed and not just unique judgments of the relevance of potential stressors; which theoretically includes low control. Less threatening and positive primary appraisals are considered more likely due to the prosocial interaction underlying identification. Conversely, a lack of identification may heighten primary appraisals of low control as experiences become more of an individual and isolated experience. Social identification is also expected to affect control through secondary appraisals, whereby group membership may enable- or the lack of identification disable- the experience of skill discretion and decision authority as a means to cope with stressors and strain.

Finally, this development is consistent with the dominant view of OS as presented in Chapter 2 that involves a range of intervening variables (LaMontagne & Keegel, 2012; Mark & Smith, 2008). A point of difference however is that the SIA suggests that the experience of stressors or resources such as support (and by extension control) is possible *only* through social identification with group members (Haslam, 2004; Haslam et al., 2009a). The biopsychosocial view of (occupational) stress (LaMontagne & Keegel, 2012; Caltabiano et al., 2004) persuades that it may be more accurate to expect that SI is one (albeit crucial) aspect to understanding stress and the key variables of control and support. A second point to clarify in relating social identification to the DC/S model is that social identification is expected to not just influence perceptual or subjective experiences of the occupational environment but ‘objective’ conditions too. This is argued on the premise that the process of SI *creates* social reality (Eggins et al., 2003) and that shared experiences *reflect* social reality

(van Dick & Haslam, 2012). Thus the view adopted is that social identification influences both perceptions of and ‘objective’ levels of control as described by the DC/S model.

Evidence for an Association Between Social Identification and Decision Latitude

To the best of knowledge, this thesis includes the first study to empirically evaluate the proposition that social identification increases workplace control and heightens the effect on depression risk as described by the DC/S model. Accordingly, research that has evaluated assertions conceptually similar to skill discretion and decision authority are considered next.

Evidence for skill discretion. Supportive evidence for the idea that social identification influences the skill discretion component of control or decision latitude can be gleaned from research on stereotyping and task performance. In the absence of direct evidence, Stone and colleagues’ (Stone, Perry, & Darley, 1997; Stone, Sjomeling, Lynch, & Darley, 1999; Stone, 2002) examination of reactions to racial stereotypes about athleticism is considered informative. The studies were based on the assumption and evidence that racial stereotypes about innate performance ability favour African Americans over White Americans (Stone et al., 1997). Stone et al (1999) found that when racial identity was primed, White Americans performed worse when informed that a golf task was diagnostic of natural athleticism compared to when the task was described as indicative of sports intelligence. African Americans also performed worse; indexed by a greater average of strokes, when the golf task was described as indicative of sports intelligence rather than of natural ability or with no prime on race.

In what may be likened to a further representation of skill discretion, Stone (2002) documented that White Americans who identified strongly with their race also practiced less and displayed less effort when the task was described as a test of natural ability than when described as being about psychological factors associated with general sports performance. The relevance here is that while the number of strokes and hand-eye co-ordination involved and the time and effort put toward practice were used to indicate performance, these features also share tones of skill use and development respectively. Therefore, such results present crude evidence for the idea that self-definition in group terms can affect skill discretion.

Similar evidence can be gathered from other experimental studies on stereotype threat and performance that examine the application of cognitively demanding skills (Harrison et al., 2009; Schmader, 2002; Spencer, Steele, & Quinn, 1999; Steele & Aronson, 1995). To

illustrate, following the stereotype that females perform poorer at math compared to males and evidence of such gender differences in complex problem-solving tasks (Hyde, Fennema, & Lamon, 1990), women who regarded gender as an important part of their identity, attempted fewer questions and scored lower on a complex math test when gender identity was salient compared to males and females who did not consider gender to be central to their identity (Schmader, 2002). Again, while performance was considered to be affected by stereotype threat from internalised group memberships, the results are considered as further evidence that the opportunity to exercise skills may depend on the experience of self in group terms. There is clearly a gap in knowledge however about the capacity of social identification to affect skill discretion as described by the DC/S model (Karasek & Theorell, 1990) and specifically in relation to health risk.

Evidence for decision authority. The evidence is more straightforward for the relationship between social identification and decision authority; the second component of decision latitude. To explain, the OS concept of authority or input over decision-making (Karasek & Theorell, 1990) presents as conceptually similar to that of ‘voice’ from the social psychology literature on procedural fairness (Folger, 1977; Lind & Tyler, 1988; Tyler & Blader, 2000; Tyler & Blader, 2003). Voice refers to participation in decision-making and is classified as instrumental when input affects the decision-making process and non-instrumental when input is afforded without affecting the desired change (Lind & Tyler, 1988). As such, decision authority appears to be especially synonymous with instrumental voice about task design. As a side note, this analysis raises that decision authority may also operate via non-instrumental voice, such that the conveyed respect, positive information about the status of the relationship (Tyler & Lind, 1992) and sense of justice (Folger & Cropanzano, 2001) in simply being granted a say may explain part of the proposed effect of decision latitude in averting health risk.

The current literature on voice is predominately concerned with its role as an antecedent of social identification (Blader & Tyler, 2009; Tyler & Blader, 2003; Haslam et al., 2013). The current line of theorising however is concerned with evidence of whether social identification leads to higher decision authority or voice. Evidence that is more in line with the proposed direction of the relationship can be gleaned from research on co-operation. Co-operation is recognised as a closely related concept to voice that is theoretically assumed to arise from social identification (Tyler & Blader, 2003). Self-report employee surveys have

shown that low organisational identification predicts lower levels of co-operative behavior (Michel, Stegmaier, & Sonntag, 2010; Peters, Tevichapong, Haslam, & Postmes, 2010). Experimental studies have also supported the proposed causal direction between group identification and co-operation as indexed by co-operative choices (Wit & Wilke, 1992) and perceived willingness to contribute to a collective decision-making task (De Cremer, van Knippenberg, van Dijk, & van Leeuwen, 2008). This demonstrates preliminary evidence for the notion that social identification enables decision authority.

As far as known, the direct assessment of the complete relationship of interest, that is, of the effect of social identification on voice or decision authority and in turn health risk, does not exist. Most closely, meta-analyses reveal a strong association between voice as assessed within the organisational justice domain and the wellbeing outcome of job satisfaction (Cohen-Carash & Spector, 2001; Colquitt, Conlon, Wesson, Porter, & Ng, 2001). Perhaps the most illustrative evidence for the association between workplace identification, control and strain is contained in a series of surveys and experimental studies on office space design (Knight & Haslam, 2010a; 2010b). Knight and Haslam (2010a) showed that employees' experience of high managerial control or as viewed here, a lack of input into the design of office space, was associated with; low organisational identification, low psychological comfort in the workspace, and non-specific distress symptoms such as headaches. These results were interpreted to demonstrate that poor wellbeing resulted from the failure to provide employees with the opportunity to voice their opinion about their workspace and the consequent effect of low organisational identification (Knight & Haslam, 2010a, 2010b; Haslam & van Dick, 2011). This explanation is also on par with the pathway theorised for voice and identification as presented above (Tyler & Blader, 2000, 2003).

The assertion of interest here however, that control mediates the relationship between social identification and health outcomes was not considered. Given that this assertion was borne from the SIA to stress and wellbeing at work, a way to reconcile these differences may be that multiple plausible explanations exist for the associations between social identification, control and wellbeing (Knight & Haslam, 2010b). The research reviewed also makes it apparent that the interplay between social identification and control on more enduring health outcomes is outstanding.

In drawing to a close the discussion about workplace control, a point of overlap between the SIA and DC/S model is considered vital to acknowledge. In much the same way

as the DC/S model (Karasek & Theorell, 1990), the social identity research on skills and voice is typically concerned with accounting for performance outcomes in the organisational domain (Blader & Tyler, 2009; Haslam, Eggins, & Reynolds, 2003; Knight & Haslam, 2010b; Van Knippenberg, 2000). Accordingly, the ideas developed from the lens of the SIA to stress and wellbeing at work (Haslam & van Dick, 2011; van Dick & Haslam, 2012) are considered compatible with the DCS model (Karasek & Theorell, 1990) in the joint goal of elucidating processes within the occupational environment that account for both stress and productivity. In fact, Karasek and Theorell (1990) suggested that further models that sought to augment the DC/S model would be effective to the extent that they explained both these concepts. The two approaches share this overarching philosophy about human functioning.

In summary, these separate lines of enquiry on skilled performance and voice are considered conceptually similar to the occupational stress concept of decision latitude; that is, the combination of skill use and opportunity for say over work tasks and pace (Karasek et al., 1985; Karasek & Theorell, 1990). The evidence, while scarce, is consistently supportive for an association between social identification, decision latitude, and strain. As illuminated, it is an outstanding task to evaluate whether social (workplace) identification predicts control at work and subsequent depression risk as defined by the DC/S model. Based on the ideas put forward by the social identity approach to stress and wellbeing (Haslam & van Dick, 2011; van Dick & Haslam, 2012) and the integrated social identity model of stress (Haslam, 2004), the following relationships are proposed: in addition to a) high social identification being a protective factor in health risk; b) social identification is expected to lead to greater decision latitude, and its individual components of skill discretion and decision authority, and c) subsequently decision latitude, and its components, are expected to mediate the relationship between social identification and health risk. The risk of depression is of particular interest.

Social Identification may be Especially Relevant in Depression

A recent proposition relevant to the current topic is that social identification is an important determinant of depression (Cruwys, Haslam, Dingle, Haslam, & Jetten, 2014a). Conceptually, this presents as appropriate, given that social identification is hypothesised to provide the very psychological characteristics that are affected in depression such as; a sense of belonging (Gotlib, 1992, Joiner & Coyne, 1999), self-esteem (Abramson, Seligman, & Teasdale, 1978; Beck, 1970), efficacy (Bandura, 1997) and a sense of control (Seligman, 1975). Cruwys et al (2014b) presented evidence to support this proposition in a clinical

sample of outpatients attending a four-week group therapy for diagnosed anxiety and/or depression. At treatment completion, higher ratings of identification with the therapy group were significantly associated with lower ratings of depression but not anxiety. Similarly, in the occupational context, Bizumic et al (2009) found that teachers' workplace identification was correlated with depression and not general stress and anxiety ratings. However as noted earlier, power was argued as the reason for the lack of association with the other mental health indices as associations were all significant for the larger subsample of students.

Accordingly, the expectations for OS-related health risk are two-fold and based on the following: the conceptualisation here of social identification as a basis of occupational stress and general health risk (van Dick & Haslam, 2012), the associated evidence for other outcomes such as burnout (Haslam et al., 2009), the point that traditional occupational stress models are supported across a wide range of health outcomes (Häusser et al., 2010; Van der Doef & Maes, 1998; Van der Doef & Maes, 1998) and are not disease-specific (e.g., Karasek & Theorell, 1990; Siegrist, 1996). Accordingly, it is expected that social identification functions as a general health risk factor via the intermediate influence on workplace support and control. The direct relationship between social identification and health outcomes is plausibly considered to be especially strong for depression. The evaluation of these processes was considered important to determine how to best enhance predictions in occupational stress and disease risk research.

Social Identification may be Best Construed as a Multidimensional Construct

The current research also sought to contribute knowledge about the measurement of social identification. To restate, social identification describes an individual group members' relationship to a social identity (Tajfel, 1972, 1978). Social identity refers to self-definition in group terms which includes knowledge about belonging to the group, an evaluation of the value of the group and accompanying reactions to that membership (Tajfel, 1972, 1978). In other words, social identity is said to comprise of a cognitive, evaluative and emotional component (Ellemers et al., 1999; Postmes et al., 2013). Classic measures of social identification (e.g., Doosje, Ellemers, & Spears, 1995; Doosje, Branscombe, Spears, & Manstead, 1998; Haslam, 2004) treat the concept as unidimensional. In fact, with the exception of a single study (Sani et al., 2012), this type of conceptualisation was applied in all of the reviewed OS related research on workplace support (Bizumic et al., 2009; Haslam et al., 2005; Haslam et al., 2009; Jimmison et al., 2010; Knight & Haslam, 2009).

An alternate perspective is that social identification can be best construed and therefore measured as a multi-dimensional construct that delineates cognitive, evaluative and affective components (e.g., Brown, Condor, Matthews, Wade, & Williams, 1986; Cameron, 2004; Ellemers et al., 1999; Leach et al., 2008). Notably, Leach et al (2008) constructed a *hierarchical* multidimensional scale based on the interpretation of early theorising about the nature of social identification (Tajfel & Turner, 1979; Turner et al., 1987) and factor analysis of existing multi-dimensional scales. Two-higher order factors were distinguished: one relating to perceptions or cognitive appraisals of identification (termed self-definition) and a second factor that captured the emotive experience of social identification (self-investment). The two components comprise of distinct lower-order constructs: *self-definition* is a product of *individual self-stereotyping* and *in-group homogeneity* and self-investment; a combination of *solidarity*, *satisfaction* and *centrality*. These features are elaborated on in the Method however are presented here to discuss in general terms, current views about the measurement of this central variable.

The Leach et al (2008) scale and other multidimensional measures of social identification have attracted criticism. The main counter arguments are that social identification can be appropriately assessed with a single-item and that Leach and colleagues' (2008) proposed measure involves components that describe associated but not defining features of social identification (Postmes et al., 2013). Specifically, Postmes et al (2013) contend that *self-definition* may be either an antecedent or consequence of identification but is not reflective of identification itself. Rather, social identification is considered to be more consistent with the emotive higher order dimension of *self-investment*. Postmes et al (2013) strengthened the claims by presenting confirmatory evidence for both a single-item measure and evidence that the single-item measure corresponded best to the self-investment factor, although reasonable variance was also shared with self-definition. An adapted version of Postmes and colleagues' (2013) single item measure was also shown to demonstrate adequate validity (Reysen, Katzarska-Miller, Nesbit, & Pierce, 2013). Despite its historic and active enquiry, the appropriate measurement of social identification is yet to be fully clarified.

One advantage of differentiating the components of identification is to gain greater insight into the nature of social identification processes. To highlight, within the organisational space, turnover intentions among new employees have been linked to the satisfaction component of organisational identification and not solidarity or centrality (Smith,

Amiot, Callan, Terry, & Smith, 2012). Although the cognitive component of identification (self-definition) was not assessed, it was concluded that affect may be key to predicting turnover intentions (Smith et al., 2010) as well as other work-related attitudes and behaviours (Ouwerkerk, Ellemers, & de Gilder, 1999; van Dick & Wagner, 2002). Further, van Dick, Wagner, Stellmacher & Christ (2004) revealed that the most relevant dimension of social identification was dependent on both the target of social identification and outcome of interest. Regarding research on depression, a study concerned with the protective role of identification in perceived racial stigma found that self-stereotyping; which is a component of self-definition, correlated with depression ratings while identification measured as commitment and centrality did not (Latrofa, Vaes, & Massimilian, & Cadinu, 2009).

Thus, it appears that the context of identification and the phenomenon considered depicts the relationship between social identification and outcomes. Thus the evaluation of the multidimensional approach could improve with a wider assessment across research domains. With regard to research on the current topic, Sani et al (2012, Study 2) in their study on army identification and depression employed the Leach et al (2008) measure however did not report component analyses. To the best of knowledge, the subsequent study represents the first report on the relationship between the dimensions of workplace social identification as proposed by Leach et al (2008) and mental illness. The overall aim is to elucidate key processes of social identification in the occupational stress context. For the purpose of this thesis, specific hypotheses for the various dimensions of social identification are not developed, rather their association with key study variables are described to initiate an understanding of how social identification may affect OS.

Various Targets of Social Identification Exist in the Workplace

A final consideration is that social identification at work can occur at many levels. For example, employees can form a sense of identification with their organisation, profession, department, the immediate workgroup or informal groups (Ashforth & Mael, 1998; Ashforth, Harrison, Corley, 2008; Reichers, 1985; van Knippenberg & van Schie, 2000). Social identification with the workgroup is considered in the subsequent analysis for several reasons. Perhaps most simply, this thesis was concerned with augmenting predictions about social support from colleagues and supervisors and so the immediate workgroup is likely to be the more relevant unit of analysis (Jimmieson et al., 2010; Riketta & van Dick, 2005). A similar argument has been made for workplace control, such that employees more easily

attribute a perceived sense of control at work to workgroup experiences than to the organisation as a whole, leading to emotive experiences that more closely reflect workgroup dynamics as opposed to organisational features (Mueller & Lawler, 1999; Riketta & van Dick, 2005). In addition, modern workplaces arguably include more lateral than top-down processes of control compared to work designs of earlier times (Ashforth & Johnson, 2001).

Other general arguments put forward by Riketter and van Dick (2005) include that workgroup identification may be more salient than higher level identities given that time at work is most often spent in interaction with other group members. In addition, proximal identities such as the workgroup, are expected to affect individuals directly and immediately as opposed to indirectly or through delayed processes via higher-order identities (Brewer, 1991; Hogg & Terry, 2001) such as the department (van Knippenberg and van Schie, 2000). Riketter and van Dick (2005) also demonstrated through a meta-analysis of correlational studies that employees identified more strongly with their workgroup than with the organisation and as expected, workgroup identification was linked to team level variables such as colleague support to a greater extent than was organisational identification. Taken together, these arguments support the selected workgroup level of analysis.

The evidence reviewed on social identification and occupational stress also typically evaluated a more proximal than distal workplace identity. This included the analysis of dynamics among team members (Jimmeison et al., 2010), a group of theatre performers (Haslam et al., 2009) and the broader unit of colleagues (Bizumic et al., 2009; Sani et al., 2012). The following empirical analysis is distinguished from earlier research by its explicit consideration about the selected level of analysis. This discussion is anticipated to assist with: the interpretation of findings, summary of emerging evidence, guidance on further research and ultimately the use of findings for targeted interventions in the occupational setting.

Conclusion

This chapter clarified and developed a number of ideas within the social identity approach to stress and wellbeing. Social identification was explicitly purported to influence the emotional dimensions of support alongside instrumental aspects, as defined by the DC/S model. The major contribution however was the extension of expectations for workplace support to workplace control and decision latitude in particular. This expansion provides a cohesive framework to enhance knowledge about the key variables in depression risk as

identified in the previous empirical study. In light of recent theorising about the significance of social identification to the specific illness of depression, the predictions in the context of OS and depression risk were clarified. It was considered that the the indirect relationship between social identification and depression via control and support would represent a general pathway of OS-related health risk while the direct relationship between social identification and ill-health would be especially strong for depression. The discussion was also concerned with clarifying the conceptualisation and measurement of social identification. Current interest in the multidimensional measurement of social identification was described and its various targets within the occupational setting were highlighted. These points were considered informative about the essence of and potential pragmatic relevance of this novel concept within the traditional view of OS. Overall, the reflection on these matters presents an up-to-date evaluation of the questions of interest.

Chapter 7 (Study 2). A Prospective Analysis of Social Identification in Occupational Stress and Depression Risk within the Australian Public Service

Study Purpose

This study sought to first replicate with longitudinal data the associations found in Study 1 between the DCS model and depression ratings. Following the significant associations found with decision latitude and social support, the present study evaluated whether social identification with workgroups could both directly and indirectly protect depression risk through higher levels of workplace support and control. To elaborate, the Social Identity Approach to Stress and Wellbeing in the Workplace expects social identification within the workplace to enable employees to experience support and its beneficial effects through lowered health risk. This was the first known study to test the idea that social identification would also enable decision latitude and in turn reduce health risk. This relationship was expected given that social identification is said to structure the experience of (occupational) stressors and motivate positive interactions, co-operation and the co-ordination of resources (as discussed in Chapter 6).

Following further discussion in Chapter 6 on theoretical developments to the SIA (Chapter 6), the evaluation was supplemented by interest in whether i) social identification was especially relevant to the health outcome of depression and ii) best construed as a multidimensional construct. As discussed, social identification was expected to affect depression more so than other health outcomes, given that it may provide the very psychological qualities affected in depression. The relevance of the SIA to OS-related ill-health was clarified as affecting health outcomes equivalently through social support and decision latitude and depression risk more so through its direct association.

Finally, the study reported on the factor structure of a recently proposed multidimensional measure. This information was sought to explore whether there was indeed benefit to evaluating social identification as a multidimensional construct (in the OS setting), as the necessity of a multidimensional instrument had recently been contended and the performance of the measure had not been tested in the occupational stress setting. These considerations supported an up-to-date evaluation of social identification processes.

Research Questions

The study purpose is summarised by the following hypotheses:

- 1) High workplace demands will be associated with an increased risk of depression as evidenced by a positive association with depression ratings. Despite the non-significant association in Study 1, this hypothesis was maintained to be in line with DC/S model predictions and the accumulated research.
- 2a) Low decision latitude and b) low social support and its component concepts of skill discretion and decision authority, and colleague and supervisor support respectively, will be associated with an increased risk of depression, as evidenced by a negative association with depression ratings.
- 3) High a) strain and b) iso-strain will be associated with high depression risk only when iso-/strain is formulated as a quadrant but not as a main effects model.
- 4) High ratings of workgroup identification will be associated with low ratings of depression ratings
- 5) High levels of workgroup identification will be associated with high levels of a) decision latitude and b) social support
- 6) The relationship between workgroup identification and depression will be mediated by a) decision latitude and b) social support
- 7) The direct association between social identification and depression will be larger than that between for general stress and anxiety
- 8) The indirect relationship between social identification and mental ill-health via a) decision latitude and b) social support will be of a similar magnitude for stress, anxiety and depression, suggesting a general process of health risk

Method

Participants

Participants were recruited from 10 Commonwealth Australian Public Service (APS) departments and agencies. At Time 1 (T1, June to August 2010), 303 respondents commenced the survey, 277 submitted the survey, and 262 provided usable data. At Time 2 (T2, August to September 2011) follow-up surveys were commenced by 193 employees and submitted by 160 respondents of whom 76 provided data that could be matched with T1 responses. In sum, data for the cross-sectional analysis was based on 262 participants and data for the longitudinal analysis derived from 76 participants. The initial and follow-up response rates were 3% and 64% respectively.

Procedure

Workplace recruitment. A request to participate was sent to the human resource manager from all 21 APS government departments and 63 agencies that employed more than 100 employees (APSC, 2011). Managers were contacted where possible via post or email or alternatively through an online request form. Follow-up phone calls were made if contact numbers were available online. Managers were provided an invitation to participate in an online research survey to advance knowledge about work and wellbeing (Appendix D), together with an information sheet, and consent form (Appendix E). As with Study 1, participation involved the advertisement display and survey link to employees. Workplaces were also requested to send staff a reminder email at two weeks after the initial advertisements at T1 and T2.

Ten workplaces agreed to participate, representing a response rate of 8.4% of the workplaces that were invited to participate. The workplaces comprised of one large government department ($N = > 1000$) and nine agencies of which three were classed as small ($N = 101 - 250$), five as medium ($N = 251 - 1000$) and one as large ($N = 1000 - 10,000$, APSC, 2011). At T2, three of the human resource managers were no longer employed in their position: subsequently one agency agreed to participate in the follow-up study, one agency withdrew from further participation and the single department agreed to partial participation. Specifically, the department declined the intranet display of the advertisement and survey link however permitted the personal contact of T1 participants who had submitted their email

address for a reminder of the follow-up survey ($N = 40$, 34% of the initial department sample), explained below. In summary, nine of the ten workplaces participated in the follow-up survey of which one workplace subscribed to partial participation. As with Study 1, workplaces were provided a feedback report in return for participation. To note, workplaces differed to those that participated in Study 1.

Participant recruitment. The *Work and Wellbeing survey* was advertised to employees either via email from their Human Resource Manager or via display of the advertisement on the workplace intranet. As in Study 1, the advertisement included the study description, confidentiality statement, and hyperlink to the online survey that contained the full study details. To enhance sample retention, participants were also provided the option to submit their email address to receive a personal reminder of the follow-up survey. This option was presented in a pop-up window following submission of the survey. Email addresses ($N = 62$, 24% of the T1 sample who submitted responses) were stored in a separate database (Gmail account) from survey responses (Qualtrics). This study was approved by the ANU Human Research and Ethics Committee (Protocol 2010/087).

Data Matching

Participants' data were matched with a validated four-item self-generated code that was developed with an occupational sample (Yurek, Vasey, & Havens, 2008). The code requested the following: i) number of older brothers, living and deceased; ii) mothers' first name initial; iii) number representing their birth month (e.g., May = 05), and; iv) their middle name initial, if without then to record 'x'. Responses were also matched by age and gender. A code was entered by 94% of participants at T1 and 82% of participants at T2. Of the 143 respondents who entered a code at T2 and indicated participation in the initial survey, 86 (60%) could be matched by code, together with gender and age where available. Of the matched codes, 62 were a complete match and 24 were matched on three of the four code elements in addition to age and gender. The code variation occurred most frequently on the request for the initial of the mother's first name (50% of partial matches, 14% of total matches), followed by the first letter of participants' middle name (25% of partial matches), birth month (17% of partial matches) and number of older brothers (8% of partial matches). Follow-up participants whose data could not be matched were more likely to have indicated a change in their job role during the past twelve months (53.5%) compared to follow-up participants with matched data (30.6%). Apart from this index, there were no significant

differences between matched and unmatched follow-up participants on mental health, occupational or demographic variables ($p > .05$).

The overall rate of data matching was slightly higher compared to Yurek et al (2008) who developed the code in a large sample of nurses across six hospitals ($N = 1182$ at baseline, $N = 929$ at 12-months follow-up) using a pen-and-paper format. The higher match rate of 60% compared to Yurek and colleagues' (2008) finding of 51 % was largely due to the higher match rate here of 'one-off' matches (17% compared to 5%) while the exact match rate was marginally lower (44% versus 47%). The match rate was similar to that of an online sample of health care employees (63%, Grant, Berg, & Cable, 2014) although that study was conducted over a relatively short five-week period and details about match types were not reported. In line with Yurek et al (2008, 50% of partial matches) the most frequent incorrect item was the request for the first letter of one's mother's first name.

In contrast, a higher rate of errors was recorded here for the first letter of participants' middle name (25% versus nine per cent) and birth month (17% versus less than one per cent) and a lower error rate was found for the number of older brothers (eight percent versus 40%). Interestingly, the latter error occurred only among males in this sample. Unlike Yurek et al (2008) matched participants were not significantly older nor did they indicate a longer tenure however a role change was less likely. The otherwise non-significant difference on study variables between matched and non-matched participants was consistent with Yurek and colleagues' (2008) determination of trivial sample bias with use of the code.

Measures

Independent variables. As in Study 1, the JCQ (Karasek et al., 1985) was used to measure the constructs of job demands, control and support. All items were measured on a four-point Likert scale with anchors of *strongly disagree* (1) and *strongly agree* (4). The subscales were added according to the formulae provided by Karasek et al (1985). Sample items and the discussion on psychometrics can be found in Study 1. This section simply reports Cronbach's alpha for the scales at T1 and T2 with comparison to Study 1.

Job demands. The five-item subscale showed good internal consistency ($T1\alpha = .80$, $T2\alpha = .83$) and was on par with that obtained in Study 1 ($\alpha = .84$).

Job control. The nine-item *decision latitude* scale; a composite measure of *skill discretion* and *decision authority* presented good internal consistency (T1 α = .83; T2 α = .80) and was marginally lower compared to that obtained in Study 1 (α = .85). Similarly, the internal consistency for *skill discretion* was good (T1 α = .75, T2 α = .73) and lower compared to that in Study 1 (α = .80). The internal consistency for *decision authority* (T1 α = .75, T2 α = .72) was consistent with Study 1 (α = .74).

Social support. The eight-item combined measure of co-worker and supervisor support showed good internal consistency (T1 α = .85, T2 α = .87). Both *co-worker support* (T1 α = .83, T2 α = .80) and *supervisor support* (T1 α = .90, T2 α = .91) showed rather consistent reliability across the time points. *Supervisor support* had excellent reliability and was on par with that found in Study 1 (α = .93). *Co-worker support* and the overall measure of *social support* had lower reliability compared to Study 1 (co-worker support, α = .88; social support; α = .93).

Social identification. Employees' social identification with their workgroup was assessed with the Leach et al (2008) measure. The 14-item instrument presented excellent internal consistency (T1 α = .93, T2 α = .91) but not to the extent of item redundancy (α = >.95, Nunally & Bernstein, 1994). The reliability was slightly higher than Sani et al (2012, α = .90) in an army unit sample and not reported by Leach et al (2008) on the full 14-item scale.

The proposed dimensions of social identification were represented by the following five Leach et al (2008) subscales: *solidarity*, three items (e.g., "I feel solidarity with workgroup members", T1 α = .89, T2 α = .85); *satisfaction*, four items (e.g., "I think that the workgroup have a lot to be proud of", T1 α = .94, T2 α = .92); *centrality*, three items (e.g., "Being in my workgroup is an important part of how I see myself", T1 α = .83, T2 α = .81); *self-stereotyping*, two items (e.g., "I am similar to the average workgroup member", T1 α = .90, T2 α = .85) and *in-group homogeneity*, two items (e.g., "Workgroup people have a lot in common with each other", T1 α = .85, T2 α = .81). The subscales were also grouped into two higher-order factors of *self-investment* (T1 α = .94, T2 α = .90; solidarity, satisfaction and centrality) and *self-definition* (T1 α = .82, T2 α = .81; self-stereotyping and in-group homogeneity). Responses were recorded on a 7-item Likert scale, with anchors of *Strongly Disagree* (1) and *Strongly Agree* (7) and a mid-point of *Neither Agree nor Disagree* (4).

Reliabilities for the five subscales were consistent with the average of Leach and colleagues' (2008) report of reliabilities for different targets of identification. More specifically, T1 reliabilities were more similar than T2 reliabilities to Leach et al (2008) (*solidarity* ($\alpha = .89$), *satisfaction* ($\alpha = .89$), *centrality* ($\alpha = .84$), *self-stereotyping* ($\alpha = .91$), *in-group homogeneity* ($\alpha = .88$)) and Leach et al (2010, Study 2) on *solidarity* ($\alpha = .88$), *self-stereotyping* ($\alpha = .89$) and *in-group homogeneity* ($\alpha = .84$). Reliabilities were higher in the current sample compared to Leach et al (2010, Study 2; university student sample) for the *satisfaction* ($\alpha = .89$) and *centrality* ($\alpha = .80$) subscales.

The internal consistency for the higher order factor of *self-investment* was similar to Jans, Postmes, and Van der Zee (2011, $\alpha = .96$) although not to the extent of concern about item redundancy. Cronbach's alpha for *self-investment* was similar to that in a sample of German university students ($\alpha = .90$, Masson & Fritsche, 2014) and higher compared to other university student samples ($\alpha = .82$, Crane & Platow, 2010; T1 $\alpha = .83$, T2 ($\geq$ seven months), $\alpha = .89$, van Veelen, Hansen, & Otten, 2013). The reliability of *self-definition* (T1 $\alpha = .82$, T2 $\alpha = .81$) was on par with Masson & Fritsche (2014, $\alpha = .83$) and similarly lower than the reliability of the *self-investment* higher order factor.

Leach et al (2008) determined good convergent and discriminant validity for the subscales and higher-order dimensions using other measures of social identification (Phinney, 1992; Jackson, 2002; Luhtanen & Crocker, 1992) and group attachment (Smith, Murphy, & Coates, 1999). Prospective construct validity was also confirmed in the prediction of group orientation and group-based threat and guilt relating to national identity (Leach et al., 2008).

Dependent variables. The short version of the *Depression Anxiety Stress Scale* (DASS21, Lovibond & Lovibond, 1995a) was used to measure depression, anxiety and stress symptoms over the past week. All items were responded to on a 4-point Likert scale ranging from 0 (*did not apply to me, or never*) to 3 (*applied to me very much, or most of the time*). Subscale scores were multiplied by two to be compatible with the properties of the full version of the DASS42, as recommended by Lovibond and Lovibond (1995b) and empirically supported (Henry & Crawford, 2005; Sinclair et al., 2012). The validity of the three factor structure has been supported in both clinical (Antony et al., 1998; Clara, Cox, & Enns, 2001) and general population samples (Henry & Crawford, 2005; Sinclair et al., 2012). The psychometric properties of the anxiety and stress subscales are elaborated on below and presented briefly for depression.

Depression. Cronbach's alpha was high and consistent across time points ($T1\alpha = .93$, $T2\alpha = .93$) and with Study 1 ($\alpha = .94$). The internal consistency was higher than Lovibond and Lovibond (1995a, $DASS21\alpha = .81$) and a UK population sample ($\alpha = .88$, Henry & Crawford, 2005). The result was comparable to a US population sample ($\alpha = .91$, Sinclair et al., 2012).

Anxiety. The seven-item anxiety subscale ($T1\alpha = .82$, $T2\alpha = .84$) measured subjective and physiological anxious arousal such as "I was aware of dryness of my mouth". The internal consistency was higher than Lovibond and Lovibond (1995a, $DASS21\alpha = .73$) and slightly higher than US $DASS21$ norms ($\alpha = .80$, Sinclair et al., 2012). The reliability was comparable to a UK general population sample ($DASS21\alpha = .82$, Henry & Crawford, 2005). The anxiety scale is known to correspond to panic disorder and other anxiety conditions such as social phobia (Antony, Bieling, Cox, & Enns, 1998; Lovibond & Lovibond, 1995b).

Stress. The seven-item stress subscale measured chronic non-specific arousal, such as "I found it hard to wind down". Cronbach's alpha ($T1\alpha = .86$; $T2\alpha = .88$) was higher than Lovibond and Lovibond (1995, $\alpha = .81$). The reliability was also slightly higher than US norms ($\alpha = .84$, Sinclair et al., 2012) and slightly lower than UK norms ($\alpha = .90$; Henry & Crawford, 2005). The stress scale has been shown to represent a narrower index of general distress than negative affect (Henry & Crawford, 2005) and is consistent with DSM-IV Generalised Anxiety Disorder (Brown, Chorpita, Korotitsch, & Barlow, 1997; Lovibond & Lovibond, 1995b).

Controls. As in Study 1, covariates were gender (male/female), age, education (1 = Postgraduate degree; 2 = Bachelor's degree; 3 = Post-high school or college certificate or diploma; 4 = College, 5 = High school, and 6 = Uncompleted high-school) and negative affect as assessed with the PANAS-NA (Watson et al., 1988). The internal consistency of NA ($\alpha = .91$) was equivalent to Study 1. Covariates were measured at T1, with age and gender also requested at T2 to assist with data matching.

Occupational demographics. Occupational demographics were requested for: workplace tenure (years and months), supervisory responsibility (no or yes, if yes; to specify the number of employees supervised) and average work hours (< 35 hours (equivalent to part-time), 36- 50 hours, 50+ hours). Participants were also asked to indicate their job description according to the Australian and New Zealand Classification Codes (ANZSCO, ABS, 2009, where 1= Manager; 2= Professional; 3 = Technician and Trade Worker; 4= Community and

Personal Service worker; 5 = Clerical and Administrative Worker; 6= Sales worker, and 7 = other). The code was selected given the difficulty synthesising information and missing data from the open-ended job description format in Study 1. At T2, employees were asked to indicate whether any major changes occurred in their employment conditions from T1 in terms of workplace restructuring, role change, new immediate supervisor or new workgroup. Response options were either 'no' or 'yes' and if yes, a binary indication of whether this significantly impacted team dynamics.

Statistical Analysis

Analyses were conducted using IBM SPSS version 22 for linear regression and IBM SPSS Amos version 22 for mediation analysis. Prior to regression, correlational analyses were performed to gain a basic understanding of the data. To preserve power this comprised of the interrelations among the aggregated measures of decision latitude, social support and social identification for the longitudinal analysis. Hierarchical regression analyses were then performed to evaluate whether causal relations were suggestive for the DCS model variables and social (workgroup) identification on the one hand and mental health outcomes (stress, anxiety, depression). A two-step hierarchical regression model was conducted for each mental health outcome. The baseline score for the respective mental health measure was entered in the first step. The occupational variables: demand, decision latitude, social support and social identification were entered in the second step.

Hierarchical regression analyses were also performed to test the causal pathway from social identification to ratings of decision latitude and social support. For the prediction of decision latitude at Time 2, the baseline value of decision latitude was entered in the first step and T1 social identification in the second step. Similarly, for the prediction of social support at Time 2, T1 social support was entered in the first step and T1 social identification was entered in the second step. Note that tobit regression was not used in this study as the skew and kurtosis of depression was not considered problematic.

Using the larger cross-sectional data set, mediation analyses were performed to examine whether decision latitude and social support and their subscales mediated the concurrent association between workgroup identification and mental health ratings. The analyses of secondary importance, that concerning; a) the multidimensional association of social identification with stressors and mental ill-health, and b) the association of social

identification and depression compared to stress and anxiety ratings, were analysed through simple correlations of T1 data. The latter query was supplemented by a series of cross-sectional mediation analyses. Mediation analysis were performed using the bootstrapping method (Preacher & Hayes, 2004).

Data Cleaning

The data was screened for normality, linearity and homoscedasticity and treated for missing values and outliers. No violations of normality were noted for social identification, decision latitude or social support. In the cross-sectional data set, a curvilinear association between demands and depression was suggested on visual inspection of the scatterplot and lowess curve; which tracks the best-fitting association between variables without enforcing parametric constraints (Jacoby, 2000; Smithson & Verkuilen, 2006). The relationship however was not significant ($p > .05$). Negative affect presented high skew (1.76) and kurtosis (3.54). The kurtosis value was higher than that Study 1 (kurtosis = 2.33, skew = 1.54) and was high for a medium-sized sample (Kim, 2013). Accordingly, NA was log transformed for use in regression and mediation analyses. At both time points, DASS21 Depression and Stress showed marginal skew and kurtosis was marginal for stress, although below values considered problematic (Kim, 2013; Curran, West, & Finch, 1996). Anxiety showed high skew and significantly high kurtosis at T1 (kurtosis = 15.21) and near significant high kurtosis (3.62) at T2. Accordingly, anxiety was log-transformed with cautious interpretation of the results indicated. The significant Shapiro-Wilk statistic in the cross-sectional and longitudinal data set indicated violation of the assumption of normality. Heteroscedasticity was observed via residual scatterplots between NA, JCQ variables and social identification and DASS21 at T1 and T2. In addition to suggesting non-normality, this may indicate greater variation in error at different levels of the predictors (Tabachnick & Fidell, 2007).

Ten univariate outliers were detected and retained given that scores were not in excess of extreme values for outlier identification (Hoaglin & Iglewicz, 1987; Iglewicz & Banerjee, 2001). Six multivariate outliers were also detected with four removed in order to minimise distorted inferences as recommended by Tabachnick & Fidell (2007). Two cases were not deleted given the high positive value on the anxiety measure which was not central to the analysis together with high values on negative affect, demands and stress. Another case had high depression scores. All were converted to less extreme values. Missing data was random and well below the five per cent threshold for posing a serious impact on data interpretation

(Tabachnick & Fidell, 2007). Missing values were replaced using the expectation maximisation method. Multicollinearity was not present for the analyses of interest, as determined by Variance Inflation Factors well below 10 and corresponding Tolerance values greater than .10 (Tabachnick & Fidell, 2007).

Results

Descriptive Statistics

Table 9 summarises the available demographic characteristics of the 262 Australian Public Service employees surveyed at baseline and the 76 participants in the follow-up sample. Means and standard deviations were calculated for continuous variables and frequencies and percentages for categorical variables.

Baseline sample demographics. The sample was mostly female (70.6%) and aged on average 37.6 years ($SD = 11.2$). The sample was overall well-educated, with a Bachelor's degree the most common level of education attained (43.3%). The majority of the sample identified as Professionals (40.1%), followed by Clerical and Administrative workers (28.2%) and Managers (19.1%). A small proportion selected other occupational categories (4.4%). A large portion of the sample also indicated supervisory responsibility (37.3%) for an average of 7.78 employees ($SD = 20.8$). The average position tenure was reported at just over two-and-a half years (31.63 months) and most identified as full-time employees (87.3%).

Follow-up sample demographics. Follow-up participants with matched data did not significantly differ from baseline sample participants in terms of gender ($t(336) = 0.17, p > .05$) and age ($t(333) = 0.77, p > .05$). However, compared to the baseline sample, the follow-up sample indicated a higher level of completed education. Specifically, a greater percentage reported postgraduate education (28.9% vs 25.3%) and a Bachelor's degree (48.7% vs 43.3%), a lower percentage reported post-school qualifications (10.5% vs 18.0%) and all follow-up participants indicated at least college education.

The follow-up sample also comprised of a greater percentage of professionals compared to the original sample (52.7% vs 40.1%) and a lower percentage of managers (16.2% vs 19.1%). Relatedly, supervisory responsibility was less endorsed by the follow-up sample (31.6%) compared to the original sample (37.3%) although supervisors in the follow-up sample did not significantly differ in the number of employees supervised (follow-up

sample: $M = 4.46$ employees, $SD = 7.59$, baseline sample: $M = 7.78$ employees, $SD = 20.80$, $t(113) = 0.80$, $p > .05$). While employment status was mainly full-time in both the follow-up (79.7%) and original sample (87.3%), the follow-up sample included a greater percentage of part-time employees compared to the baseline sample (20.3% vs 12.7%).

Follow-up participants reported a significant amount of change in occupational demographics since the initial survey 12 months prior. Workplace restructuring was endorsed by 40.8%, followed by a change in workgroup (44.3%), supervisor (41.7%) and role (31.1%), which was predominately cited as due to promotion as ascertained in the Comments section. Of the respondents who indicated a change in supervisor, 73% indicated it as having a significant impact on team dynamics as opposed to little to no impact. Of those who indicated a change of workgroup, 48% indicated a significant impact on team dynamics (results not displayed in the table).

Table 9

Demographic Characteristics of the Baseline (n = 262) and Follow-up sample (n = 76)

Demographics	Baseline sample				Follow-up sample			
	Mean	SD	No.	%	Mean	SD	No.	%
<i>Individual Demographics</i>								
Gender								
Female			185	70.6			55	72.4
Male			77	29.4			21	27.6
Age (years)	37.6	11.2			36.5	11.61		
Education								
Postgraduate degree			66	25.3			22	28.9
Bachelor' degree			113	43.3			37	48.7
Post-college cert/diploma			47	18.0			8	10.5
College			29	11.1			9	11.8
Uncompleted high school			6	2.3			0	0.0
<i>Occupational Demographics</i>								
Job Category								
Manager			53	19.1			12	16.2
Professional			111	40.1			39	52.7
Clerical/Administrative			78	28.2			20	27.0
Other			11	4.4			3	4.1
Supervisory Responsibility			97	37.3			6	31.6
Employees Supervised	7.8	20.8			4.5	7.6		
Position Tenure (months)	31.6	18.0			25.9	28.7		
Employment Status								
Full-time			226	87.3			59	79.7
Part-time			33	12.7			15	20.3
Change to employment in past 12 months								
Restructuring							31	40.8
New supervisor							26	41.7
New workgroup							27	44.3
New role							19	31.1

Note. Follow-up sample refers to T2 respondents with matched data and not all respondents at T2. No. does not always add to sample total due to missing data. Percentages are corrected for missing data.

Study Variable Correlation Matrix

Table 10 displays the means, standard deviations and inter-correlations among the main study variables for the longitudinal analysis.

Means and standard deviations. Mean and standard deviation values did not differ significantly between T1 and T2 for the variables demand, decision latitude, social support, anxiety, stress and depression ($p > .05$). The mean of workgroup identification at T2 ($M = 61.55$, $SD = 11.74$) was lower than that at T1 ($M = 66.78$, $SD = 14.36$, $t(150) = 2.46$, $p < .05$),

as was the variance. This reduction was evident regardless of whether participants indicated a change to their workgroup or workplace restructuring. However for participants indicating a 'change to their supervisor' with 'significant impact on team dynamics', workgroup identification increased significantly from T1 ($M = 63.22$, $SD = 11.86$) to T2 ($M = 66.78$, $SD = 9.9$); $t(150) = 2.01$, $p < .05$. The follow-up sample did not significantly differ ($p > .05$) from the baseline sample on any stressor or mental health index mean.

As with Study 1, no significant differences were noted between males and females on the key study variables. However females in the T1 cross-sectional sample reported lower levels of demand ($M = 30.31$, $SD = 6.23$) compared to females in Study 1 ($M = 32.20$, $SD = 6.89$); $t(531) = 3.12$, $p < .001$ and males in the T1 cross-sectional sample reported higher levels of skill discretion ($M = 35.40$, $SD = 5.11$) compared to the males in Study 1 ($M = 33.84$, $SD = 5.58$); $t(202) = 1.99$, $p < .05$. Ratings of social support for both males ($M = 24.32$, $SD = 4.10$) and females ($M = 24.63$, $SD = 4.01$) were lower than Study 1 (males, $M = 34.86$, $SD = 5.71$, $t(202) = 14.13$, $p < .001$; females, $M = 35.47$, $SD = 6.88$, $t(531) = 19.72$, $p < .001$) and were instead more in line with normative data (Karasek et al., 1988, $M = 12.40$, $SD = 2.61$). Gender stratified values are presented in text only to aid comparison to Study 1.

Auto-correlations. The T1 and T2 auto-correlations for stressors were all approximately large: demand showed the largest auto-correlation ($r = .71$) followed by decision latitude ($r = .53$) and then workgroup identification ($r = .47$) and support ($r = .46$). The auto-correlations for mental health indices were also large and of the same magnitude for depression and anxiety ($r = .71$) and somewhat lower for stress ($r = .64$). Comparative data for the one-year temporal stability of the DASS21 was not available however the serial correlation was in line with the two week test-retest data by Brown et al (1997) for depression ($r = .71$) and anxiety ($r = .79$) and lower for the measure of stress ($r = .81$).

Correlations between mental health indices. DASS21 subscales were all highly correlated ($r_s = .57-.75$). T1 depression had a higher correlation with T1 stress ($r = .65$) than T1 anxiety ($r = .53$). Lovibond and Lovibond (1995b) also found correlations to be large although more similar in magnitude ($r_{\text{depression/anxiety}} = .54$, $r_{\text{depression/stress}} = .56$). Compared to T1, the inter-correlations at T2 were higher between depression and stress ($r = .71$) and depression and anxiety ($r = .73$) and were similar to Lovibond and Lovibond's (1995) trend of a similar magnitude in association. T1 inter-correlations were larger than Antony et al (1998; depression and stress $r = .57$; depression and anxiety $r = .46$; stress and anxiety $r = .72$)

and the even larger T2 associations for depression were consistent with Sinclair and colleagues' (2012) analysis on the US general adult population (depression and stress $r = .72$, depression and anxiety $r = .72$). The strong correlation between NA and the DASS21 was similar in magnitude between T1 and T2 scores (depression, $T1r = .73$, $T2r = .77$; anxiety, $T1r = .62$, $T2r = .69$; stress, $T1r = .71$, $T2r = .72$). For NA, the correlation with stress was marginally higher compared to Henry and Crawford (2005, $r = .64$) and for depression ($r = .59$) and anxiety ($r = .58$) it was significantly higher.

Correlations between covariates and study variables. As for Study 1, gender was not significantly correlated with any T1 or T2 stressor or mental health index. Age was positively correlated with decision latitude ($r_{T1} = .38$, $r_{T2} = .27$) and workgroup identity ($r_{T1} = .23$). Age was also negatively correlated with T1 and T2 depression ($r_{T1} = -.26$; $r_{T2} = -.26$) and T1 anxiety ($r = -.23$). Of the stressors, negative affect was only significantly associated with T1 demands ($r = .23$). This contrasted Study 1's finding of significant associations between NA and all stressors except for demands.

Correlations between stressors and mental health indices. T1 demands displayed the only significant correlation between T1 stressors and T2 depression ($r = .27$), stress ($r = .37$) and anxiety ($r = .37$). Decision latitude was negatively associated with contemporaneous depression ratings only ($T1r = -.39$, $T2r = -.22$). T1 decision latitude was not significantly associated with T1 stress or anxiety. At both time points, the variable support showed a medium-sized negative contemporaneous association with depression ($T1r = -.36$; $T2r = -.32$). T1 support was significantly associated with anxiety ($r = .27$) but not stress ($p > .05$) at T1. Workgroup identification had an approximately medium-sized concurrent association with depression at both time points ($T1r = -.35$; $T2r = -.27$); correlations with stress and anxiety ratings were not significant ($p > .05$).

Correlations among stressors. T1 workgroup identification had a large positive association with T1 decision latitude ($r = .50$) and close to medium-sized association with T2 decision latitude ($r = .28$). In a similar way, T1 workgroup identification was strongly associated with T1 support ($r = .77$) and had a close to large-sized association with T2 support ($r = .47$). Decision latitude and support had an approximately large concurrent association ($T1r = .46$, $T2r = .55$) which was slightly higher compared to Study 1 ($r = .41$) and significantly higher than Luchman & González-Morales' (2013) meta-analysis on DCS model interrelations ($r = .23-.30$). Demand was not significantly associated with stressors which

were similar to Study 1 although in contrast to the (small) negative correlation documented with social support (Luchman & González-Morales., 2013). Conversely, the non-significant negative association between demands and decision latitude was in line with Luchman & González-Morales (2013) but contrasted the small positive correlation found in Study 1 ($r = .20$).

Table 10

Means, Standard Deviations and Inter-Correlations among the Main Study Variables in the Longitudinal Analysis (n = 76)

Variables	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Gender ^a	1.72	0.45																	
2. Age	36.50	11.61	-.31*																
3. NA	14.81	5.12	.09	-.13															
4. Demands T1	30.52	6.12	-.06	-.07	.23*														
5. Demands T2	31.43	7.31	.04	-.16	.12	.71*													
6. Dec Latitude T1	68.80	10.98	.09	.38*	-.20	.01	-.02												
7. Dec Latitude T2	68.55	9.90	-.18	.27*	-.14	.10	.18	.53*											
8. Social support T1	25.47	3.93	.13	.14	-.11	-.21	-.19	.46*	.26*										
9. Social support T2	24.50	3.24	-.04	-.04	-.08	-.04	.02	.04	.55*	.46*									
10. Wrkgrou ID T1	66.78	14.36	.06	.23*	-.02	-.00	-.07	.50*	.28*	.77*	.47*								
11. Wrkgrou ID T2	61.55	11.74	.01	.09	-.17	-.08	-.01	.22	.49*	.51*	.63*	.47*							
12. Depression T1	7.71	8.52	.08	-.25*	.73*	.11	.08	-.39*	-.20	-.36*	-.17	-.35*	-.23						
13. Depression T2	9.55	11.12	.16	-.26*	.77*	.27*	.05	-.03	-.23*	-.12	-.32*	-.09	-.27*	.71*					
14. Anxiety T1	3.42	5.11	-.09	-.23*	.62*	.34*	.37*	-.15	-.02	-.27*	-.08	-.10	-.13	.53*	.57*				
15. Anxiety T2	4.34	6.52	.09	-.22	.69*	.37*	.29*	.03	-.02	-.08	-.12	-.01	-.13	.48*	.73*	.71*			
16. Stress T1	8.24	6.73	.19	-.16	.71*	.39*	.25*	-.08	.00	-.16	-.11	-.02	-.10	.65*	.67*	.63*	.55*		
17. Stress T2	8.48	8.98	.14	-.13	.72*	.37*	.30*	.05	-.08	-.06	-.16	.05	-.20	.52*	.71*	.57*	.82*	.64*	

Notes. ^a =Point bi-serial correlation (1= male 2 = female). NA = negative affect. T1 and T2 refer to Time 1 and Time 2 respectively. Mean scores for demand, control and support were calculated using the scale construction formulae for the Job Content Questionnaire (Karasek et al., 1985). Dec latitude = decision latitude. Wrkgrou ID = Workgroup social identification. Depression, anxiety and stress refer to the respective scores on the DASS2. DASS21 means have been doubled according to scoring recommendations and therefore reflect scores out of a possible 42 points, where higher scores represent higher depression ratings (Lovibond & Lovivond, 1995a/b). **p* < .05.

Correlations between Social Identification Components and the Main Study Variables

Table 11 displays the correlations between the dimensions of social (workgroup) identification and the study variables of the T1 cross-sectional sample. The reporting of the larger cross-sectional versus longitudinal sample was selected to maximise the power to explore significant associations. Of the mental health indices, depression showed the largest association with all significant social identification components ($r = -.23$ to $-.47$). *Self-investment* was the higher order factor with the stronger association with mental health indices; especially depression ($r = .47$). The components of social identification shared a correlation of a largely similar magnitude for anxiety, stress and NA ($r = -.25$ to $-.28$). With exception, *self-definition* had a small significant association with stress ($r = -.13$) and NA ($r = -.15$) but not anxiety ($r = -.08, p > .05$) and *centrality* had a small significant correlation with anxiety ($r = -.15$) and NA ($r = -.16$) but not stress ($r = -.10, p > .05$). *In-group homogeneity* was the only subscale with a non-significant association with all mental health indices.

All components of social identification were significantly associated with stressors with the exception of demands which was only significantly associated with *centrality* ($r = .14$). As with the mental health indices, *self-investment* was the higher-order factor more strongly related to stressor variables. For example, correlations between *self-investment* and decision latitude and support dimensions were large ($r = .55$ - $.58$) in contrast to the greater variability and smaller magnitude of correlations with *self-definition* ($r = .28$ - $.46$).

Of the subscales, *solidarity* and *satisfaction* showed the largest correlation with the decision latitude and support subscales. *Centrality* had a medium-sized correlation with decision latitude and support ($r = .33$ -. $.37$) which contrasted the small or non-significant association found with mental health indices. Similarly, *in-group homogeneity* had a medium-sized correlation with colleague support ($r = .31$) and small association with supervisor support and the decision latitude subscales ($r = .13$ - $.18$) in contrast to non-significant DASS21 associations.

Table 11

Contemporaneous Correlations among Dimensions of Social Workgroup Identification and Occupational Stressors and Mental Health Indices at T1 (N = 262)

Variables	Self- Investment	Self- Definition	Solidarity	Satisfaction	Centrality	Self- Stereotyping	In-group Homogeneity
1. Depression ^a	-.47*	-.23*	-.46*	-.52*	-.25*	-.31*	-.06
2. Anxiety ^a	-.26*	-.08	-.25*	-.28*	-.15*	-.15*	-.03
3. Stress ^a	-.25*	-.13*	-.25*	-.28*	-.10	-.18*	-.02
4. Negative affect	-.28*	-.15*	-.25*	-.32*	-.16*	-.21*	-.02
5. Colleague support	.56*	.46*	.57*	.56*	.36*	.46*	.31*
6. Supervisor support	.58*	.28*	.58*	.61*	.33*	.30*	.18*
7. Skill discretion	.56*	.31*	.53*	.57*	.37*	.37*	.13*
8. Decision authority	.55*	.28*	.52*	.57*	.35*	.31*	.17*
9. Demands	.12	-.04	.08	-.10	.14*	-.01	.06

^a Depression, Anxiety and Stress refer to the corresponding ratings on the DASS21 (Lovibond & Lovibond, 1995a,1995b).

* $p < .05$. Scales in bold refer to the higher order dimensions of social identification according to Leach et al (2008). Unbolded scales refer to the component scales of self-investment (solidarity, satisfaction and centrality) and self-definition (self-stereotyping and in-group homogeneity).

Regression analysis for DCS model predictions

A series of hierarchical regression analyses were carried out to test the strain and iso-strain hypothesis in the prediction of DASS21 depression, anxiety, and stress ratings after one year. The results for depression are displayed in Table 12. The results for stress and anxiety are presented in text only given their peripheral examination.

Strain and iso-strain assessed as a ratio term. To increase power to detect effects, the relationship between baseline iso-strain and prospective mental health ratings was first tested using the continuous ratio term of demands, decision latitude and overall support, without adjustments (Model 1). This association was not significant for depression ($F(1,74) = 3.35, p > .05$), anxiety, ($F(1, 74) = 3.36, p > .05$) or stress ($F(1, 74) = 3.36, p > .05$). The strain hypothesis was similarly modelled by the continuous ratio of demands and decision latitude without adjustments (Model 2) and was also not significant for depression ($F(1,74) = 3.25, p > .05$) or anxiety ($F(1,74) = 2.53, p > .05$). The association was significant for stress (standardised $\beta = .24, p < .05, F(1,74) = 4.42, p < .05$) although this reduced to non-significance (standardised $\beta = .06, p > .05$) upon the adjustment of baseline stress. The sample size was adequate for detecting medium-sized effects with 80% confidence for the unadjusted ($N > 54$) and adjusted ($N > 67$) models.

Strain and iso-strain assessed as a main effects model. As performed in Study 1, a multivariate main effects model was tested for demands, decision latitude and support. This model was tested without adjustments (Model 3) and the sample size was just adequate ($N = 76$) for detecting a medium-sized effect with 80% confidence. For depression, the main effect of demands was the only significant variable (standardised $\beta = 0.25, p < .05$) although the model itself was not significant, $F(3,71) = 2.29, p = .09$. To maximise power, Model 4 tested only the univariate demands main effect, which was significant, accounting for six per cent of the variance in depression scores at Time 2, $F(1, 74) = 5.96, p < .05$. Model 5 adjusted for baseline depression. T1 depression explained a significant portion of variance (44 %) in T2 depression scores and T1 demands explained an additional three per cent of the variance, R^2 change = .04, F change (1, 72) = 5.60, $p < .05$. NA was not factored as an additional covariate given its high correlation with T1 depression ($r = .73$) which was already factored.

As for depression, the main effect of demand was the only significant variable (standardised $\beta = 0.38, p < .05$) in the unadjusted model for stress (Model 3). However, while

the main effect model (Model 3) was significant, $F(3, 70) = 3.87, p < .05$, the demand main effect reduced to non-significance (standardised $\beta = 0.17, p > .05$) upon the adjustment of T1 stress (Model 5). T1 stress accounted for 39% of the variance in T2 stress scores, $F(2, 71) = 43.78, p < .05$. For anxiety, Model 3 which included the stressor variables was non-significant, $F(3, 1) = .41, p > .05$. Accordingly, no further models were tested.

Table 12

Heirarchical Regression Analysis for the One Year Association Between Baseline DCS Model Ratings and Prospective Depression Ratings, with and without Adjustments (n = 76)

Model	Unstandardised β for effect on depression [95% CI]	Standardised β for effect on DASS21-depression	p value	R ²	F(df1, df2)
M1. T1 Iso-strain	260.15 [-23.10, 543.36]	.21	.07	.03	3.35 (1, 74)
M2. T1 Strain	16.37 [-1.73, 34.47]	.21	.08	.03	3.25 (1, 74)
M3.				.05	2.29 (3, 71)
T1 Main effects					
Demands	1.13 [.09, 2.16]	.25	.03		
Decision latitude	-.12 [-.81, .56]	-.05	.72		
Social support	-.26 [-.98, .45]	-.10	.47		
M4. T1 demands	1.21 [.22, 2.21]	.27	.02	.06	5.86* (1, 74)
M5. Adjusted					
T1 depression	.82 [.61, 1.03]	.65	<.001	.44	59.14*** (1, 74)
T1 demands	.89 [.14, 1.65]	.20	.02	.47	34.20*** (2, 73)

Note. T1 = Variables at Time 1. M1 = Iso-strain as a ratio term without adjustments. M2 = Strain as a ratio term without adjustments. M3 = Multivariate main effects model without adjustments. M4 = Univariate analysis of the demands main effect. M5 = Demands main effect model adjusted for by T1 depression. df = degrees of freedom. R² refers to the adjusted R square, which provides a superior indication of R² within small samples (Tabachnick & Fidell, 2007). * $p < .05$ *** $p < .001$.

Regression analysis for SIA predictions

Given the non-significant correlation between T1 social (workgroup) identification and T2 depression ($r = .09, p > .05$), stress ($r = .05, p > .05$) and anxiety ($r = -.01, p > .05$), a regression analysis was not performed on these variables. The correlation table however revealed significant positive associations between T1 social identification and T2 stressor

ratings of decision latitude ($r = .28, p < .05$) and social support ($r = .47, p < .05$).

Accordingly, causal predictions for these relationships were examined in separate univariate regression analyses. These results are displayed in Table 13.

The analyses revealed that social identification significantly predicted ratings of decision latitude (unstandardised $\beta = .22$, 95%CI [.06, .38]) and support (unstandardised $\beta = .08$, 95%CI [.03, .13]) at one-year follow-up, such that higher ratings of social identification was associated with higher ratings of decision latitude and support. These associations reduced to non-significance ($p > .05$) after the respective adjustment of baseline decision latitude and support ratings. The univariate adjusted analyses were evaluated as having sufficient sample size ($N > 67$) to detect a medium size effect with 80% power.

Table 13

Heirarchical Regression Analysis for the One Year Association between T1 Workgroup Identification and T2 Decision Latitude and Support, with and without Adjustments (n = 76)

Dependent Variable	Unadjusted			Adjusted for baseline stressor		
	Unstandardised β [95% CI]	t	p value	Unstandardised β [95% CI]	t	p value
Dec lat.	.22 [.06, .38]	2.76	<.01	1.45 [-.14, .18]	5.05	.83
Support	.08 [.03,.13]	3.37	.001	.03 [-.05, .10]	1.96	.49

Note. Dec lat = decision latitude. Unadjusted refers to the simple regression of T1 workgroup identification on the T2 dependent variable. Adjusted for baseline stressor refers to the adjustment of T1 decision latitude in the prediction of T2 decision latitude and the adjustment for T1 support in the prediction of T2 support.

Mediation analysis between Social Identification, Stressors and Depression

The proposed mediation pathways of interest were examined using the T1 cross-sectional data ($N = 262$). The analysis was not carried out with the longitudinal data ($n = 76$) as correlations were not significant between T1 social identification and T2 depression and neither was the regression of T2 depression on T1 decision latitude and T1 support significant. Instead, the cross-sectional data was used to assess whether the association

between social identification and depression was mediated by the components of decision latitude and social support. The hypothesised model is presented in Figure 3.

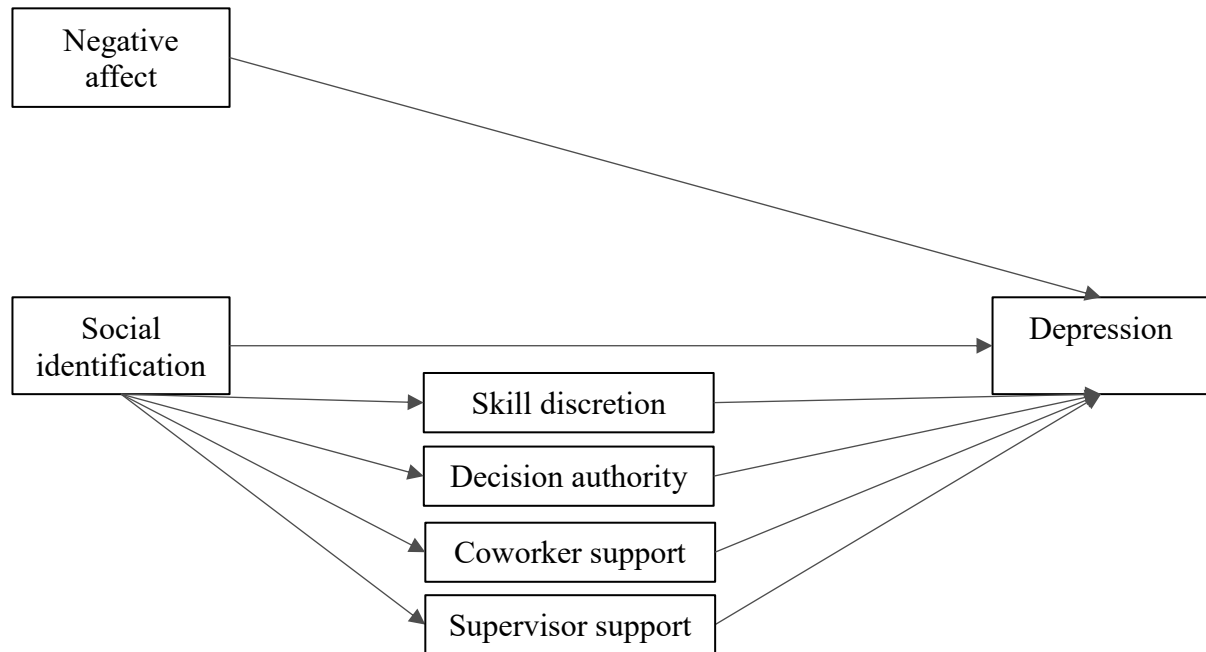


Fig 3. Hypothesised Conceptual Mediation Model Between Concurrent Social Identification, the Components of Decision Latitude and Social Support and Depression, after the adjustment of Negative Affect. A direct association between social identification and depression is proposed together with indirect pathways through the decision latitude (skill discretion, decision authority) and social support (co-worker, supervisor) components.

IBM SPSS Amos version 22 was used to test the mediation model according to the Baron and Kenny approach (1986) and bias-corrected bootstrapping set to 2000 samples to determine significance with 95% confidence intervals (Bollen & Stine, 1990; Hayes & Scharkow, 2013). Mediation was tested with three steps. First, the standardised regression weight for the relationship between each mediator and depression was first determined. The standardised regression weight for the direct association between social identification and depression was subsequently reported followed by that for the indirect association via the mediators. The mediators were skill discretion, decision authority, colleague support and supervisor support as displayed in Figure 2. The overall measures of social support and decision latitude were also tested as mediators in a further model to preserve power and

explore whether the relationship between social identification and depression might be better captured using the conceptualisations put forward by the full DCS model constructs.

The relationships were initially evaluated through univariate analysis. This was carried out to obtain a crude estimate of the association (including the viability for the mediation analysis via R^2). The univariate analysis was also reported so as to be compatible to the referenced social identification literature that assessed single variable pathways. Multivariate analysis was then performed to determine the associations in the context of the full model with all mediators. Two multivariate analyses were performed; one assessing the subscales of decision latitude and social support and the second containing the full scale of decision latitude and social support. All analyses were adjusted for by NA. Each analysis had sufficient sample size ($N > 97$) to detect a medium effect size with 80% power.

Maximum likelihood estimation was employed to estimate the final measurement model. A non-significant Chi-Square was taken to indicate good model fit. Acceptable model fit was determined by a Chi-square value up to three times the size of the degrees of freedom (Carmines & McIver, 1981) and the following additional statistics: The comparative fit index (CFI) that was close to or optimally exceeded a value of .95, a standardised root mean residual (SRMR) value below .08, a root mean squared error of approximation (RMSEA) value close to .06 (Hu & Bentler, 1999) with confidence intervals between 0 and .08 (Hooper, Coughlan, & Mullern, 2008) or up to .10 for mediocre fit (MacCallum, Browne, & Sugawara, 1996).

Table 14 revealed that the univariate mediation relationships were supported for all proposed mediators except for colleague support. Of note, colleague support was significantly associated with social identification but not with depression ratings. Overall model fit was approaching a medium size ($R^2 = .25, p < .05$). The R^2 values for the independent variables and depression were significant and small (R^2 skill discretion/decision authority/decision latitude = .15, supervisor support = .18, co-worker support = .06, overall social support = .17, social identification = .19, $p < .05$). Multivariate analyses revealed that supervisor support was the only significant mediator. The combination of supervisor and colleague support into a single index of support yielded approximately the same indirect effect and confidence intervals as the supervisor support subscale alone, indicating little improvement through the amalgamation of colleague and supervisor support into a single index. By contrast, the aggregated measure of decision latitude (skill discretion plus decision

authority) significantly mediated the association between social identification and depression in multivariate analysis while the individual subscales did not, suggesting that the combined variable of decision latitude may better account for the association between social identification and depression compared to the subscales considered in isolation.

Table 14

Path Analysis Between Concurrent Social Identification and DASS21 Depression as Mediated by the Subscales and Full Scales of Decision Latitude and Social Support (n = 262)

Mediator	β direct effect of mediator on depression	β direct effect of SI on depression	β direct effect of SI on depression with mediator	Indirect effect [95% CI]
Skill discretion				
Univariate	-.18 ***	-.37 ***	-.27 ***	-.10** [-.17, -.04]
Multivariate	-.13 **	-.37 **	-.18 ***	-.07 [-.15, .01]
Decision authority				
Univariate	-.18 **	-.37 ***	-.28 ***	-.09** [-.15, -.04]
Multivariate	-.10*	-.37 ***	-.18*	-.05† [-.12, -.03]
Co-worker Support				
Univariate	-.01	-.37 ***	-.36***	-.00 [-.07, -.07]
Multivariate	.01	-.37 ***	-.18 **	.01 [-.07, .08]
Supervisor Support				
Univariate	-.21 ***	-.37 ***	-.26 ***	-.12*** [-.19, -.05]
Multivariate	-.20 ***	-.37 ***	-.18 **	-.10** [-.18, -.03]
Decision latitude				
Univariate	-.23***	-.37***	-.24***	-.13*** [-.19, -.07]
Multivariate	-.22***	-.37***	-.16**	-.12*** [-.19, -.06]
Social Support				
Univariate	-.18***	-.37***	-.25***	-.12* [-.21, -.03]
Multivariate	-.15***	-.37***	-.16**	-.10* [-.20, -.01]

Note. SI = social (workgroup) identification. Univariate refers to the analysis conducted with the mediator of interest, after adjusting for negative affect. Multivariate refers to the analysis containing all mediators, after adjustment for negative affect. The indirect effect refers to the indirect effect of social identification on depression ratings via the decision latitude and support scales *** = $p \leq .001$, ** = $p < .01$, * = $p < .05$, † $p = .054$

Figure 4 displays the final measurement model, $\chi^2(4) = 40.38$, $p < .001$, comparative fit index (CFI) = .93, root mean square error of approximation (RMSEA) = .18, 90%CI[.13, .23], standardized root mean square residual (SRMR) = .14. To maximise power, the final model included the measure of social support rather than supervisor support. Poor model fit was suggested by all fit indices.

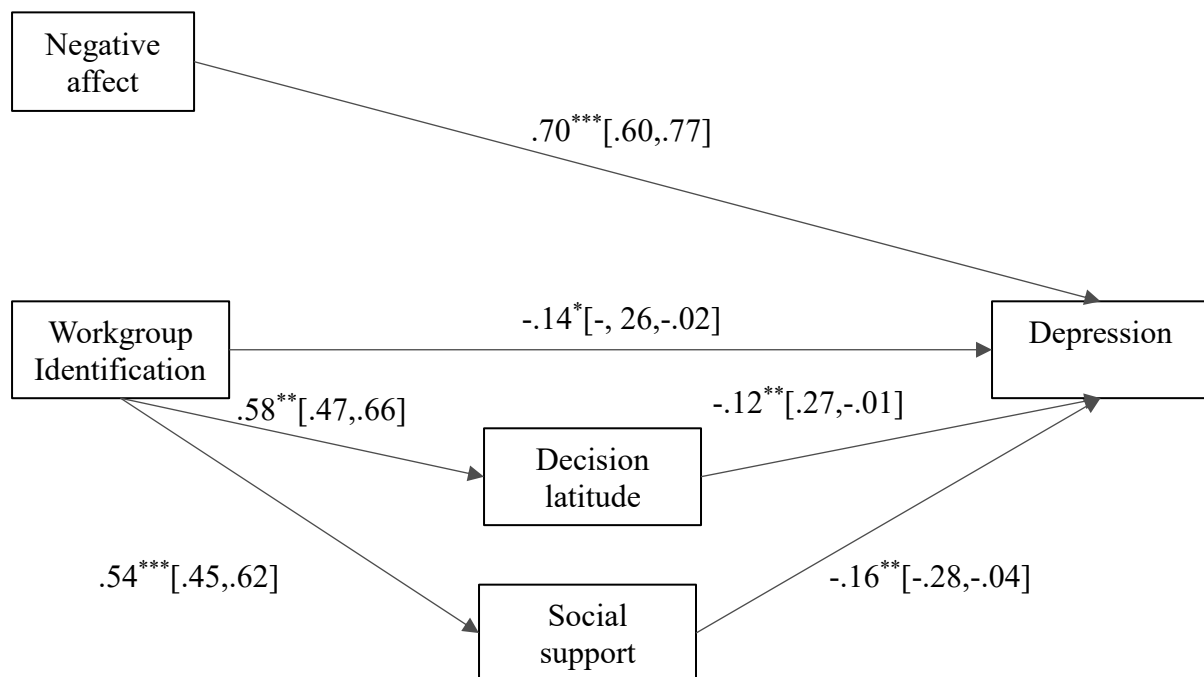


Figure 4. Final Measurement Model Between Workgroup Identification and Concurrent Decision Latitude, Social Support and Depression. $^{***}p = .001$ $^{**}p < .01$, $^{*}p < .05$. $R^2 = .58$

Mediation analysis between Social Identification, Stressors and Stress and Anxiety

To evaluate the idea that social identification and ill-health is particularly salient for depression, the mediation analysis was repeated using the outcome of stress and anxiety. The mediators assessed were the complete scales of decision latitude and social support. The subscales were not evaluated as the primary query concerned the presence and magnitude of associations with other (mental) health outcomes and not whether specific dimensions of support and control were mediators. For similar reasons, univariate analyses were performed and were adjusted for by NA. The respective results for stress and anxiety are displayed in Table 15.1 and 15.2.

Table 15.1

Path Analysis Between Concurrent Social Identification and DASS21 Stress as Mediated by Decision Latitude and Social Support (n = 262)

Mediator	β direct effect of mediator on stress	β direct effect of SI on stress	β direct effect of SI on stress with mediator	Indirect effect [95% CI]
Decision latitude	-.03	-.14 ***	N/A	N/A
Social support	-.23 ***	-.14 ***	.01	-.16** [-.27, -.06]

Note. SI = social (workgroup) identification. The results represent separate analyses and were adjusted for by negative affect. *** $p \leq .001$, ** $p < .01$, * $p < .05$.

Social support fully mediated the association between social identification and stress, after adjustment for NA. The direct effect of decision latitude on stress was not significant ($p > .05$) and thus not feasible for mediation. For anxiety, a full mediation for support was suggested by the change in significance of the direct effect of social identification on anxiety following the consideration of social support. However, the actual indirect effect was not significant, containing a null value in the confidence interval. A full mediation through decision latitude was supported although the relationship between social identification and anxiety was no longer significant upon the adjustment of negative affect (standardised $\beta = -.08$, $p > .05$), rendering the mediation pathway non-significant.

Table 15.2

Path Analysis between Concurrent Social Identification and DASS21 Anxiety as Mediated by Decision Latitude and Social Support (n = 262)

Mediator	β direct effect of mediator on anxiety	β direct effect of SI on anxiety	β direct effect of SI on anxiety with mediator	Indirect effect [95% CI]
Decision latitude	-.17**	-.13 ***	-.04	-.09* [-.17, -.01]
Social support	-.13 ***	-.13 *	-.07	-.05 [-.16, .07]

Note. SI = social (workgroup) identification. Univariate analyses are not adjusted for NA. The adjustment of NA rendered the pathways non-significant. *** $p \leq .001$, ** $p < .01$, * $p < .05$.

Taken together, the results revealed that the indirect relationship via social support was more robust for depression compared to anxiety as the pathway was significant. By comparison, the univariate indirect effect of social support was of similar small magnitude for both stress ($\beta = -.13$, 95% CI $[-.20, -.07]$) and depression ($\beta = -.12$, 95% CI $[-.19, -.05]$). Full mediation was supported between social identification and stress while partial mediation was found for depression. The indirect pathway via decision latitude was most relevant for depression. This was evident through comparison with the non-significant indirect effect for anxiety and the non-significant direct association between decision latitude and stress.

Discussion

The intent of this study was to evaluate causal relations between occupational stressors and depression risk and to examine whether social identification could enhance DCS model predictions. As expected, ratings of high job demand predicted heightened depression ratings after one year (Research Question 1). Interestingly, concurrent ratings of job demand and depression were not significantly related, lending partial support to the demands main effect. Partial support for the main effect of decision latitude (RQ2a) was found such that decision latitude and the subcomponents of skill discretion and decision authority were concurrently associated with depression. Partial support was also obtained for the support main effect (RQ2b) although such that supervisor but not colleague support was significantly associated with concurrent depression ratings. Prospective associations for decision latitude and support main effects were not supported. Regardless of formulation, the strain (RQ3a) and iso-strain (RQ3b) hypotheses were not supported for depression, nor stress or anxiety.

With regard to the predictions for social identification, a causal role in depression was not supported while partial support was determined for the predicted association with decision latitude and social support. Specifically, social identification did not predict depression ratings one year later (RQ4). Rather, higher ratings of social identification at baseline predicted higher ratings of decision latitude (RQ5a) and social support (RQ5b) after one year. The associations however were not maintained following the adjustment of baseline decision latitude and social support ratings respectively. Partial support for the hypotheses were nonetheless indicated as social identification showed a negative concurrent association with depression (RQ4), decision latitude (RQ5a) and social support ratings (RQ5b). Furthermore, as predicted decision latitude and social support mediated the concurrent relationship

between social identification and depression ratings (RQ6). Additional analyses revealed that the individual components of skill discretion and colleague support were not in isolation significantly implicated in the process.

As an adjunct to the core queries, social identification was found to have a stronger contemporaneous association with depression than with stress and anxiety ratings, as predicted (RQ7a). The indirect effect of decision latitude was significant only for depression while the indirect association via social support was of similar magnitude for stress, anxiety and depression. The association for anxiety however reduced to non-significance after the adjustment of negative affect. Thus, partial support was obtained for the proposition that indirect associations between social identification and mental health may be more equivalent than enhanced for depression (RQ7b). Lastly, exploratory analyses revealed that the self-investment component of social identification, especially the solidarity and satisfaction subscales, had the strongest correlations with mental health and stressor ratings. The components of self-definition showed stronger associations with stressors than with mental health ratings although self-definition overall had weaker associations compared to the full social identification construct. The following discussion is organised around the research matters that shaped the predictions.

Evidence for the Demand Control Support Model

A core aim of the study was to investigate with longitudinal data the cross-sectional associations found in Study 1 between ratings of DCS model variables and depression.

Demands main effect. High demands predicted high depression ratings after one year which supports the demands main effect hypothesis of the DC/S model (Karasek, 1979; Karasek & Theorell, 1990). The relationship held even after the adjustment for baseline depression, strengthening the claim about direct causal effects and weakening the counter-claim that effects may be biased by prior mental health (see de Lange et al., 2005). The significant finding was in line with results from methodologically superior cohort studies (Andrea et al., 2009; Clays et al., 2007; Paterniti et al., 2002; Plaisier et al., 2007; Smith & Bielecky, 2012). The data also adds confirmatory evidence to other studies utilising a one-year lag for depression (Godin et al., 2005; Kawakami et al., 1992; Kivimäki et al 2010; Niedhammer et al., 1998; Tokoyuma et al., 2003; Wang et al., 2012a), suggesting that the effects of high demands may be observed after relatively brief periods of exposure. Most

notably, the results add to the emerging evidence base that high job demands within the Australian occupational environment can directly elevate the risk of depression (Butterworth et al., 2011; Strazdins et al., 2011; LaMontagne et al., 2008).

The simultaneous non-significant cross-sectional association between demand and depression ratings however was puzzling and not in line with reviews on cross-sectional associations (Häusser et al., 2010; Van der Doef & Maes, 1999). Nonetheless, the finding that demand was not significantly associated with concurrent depression ratings in a second independent sample is noteworthy. With the use of the full DASS21 the current study clarified that demands were linked to the associated states of stress and anxiety. Given the correspondence of DASS21 Stress and Anxiety to anxiety disorders as well as general distress (Antony et al., 1998; Lovibond & Lovibond, 1995b) this might suggest that demands are still relevant to employees' experience of concurrent depression, although more indirectly through comorbid states. The results suggest that employees reporting high demands and displaying signs of general distress and anxiety may be early warning signs for the subsequent risk of depressive symptoms (Dormann & Zapf, 2002). Although not directly tested, the results could also suggest that demands may have a more immediate effect on general distress and anxiety and through other processes come to affect depression risk.

Control main effect. The lack of prospective support for the main effect of control in depression risk contradicted theoretical predictions (Karasek, 1979; Karasek & Theorell, 1990) and other self-report prospective research (Clays et al., 2007; Griffin et al., 2002; Magnusson-Hanson et al 2009; Strazdins et al., 2011; Weigl et al., 2012). Nonetheless, the finding was in line with self-report longitudinal studies that were also methodologically sound (Fandiño-Losada et al 2013; Smith & Bielecky, 2012) as well as the bulk of research that employed objective measures of depression (Godin et al., 2009; Grynderup et al., 2012; Kivimäki et al., 2010; Plaisier et al., 2007; Thielen et al., 2010; Ylipaavalniemi et al., 2005) including objective measures of control (Bonde et al., 2009; d'Errico et al., 2011; DeSanto Iennaco et al., 2009). Compared to the supportive research, the current results were clearly based on a small sized sample. At the same time, the supportive and unsupportive self-report literature noted did not differ in this regard or on other design features such as time lag or sample type. The findings add to the observation that the main effect of control is less consistently supported than the demands main effect.

Unlike results for the demands main effect and depression, the main effect for control was supported in cross-sectional analyses; with significant associations found for the complete construct of decision latitude as well as the individual subscales of skill discretion and decision authority. The results replicated the association between skill discretion and depression in Study 1 (which was found for both genders), strengthening support for the relationship. The support here for decision authority was in line with a US study that documented an association between self-reported decision authority and clinical interview determined depression (Mausner-Deutsch & Eaton., 2000) and a Danish five-year longitudinal survey, for women (Rugulies et al., 2006). However, both Mausner-Deutsch and Eaton (2000) and Rugulies et al (2006) did not find support for the skill discretion main effect. Conversely, the results were in line with Griffin et al (2007) for the component of skill discretion in a small sample of UK public servants that used both subjective and objective measures for control and depression, although decision authority was not significant. Accordingly, this study adds concurrent support for the overall relationship between decision latitude and elevated depression ratings and adds to the variable nature of support for the individual subscales.

Support main effect. At the time of assessment, this was the first known prospective test of the DCS model support main effect in the depression risk of Australian employees. The lack of support contrasted the significant results found in large ($N > 9000$) cohort surveys (Niedhammer et al., 1998; Paterniti et al., 2002). Thus power may be an explanatory factor for the lack of support. However, even more recent large cohort surveys revealed, for various reasons, partial support at best (Andrea et al., 2009, $N = 3707$; Fandiño-Losada et al 2013, $N = 4427$; Magnusson-Hanson et al., 2009, $N = 5985$). Thus the non-significant result, while contrary to predictions (Johnson & Hall, 1988; Karasek & Theorell, 1990), was not atypical and in fact was in line with the majority of recent longitudinal research (Godin et al., 2009; Horton & Lipscomb, 2011; Inoue et al., 2010; Smith & Bielecky, 2012; Wang et al., 2012a), albeit these studies utilised objective measures of depression. Taken together, the results challenge the robustness of the causal role of low workplace support in depression risk.

As in Study 1, a positive cross-sectional relationship between social support and depression was found, confirming the well-established contemporaneous association between workplace support and depression (Häusser et al., 2010; Van der Doef & Maes, 1999). Subscale analysis revealed however that supervisor and not colleague support was the

significant dimension. This was in line with evaluations on male samples by Frese (1999) and Edimansyah et al (2008) with the latter study also employing the DASS21 and JCQ. For females only, Fandiño-Losada et al (2013) showed that the social climate at work was relevant, although the comparative influence of colleagues versus the supervisor was not evaluated.

These findings demonstrate the importance of distinguishing the source of support as arising from either the supervisor or colleagues given the potential for different effects on psychological functioning. Indeed, the supervisor's role, as assessed by the Job Content Questionnaire, differs from colleague support by the additional role of team work facilitation. It has also been suggested that supervisors are viewed as representatives of the organisation, thus relationships may also reflect the effect of perceived macro-level support (Eisenberger, Stinglhamber, Vandenberghe, Sucharski, & Rhoades, 2002), which may have led to a stronger effect on concurrent depression ratings. However, it is unclear why the opposite subscale effect was found in Study 1 where colleague but not supervisor support was associated with depression, particularly as both studies recruited from the Australian Public Service and demographics such as gender, age, and supervisory responsibility were not grossly different. One difference between the studies was the overall level of support which in Study 1 was higher than in the current study. To speculate this may suggest that in high support environments colleague support may be particularly relevant to health risk. In sum, this study confirms the contemporaneous association between workplace support and depression and highlights that in certain instances, specific sources of support may be more relevant than others to health risk (Blackmore et al., 2007).

Strain and iso-strain hypotheses. Accordingly, the strain and iso-strain hypotheses were not supported. This was evident in the longitudinal analysis with both the additive and ratio formulation and the cross-sectional analysis of only the additive main effect model. The lack of support for the additive strain hypothesis was also found in Study 1 although in that study the quadrant formulation was significant. These results demonstrate that the strain hypothesis is not robust. The non-significant outcome was nonetheless inconsistent with the prevailing evidence for the strain hypothesis (Bonde et al., 2008; see also Chapter 3). To remind, support in those studies typically utilised a quadrant formulation thus the individual test of the effect of demand and control.

The current findings with regard to iso-strain were more clearly in line with the majority of research that failed to support the hypothesis in depression risk (de Lange et al., 2005; Niedhammer et al., 2006; Plaisier et al., 2007; Rugulies et al., 2006; see also Chapter 3 for the review). The results suggest that unlike DCS model predictions (Karasek & Theorell, 1990) self-reported health risk may not necessarily depend on the presence of multiple occupational stressors. The results rather support the idea that a single occupational stressor, in this instance demands, may sufficiently account for heightened depression risk.

While not central to the current query, the results for stress and anxiety support wider generalisations of the DCS model to health risk. To some extent, the idea that the single stressor of high demands, and not necessarily multiple stressors, elevates health risk was supported for stress, although the effect reduced to non-significance after the adjustment for baseline stress. In addition, a common finding across all three mental health ratings was the significant contemporaneous association with decision latitude and social support. Thus aspects of workplace control and support may be variables most consistently related to mental health. Despite the association not being accounted for by the proposed causal relations, this suggests to a certain extent that the DC/S model identifies key factors of the occupational environment that relate to general health risk.

Evidence for the Social Identity Approach to Stress and Wellbeing at Work

Main effect of social identification in mental health risk. In the context of non-significant prospective associations for workplace control and support it was perhaps not surprising that the association was also not supported for social identification. The absence of support contrasted that determined in experimental studies (Cruwys et al., 2014b; Gleibs et al., 2011; Haslam et al., 2004; Reicher & Haslam, 2006) and that inferred from self-report cross-sectional associations (Bizumic et al., 2009; Haslam et al., 2005; Jimmieson et al., 2010; Sani et al., 2012). That employees' identification with their workgroup members did not predict their experience of mental strain after one year may indeed reflect that social identification is not causally implicated in mental health risk, despite the predictions put forward by the SIA to stress and wellbeing (Haslam, 2004; van Dick & Haslam, 2012). The results thus challenge the direct role of social identification in long-term health risk.

A key difference in this research was the longitudinal survey data including the one-year follow-up period. Alternative to challenging causality, the design might have also led to

inadequate power to detect an effect that may be small or may have studied an insufficient time lag to capture effects. These methodological factors are also relevant to hypothesising about the lack of support for the main effect of control and social support. More specific to the SIA, the lack of prospective support could also suggest that health risk may be more dependent or sensitive to other processes of social identification such as salience or fit (see Turner et al., 1994) as opposed to chronicity. The results draw such ideas into the spotlight to assist in understanding the causal role of social identification in occupational stress risk

The supportive relationship found between contemporaneous social identification and mental health ratings was an important contribution to the largely cross-sectional knowledge base on occupational stress. In fact, this was the first known study at the time to confirm the association between workgroup identification and valid measures of mental health risk after the adjustment of pre-existing mental health risk via negative affect. In addition to supporting the claim that social identification is relevant to general health risk, the results demonstrate that associations are maintained beyond individual risk factors, which was a common critique obscuring confidence in conclusions of early research on the DCS model (see Brief et al., 1998; Van der Doef & Maes, 1999). The contribution of the data to the prediction of occupational stressors is discussed next followed by the proposed mediation relationship linking social identification to mental ill-health via these stressors.

Main effect of social identification in workplace support. A noteworthy finding was that workgroup identification prospectively predicted ratings of workplace support at one year. This contributed to the evidence base in a number of significant ways. First, the data adds weight to the cross-sectional associations documented between workplace support networks and depression ratings (Bizumic et al., 2009; Jimmieson et al., 2010; Sani et al., 2012), strengthening evidence for the causal role of social identification in the experience of social support. The results also extend the external validity of results from earlier experimental research conducted within a simulated institution or prison environment (Haslam & Reicher, 2006; Reicher & Haslam, 2006) and a university setting with a generated stressor of a mental arithmetic task (Haslam et al., 2004) and pain (Platow et al., 2007).

The operationalisation of workplace support in this study also supported the role of social identification in an extended conceptualisation of social support that included; emotional and not just instrumental support sourced from both colleagues and the supervisor, and not a non-specific or generic measure. In line with the social identity approach to stress

(Haslam, 2004; van Dick & Haslam, 2012) these results suggest that a shared sense of identity among employees' immediate colleagues and supervisor can facilitate the experience of emotional support and practical assistance with work tasks. The longitudinal link however reduced to non-significance upon the adjustment of baseline support, ultimately casting caution about the causal sequence of the relation.

Main effect of social identification in workplace control. Evidence was presented too for the novel proposition that social identification increases decision latitude. The longitudinal data in particular suggested that a shared sense of identity with fellow workgroup members enhanced employees' capacity for input over work tasks (decision authority) and skill use and development (skill discretion). As for workplace support however, the relationship was no longer supported after the adjustment of baseline levels of decision latitude one year earlier. The cross-sectional associations however were maintained after the adjustment of negative affect.

The supportive cross-sectional results for decision authority were in line with research documenting an association between social identification and decision-making freedom in the context of office space design (Knight & Haslam, 2010a). This study extended the relevance of social identification to decision-making authority about assigned work tasks. It was also the first known demonstration of a positive association between employees' social identification with their workgroup and skill discretion. These results demonstrate the wider relevance of social identification to the array of occupational stressors. The non-significant results that followed from the adjustment of baseline social support and decision latitude revealed that the current and accumulated research, including with other health outcomes such as burnout (Haslam et al., 2009), may need cautious interpretation. Apart from the methodological limitations already discussed, the results indicate that social identification could also operate on stressors and health via a more contemporaneous process.

Mediation between Social Identification, Occupational Stressors and Depression

The proposed pathway between social identification and depression as mediated by decision latitude and social support was supported by cross-sectional data, even after the adjustment of negative affect. This result suggests that the health risk associated with classic occupational stressors may be shaped by group processes (Haslam et al., 2004; Haslam et al., 2005; Haslam & van Dick, 2011; van Dick & Haslam, 2012). Specifically, the data supported

the notion that social identification has the capacity to attenuate health risk through greater access to and benefit from resources purported to reduce health risk (Haslam et al., 2005). The data was also consistent with the converse; that poor identification with the immediate workgroup increases the experience of stressors such as low support and low control that in turn elevate disease risk (Karasek & Theorell, 1990). The management of negatively biased perceptions (NA) strengthened the assertions.

The specific pathway involving workplace support as the mediator confirmed theorising about the indirect effect of social identification in occupational stress risk (Haslam et al., 2005; van Dick & Haslam, 2012). The more fine-grained identified that the support sourced from the supervisor but not colleagues was the significant mediator. This could suggest that workgroup identification had particular relevance to depression risk via its capacity to influence employees' experience of supervisor support. This interpretation is of course suggestive given its base in cross-sectional associations only. Moreover, the lack of support for the mediator co-worker support can be explained by the non-significant link between co-worker support and depression ratings as opposed to flawed SIA predictions.

By contrast, a different set of results and possible explanations emerged for the subscale analysis of decision latitude. On the one hand, univariate analyses supported both skill discretion and decision authority as significant mediators of the relationship between social identification and depression. However, both indirect effects became non-significant in the multivariate analysis with social support subscales in which supervisor support was the only significant mediator. These results might suggest that supervisor support is a critical mediator in the wider context of occupational stressors. However, the relative potential of colleague support as a mediator was difficult to ascertain given the lack of association with depression as opposed to a lack of robustness in the context of other occupational stressors, which appeared to be the case for the decision latitude variables. Alternatively, the significance of the full decision latitude scale could be interpreted to suggest that social identification may be better viewed as influencing the combined rather than discrete factors of skill discretion and decision authority. Indeed, DCS model theorising and factor analysis (Karasek & Theorell, 1990; Karasek et al., 1998) supports the view of decision latitude as both a single and dual construct. Thus the association of social identification with decision latitude expands the scope of constructs that social identification may influence.

In sum, partial support was determined for the proposed indirect effect of social identification in depression via social support (Haslam et al., 2005; van Dick & Haslam, 2012) and control at work, the latter of which was a novel prediction developed in this thesis. At a broad level, multivariate analysis supported both decision latitude and social support as significant contemporaneous mediators, which supported the general theoretical standpoint that social identification shapes the experience of stressors and in turn their capacity to influence health risk (Haslam, 2004; van Dick & Haslam, 2012). The multivariate path analysis, adjusted for by negative affect, was an important contribution as it presented evidence for the theorised role of social identification in simultaneous occupational stress experiences (van Dick & Haslam, 2012). The subscale analysis raised speculation about whether specific dimensions of support and control, such as supervisor support and decision latitude, may be more relevant than others to understanding the indirect role of social (workplace) identification in depression risk. Replication with greater power would aid clarity about these specific relationships. Finally, although the results were encouraging of support for the SIA to stress and wellbeing, it is important to bear in mind that the lack of support for prospective associations hampers confidence in the interpretation of causality.

Social Identification as an Explanatory Variable Particularly Relevant to Depression

Of secondary interest, the study sought to consider the proposition that social identification was especially relevant to understanding depression (Cruwys et al., 2014a). This was evaluated by comparing associations with other mental health outcomes. Support for a greater direct effect may be considered given that social (workgroup) identification was significantly associated with contemporaneous depression ratings to a stronger degree than it was with stress and anxiety ratings. This data supported the generalisability of the claim to a more enduring target of social identification; employees' workgroup, adding to the initial evidence obtained with the target of a client's therapy group (Cruwys et al., 2014b). The results were to some extent consistent with Bizumic et al (2009) who also employed the DASS21 in a sample of teachers and found significant associations between workplace (school) identification and depression but not stress and anxiety. Their explanation of low power ($N = 113$) nonetheless is plausible given the results for all dimensions found in the current analysis ($n = 262$). The comparatively stronger relationship between social identification and depression can be interpreted to be indicative of the heavily based social

aetiology in depression (Cruwys et al., 2014a, 2014b). The concomitant data may support the understanding of this unique health risk in the occupational environment.

To further this, the mediation analysis demonstrated that social identification may have a comparative effect on general health risk through its indirect role via support and control. Specifically, the cross-sectional analysis revealed an indirect effect size of similar small magnitude for the pathway between social identification on the one hand and depression, anxiety and stress ratings via the significant workplace support and control variables. This evidence raises the notion that social identification may be particularly relevant to the direct association with depression compared to other health outcomes but its indirect role via support and control may be best conceived of as similarly affecting general health risk, in line with classic views on OS (see Chapter 2). This analysis was considered relevant for supporting appropriate generalisations about the expectations of social identification as a novel occupational stressor and specifically in its account of the DCS model of health risk.

The Representation of Social Identification as a Multidimensional Construct

Lastly, the study provided information about the utility of a novel multidimensional measure of social identification (Leach et al., 2008). Exploratory cross-sectional analyses revealed that the emotive component of social identification, termed self-investment, was more strongly associated with mental health and stressor ratings compared to the cognitive component of self-definition. In fact, in-group homogeneity, a component of self-definition, was not directly related to the experience of mental health. This latter observation may support Postmes and colleagues' (2013) view that the perceived homogeneity between group members is not a component of social identification and their proposed single item measure of social identification that mapped on to self-investment.

At the same time, self-definition and its two sub-components were found to be more relevant to the experience of the occupational environment than to mental health. Following Leach and colleagues' (2008) conceptualisation of social identification, it could be argued that different aspects of social identification may affect different points in the occupational stress process, although self-investment appears to be especially relevant to the experience of both stressors and strain. The sub-component analysis further highlighted that satisfaction had the largest association with all significant variables, which was also noted by Leach et al (2008) in a student sample and Smith et al (2012) in the occupational context.

This study generalised the utility of the Leach et al (2008) multidimensional scale to the measurement of social identification at work as relevant to the experience of occupational stressors and mental health. Interestingly, the analysis revealed that workplace demand was not significantly associated with any component of social identification except for a trivial correlation with centrality. By contrast, each facet of social identification was concurrently related to the introduced variables of skill discretion and decision authority (in addition to colleague and supervisor support). While no priori hypothesis was advanced for this thesis, the reporting of the interrelations between study variables illuminated processes through which social (workgroup) identification may be implicated in occupational stress.

Methodological Strengths

Validated scales. A number of methodological strengths supported the results obtained and interpretations offered. First, validated scales were employed to measure social identification, occupational stressors and mental health. Although this may seem a basic point, the measurement of social identification was considered superior to previously utilised measures of the Leach et al (2008) scale that were adapted without corresponding psychometric tests (e.g., Durmont & Waldzus, 2014; Kuppens & Yzerbyt, 2014; Smith et al., 2012). This also applied to the bulk of adapted social identification measures utilised in OS research (Bizumic et al., 2009; Haslam et al., 2005; Jimmieson et al., 2010) and the reviewed research on mental health (Haslam et al., 2005; Haslam et al., 2009; Reicher & Haslam, 2006). The accompanying use of validated scales for the assessment of occupational stressors (Karasek et al., 1985) also contributed to the Australian evidence base of mostly economic and less methodologically rigorous evaluations of OS and depression, as discussed in Chapter 3. The measures selected therefore supported a valid empirical foundation to test the claims of the DCS model and SIA of stress and wellbeing in the workplace.

Adjustments. To the best of knowledge, this was the first study to directly demonstrate associations between workplace identification, workplace support and control and mental health, that persisted beyond the effect of individual mental health risk factors such as negative affect. This was considered a major strength given that much of the evidence accumulated within the occupational stress domain (e.g., Bizumic et al., 2009; Haslam et al., 2005; Jimmieson et al., 2010; Sani et al., 2012) can be argued to result from pre-existing individual risk factors. The findings support the stance that negative affect does not overly distort the association among occupational stressors and strain (Chen & Spector, 1991;

Spector et al., 2000) and extends the claim to include social identification processes. In addition, the SIA and DC/S model claims were not shown to be biased by gender, age, occupational level or education. An outcome of the non-significant association for gender was weakened strength for speculation that gender differences in OS and health risk may be due to the poorer experience of occupational conditions among women compared to men (Karasek & Theorell, 1990; Vermeulen & Mustard, 2000) and heightened risk for men due to their stronger sense of work identity compared to women (Burke, 1991; Wang et al., 2012a).

Longitudinal design. The design strengthened evidence of a causal relation between high demands and subsequent depression. The longitudinal design improved the evaluation of the DCS model compared to Study 1 and was considered a notable contribution to the evidence base about risk in the Australian occupational environment. The longitudinal survey data also contributed to the triangulation of evidence for causal relations between social identification and strain obtained with experimental evidence (Haslam et al., 2004; Reicher & Haslam, 2006; Knight & Haslam, 2010; Platow et al., 2007). The prospective support for the main effect of social identification in subsequent support and control ratings strengthened the proposed causal pathways of the SIA and highlighted the importance of adjusting for baseline stressors to more accurately determine the relevance of social identification in predicting the subsequent experience of stressors. Although adjusted associations were not significant, the current study represented the first known attempt to examine the predictions of the SIA in this context over a one-year period.

Recruitment and sample representation. The recruitment procedure was considered an advance on Study 1. In contrast to the previously employed snowball technique, the sample was recruited through contact with all APS departments and agencies employing over 100 employees, which supported the pursuit of a more representative sample. The use of ANZSCO classification codes compared to the open-ended responses in Study 1 also provided a greater opportunity to better describe the sample and catalogue the evidence from within the Australian workforce. The data also added important descriptive evidence about the level of OS among Australian Public Service employees.

Limitations

It is first acknowledged that the comparison of results between Study 1 and 2 is hampered by the use of different adjustments and the stratification of results by gender in

Study 1. This also reflects the difficulty in the literature of comparing results by different study designs. Nonetheless, the essence of the data reveals that while support is more likely for the contemporaneous association between stressors of low control and support and depression risk, the longitudinal relationship is less clear.

Despite the longitudinal design and attempt at recruiting a representative sample the strength of the conclusions is constrained by the small sample size. Based on the response to Study 1 ($N = 475$) it was anticipated that a larger sample could be obtained with a greater number of workplaces (10 workplaces in this study compared to three workplaces in Study 1). However, the response rate was low from both workplaces (eight percent) and participants within the recruited workplaces (at best less than four percent). The response rates were significantly lower to that estimated in organisational research surveys ($M = 53\%$, $SD = 20\%$, Baruch & Holtom, 2008) and the average combined baseline response rate for participants or workplaces (64%) as determined in the (Chapter 3) review of recently published research on the DCS model and depression.

By comparison, the follow-up response rate from workplaces was considered good as eight out of 10 workplaces agreed to participate in the one-year follow-up. The available sample pool was limited also as the largest workplace did not agree to re-advertise the study to all employees but rather consented to the contact of participants who had provided their email address for a reminder message. The follow-up response rate of participants who submitted responses after one year was reasonable (57%) and not too far from the average reported rate in other research on this topic (64%, Chapter 3). However, the final follow-up response rate after matching data was low (27%) albeit consistent with the finding of a higher follow-up than baseline participation rate. It is also worthwhile to bear in mind that the obtained sample size was significantly larger than the majority of the reviewed research on social identification processes in occupational stress. As such, the extent to which sample size is considered a weakness should be interpreted in light of both research areas.

The use of an online medium to conduct the research may have contributed to the poor response rate as discussed in Study 1. To add, given that participants were recruited from a larger number of workplaces to Study 1 the variability in the recruitment method such as the method of study advertisement and the physical conditions during survey completion, would have affected the standardisation of the assessment and recruitment of participants. As with Study 1, a large percentage of respondents were supervisors (37% at baseline)

suggesting interest in the topic by this particular group. Although limiting generalizability, take together with the larger percentage of female respondents the data highlights the type of employee groups with interest in this topic.

The performance of the self-generated code (Yurek et al., 2008) was a novel consideration to understanding the low sample size in the current study. As alluded to, the capacity to track participants was a challenge. The match rate (60%) was slightly higher than Yurek et al (51%, 2008) although the error associated with one-off-matches was higher in the current study. The error was minimised through the additional match of age and gender when available. The analysis of the errors underscored Yurek and colleagues' (2008) finding that mismatches were more likely to be determined for the item of the first letter of participants' mother's name. To speculate, this may have been confused with the typical request for the mother's *maiden* name. Other research utilising the code in organisational samples (e.g., Gates, Parr, & Huhgen, 2012; Grant, Berg, & Cable, 2014; McCormack & Garvan, 2014) did not report match data or retention rates. In the absence of comparative data, it is hypothesised that the capacity of this code to match data may not be the central limiting factor in this study given the similar range of match rates found with other self-generated codes across an approximately similar one-year time frame (63% to 73%, Di Iorio, Henley, & Doughty, 2000; 67% to 81%, Honig, 1995; 61%, Kristjansson, Sigfusdottir, Sigfusson, & Allegrante, 2014; 58%, McAlister & Gordon, 1986). The reporting of outcomes associated with Yurek and colleagues' (2008) code contributed important information about the utility of the tool in a sample of public service employees and highlighted the challenges involved in conducting prospective online assessments of OS in the modern dynamic occupational environment.

Importantly however, participants with non-matching data did not significantly differ from participants with matched data on the key study variables. Follow-up participants whose data could not be matched were more likely though to have indicated a change to their job role during the past 12 months compared to follow-up participants with matched data. This could indicate that data matching errors reflect in part participants who did not provide data at Time 1 or responses that are associated with more variable experiences of the occupational environment. Relatedly, given that follow-up participants reported a significant amount of change to their occupational conditions since the initial survey 12 months prior in terms of workplace restructuring, role change and change in supervisor and workgroup, the power to detect effects may have been affected. Specifically, this may have weakened otherwise

significant associations. This is acknowledged as a factor potentially affecting the ability to detect prospective associations and make claims about chronic exposure in health risk.

A clear constraint of the low sample size was the low representation of key outcomes. For example, conditions of iso-strain, as informed by the quadrant formulation, were only reported by 11 participants in the longitudinal analysis. To manage the low exposure, scores were evaluated using the ratio term rather than the classically employed quadrant approach which would have excluded further (median) data. With regard to mental health, the measures were somewhat skewed although the results for anxiety should be considered with particular caution given only very few cases of high anxiety presented in the sample. Taken together, the target audience with poorer occupational conditions and mental ill-health may not be as well represented in the study. A further limitation of the low sample size was the sufficient but low power to detect medium-sized effects. The sample size may have obscured detection of small effect sizes. This was particularly relevant for the subscale analyses for social support and decision latitude in relation to social identification and mental health. In the context of this limitation, the significant adjusted demand main effect with prospective depression was deemed a particularly robust finding.

Conclusions and Further Research

The current study provided valuable insights into the experience of OS and mental health in Australian public service employees. The results supported the claim that high work demands elevate the risk for depression. The data also suggested that social identification processes may enhance this classic understanding of occupational stress. Preliminary evidence suggested that the occupational stressors of low workplace control and support as well as mental health correlates may be influenced by employees' social identification. While these relations were in line with the SIA approach to stress and wellbeing and the DCS model, the lack of prospective support for the main effect of social identification, control, and support and the cross-sectional evidence for the mediation pathway raise the idea that the proposed causal relations may not occur as expected. The results raise the priority for the final empirical study to clarify the direction and explanation for the documented associations.

Chapter 8. Considerations in the Assessment of Causal Relations

The positive associations found in the previous studies between ratings of workplace control, support, social identification and depression and the lack of support for longitudinal associations brings to light the contention about causality. This critique concerns whether the relationship between occupational stressors and mental health is causal and, if so, the nature of the causation (de Lange et al., 2005; Kompier & Taris, 2011; Strazdins et al., 2011). The discrepant results of the previous investigations raise the idea that other explanations may better account for the data. The following section considers alternate explanations for the well-documented association between employees' ratings of occupational stressors and depression. These arguments pertain to perceptual biases and the influence of pre-existing health on employment opportunities. Methodological issues relating to the assessed time lag in longitudinal studies are also considered as a means to advance the prospective assessment of occupational stressors and depression risk. It is concluded that the assessment of causal relations, with attention to counter-arguments about the link between social identification, the DCS model and depression risk, represent critical tasks for advancing this current program of research. This chapter provides the basis to present a stronger assessment of the relationships of interest in the final empirical study.

Alternate Explanations for the Link between Occupational Stressors and Depression

Perceptual mechanisms. Perceptual mechanisms are considered a key factor that precludes confirmation that occupational stressors directly cause mental disorders (Bonde, 2008; Kolstad et al., 2011). Specifically, the *gloomy perception mechanism* describes the idea that unhealthy mental states such as depression foster negative perceptions including of the occupational environment (de Lange et al., 2004; 2005). This idea has also been referred to as a 'true strain-stressor process' (Zapf, Dormann, & Frese, 1996). The earlier discussion (Study 1) on the role of negative affect in inflating stressors and strain ratings (Brief et al., 1988; Spector, 2000) is consistent with this view. While the risk of reporting bias is reduced in prospective design, it has been reminded that it may still complicate results as depression often has a long insidious course (APA, 2013; Beck & Alford, 2009; Grynderup et al., 2012; Kolstad et al., 2011). An alternate perspective, termed the *rosy perception mechanism* expects individuals with greater health and adaptation to experience their occupational environment in a more positive light (deLange et al., 2004, 2005). Therefore, rather than a direct

association between the occupational environment and health, associations may be accounted for by negatively or positively skewed perceptions of the occupational environment.

These explanations are also consistent with the well-documented clinical evidence on mood and recall bias. For example, a meta-analysis revealed that individuals without depression were more likely to recall positive than negative information. Individuals with sub-clinical depression showed a tendency to recall an equal share of negative and positive information and as expected individuals with clinical depression were more likely to recall negative than positive information (Matt, Vazques, & Campbell, 1992). Subsequent meta-analyses confirm a negative information processing bias in depression (Bourke, Douglas, & Porter, 2010; Gaddy & Ingram, 2014; Gotlib & Krasnoperova, 1998).

The OS literature also indicates support for perceptual processes. For example, a significant association was documented between baseline depression and ratings of work demands at two to three-years follow-up in a Swedish population survey, among men only (Magnusson-Hanson et al., 2009). Also a composite measure of OS that comprised of job demands, control and job insecurity was predicted by depression four years earlier in an Australian population survey (Strazdins et al., 2011). de Lange et al (2004) also found a reverse causal association for a combined measure of mental health ratings (depression, job satisfaction, and emotional exhaustion) and each DCS model dimension at one, two and three-years follow-up.

Stronger evidence for perceptual processes is gathered from a cohort study that focussed on the course and impact of anxiety and depressive disorders. Employees with a current or remitted diagnosis of depression reported a lower sense of control and support at work compared to employees who did not have a diagnosis (Plaisier et al., 2012). In addition, a clinical study on the effect of psychotherapy for work-related depression revealed that perceptions of skill use, the opportunity for control and interpersonal contact improved following symptom improvement at four months follow-up. However, ratings of job variety and role clarity did not vary according to symptom improvement (Firth-Cozens & Hardy, 1992). Thus it is plausible that depression leads to heightened levels of occupational stress or particular features of OS. Further reporting on alternate and specific associations would clarify the relative importance of this claim.

Health selection. Health selection presents as another explanation for the association between depression and occupational stressors. More specifically, good physical and mental health is expected to attract employment conditions that continue to support health as well as ‘upward selection’ into jobs of higher quality over time. Conversely, poor health status may lead individuals to experience poorer occupational conditions given the associated difficulties with work attendance and functioning. Over time individuals may ‘drift’ to jobs with greater disadvantage that include low variety and autonomy (de Lange et al., 2005; Stansfeld, Head, & Marmot, 1998). This later mechanism is termed the *drift hypothesis* (Zapf et al., 1996).

The *drift hypothesis* has gained some support as an explanation for the association between occupational stressors and depression. Notably, Stansfeld et al (2008) showed in a British Cohort that childhood internalising behaviours and early adulthood psychological distress predicted a higher likelihood of employment in lower status jobs during mid-adulthood. Childhood internalising behaviours as ascertained through a validated teacher rating scale and early adulthood distress via self-report also predicted ratings of low decision latitude and support in mid-adulthood. Early adulthood distress further predicted mid-adulthood ratings of high demand and strain. It was inferred that psychological distress (and based on the strength of association, especially during adolescents) influenced selection into less advantaged occupations with poorer working conditions and limited upward mobility. The finding that internalising behaviours in childhood predicted low job demands was explained as supportive of the idea that childhood mental ill health leads to poor educational attainment and a pathway to jobs with little responsibility and demands (Stansfeld et al., 2008). Childhood and adolescent *externalising* behaviours however did not predict occupational characteristics in early or mid-adulthood. Taken together, the data might suggest specificity in such ‘reversed’ associations both in terms of the type of mental health risk implicated and subsequent stressors or job types experienced.

This notion of reverse causation has received further mixed support. For example, in a large population cohort (Dooley, Prause, & Ham-Rowbottom, 2000), a two-year history of high depression ratings predicted unemployment but not underemployment. de Lange et al (2005) also failed to support the drift hypothesis in a one-year follow-up on a Dutch population cohort, which Stansfeld et al (2008) hypothesised was due to an insufficient time lag to observe effects. The present knowledge about the effect of poor mental health on the experience of occupational stress remains equivocal.

Stressor-specific explanations. Explanations have also been put forward for mechanisms through which depression might influence specific psychosocial stressors. With relevance to workplace support, Sacco's (1999) social-cognitive model of interpersonal processes in depression purports that the display of negative mood states affects the response of others, including a negative perception of the individual and their avoidance. A large literature base supports this assertion with regard to the provision of support (Gotlib & Hammen, 1992; Sacco, Dumont, Dow, 1993). To illuminate, individuals interacting with those exhibiting depression symptoms have been shown to experience negative mood themselves, which has been presumed to have lead to subsequent withdrawal (Coyne, 1976).

This process highlights a mechanism whereby individuals affected by depression are expected to actually receive less support rather than simply perceive less support as a consequence of others' response to their mood. This idea is consistent with the 'stressor creation mechanism' where individuals' behaviour is said to create stressors (Spector et al., 2000). In the occupational setting specifically, reversed associations between depression and support have been interpreted to suggest that depression in employees elicits irritation (Stansfeld et al., 2008) or stressful interactions with colleagues or supervisors (Dormann & Zapf, 2002). Within the clinical literature, it is generally accepted that the relationship between depressive behaviours and support is bi-directional (Haefffel, Voelz, & Joiner, 2007; Stice, Ragan, & Randall, 2004). By extension, it is considered likely too in the context of workplace support.

It has been speculated too that access to resources such as support and control may be limited under conditions of high work pressure (Bakker & Demerouti, 2007). Rau et al (2010) considered this explanation for the finding that subjective and not objective measures of control were associated with clinical interview determined depression, while both objective and subjective work demands were significantly linked. This idea is also consistent with Hobfoll's (1989, 2001) Conservation of Resources theory, notably the hypothesised 'loss spiral'. This perspective suggests that initial losses set a pathway for continued loss. For example, depression and specific symptoms such as loss of self-esteem or energy, are expected to affect engagement with resources such as control and support, given the effort required under an already strained system. A converse positive resource spiral is also suggested. Common method bias is regarded as a further explanation that might operate to a greater degree for specific stressors such as control (Rau et al., 2010). This idea follows from

the more consistent support obtained when objective measures of demands are employed compared to when objective measures of control and support are employed in the prediction of depression (see Chapter 3). These ideas highlight that the pathway from depression to occupational stressors may also be accounted for by dimension-specific explanations.

This section demonstrates that valid alternate reasons exist for the association between occupational stressors and depression. Collectively, the range of competing explanations is referred to as arguments of ‘reverse causation’. These points are considered as especially critical in the study of depression given its biopsychosocial aetiology as discussed in Chapter 1. To add, Kivimäki, Hotopf, and Henderson (2010) remind that exposure to occupational stressors is likely only to be modest during the time of the first onset of mood disorders, which peaks during adolescence and early adulthood (APA, 2013; Kessler et al., 2005). In addition, a systematic review on a range of life stressors and depression concluded that depression consistently lead to an increased susceptibility to stressful life events (Liu & Alloy, 2010). Accordingly, it is considered an important empirical task to determine whether the proposed causal relations of the DC/S model in depression risk exist beyond the general competing argument of reverse causation.

Synchronous Effects between Occupational Stressors and Depression

To synthesise the data, convincing arguments exist for a reverse causal association between occupational stressors and depression in addition to the direct role of occupational stressors in depression risk. The term ‘reciprocal’ or ‘synchronous’ effects captures the notion that both direct and reverse causation are operating (Tennant, 2001; de Lange et al., 2005). The literature base has increasingly tested for synchronous relations between the DCS model and depression, revealing mixed results. Tang’s review (2014) concluded that reciprocal effects were ‘possible’ between demands and (mental) health indices. The research reviewed above on reverse causation also revealed supportive evidence for normal causation (de Lange et al., 2004; Stansfeld et al., 2008; Strazdins et al., 2011), although de Lange et al (2004) found the normal causation model to be best-fitting while Strazdins et al (2011) found the reverse. Other research reports reciprocal relations for men only (Netterstrøm et al., 2008) or for particular stressors (Magnusson-Hanson et al., 2009). These results reveal the outstanding task of clarifying the strength and direction of associations.

The theory and available evidence reviewed leads to the expectation that the relationship between occupational stressors and depression is most likely a process of mutual influence. In fact, Karasek and Theorell's (1990) largely ignored dynamic demand-control hypothesis factors a bidirectional relationship between stressors and strain. To restate, ill-health is said to arise from chronic conditions of high 'strain' which in turn is expected to inhibit the pursuit of further challenges, learning and self-efficacy and shapes subsequent stress reactivity and personality. The hypothesis, while concerned with the long-term effects of high 'strain' conditions on personality formation, presents as a further theoretical base for assuming a synchronous relationship between the DC/S model and depression.

Alternate Explanations for the Association between Social Identification and Depression

Up to this point, hypotheses for alternate associations have arisen from DCS model research. Similar arguments have also been considered within the Social Identity Approach. Consistent with synchronous effects it has been discussed that a sense of wellbeing may increase the likelihood of participation in group life as well as group life increasing the likelihood of wellbeing (Wegge, Schuh, & van Dick, 2012). For example, the well-documented association between organisational identification and job satisfaction (Riketta, 2005) has been discussed in terms of job satisfaction functioning as both an antecedent (Mael & Ashforth, 1992) and consequence (Riketta & van Dick, 2005) of organisational identification, with both pathways considered likely (van Knippenberg & Schie, 2000). An 'upward spiral' (Hobfoll, 1989, 2001) may be implied whereby organisational identification increases well-being (in this instance job-specific wellbeing) which in turn maintains and increases identification. These ideas may also be consistent with the discussed *rosy perception mechanism* and health selection hypothesis.

On the flipside, it has been suggested that when individuals are experiencing a negative mood they are more likely to make negative evaluations of social groups and experience less openness to identify than when in a neutral or positive mood (Wegge et al., 2012). This idea builds from the well-established notion that perceptions of other individuals (Forgas & Bower, 1987) and by extension groups (Forgas, 1990) are influenced by the individual's own emotional states. This is not to suggest that negative mood states per se preclude identification rather it is when negative mood states are experienced on a more individual than collective level. Depression in particular has been suggested to affect the capacity to experience a sense of belonging and engage in group life (Hagerty, Williams, Coyne, & Early,

1996; Steger & Kashdan, 2009), which may include difficulty with identifying with groups (Cruwys et al., 2014a).

To highlight, a diary study on daily interactions revealed that higher ratings of depression corresponded with a higher number of negative social interactions and lower ratings on a sense of belonging and satisfaction (Steger & Kashdan, 2009). Interestingly too, a sense of belonging negatively predicted depression ratings in a clinical sample of individuals diagnosed with Major Depressive Disorder while the association was not significant for controls who presented without a history of depression (Choenarom, William, & Hagerty, 2005). Thus clinical perspectives on the aetiology of depression present a strong case that a lack of belonging, or a lack of feeling that the self is a key part of a system, is as a key vulnerability factor in depression (Choenarom et al., 2005; Hagerty, Lynch-Sauer, Patusky, Bouwseman, & Collier, 1992).

While theoretical claims are suggestive for a normal and reverse casual association between social identification and depression, empirical studies that directly evaluate both explanations are lacking. A notable exception was an experimental study on a sample of call centre employees (Wegge et al., 2012). Ratings of positive emotions such as joy and the absence of negative emotions such as guilt were associated with a greater likelihood of organisational identification. The presence of negative emotions was linked to higher personal identity. It was inferred that a vicious cycle may ensue for employees with low organisational identification following the speculated risk of strain which could in turn reduce the tendency for organisational identification. However, the direction of the association between workplace identification and depression remains to be determined in a single evaluation, beyond a simulated organisational identity (Wegge et al., 2012) and negative emotional states (Steger & Kashdan, 2009; Wegge et al., 2012).

Reversed Associations Between Social Identification and Social Support

The SIA elaborates further into the supposed link between social identification and support. First, it is recognised that social identification and social experiences such as support are closely entwined (Haslam, 2004; Haslam, Reicher, & Levine, 2012). More specifically, a reciprocal process is considered to represent real-time identification in the workplace; such that acts of support to in-group members represents, builds, and maintains identification, which in turn lays the foundation for effective support (Haslam et al., 2005).

Contemporaneous associations between social identification and workplace support have been interpreted in this light (Cheung & Law, 2008; Ertürk, 2009; He, Pham & Zhu, 2014).

More direct assessments of reciprocal relations are less supportive. For example, Bizumic, Reynolds, & Meyer (2012) demonstrated that perceptions of (school) group support positively predicted social (school) identification at one-year follow-up. However, the pathway from baseline social identification to support at follow-up was not significant. In an experimental study on residential care patrons, contemporaneous ratings of support (from the care home) linked to (care home) identification which in turn mediated the association between support and quality of life. Unlike Bizumic and colleagues' (2012) prospective study however, (care home) identification predicted support although support did not mediate the association between identification and quality of life. Therefore, more direct evaluations of reciprocal causation, especially in the occupational stress context, would contribute to a more substantial evaluation of these ideas.

Reversed Relations Between Social Identification and Control

The novel theorising about the pathway from social identification to workplace control may be contested given the strong arguments for 'reverse causation'. As put forward by the group engagement model (Tyler & Blader, 2003) a higher level of identification is an anticipated outcome of 'voice' (considered here to be a synonymous with the decision authority concept of workplace control). This causal pathway from voice to identification is expected as the opportunity to convey an opinion reflects a positive interpersonal experience that conveys respect and confirms status and a sense of fairness in the group, in turn which affirms a secure sense of identity (Tyler & Blader, 2003). These ideas could plausibly extend to the skill discretion component of control, such that the opportunity for skill use and development conveys respect, nurtures pride, and fosters a secure identity leading to a greater appeal for connection with group members and investment in the identity.

The path from high decision latitude to high identification may be underpinned also by a sense of distributive justice (Tyler & Blader, 2003; Thibaut & Walker, 1975). To elaborate, stronger identification may emerge as a consequence of the perceived fairness of the outcome, that is, the receipt of control, and not just the receipt of a fair interpersonal interaction, as described above. Evidence supports the here labeled 'reverse' causal association between voice and identification at work (Ellemers et al., 2004; Tyler & Blader,

2000). Support within the OS domain is observed through Knight and Haslam's (2010a, 2010b) positive association between ratings of control over office space design and organisational identification. Associations were assessed contemporaneously and the proposed pathway of high social identification leading to a greater sense of control was not explicitly assessed, making it difficult to ascertain the direction of causality. In line with all OS relations in this study, a reciprocal relationship is expected from the theory developed from the SIA approach to stress and wellbeing (Haslam & van Dick, 2012; van Dick & Haslam, 2011) and group engagement model (Tyler & Blader, 2003).

Finally, Sani et al (2012) legitimately challenge that group identification may be a mere epiphenomenon of social contact. To elaborate, it is raised that group identification may not be a determinant of mental health nor of occupational stressors and may instead represent a by-product of social contact. To add, the relationships supporting arguments of reverse causation may also reflect an incidental occurrence. As Kivimäki et al (2010) remind, robust associations do not necessarily guarantee causality. Accordingly, the core idea that social identification is central to the experience of stress (Haslam, 2004) may also be challenged.

Time Lag

As raised in the previous chapter, a particular challenge in the enquiry of OS is the selection of a time lag that appropriately captures the health effects of chronic exposure to stressors. Even after decades of research, neither theory (Karasek & Theorell, 1990; Karasek, 2008) nor evidence provides a clear indication of the time lag required to verify causal relationships (Bonde, 2008; Häusser et al., 2010; Netterstrøm et al., 2008; Taris & Kompier, 2003; Zapf et al., 1996). The concern is that the selection of a lag that is too short (such as a few weeks) may lead to Type II error following an incomplete observation of the expected effect of stressors on strain (Mitchell & James, 2001). Conversely, a lag that is too long (such as 24 years; Michélsen & Bildt, 2003) may contaminate results with interim effects such as; changed employment conditions including jobs or supervisors (Butterworth et al., 2011; Joensuu et al., 2010; Mitchell & James, 2001), maturation effects including increased experience (de Lange et al., 2004) and inconsistent evaluations of the same stressors (Dorman & Zapf, 2002; Schaubroeck & Green, 1989; Vandenberg & Self, 1993). The appropriate selection of a time lag can assist in minimising the risk of Type I and Type II error.

The evidence reviewed in Chapter 3 nevertheless revealed that support for the DCS model and depression risk did not vary by time lag. This was concluded from the inspection of studies with a time lag of between nine months (Garbarino et al., 2013) and ten years (Stansfeld et al., 2012) with a median of 3.25 years. Similarly, Bonde's (2008) review did not find attenuated risk estimates with longer follow-up periods nor did Tang's (2014) review on reciprocal relations between the DCS model and a range of mental health outcomes. Information is nonetheless lacking for time lags shorter than one year, despite calls for longitudinal studies with short exposure periods (de Lange et al., 2004). Research examining shorter time lags would assist in clarifying the required chronicity for stressors to exert an effect on health risk and expand insights into the trajectory of health risk.

The published evidence on shorter time lags for OS and depression has identified significant results within less than one year of the examined exposure. For example, Daniels and Guppy (1994) demonstrated after one month, significant effects of ratings of workplace support and accountant-specific work stressors on ratings of job-related depression, even after factoring baseline distress scores. Schonfeld (1992) reported reciprocal effects at two-months follow-up in a sample of newly appointed teachers, with the normal causal relationship between a general index of occupational stressors and CES-D scores as the stronger pathway. Schonfeld (1992) inferred that the link between occupational conditions and depressive symptoms were relatively immediate.

The evidence, while scant, suggests that causal effects can emerge after a period of months and could even in part explain the non-significant results found in longer follow-up periods. For example, Dormann and Zapf (1999) found after eight but not four months a moderating effect between supervisor (and not colleague) support and social workplace stressors on depression ratings. Another eight-month study on care staff also showed that poor relations with supervisors and doctors and workload predicted higher depression ratings, after adjustment for demographics and baseline depression. Factors such as co-worker cohesion, autonomy and role clarity however were not significant (Shaefer & Moos, 1996), suggesting that exposure duration may vary by stressor type. The individual assessment of occupational stressors may aid a clearer interpretation of support for (shorter) time lags.

The single relevant prospective study on social identification revealed a significant relationship between low identification and a proxy measure of burnout at eight and 10 weeks from baseline (Haslam et al., 2009). These time points corresponded with key phases of the

sampled theatre performers' production, that is, at dress rehearsal and the final performance. Results were not significant at post-production (14 weeks from baseline) which suggests that health effects may be more likely to emerge after relatively brief exposure times. The finding however also questions the longer-lasting health effects of low social identification.

No further identified published study on the SIA or DC/S model and depression risk documented non-significant results for short time lags. For the DC/S model in particular, this may reflect publication bias (see Bonde, 2008). The paucity of research exemplifies the difficulty in confirming knowledge about shorter time lags. Nevertheless, the small pool of available data suggests that depression can be preceded by chronic stressors that need not to have been sustained for years before the effects on health risk become apparent. Such knowledge is informative for predicting the time window in which occupational stressors may translate into health risk and simultaneously a time window for intervention.

At the same time, the lack of published data on shorter time lags could be interpreted to indicate that time frames less than one year are not relevant. Beyond the lack of empirical evidence to directly substantiate this claim, the selected follow-up period is considered theoretically and empirically appropriate. The general literature considers chronic stress to occur over weeks, months or years, although the required chronicity is also dependent on the health outcome of interest (Cohen, Kessler, & Gordon, 1997). Clinical models of depression propose precipitants of chronic stressors (Beck & Alford, 2009; Gibb & Coles, 2005; Kessler & Wang, 2002) and it has been suggested that following an initial episode of depression, the duration and severity of stressors need not be excessive for subsequent episodes of depression to emerge (Tennant, 2002). For example, a variety of chronic life stressors have predicted depression relapse after three (Mundt, Reck, Backenstrass, Kronmüller, & Fiedler, 2000) and six months (Hammen, Brown, Ellicott, & Gitlin, 1992). Physiological indicators of strain have also been documented after six months of citing chronic interpersonal stress in a sample of young women presenting with a high risk of mood disorders (Miller, Rohleder, & Cole, 2009). However, even within the clinical literature on depression, there is no clear agreement or knowledge about the required chronicity of stressors to affect risk (Beck & Alford, 2009; Hammen, 2015; Kessler, 1997). Thus, the subsequent empirical study may provide further insights into the broader aetiology of depression.

Conclusion

The current chapter illustrated that the relationship between occupational stressors and depression can be accounted for by several plausible explanations. In addition to the core theorising of the DC/S model and SIA to stress and wellbeing in the workplace, explanations relating to health selection, perceptual biases and mood based phenomenon may also describe the link. It was concluded that reciprocal associations would best characterise the relation between stressors and depression. The discussion on alternate relations also presented a more integrated account of the SIA in the context of OS. It was reflected that the SIA was limited by prospective research beyond three months of follow-up. Evidence for time lags of less than a year were generally supportive for the DC/S model although were also notably lacking. It was considered that a time lag of less than one year would be appropriate to evaluate causal relations of both models. The empirical study that follows, with a shorter time lag of six months, seeks to address the general competing argument of reverse causation for the associations determined in Study 1 and 2.

Chapter 9. A Six-Month Prospective Analysis of Reciprocal Predictions of the SIA and DCS model in Depression Risk

Research Questions

The intent of this final study was to clarify the nature and direction of the association between the occupational stressors examined in the previous studies and depression risk. It was of primary interest to determine whether the proposed causal relations extended beyond the general competing argument of reverse causation. Following the discussion in Chapter 9, a synchronous association was nonetheless expected between OS and depression ratings. Specifically;

1. Decision latitude and its component scales of skill discretion and decision authority will show a negative synchronous association with depression ratings
2. Social support and the sub-components of supervisor and co-worker support will have a negative synchronous association with depression ratings
3. Social identification will have a negative synchronous association with depression ratings
4. Social identification will have a positive synchronous association with the occupational factors of a) decision latitude and b) social support
5. Demand is expected to show a significant synchronous association with depression ratings. Based on the findings of Study 1 and 2, the relationship is expected for longitudinal but not cross-sectional associations

An exploratory analysis was also carried out on the Leach et al (2008) social identification scale. As discussed in Chapter 6 (Conceptual developments to the SIA to Stress and Wellbeing at Work, p.177-179), the multidimensional assessment of social identification has recently been contested. The counter-claim is that a dimensional assessment may not be necessary and that social identification may be sufficiently represented by a single item (Postmes, 2013). Given the novelty of the Leach et al (2008) scale, especially in the occupational stress domain, a closer analysis of its factor structure would shed light on the relevance of this criticism.

Method

Participants

Respondents were employees recruited from an Australian University. At Time 1 (T1, June to July 2011) 793 surveys were commenced; of these 614 were submitted and 604 contained usable data. Data on the response pool was not available to calculate the response rate. At the Time 2 (T2, November to December 2011) sixth month follow-up, 758 surveys were started and 594 submitted. At T2 92% of respondents who submitted their surveys indicated that they had participated at T1 ($N = 581$) and 51% of these respondents ($N = 291$) submitted matched and usable data for prospective analysis. In sum, the longitudinal analysis was based on 291 participants and the cross-sectional analysis on 604 participants.

Procedure

Workplace recruitment. The Human Resources Manager was contacted via email, follow-up phone call and face-to-face meeting, with an invitation for staff to participate in an online research survey to advance knowledge about the relationship between work and wellbeing (see Appendix G). As in previous studies, a feedback report was provided in return for participation (see Appendix H).

Participant recruitment. The *Work and Wellbeing* online survey was advertised to staff via an email from the Director of Human Resources (Appendix I). A reminder email was sent two weeks after the initial advertisement, at T1 and T2. As for Study 1 and 2, the advertisement included a brief study description, confidentiality statement and hyperlink to the information page and online survey. As in Study 2, participants were provided the option to submit their email address to receive a personal reminder of the follow-up survey. This option was selected by 152 participants who entered their email address in a separate pop-up window following the completion of the T1 survey. Email addresses were stored in a Gmail account separate to the Qualtrics survey database. The study was approved by the ANU Human Research and Ethics Committee (Protocol 2010/087).

Data matching

Participants' data were matched using the four-item self-generated code (Yurek et al., 2008) employed in Study 2 together with age and gender. Codes were entered by 98% of the

T1 sample who submitted otherwise usable data. Ninety per cent of participants entered codes at both T1 and T2. However, codes were matched for only 51% of the follow-up sample of which 68% of codes were fully matched. Partially-matched codes were incorrect most frequently on the *first letter of participants' mother's first name* (73% of partial matches) followed by the *number of older brothers* (12% of partial matches) and birth month (10% of partial matches). Five per cent of partial matches were judged to occur for the *first letter of participants' middle name*. The overall percentage of matched codes (51%) was lower than the six-month match rate found in Yurek et al (2008; 67%) and the one-year follow-up rate obtained in Study 2 (60%). The percentage of *fully* matched codes (68%) was significantly higher compared to the six-month data for Yurek et al (2008; 58%) and slightly lower to that obtained in Study 2 (72% in Study 2). In line with Yurek et al (2008) and Study 2 the most frequent partial match was on the initial of the mother's first name.

Measures

As for Study 2, The JCQ (Karasek et al., 1985), Leach et al (2008) social identification scale and DASS21 (Lovibond & Lovibond, 1995) were used to measure stressors and depression. The reliability of all scales was consistent between T1 and T2 and are presented below for the follow-up sample ($n = 291$).

The JCQ was used to measure the constructs of job demands, control and support. All items were measured on a four-point Likert scale with anchors of *strongly disagree* (1) and *strongly agree* (4). Subscales were added according to the provided formulae. Sample items can be found in Study 1 and 2.

Job demands. The five-item demands subscale had good internal consistency (Time 1 $\alpha = .84$; Time 2 $\alpha = .86$) and was comparable to that obtained in Study 1 ($\alpha = .85$) and the average of T1 and T2's Cronbach's alpha in Study 2 ($\alpha = .85$).

Job control. Cronbach's alpha for the nine-item *decision latitude* scale (T1 $\alpha = .85$, T2 $\alpha = .82$) was comparable to Study 2 (T1 $\alpha = .83$, T2 $\alpha = .80$) and the T1 figure was identical to Study 1 ($\alpha = .85$). The internal consistency for the *skill discretion* subscale (T1 $\alpha = .78$, T2 $\alpha = .75$) fell between that obtained in Study 1 ($\alpha = .80$) and Study 2 (T1 $\alpha = .75$, T2 $\alpha = .73$). The *decision authority* subscale (T1 $\alpha = .76$, T2 $\alpha = .77$) had a slightly higher internal consistency to that obtained in Study 1 ($\alpha = .74$) and Study 2 (T1 $\alpha = .75$, T2 $\alpha = .72$).

Social support. Cronbach's alpha for the eight-item support scale ($T1\alpha = .87$, $T2\alpha = .85$) was on par with Study 2 ($T1\alpha = .85$, $T2\alpha = .87$) and lower than Study 1 ($\alpha = .93$). Similarly, the internal consistency of the *co-worker support* subscale ($T1\alpha = .82$, $T2\alpha = .78$) was on par with Study 2 ($T1\alpha = .83$, $T2\alpha = .80$) and lower than Study 1 ($\alpha = .88$). Cronbach's alpha was similarly excellent for supervisor support ($T1\alpha = .90$, $T2\alpha = .90$) as found in Study 1 ($\alpha = .93$) and Study 2 ($T1\alpha = .90$, $T2\alpha = .91$).

Social identification. Employees' identification with their workgroup was assessed with the 14-item social identification scale by Leach et al (2008; $T1/T2\alpha = .92$). Responses were recorded on a 7-item Likert scale with anchors of *Strongly Disagree* (1) and *Strongly Agree* (7) and a mid-point of *Neither Agree nor Disagree* (4). The internal consistency of the unidimensional scale was on par with Study 2 ($T1\alpha = .93$, $T2\alpha = .91$). Cronbach's alpha for the higher order factor of *self-investment* was similarly excellent ($T1\alpha = .91$; $T2\alpha = .92$) and on par with Study 2 ($T1\alpha = .94$, $T2\alpha = .90$). The internal consistency for the higher order factor of *self-definition* was good ($T1\alpha = .80$, $T2\alpha = .84$) and similar to Study 2 ($T1\alpha = .82$, $T2\alpha = .81$).

All subscales showed good to excellent reliability. The internal consistency for *solidarity* (3 items, $T1\alpha = .84$, $T2\alpha = .87$), *satisfaction* (4 items, $T1\alpha = .92$, $T2\alpha = .91$) and *self-stereotyping* (2 items, $T1\alpha = .85$, $T2\alpha = .86$) were marginally lower to that in Study 2 (*solidarity* $T1\alpha = .89$, $T2\alpha = .85$; *satisfaction* $T1\alpha = .94$, $T2\alpha = .92$; *self-stereotyping* $T1\alpha = .90$, $T2\alpha = .85$). Cronbach's alpha for *centrality* (3 items, $T1\alpha = .89$, $T2\alpha = .87$) and *in-group homogeneity* (2 items, $T1\alpha = .89$; $T2\alpha = .83$) was slightly higher than Study 2 (*centrality* $T1\alpha = .83$, $T2\alpha = .81$; *in-group homogeneity* $T1\alpha = .85$, $T2\alpha = .81$).

Depression. The short version of the *Depression Anxiety Stress Scale* (DASS21, Lovibond & Lovibond, 1995b) was used to measure depression symptoms over the past week. All items were responded to on a 4-point Likert-type scale ranging from 0 (*did not apply to me, or never*) to 3 (*applied to me very much, or most of the time*). The seven-item subscale score was multiplied by two as recommended by Lovibond and Lovibond (1995) to be compatible with the properties of the full version of the DASS. *Depression* ($T1\alpha = .90$; $T2\alpha = .91$) showed a slightly lower but similarly excellent internal consistency to that obtained in Study 1 ($\alpha = .94$) and Study 2 ($T1/T2\alpha = .93$). Cronbach's alpha in this study was higher than Lovibond & Lovibond (1995b, $DASS21\alpha = .81$) and in line with more recent US norms ($DASS21\alpha = .91$, Sinclair et al., 2012).

Controls. As in Study 2, the following variables were requested at T1 for use as covariates: Gender (male/female), age, education (1 = Postgraduate degree; 2 = Bachelor's degree; 3 = Post-high school or college certificate or diploma; 4 = College, 5 = High school, and 6 = Uncompleted high-school) and negative affect (NA). NA was measured with the ten-item trait version of the PANAS-NA (Watson et al., 1988, $\alpha = .89$) and Cronbach's alpha was on par with that obtained in both Study 1 and Study 2 ($\alpha = .91$).

Occupational Demographics

As in Study 2, occupational demographics were requested for position tenure (years and months), supervisory responsibility (no or yes, if yes to indicate the number of employees supervised), average work hours (< 35 hours (equivalent to part-time); 36-50 hours (equivalent to full time); 50+ hours (over-work); ABS Australian Labour Market Statistics, 2010) and job description according to the Australia and New Zealand Standard Classification of Occupations (ABS, 2009; 1= Manager; 2= Professional; 3= Technician and Trades Worker; 4 = Community and Personal Service Worker; 5 = Clerical and Administrative Worker; 6 = Sales Worker; 7 = Machinery Operator and Driver, and 8 = Labourer). In addition, participants were asked to indicate whether they identified as an academic or non-academic and the size of their workgroup (2-5, 6-10, 11+ employees). At T2 employees were asked to indicate through a binary 'yes' or 'no' option any major changes to their employment conditions from T1 in terms of role change, new immediate supervisor or new workgroup. A space for comments was also provided.

Statistical Analysis

Analyses were conducted using IBM SPSS Statistics version 22 for descriptive data and SPSS Amos version 22 for Structural Equations Modelling (SEM). Correlational analyses were first performed to ascertain a basic understanding of the data. This comprised of the interrelations among study variables used in the longitudinal analysis and inter-correlations among sub-components of social identification and the study variables. SEM was used to test the direction of the association between the stressors of demands, decision latitude, social support and social identification and depression and to examine whether the DCS model variables mediated the relationship between social identification and depression.

Results

Table 16 summarises the demographic characteristics of the 604 University employees surveyed at T1 and the 291 participants that comprised the follow-up sample.

Table 16

Demographic Characteristics of the Baseline (N = 605) and Follow-up Sample (n = 291)

Demographics	Baseline sample				Follow-up sample			
	Mean	SD	No.	%	Mean	SD	No.	%
<i>Personal Demographics</i>								
Gender								
Female			382	63.6			180	61.9
Male			219	36.4			111	38.1
Age (years)	42.8	12.4			44.5	12.1		
Education								
Postgraduate degree			297	49.2			135	46.4
Bachelor's degree			159	26.5			82	28.2
Post-college cert/diploma			87	14.4			44	15.1
College			38	6.3			19	6.5
Up to High school			19	3.2			11	3.8
<i>Occupational Demographics</i>								
Job Category								
Manager			76	13.1			37	13.1
Professional			286	49.4			135	47.9
Clerical/Administrative			180	31.1			91	32.3
Technician or Trade			28	4.8			14	5.0
Other			9	1.5			5	1.8
Academic role			189	31.8			83	28.9
Supervisory Responsibility			217	36.2			100	34.4
Employees Supervised	7.8	20.8			4.5	7.6		
Position Tenure (months)	89.8	96.1			94.18	98.2		
Average work hours/week								
≤ 35			255	42.4			120	41.4
36-49			267	44.4			140	48.3
≥ 50			80	13.2			30	10.3
Workgroup Composition								
2-5 employees			261	43.4			129	44.5
6-10 employees			196	32.6			92	31.6
11-20 employees			91	15.1			42	14.4
≥ 21 employees			54	8.9			27	9.3
Change to employment in past 12 months								
New supervisor							59	21.2
New workgroup							48	17.3
New role							56	20.1

Note. Follow-up sample refers to T2 respondents with matched data and not all respondents at T2. No. does not always add to sample total due to missing data. Percentages are corrected for missing data.

Means and standard deviations were calculated for continuous variables and frequencies and percentages for categorical variables. The baseline and follow-up sample did not differ significantly ($p > .05$) on demographic data.

Personal Demographics

The sample consisted of mostly females (63.6% at baseline, 61.9% at follow-up), which was like Study 1 (73.3%) and Study 2 (70.6% at baseline, 72.4% at follow-up). Participants were of similar age ($M_{T1} = 42.8$ years, $SD = 12.4$ years) to Study 1 participants ($M = 41.8$ years, $SD = 11.6$ years) and were on average older than Study 2 participants at baseline ($M = 37.6$ years, $SD = 11.2$ years); $t(551) = 5.15$, $p < .001$. Not surprisingly, the sample were highly educated, with close to half indicating a Postgraduate degree as their highest level of completed education (49.2% of the baseline sample, 46.4% of the follow-up sample), followed by a Bachelor's degree (26.5% of the baseline sample, 28.2% of the follow-up sample). The report of mostly tertiary education (75.7% at baseline) was similar to the public service sample in Study 2 (68.6% at baseline, 77.6% at follow-up) and contrasted the greater variation in the Study 1 sample (with 53.2% indicating a tertiary degree).

Occupational Demographics

The majority of participants occupied *Professional* job roles (49.4% of the baseline sample, 47.9% of the follow-up sample), followed by *Clerical and Administrative* positions (31.1% of the baseline sample, 32.3% of the follow-up sample). This was in line with the ratio of job categories indicated in Study 2 while comparative data for Study 1 was not available. Approximately one third of the sample indicated supervisory responsibility (36.2% of the baseline sample, 34.4% of the follow-up sample) which was similar to Study 2 (37.3% of the baseline sample, 31.6% of the follow-up sample). In contrast, Study 1 contained a large proportion of supervisors (41.7%). While this was a university employee sample, a range of occupations were represented as also indicated by over three quarters of the sample (68.2% at baseline, 71.1% at follow-up) indicating non-academic positions.

Participants reported at baseline a mean position tenure of almost seven years ($M = 89.8$ months, $SD = 96.1$ months) and a median of four years (48 months). Position tenure was relatively long compared to that in the public service sample (Study 2) which was on average just over two years at baseline ($M = 31.6$ months, $SD = 18.0$ months). As in Study 2, a comparatively similar portion of employees indicated standard full-time work hours (44% of

the baseline sample, 48.3% of the follow-up sample). While Australian law indicates a maximum of 38 ordinary hours per week (Fair Work Act, 2009, section 63) a significant portion of employees (13.2% of the baseline sample, 10.3% of the follow-up sample) indicated average work hours that exceeded 50 hours per week which by conventional standards is considered to represent overwork. The figure for overwork at baseline was similar to Australian figures at the time (14%) but significantly higher than average international data (nine per cent, Organisation for Economic Co-operation and Development, 2013). Lastly, approximately one fifth of the follow-up sample reported significant changes to their employment conditions within the past six months; a new role was reported by 20.1% of the sample, a new supervisor by 21.2% and new workgroup by 17.3%. The percentage of changes reported in this six-month study were lower compared to the public service sample in Study 2, where 44% reported a new workgroup, 42% had a new supervisor, and 31% a new role after one year.

Study Variable Correlation Matrix

Table 17 displays the means, standard deviations, and inter-correlations among the main study variables in the longitudinal analysis. The magnitude of associations are described with reference to Cohen's (1988) criteria.

Mean and standard deviation values. The mean values for all reported study values did not significantly differ between baseline and follow-up ($p > .05$). Baseline values are therefore reported unless otherwise stated. The mean value for demand ($M = 33.00$, $SD = 7.18$) was on par with Study 1 ($M = 32.12$, $SD = 6.64$) and Karasek et al (1985; $M = 32.30$, $SD = 6.99$) although was significantly higher than Study 2 at baseline ($M = 30.52$, $SD = 6.12$); $t(578) = 4.47$, $p < .001$). The mean level of skill discretion ($M = 30.80$, $SD = 5.12$) was lower compared to both Study 1 ($M = 33.84$, $SD = 5.77$); $t(764) = 7.54$, $p < .001$ and Study 2 ($M = 34.75$, $SD = 5.57$); $t(578) = 8.89$, $p < .001$ and Karasek et al (1998). In contrast, the mean of decision authority ($M = 35.83$, $SD = 6.04$) was significantly higher than Study 1 ($M = 31.78$, $SD = 7.10$); $t(764) = 8.10$, $p < .001$, and Study 2 ($M = 32.72$, $SD = 7.54$); $t(578) = 5.48$, $p < .001$ and Karasek et al (1998). The values for co-worker ($M = 12.03$, $SD = 2.08$) and supervisor support ($M = 12.08$, $SD = 2.62$) were consistent with Study 2 and Karasek et al (1998) and contrasted the much higher levels reported in Study 1 (co-worker support, $M = 17.80$, $SD = 3.04$; supervisor support, $M = 17.36$, $SD = 5.61$).

The mean of workgroup identification ($M = 68.27$, $SD = 13.66$) was similar to that at baseline in Study 2 ($M = 66.78$, $SD = 14.36$), $t(578) = 1.28$, $p > .05$. The mean value for depression ($M = 7.52$, $SD = 8.45$) was on par with that obtained in Study 2 at baseline ($M = 7.71$, $SD = 8.52$) and Study 1 ($M = 8.73$, $SD = 10.51$). The consistency in depression mean scores from baseline to six-month follow-up was unlike Study 2 which had a higher mean at T2. In line with Study 2, the follow-up sample ($n = 291$) was not significantly different from the original T1 sample ($N = 604$) on mean values for study variables with the exception of skill discretion. Follow-up participants reported lower levels of skill discretion ($M = 30.80$, $SD = 5.12$) compared to the original sample ($M = 36.82$, $SD = 6.00$); $t(893) = 14.73$, $p < .001$). See Appendix J (Table 17) for Means, Standard Deviations and Inter-correlations for the original T1 cross-sectional sample.

Auto-correlations. All auto-correlations were large ($r_s = .53-.77$). The auto-correlation for demand ($r = .76$) was higher than that obtained in the one-year study (Study 2, $r = .71$). The auto-correlation for workgroup identification ($r = .60$) was larger than the moderate sized one in Study 2 ($r = .47$). The correlation between T1 and T2 depression ($r = .58$) was lower compared to Study 2 ($r = .71$).

Correlations between covariates and study variables. Gender had a small significant association with the dimensions of decision latitude such that women were more likely than men to report lower skill discretion ($r_{T1} = -.14$, $r_{T2} = -.16$) and decision authority ($r_{T1} = -.15$, $r_{T2} = -.13$). Gender, as assessed through bivariate correlation, was not significantly correlated with other ratings which was in line with non-significant associations reported in Study 1 and 2. Age had a small negative association with depression at T2 only ($r = -.12$) which was consistent with Study 2 ($r_{T1/T2} = -.26$). NA had a significant medium-sized association with demand ($r_{T1} = .31$, $r_{T2} = .26$) and a significant small sized association with supervisor support ($r_{T1} = -.25$, $r_{T2} = -.22$) and colleague support ($r_{T1} = -.19$, $r_{T2} = -.13$). NA was significantly associated with decision authority ($r = -.18$) and workgroup identification ($r = -.16$) at T1 only. NA and depression had a large association ($r_{T1} = .66$, $r_{T2} = .72$) and the association was consistent in magnitude to Study 1 and Study 2.

Table 17

Means, Standard Deviations and Inter-Correlations among the Main Study Variables in the Longitudinal Sample (n = 291)

Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Gender ^a	1.62	0.49																	
2. Age	44.28	12.10	-.17*																
3. NA	14.64	5.67	.07	-.15*															
4. Demands T1	33.00	7.18	-.06	.08	.31*														
5. Demands T2	32.86	7.25	-.07	.06	.26*	.76*													
6. Skill T1	30.80	5.12	-.14*	.08	-.09	.22*	.19*												
7. Skill T2	30.35	5.24	-.16*	.12*	-.04	.21*	.26*	.77*											
8. Decision T1	35.83	6.04	-.15*	.09	-.18*	.02	.07	.65*	.51*										
9. Decision T2	35.81	7.54	-.13*	.03	-.11	.01	.06	.52*	.61*	.59*									
10. Co-worker T1	12.53	2.00	.06	-.13*	-.19*	-.20*	-.15	.14*	.09	.24*	.20*								
11. Co-worker T2	12.08	1.79	.10	-.05	-.13*	-.28*	-.24*	.04	.10	.11	.24*	.53*							
12. Supervisor T1	12.08	2.62	-.01	-.12*	-.25*	-.26*	-.21*	.25*	.13*	.31*	.32*	.47*	.36*						
13. Supervisor T2	12.01	2.73	.03	-.02	-.22*	-.27*	-.25*	.15*	.17*	.18*	.30*	.37*	.40*	.63*					
14. Wrkgrou ID T1	68.27	13.66	.06	-.16*	-.16*	-.10	-.08	.23*	.16*	.29*	.28*	.60*	.48*	.40*	.37*				
15. Wrkgrou ID T2	69.72	12.60	-.02	.06	-.06	-.04	-.02	.29*	.28*	.29*	.42*	.37*	.49*	.32*	.34*	.60*			
16. Depression T1	7.52	8.45	.03	-.07	.66*	.22*	.09	-.20	-.17*	-.26*	-.25*	-.25*	-.22*	-.26*	-.27*	-.28*	-.20*		
17. Depression T2	7.34	8.53	-.02	-.12*	.72*	.12*	.08	-.14	-.21*	-.16*	-.24*	-.12	-.24*	-.08	-.22*	-.13*	-.16*	.58*	

Notes. ^a =Point bi-serial correlation (1= male 2 = female). NA = negative affect. T1 and T2 refer to Time 1 and Time 2 respectively. Wrkgrou ID = Workgroup social identification. Skill = Skill discretion. Decision = Decision Authority. The scores for the DCS variables were derived from the scale construction formulae for the Job Content Questionnaire (Karasek et al., 1985). Depression refers to the DASS21 Depression scale. The DASS21 depression mean has been doubled according to scoring recommendations and therefore reflects scores out of a possible 42 points where higher scores represent higher depression ratings (Lovibond & Lovivond, 1995). * $p < .05$

Correlations between occupational stressors and depression. T1 demand showed a significant small positive correlation with depression that was higher at T1 compared to T2 ($r_{T1} = .22$, $r_{T2} = .12$). This contrasted Study 2's non-significant concurrent correlation and medium sized T2 association. Unlike Study 2 as well, associations between T1 decision latitude subscales and T2 depression were significant. T1 supervisor support was significantly associated with T1 depression ratings ($r = -.26$) but not T2 depression, as found in Study 2 for overall support. To ascertain the possibility of reversed relations, relationships between T1 depression and T2 stressors were also analysed: T1 depression showed small significant negative associations with all T2 stressors: skill discretion ($r = -.17$), decision authority ($r = -.25$), co-worker support ($r = -.22$), supervisor support ($r = -.27$) and workgroup identification ($r = -.20$) except for demands ($r = .09$, $p > .05$).

Correlations between sub-components of social identification, stressors and mental health indices. The correlation between the social identification subscales and T1 and T2 main study variables were reported in order to compare contemporaneous and prospective associations and explore key relations. As reported in Table 18, NA was significantly associated with solidarity ($r = -.17$), satisfaction ($r = -.23$), and in-group homogeneity ($r = -.17$) but not centrality or self-stereotyping ($p > .05$). All dimensions of social identification except for centrality were significantly associated with T1 depression. Satisfaction was the only component to significantly relate to T2 depression ($r = -.21$).

All dimensions of social identification were associated with co-worker and supervisor support at both time points. Of the stressors, co-worker support, also had the highest association with all significant social identification subscales, in line with Study 2. Concurrent associations for support were higher for solidarity and satisfaction at T2 than T1 while associations were of a similar magnitude between T1 and T2 centrality, self-stereotyping and in-group homogeneity. Of the social identification indices, satisfaction had the largest association with all study variables followed by solidarity while centrality showed the weakest association, which too was in line with Study 2. At both time points, except for in-group homogeneity, all social identification indices showed a small significant association with skill discretion. Quite differently, T1 decision authority was moderately associated with T2 indices of solidarity and satisfaction while the T1 associations were small. Social identification was not significantly associated with demands

except for a small association with T1 and T2 in-group homogeneity and T1 satisfaction. A trend for limited associations with demands was also found in Study 2.

Table 18

Correlations among Dimensions of T1 Social Identification and Occupational Stressors and Mental Health Indices at Baseline and Post-Six Months (n = 291)

Variables	<i>Solidarity</i>	<i>Satisfaction</i>	<i>Centrality</i>	<i>Self-Stereotyping</i>	<i>In-group homogeneity</i>
Negative affect	-.17**	-.23**	.02	-.02	-.17**
Depression T1	-.20**	-.34**	-.11	-.16**	-.21**
Depression T2	-.10	-.21**	-.03	-.07	-.03
Co-worker Support T1	.63**	.64**	.25**	.36**	.31**
Co-worker Support T2	.44**	.45**	.31**	.39**	.26**
Supervisor Support T1	.43**	.50**	.15*	.19**	.22**
Supervisor Support T2	.36**	.43**	.19**	.16**	.20**
Skill discretion T1	.21**	.20**	.15**	.16**	.04
Skill discretion T2	.18**	.17**	.14*	.14*	.03
Decision Authority T1	.14*	.15*	.06	.09	-.01
Decision Authority T2	.29**	.34**	.16**	.16**	.10
Demands T1	-.07	-.15*	.01	.01	-.19*
Demands T2	-.05	-.10	.00	.03	-.17*

Notes. Depression refers to the rating on the DASS21 (Lovibond & Lovibond, 1995a).

* $p < .05$ ** $p < .001$.

Confirmatory Factor Analysis for the measure of Social Identification

Using SPSS Amos Version 22 a confirmatory factor analysis was performed on the Leach et al (2008) multidimensional social identification scale to examine the fit of the proposed model. The proposed model included two higher-order factors capturing emotional and cognitive representations of identification, respectively termed self-investment and self-definition. Self-investment comprised of three subscales; solidarity, satisfaction and centrality, and two subscales captured self-definition: in-group homogeneity and self-stereotyping. As performed by Leach et al (2008), the two higher order factors of self-investment and self-definition were permitted to correlate while individual item errors were not and individual items were constrained to load

only on the expected factor. The proposed model is presented in Figure 5a in which the higher-order latent factors are represented by circles and the measured variables by rectangles.

Given the novelty of the scale especially in the occupational setting, competing measurement models were examined to consider whether the proposed structure was optimal. The alternate models are presented in Figures 5b-f and were informed by the tests conducted by Leach et al (2008), theoretical counter-arguments put forward by Postmes et al (2013) and suggested modification indices. Figure 5b specified the least complex model where all fourteen items indicated a general factor of workgroup identification, rendering the factors unnecessary. The second alternate model (Figure 5c) included the five proposed lower-order factors and deemed the two second-order dimensions unnecessary. Figure 5d considered a model where the lower order factor of centrality loaded onto self-investment rather than self-definition. Figure 5e evaluated a model where centrality, self-definition and self-investment were considered as three separate higher-order factors, thereby treating centrality as a stand-alone construct separate from self-investment. Figure 5f considered a less complex model where model 5e was proposed but not the higher-order components of self-investment and self-definition. The models were evaluated using T1 scores from the longitudinal sample ($n = 291$).

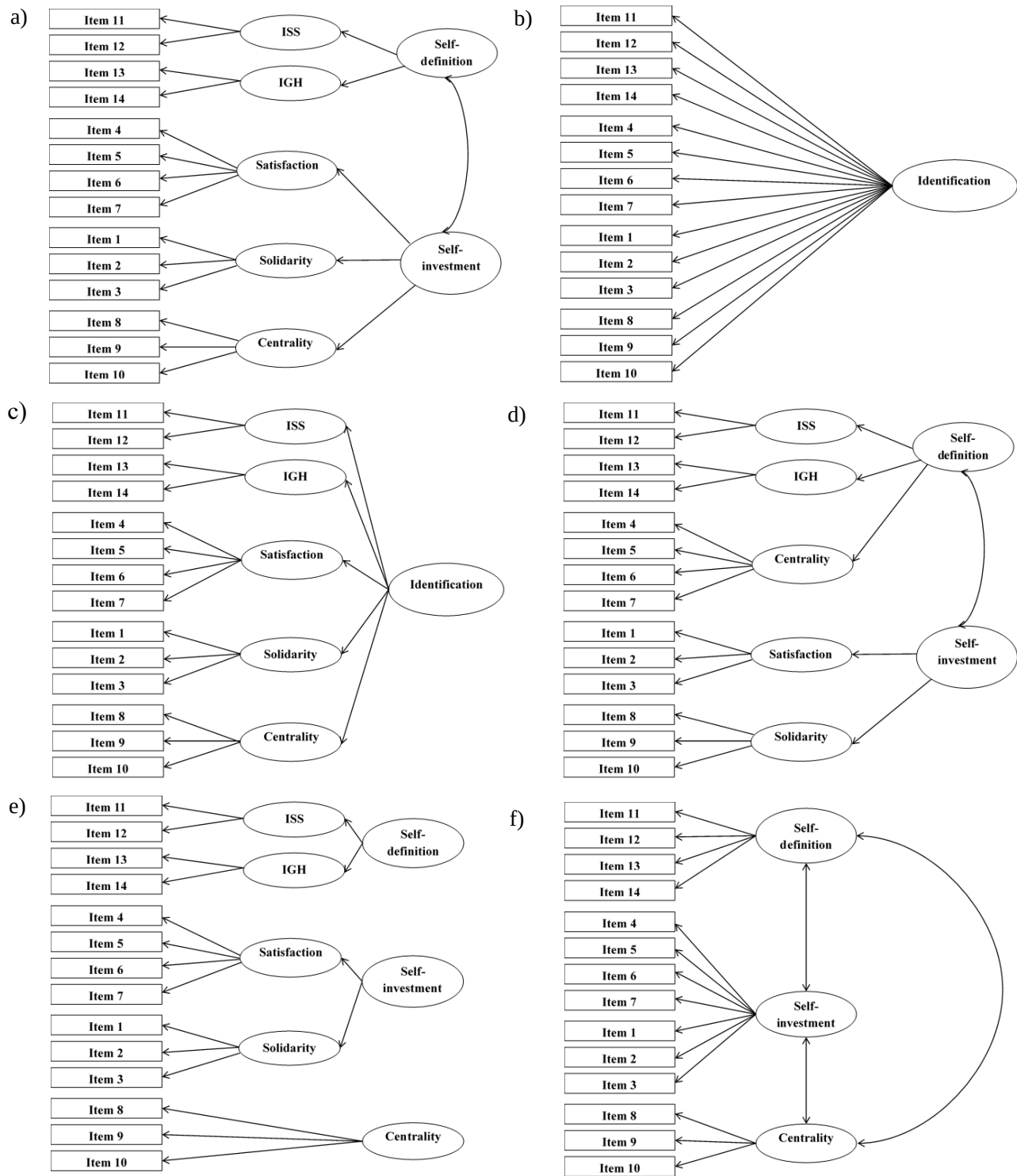


Figure 5. Proposed Measurement Models for Workgroup Identification. a) Leach et al (2008) scale with two higher order factors and five lower order factors; b) a uni-dimensional model; c) a five factor lower order model with no higher order factors; d) centrality included in the self-definition higher order factor; e) centrality as a separate factor to self-investment (solidarity, satisfaction) and self-definition, and; f) three higher order factors only of centrality, self-investment and self-definition.

Model Estimation. Maximum likelihood estimation was employed to estimate the models. A non-significant Chi-Square was taken to indicate good model fit. A significant result however was expected with a sample size over 200 and data with deviations from normality (Barrett, 2007). Accordingly, acceptable model fit was determined by a Chi-square value up to three times the size of the degrees of freedom (Carmines & McIver, 1981) and the following additional statistics: The normed fit index (NFI), goodness of fit index (GFI) and comparative fit index (CFI) that was close to or optimally exceeded a value of .95, a standardised root mean residual (SRMR) value below .08, a root mean squared error of approximation (RMSEA) value close to .06 (Hu & Bentler, 1999) with confidence intervals between 0 and .08 (Hooper, Coughlan, & Mullern, 2008) or up to .10 for mediocre fit (MacCallum, Browne, & Sugawara, 1996), and the lower of the Akaike information criterion (AIC) values between competing models (Burnham & Anderson, 2004). The Chi-square difference test was also used to determine the significance of competing models (Bollen, 1989).

Model fit. Fit indices for the proposed models are displayed in Table 19. The original Leach et al (2008) two-factor five-component model (Figure 5a) demonstrated compatible model fit to Leach et al (2008) and overall acceptable model fit, $\chi^2(71, N = 291) = 191.98, p < .001$, GFI = .92, NFI = .94, CFI = .96, SRMR = 0.05, RMSEA = .08, 90% CI [.06, .09], AIC = 259.98. The CFI value exceeded the benchmark of .95 (Hu & Bentler, 1999), while the GFI and NFI were close to the benchmark and exceeded earlier recommendations of a $\geq .90$ cut-off (see Hu & Bentler, 1999). The RMSEA was marginally higher than Leach et al (2008; RMSEA = .066) and in this sample showed mediocre fit, while the SRMR value, which is positively biased toward a greater number of parameters or model complexity (Hooper et al., 2008), was identical to Leach et al (2008). The standardised item loadings for the five components (.71 - .99) were excellent and for the centrality item 'I often think about the fact that I am part of my workgroup' (.67), very good (Tabachnick & Fidell, 2007). This confirmed that the five components were well defined by the items proposed by Leach et al (2008).

However, unlike Leach et al (2008) the centrality factor loaded fairly onto the proposed higher-order factor of self-investment. While optimal cut-off values for factor loadings are not definitive, for example varying from .32 (as indicative as poor fit, Tabachnick & Fidell, 2007) to .50 as minimum fit (Hair et al., 2006) or .60 as reliable fit (MacCallum et al 1999, 2001), the

loading for centrality (.49) was considered to be markedly different from that of solidarity (.98) and satisfaction (.94) as well as that found by Leach et al (2008, loadings of between .68 and .80 for centrality on self-investment). Especially given the novelty of the measure in the OS domain, alternate models that factored the fit of centrality were evaluated.

Table 20

Goodness-of-Fit Statistics for the Leach et al (2008) Multidimensional Model of Social Identification and Competing Measurement models among University employees (n = 291)

Model	χ^2	df	GFI	NFI	CFI	SRMR	RMSEA [90% CI]	AIC
Proposed (Figure 5a)	191.98	71	.92	.94	.96	.05	.08 [.06, .09]	259.98
One component (Fig 5b)	525.23	75	.80	.84	.89	.13	.14 [.13, .16]	585.30
Five components ^a (Fig 5c)	N/A	N/A	.91	.94	.96	.06	.08 [.07, .10]	279.26
Centrality under Self- definition (Fig 5d)	180.34	71	.92	.95	.97	.04	.07 [.06, .09]	248.34
Three higher order and four lower-order factors (Fig 5e)	179.20	70	.92	.95	.97	.04	.07 [.06, .09]	249.20
Three higher order factors (Fig 5f)	430.55	75	.83	.87	.89	.07	.13 [.12, .14]	490.55

Note. All Chi square tests are significant at the .001level.^a χ^2 (df) could not be calculated as the five-component model contained a negative error variance for an *in-group homogeneity* item.

The modelling of a unitary measure of workgroup identification (Figure 5b) fit the data most poorly, with an AIC value that was almost three times larger than the proposed model. This was in line with Leach et al (2008), supporting a multidimensional view of social identification. The model with five lower-order factors (Figure 5c) and the model loading centrality on to the higher order factor of self-definition rather than self-investment (Figure 5d) provided better fit

compared to the unidimensional model however was not superior to the proposed model (Figure 5a). Of note, the standardised factor loading for centrality improved when loaded onto self-definition (.57) rather than self-investment (.49). The three-factor model with centrality specified as a separate factor from self-investment (Figure 5e) provided a better fit than the original proposed model, $\Delta\chi^2(1, N = 291) = 12.78, p < .001$. The correlation between centrality and the remaining components of self-investment ($r = .48$) and between centrality and self-definition ($r = .55$) was similar. Figure 5f, the lesser complex model of Figure 5e where only three higher order factors were proposed and not the five subcomponents, revealed an AIC value that were almost twice as high as Model 5e, suggesting that the measure of social identification was better suited to a combined higher and lower order multi-component model. Figure 5e was selected as the model for further analyses.

Figure 6 displays the factor loadings of the final three-factor four-component model of centrality, self-investment (solidarity, satisfaction) and self-definition (individual self-stereotyping, ingroup homogeneity). To maintain power in further analyses, the complexity of the model was managed by using manifest variables for the lower-order factors (Jöreskog & Sörbom, 1993), an approach also utilised in other OS research (Rodriguez-Muñoz, Sanz-Vergel, Demerouti, & Bakker, 2012).

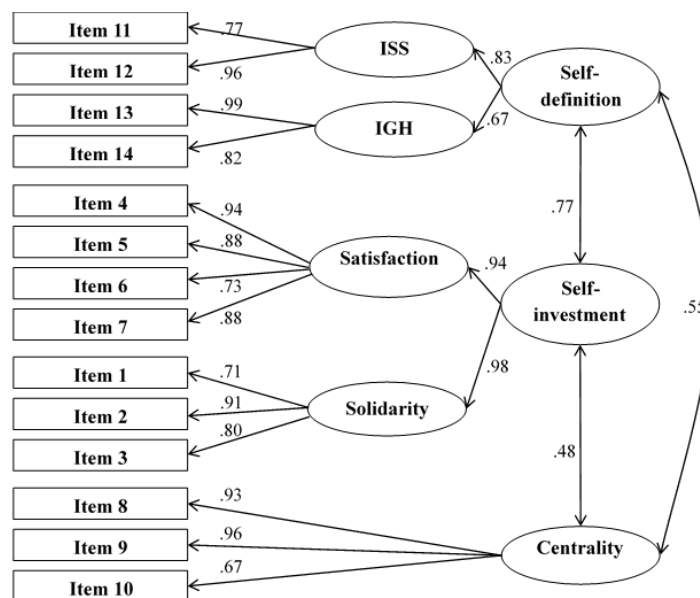


Figure 6. The Final Measurement Model for Workgroup Identification. ISS = Individual self-stereotyping; IGH= Ingroup homogeneity. Numbers refer to factor loadings.

Structural Equations Modelling

The direction of influence between occupational stressors and depression

Model estimation. Structural equations modelling was employed to test five competing models. First, a baseline model (M_0) was specified that comprised of the temporal stabilities of T1 and T2 stressors, that is; demands, skill discretion, decision authority, colleague support, supervisor support and social identification⁹. A correlation between skill discretion and decision authority was permitted within each measurement wave based on modification improvement indices and correspondence with the theoretical construct of decision latitude¹⁰. The normal, reverse causal, reciprocal and cross-sectional models were then evaluated in comparison to the baseline model. The normal model (M_1) examined the cross-lagged paths from T1 social identification and DCS variables to T2 depression. The reverse causal model (M_2) evaluated the effect of T1 depression on T2 social identification and DCS variables. The reciprocal model (M_3) included both paths specified in M_1 and M_2 which represented the idea of co-existing normal and reverse casual relations. The cross-sectional model (M_4) evaluated T2 stressor and T2 depression associations after controlling for T1 depression.

Model fit. Fit indices are displayed in Table 21. The AIC values and chi-square (χ^2) difference test showed that the normal model (M_1) was not significantly better than the baseline model (M_0) at accounting for the data. In contrast, the reverse causal (M_2), reciprocal (M_3) and cross-sectional (M_4) models were fit the data significantly better than the baseline model. While the reciprocal model produced the lowest chi-square value, the model did not perform significantly better than the reverse causal model ($\Delta\chi^2 (126, N = 291) = 3.75, p > .05$).

⁹ The baseline model for T2 depression did not included additional adjustments. This was decided given that the control of NA, gender, age and education in fact worsened model fit from baseline, $\chi^2 (212, N = 291) = 1289.17, p < .001$, AIC = 1371.1, CFI = .59, SRMR = .18, RMSEA = .13, 90%CI [.13, .14]). In addition, after T1 depression was factored the individual covariates were not significant ($p > .05$). Thus, to preserve power and increase model fit the baseline model adjusted for auto-correlations only.

¹⁰ Other modifications were also suggested such as between decision authority and demands, however these were not factored given the lack of definitive theoretical support, concern over power, and as study variable inter-correlations were not a central purpose of the current study.

Table 21

Goodness-of-Fit Statistics for Competing Structural Models for the Association Between Social Identification, DCS variables and DASS21 Depression in a Longitudinal sample of University employees (n = 291)

Model	χ^2 ^a	Df	AIC	CFI	SRMR	RMSEA (90% CI)	Comparison	$\Delta\chi^2$	Δdf
M ₀ Baseline	952.60	138	1018.60	.66	.20	.14 [.13, .15]			
M ₁ Normal	948.84	132	1026.84	.66	.20	.14 [.14, .15]	M ₀ -M ₁	3.76	6
M ₂ Reverse	922.91	132	1000.91	.67	.20	.14 [.14, .15]	M ₀ -M ₂ ^{**}	29.69	6
M ₃ Reciprocal	919.16	126	1009.16	.68	.20	.15 [.14, .16]	M ₀ -M ₃ ^{**}	33.44	12
							M ₂ -M ₃	3.75	6
M ₄ Cross- Sectional	936.32	132	1014.32	.66	.20	.14 [.14, .15]	M ₀ -M ₄ [*]	16.28	6

Note. ^a Chi-square tests are all significant at $p < .001$. $\Delta\chi^2$ = Change in chi-square. Δdf = Change in degrees of freedom. ^{**} = Chi-square change significant at the .001 level; ^{*} significant at the .05 level.

With regard to individual hypotheses, parameter estimates revealed no significant main effects for T2 depression in the normal causation model ($p > .05$). T2 depression was largely accounted for by T1 depression ($\beta = .58$, 95% CI [.49, .65], $p < .05$, $r^2 = .34$). In the reverse causal model, significant cross-lagged paths were found between T1 depression and T2 ratings of decision authority ($\beta = -.20$ [-.26, -.12], $p = .01$), supervisor support ($\beta = -.12$ [-.21, -.05], $p = < .01$) and demands ($\beta = -.07$ [-.16, -.02], $p < .05$) with the latter showing an unexpected negative relationship. T1 depression was not significantly associated with T2 skill discretion, co-worker support and workgroup identity ($ps > .05$). The cross-sectional model for T2 depression revealed a significant small negative association with skill discretion ($\beta = -.11$, $p < .05$) and co-worker support ($\beta = -.14$, $p < .01$) and an unexpected significant positive association with social identification ($\beta = .13$, $p < .05$). However, all initially significant coefficients in the cross-sectional model reduced to non-significance after bootstrapping. Taken together with model fit, the reverse causal model was considered the best fitting model for the data.

Overall however, all models including the baseline model revealed poor fit. This was indicated by Chi square values that were more than three times larger than the degrees of freedom (Carmines & McIver, 1981). In addition, the SRMR value (.20) was equivalent across models and above the $\leq .08$ cut-off for acceptable model fit (Hu & Bentler, 1999). The RMSEA values of .14 and .15 also did not meet the $\leq .06$ cut-off (Hu & Bentler, 1999) nor the more conservative benchmark of .10 for mediocre fit (MacCallam et al., 1996) and instead indicated poor fit (Browne & Cudeck, 1993). Similarly, all CFI values (.66 - .68) fell below the minimum .95 benchmark and even the earlier criteria of $\geq .90$ (see Hu & Bentler, 1999). A log transformation of the skewed depression scores did not significantly improve model fit or change the results. Thus, while appropriate model fit was not determined, the data indicated that the specified reverse causation model was substantially less false than competing models in accounting for the association between the assessed occupational stressors and depression.

The direction of influence between social identification and occupational stressors

Given the absent direct effect of T1 and T2 social identification and DCS variables on T2 depression, a mediation analysis testing causal associations was deemed inadmissible¹¹. Nevertheless, it was of interest to use the longitudinal data to clarify the direction of association between social identification and the DCS model variables of control and support.

Model estimation. Four competing models were tested using structural equation modelling. A respecified baseline model (M_0) was formulated based on the relevant parameter estimates obtained in the previous analysis. This composed of the temporal stabilities between the T1 and T2 variables of social identification, skill discretion, decision authority, colleague support and supervisor support but not demands or depression. A correlation between skill discretion and decision authority was again permitted within each measurement wave. Given the significant correlations between the variables (Table 16), associated significant parameter estimates and potential confounding role of depression, T1 depression was also included as a control for T1 and T2 social identification, decision authority and supervisor support.

¹¹ A simple test of the relationship between T1 social identification and T2 depression revealed a significant association using maximum likelihood estimation ($\beta = .10, p < .05$) but not when bootstrapping was applied ($\beta = .10 [-.23, .01], p = .12$) or when T1 depression was additionally factored ($\beta = .05, p = .39$). Thus, even a more conservative mediation analysis of would not have been supported by the data.

The normal, reverse causal, and reciprocal models were then tested. The normal model (M₁) examined the cross-lagged path from T1 social identification to the T2 control and support subscales. The reverse causal model (M₂) evaluated the effect of T1 control and support subscales on T2 social identification. The reciprocal model (M₃) included both paths specified in M₁ and M₂. As above, maximum likelihood estimation was employed to evaluate the models. The competing models were compared by means of the chi-square difference test. Acceptable model fit was also indicated by lower AIC values, CFI $\geq$.95, SRMR $\leq$.08 and RMSEA $\leq$.06.

Table 22

Goodness-of-Fit Statistics for the Baseline Model versus Competing Structural Models for the Association Between Social Identification and the Control and Support Subscales in the Longitudinal Sample of University Employees (n = 291)

Model	χ^2 ^a	df	AIC	CFI	SRMR	RMSEA [90% CI]	Comparison	$\Delta\chi^2$	Δdf
M ₀ Baseline	706.13	89	768.13	.67	.20	.16 [.15, .17]			
M ₁ Normal	628.37	85	698.37	.71	.17	.15 [.14, .16]	M ₀ -M ₁ **	77.76	4
M ₂ Reverse	694.41	85	764.41	.67	.20	.16 [.15, .17]	M ₀ -M ₂ *	11.72	4
M ₃ Reciprocal	619.05	81	697.05	.71	.16	.15 [.14, .16]	M ₀ -M ₃ **	87.08	8
							M ₃ - M ₁	9.32	4

Note. ^a Chi-square are all significant at $p < .001$. $\Delta\chi^2$ = Change in chi-square. Δdf = Change in degrees of freedom.

** = Chi-square change significant at the .001 level; * significant at the .05 level.

Model fit. As displayed in Table 22 all specified models (M₁ - M₃) performed significantly better than baseline (M₀). While the reciprocal model revealed the lowest chi-square value (χ^2 (81, $N = 291$) = 619.05, $p < .001$) it did not significantly differ from the normal causation model ($\Delta\chi^2$ (81, $N = 291$) = 9.32, $p > .05$). Parameter estimates for the normal causal model revealed significant associations for co-worker support ($\beta = .45$, 95%CI [.26, .59]), supervisor support ($\beta = .28$, 95%CI [.08, .37]) and decision authority ($\beta = .37$, 95%CI [.22, .50]). Parameter estimates for the reverse causal model revealed a significant pathway from skill

discretion to social identification ($\beta = .10, p = .05$) however the bootstrap estimated confidence intervals were not significant ($\beta = .10 [-.01, .22], p = .053$). Accordingly, the normal causation model was evaluated as the most parsimonious model. As for the causal model for depression, the fit indices of the optimal model did not indicate acceptable model fit, $\chi^2 (89, N = 291) = 628.37, p < .001$, CFI = .71, SRMR = .17, RMSEA = .15, 90%CI [.14, .16]). This suggests that the reverse causal relationship was the less likely account of the association between social identification and control and support compared to the normal causal model.

To present a final model that accounted for the complete data, the normal causal model between social identification and stressors was ran together with the reverse causal model determined for the relationship between the DCS model, SI and depression. In this model, the originally significant pathways from T1 depression to T2 demands, supervisor support and decision authority was non-significant ($p > .05$). Therefore, the above normal causal model with the specified parameter estimates between social identification and support and decision authority was considered the final model.

Discussion

The primary aim of this study was to clarify the direction of the association between occupational stressors and depression. With the backbone of the DCS model and SIA to stress and wellbeing in the workplace, the study assessed whether self-report demands, skill discretion, decision authority, co-worker support, supervisor support and social identification could predict ratings of DASS21 Depression six months later. To address a key critique of the proposed relationship, competing explanations about the direction of association were evaluated in the form of reverse and reciprocal relations. It was hypothesised that a reciprocal relation between the components of decision latitude (Research Question 1; RQ1) and social support (RQ 2) on the one hand and depression would best characterise the association. To illuminate the relationship further, it was hypothesised that social identification would positively link to the components of workplace support and control which in turn would mediate the association with depression. A reciprocal relationship between social identification and DCS variables was also considered to best describe the association (RQ3). Based on the associations between demands

and depression in the previous two studies, a synchronous association was expected for the longitudinal but not contemporaneous association (RQ4).

DCS Model and Depression Risk

A lack of prospective support was revealed for the causal role of high work demands and low decision latitude and social support in depression risk. Instead, a reverse causal relationship was supported where higher baseline depression scores predicted at six months, lower ratings of decision authority, supervisor support and demands. The trend for a dominant reverse causal effect was in line with a four-year Australian prospective population survey (Strazdins et al., 2011) for decision latitude although the main effect of demands was also significant unlike the current results. The results somewhat differed from de Lange et al (2004) who like Strazdins et al (2011) cited a reverse causal relationship although with a dominant normal causal pathway. On closer inspection of de Lange and colleagues' (2004) three-year survey on the DCS model and mental health outcomes however, job demand was the only significant stressor predicting depression and the reverse causal effect for the specific outcome of depression was in fact non-significant for demands, decision latitude and supervisor support. The results obtained thus add to the literature's mixed outcomes for reciprocal effects and the dominant pathway. The separate study of stressors in this study revealed that the skill discretion component of control may be less biased by reverse effects than decision authority and the lack of support for normal and reverse causal relations might extend to colleague support and not just from the supervisor.

For the normal causal effect, the lack of support was at odds with theoretical predictions (Karasek, 1979; Karasek & Theorell, 1990), the cross-sectional evidence for control and support reported in the previous two studies and the accumulation of prospective evidence for the main effect of control and especially demands (Bonde, 2008; Netterstrøm et al., 2008; Nieuwenhuijsen et al., 2010). The outcome was however more consistent with recent research that failed to support the hypothesised causal relation for self-report demands (Fandiño-Losada et al 2013; Garbarino et al., 2013; Magnusson-Hanson et al., 2009) and control (Fandiño-Losada et al 2013; Garbarino et al., 2013). The supportive studies cited were typically based on large representative samples and time lags greater than a year although so too were two of the three unsupportive

studies (Fandiño-Losada et al 2013; Magnusson-Hanson et al., 2009). In this regard, the current study did not share discernible features with either stream of published literature.

The lack of support for the main effect of control in particular however was more consistent with research that utilised objective measures of depression (Bonde et al., 2009; de Santo Iennaco et al., 2009; Godin et al., 2009; Grynderup et al., 2012; Kivimäki et al., 2010; Rau et al., 2010; Smith & Bielecky, 2012; Thielen et al., 2010). For workplace support, the results were actually in line with the bulk of recent prospective research which failed to confirm a prospective relationship with depression (de Lange et al., 2004; Inoue et al., 2010; Smith & Bielecky, 2012; Stansfeld et al., 2012; Wang et al., 2012a; Weigl et al., 2012). Furthermore, the lack of support for the iso-strain hypothesis was not dissimilar to that determined in the literature (Chapter 3) and was comprehensible for strain. To explain, although the unsupported demands main effect was most inconsistent with the literature, it was not surprising given that the three empirical studies did not support cross-sectional associations.

The results thus add contention to the claim that strain and especially iso-strain lead to depression. A causal link between depression and the subsequent negative experience of supervisory support and decision authority was suggested by fit indices. While this study was not concerned with testing specific explanations, it could support ‘gloomy’ perceptual processes such that depression negatively biased the experience of the occupational environment (de Lange et al., 2004, 2005) and might also reflect the depressed worker’s ‘drift’ towards poorer occupational conditions (Zapf et al., 1996), although a ‘drift’ towards poor supervisor support does not present as logical. The results may also support the notion that depression strains social experiences (Sacco, 1999; Spector et al., 2008) and interferes in the access to and use of resources such as decision authority and supervisor support (Bakker & Demerouti, 2007; Hobfoll, 1989, 2001).

The unexpected negative link between baseline depression and prospective demand ratings could suggest that depression blunts stimulation or meaning and purpose in task demands (in line with a gloomy perception hypothesis) or that actual occupational conditions are being reduced in response to an employee’s depression (drift hypothesis). These interpretations are speculative particularly given the typical positive association found between depression and demands (Chapter 3). To place this unexpected finding in context, ratings of high demands

(d'Errico et al., 2011; Fandiño-Losada et al 2013; Magnusson-Hanson et al., 2009) and low control (Fandiño-Losada et al 2013; Grynderup et al., 2012) have predicted lower depression symptom ratings and so it is not entirely unusual for such results to occur in the literature. A cohesive explanation for such associations lacks however. The analysis of specific stressors in this study also raise that explanations are lacking for how or why certain stressors might be affected by depression while others might not.

Another account of the reverse and not normal causal associations might relate to their respective mechanisms. The results could suggest that reverse causal effects occur more readily while normal causal relations take longer than six months to exert an effect. Alternatively, the non-significant prospective results and significant cross-sectional adjusted associations between the stressors of skill discretion and colleague support on the one hand and depression might suggest that depression risk is more closely tied to concurrent rather than retrospective experiences of collegial support and skill utilisation. While these explanations are plausible, it is reminded that the overall model fit for the reverse causal relationship was nonetheless poor and results for the cross-sectional study were non-significant upon the more stringent bootstrap method. In a strict sense then, the study did not support a reciprocal relationship between occupational stressors and depression (de Lange et al., 2004) or clinical insights into depression (Sacco, 1999; Haefel et al., 2007; Stice et al., 2004).

Social Identification and Depression Risk

As for the above occupational stressors, the non-significant prospective association between social identification and depression ratings suggested that heightened depression risk did not result from employees' weak identification with their workgroup. This was at odds with the predictions of the SIA to stress and wellbeing (Haslam, 2004; van Dick & Haslam, 2012). This outcome was particularly surprising given that the purported provisions of social identification such as esteem, belonging, connection and meaning, present as logical antecedents to depression, especially in terms of the symptoms assessed by the DASS21 that weight on feelings of worthlessness and a lack of meaning or purpose (Lovibond & Lovibond, 1995a).

Instead, the cross-sectional analysis that adjusted for baseline depression symptoms revealed that workgroup identification was positively associated with depression, highlighting

that cautionary statements about the harmful role of over-identification are valid (Ashforth et al., 2008; Avanzi et al., 2012; Branscombe et al., 1999; van Dick & Haslam, 2012). Although results were not significant upon the more stringent bootstrapping, this study extends evidence for this caution to the health condition of depression and not just general mental wellbeing scores (Avanzi et al., 2012). Interestingly though, the predicted negative association between workgroup identification and depression was found when a simpler cross-sectional analysis was employed that did not adjust for depression, which was in line with other research on organisational identification and strain that did not adjust for baseline mental health (Haslam & O'Brien, 2003; Haslam et al., 2005; Haslam et al., 2009; Jimmieson et al., 2010; Sani et al., 2012). The unexpected positive association between workgroup identification and depression could also indicate a suppression effect involving co-worker support and skill discretion. In all, the results in this study are regarded as consistent with the accumulated research although the prospective analysis challenges the direction of causality inferred by the above studies.

With regard to interpretation, it assists to consider that baseline depression was a large explanatory factor for subsequent depression. This was in line with established knowledge that a history of depression is a strong indicator of future depression (Burcusa & Iacono, 2007). Subsequently, the results could suggest that a history of depression supersedes the relevance of social identification (and other occupational stressors) in the forecast of subsequent depression. Alternatively, the tendency for greater support of a cross-sectional rather than prospective association raises query as to whether social identification may directly affect concurrent distress to a greater degree than chronic or future episodes of distress. This might also account for Haslam and colleagues' (2009) report of a significant association between low team identification and prospective burnout at eight and 10 weeks from baseline but not after 14 weeks. Alternatively, the data may simply not support the claim that depression negatively affects the inclination for social identification (Cruwys et al., 2014a; Wegge et al., 2012) or a synchronous association between social identification and strain (Wegge et al., 2012).

Social Identification and Stressor Experiences

A more straightforward contribution was the finding that social identification prospectively predicted ratings of control and support, even after accounting for depression and

auto-correlations. Specifically, participants indicating a higher rather than lower sense of connection with their workgroup were more likely after six months to report higher levels of colleague and supervisor support and say over work tasks (decision authority). Conversely, the data suggested that employees reporting low levels of identification with their workgroups were more likely to experience stressors of low support from colleagues and the supervisor as well as low decision authority. The prospective evidence adds substantial weight to the previously documented cross-sectional associations between workplace identification and support (Bizumic et al., 2009; Haslam et al., 2005; Jimmieson et al., 2010; O'Brien & Haslam, 2003, as cited in van Dick & Haslam, 2012) and confirms the initial experimental and observational data obtained with 15 participants in a simulated institution (Haslam & Reicher, 2006; Reicher & Haslam, 2006); contributing more direct evidence about social identification in OS.

The research also informed that despite predictions, social identification may not facilitate skill discretion at work. Interestingly, the more established 'reverse causal' prediction that social identification is a consequence of voice (Blader & Tyler, 2009; Tyler & Blader, 2003) was also not supported nor did the study confirm the crude evidence gathered that skill discretion (Harrison et al., 2009; Stone et al., 1997, 1999) and social support (Bizumic et al., 2009) are antecedents of social identification. More generally, the research revealed that the speculated synchronous relations between social identification and stressors (Haslam et al., 2005; 2012) may not always present. The significant correlation between skill discretion and workgroup identification nonetheless suggests further research to understand the nature of this link.

The prospective association between workgroup identification and decision authority ratings after six months provided concrete support for the idea that workgroup identification facilitates employees' 'voice' or input into decision-making about work tasks. This finding generalises theorising about social identification and voice (Blader & Tyler, 2009; Tyler & Blader, 2003; see also Chapter 6) and the evidence in the context of job satisfaction and performance (Colquitt et al., 2001) to health outcomes in the context of OS. Namely, the study demonstrated that social identification can be an antecedent of authority over core work tasks, which widens the OS evidence from associations with authority over office space design (Knight & Haslam, 2010a). It was also interesting to note that reverse causal associations between depression with supervisor support and decision authority became non-significant upon the

inclusion of a causal pathway from social identification to stressors. This could suggest that compared to reverse causal relations between depression and occupational stressors, the relationship between social identification and the stressors were more relevant. This builds the argument that social identification is not just an additional factor but an integral component of the stress process (Haslam, 2004).

Although ratings of decision authority and support did not predict six-month depression scores in this study the results suggest that social identification may be a precursor to these risk factors (see Bonde, 2008; Karasek & Theorell, 1990; Netterstrøm et al., 2008; Nieuwenhuijsen et al., 2010). Based on the finding that the main effect of social identification was not robust across analyses for depression, it might be inferred that social identification has a stronger indirect effect on mental health outcomes via the experience of workplace control and support; which either concurrently or over an extended period of time may affect health risk. Also, the unsupported proposed mediation was not entirely surprising given that DCS model variables also did not predict prospective depression ratings. Thus rather than being indicative of a flawed mediation hypothesis, the overall lack of prospective support for main effects in depression risk might reflect a more general cause. Accordingly, methodological factors are considered next.

Methodological Factors

Sample. A clear limitation of the current study was the sample size which in turn affects power and generalisability. On the one hand, the sample size met the minimum requirement of 200 cases for structural equation modelling (Bentler & Chou, 1987; Kline, 2011; MacCallum et al., 1996). The additional recommendation for a minimum ratio of at least five cases to each parameter estimate (Bentler & Chou, 1987) was also reached for all but one analysis (the reciprocal model between social identification and stressors). Thus while minimum conditions were generally met the design did not lend optimal power to detect small effects with 80% power, which was estimated to involve a minimum sample of 87 and over 9000 to confirm the model structure. Accordingly, poor model fit was not unexpected. To elaborate, Chi-square is sensitive to complex models and the RMSEA; to the number of estimated parameters in the model (Byrne, 2013). Thus, a limitation is that the true population model may have been over rejected due to small sample size ($N < 250$, Hu & Bentler, 1999).

The reporting of a number of fit indices aided the balance of the strengths and limitations of various indices. In addition, parameter estimates that were significant at the more conservative level ($p \leq .001$) were interpreted as indicative of potentially important pathways. The relevance of the findings should also be interpreted with the wider recognition that fit indices are simply guidelines (Bollen, 1989) that at present involve a component of subjective judgement about the model's lack of fit that alone does not reflect the extent to which the model is plausible. Instead, model adequacy is informed by multiple theoretical, statistical and practical considerations (Byrne, 2013). It was therefore considered fruitful to pursue the analyses while recognising this limitation. To illustrate, studies with even smaller sample sizes have produced important findings that have motivated a tradition of enquiry, most notably in this context the BBC series of studies ($N = 15$, Haslam & Reicher, 2006; Reicher & Haslam, 2006).

Generalisability was a further concern of the small sample size. The sample was well-educated and almost half identified as professionals and 34% as supervisors and so generalisability may be more relevant to these groups. While the sample originated from a university setting, approximately 30% identified as academics and so generalisability may be more widespread than unique to university employees. A noteworthy setback was that the follow-up sample represented only 51% of the original sample that provided follow-up codes. Despite the loss of data, the follow-up sample did not significantly differ from the original sample on key demographics or study variables. This suggests that the results may be extrapolated to the larger sample ($N > 600$) although wider generalisability is uncertain as demographics were not accessible for the population. A potential means through which the small sample size may have affected results is through the representation of depression scores. The depression scores were skewed with a mean value in the normal range; as was expected for a general community sample (Crawford et al., 2011; Lovibond & Lovibond, 1995b). However, the underrepresentation of cases in the context of a small sample size may have contributed to the overall non-significant findings for depression and is a limitation of the current study.

The data collection method might have also influenced sample size and representation. As in the previous studies, a high percentage of supervisors responded and professionals were particularly represented. As with Study 2, overall retention was also somewhat poor in comparison to other prospective research in the field (average retention of 83%, range of 37% to

100%; Bonde, 2008). Based on the high percentage of participants who indicated having completed the T1 and T2 survey (92%), the Yurek et al (2008) scale could be considered poor in matching participants for this sample, with match rates (51%) lower than expected after six months (67%). The difficulty with data matching might also be explained by the understanding that another work health survey was running at the time and participants may have perhaps mistakenly confused their stated participation with that in the other survey.

Time lag. The non-significant results for depression also draws query as to whether the six-month time lag was sufficient to detect the effects of occupational stressors. While research has determined causal support after periods of months (Daniels & Guppy, 1994; Dorman & Zapf, 1999; Schonfeld, 1992) the bulk of research on OS and depression has utilised time frames of years, making it difficult to compare results on the basis of shorter exposure times. Accordingly, the current study contributes important evidence that may indicate that effects on depression risk may require an exposure to stressors that exceed six months. Of note, the significant prospective associations between social identification and subsequent support and control as well as baseline depression and subsequent supervisor support and decision authority ratings, might suggest that relatively shorter exposure times are sufficient for other processes of occupational stress. These ideas highlight that considerations about the chronicity of occupational stressors are important for managing Type II error. Clarity about any effect of different exposure durations is also hampered by the lack of invariance testing across both studies.

Adjustments. Another criticism of the data is the lack of adjustments for depression. While gender, age, education and negative affect were intended as adjustments, concerns about power outweighed their inclusion. As with the previous two studies, gender was not significantly associated with depression ratings even in univariate analyses and model fit was in fact poorer on inclusion of all adjustments. Importantly, given the non-significant main effects for depression the counter-claim that causal support was confounded by other variables was not relevant here. Claims about confounding however might be relevant for the causal association reported between social identification and control and support. Even so, correlations revealed only a significant negligible association between gender and social identification such that SI was higher among females and so this is unlikely to have grossly affected results.

The results of this study instead add knowledge about demographics in the study of OS and depression in a relatively well-educated sample. The results inform that work identity, specifically in the form of social identification with the workgroup, is not skewed towards men; challenging the idea that men's health risk may be attributed to their work identity to a greater extent than females' (Wiley, 1991). The generalisation of the non-significant association between gender and DASS21 Depression ratings to inferences about depression risk however should be treated cautiously given that depressive disorders are known to occur more commonly among females (APA, 2013). Interestingly, negative affect no longer significantly predicted depression risk once baseline depression was taken into account, which underscores the priority of accounting for depression history in the assessment of depression risk.

Measurement of Social Identification. The validity of results may be hampered by the modification of the Leach et al (2008) scale. Specifically, modification indices suggested improved fit through the exclusion of centrality from the higher order emotive factor of self-definition (which included the subscales of satisfaction and solidarity). Given the novelty of the scale in terms of the sample (employees) and target of identification (work-related identification) it was considered an important and logical distinction to uphold that centrality was a more separate experience to solidarity and satisfaction with the workgroup. The modified structure and use of the unidimensional scale nonetheless preserved the theoretical account of social identification as involving an emotional, evaluative and cognitive component (Tajfel & Turner, 1991; Leach et al., 2008) and supports the proposed five lower-order factor model, especially in comparison to a unidimensional concept. The impact on validity may be placed in perspective by recognising the common although undesirable measurement of social identification that typically involves a selection of items from a single scale or multiple scales, without theoretical or empirical justification (see Smith et al., 2012; van Veelen et al., 2013). Regardless, the very real concern about validity is acknowledged and the performance of this scale prompts ongoing research to refine the conceptualisation of social identification.

Model fit. Poor model fit was recognised as a limitation of the results. Given that this was the first known study to report on the psychometrics of the Leach et al (2008) scale in the OS setting, this information was considered particularly informative. The modification indices did not reveal unusual or unexpected associations. An exogenous factor could thus account for

the poor fit. It was noted that the effect sizes of variables were small and this may have also rendered poor fit. These results also for theoretical clarity about the key processes in OS.

Methodological Strengths and Concluding Remarks

Despite the limitations, the current prospective analysis contributed important knowledge about the occupational stress process. Support was revealed for the notion that social identification increases employees' opportunity to experience say over their work tasks and access support from colleagues and their supervisor, which are key occupational factors implicated in health risk (DCS model; Karasek & Theorell, 1990). The longitudinal design and consideration of reverse causal relations supported claims about the proposed causal direction and produced initial evidence that depression may be a precursor to weak identification at work, highlighting the complexity of processes involved in OS. The assessment of the sub-components of the DC/S model expanded the evidence and discussion about the role of social identification in both emotional and practical forms of support as well as from the supervisor. The considered relevance of social identification to decision latitude also broadened the potential influence of SI in OS more broadly. The use of the Leach et al (2008) measure facilitated the novel assessment of social identification in an occupational sample, clarified that the measure was best represented by dimensions rather than a single factor and generated the idea that centrality may be better suited as a separate factor from self-investment.

This study also represented one of the first few Australian studies that empirically tested reciprocal relations between occupational stressors and depression risk. This evaluation contributed information that normal causation relations are not always supported and reverse causal associations can vary according to stressors. The novel use of a six-month time lag raised theoretical and methodological issues about detecting causal effects. The data also demonstrated that accurate claims about the position of social identification in the occupational stress process are contingent on stringent testing and the consideration of adjustments. The novel use of the DASS21 in research and discussion about the adjustments in evaluating depression also supported the core focus of the research. Finally, the use of the Yurek et al (2008) scale for tracking participants added important knowledge about methodological issues to factor in

assessments of the modern occupational environment. The relevance of the findings is elaborated on next in the general discussion.

Chapter 10. General Discussion

Overview of the Thesis

This body of work began with the recognition of occupational stress and depression as a major public health issue (Chapter 1). The well-established Demand Control/Support model was selected from the examination of traditional theoretical frameworks to guide the initial empirical investigation (Chapter 2). To clarify the current state of knowledge, a review of the recent research on the DC/S model and depression risk was conducted (Chapter 3). It was concluded that the link between the DCS model and depression risk was suggestive although not yet conclusive. A paucity of research within the Australian workforce was also noted.

The DC/S model was supported by the significant positive contemporaneous associations between workplace control and support on the one hand and depression in three independent studies (Chapters 4, 7 & 9). To further knowledge about these associations the well-established social psychology theory; the social identity approach (SIA) was introduced. It was argued that the analysis of stress, particularly in terms of social support (Chapter 5) and control (Chapter 6) was limited without the consideration of employees as group members. Evidence was presented for the proposed positive relationship between social identification with workgroups on the one hand and ratings of workplace support and control and mental health indices on the other hand (Chapter 7, Chapter 9). Compelling evidence for the causal influence of social identification in the experience of support and control was demonstrated with prospective data (Chapter 9).

In contrast to predictions however, neither social identification, nor workplace control or support predicted prospective mental illness risk (Chapter 7, Chapter 9). In addition, while workplace support and control showed consistent associations with social identification and depression, the significance of the individual components, that is, supervisor or colleague support, and skill discretion or decision authority, varied across each study. Workplace demands did not predict simultaneous depression risk and this was consistent across the three studies. Interestingly, the prospective association with depression risk was supported in the one year (Chapter 7) but not six-month (Chapter 9) evaluation. Contrary to predictions and the crude

evidence (Chapter 8), reciprocal associations were unlikely to be supported and the non-significant buffer hypothesis (Chapter 4) confirmed expectations from the accumulated evidence.

The exploratory analysis showed that social identification was more strongly associated with depression than with other mental health endpoints. The data also revealed that the affective experience of social identification was particularly relevant to occupational stress and that cognitive aspects of identification had greater bearing in the experience of stressors than directly with mental distress (Chapter 7, 9). The significance of these findings and recommendations for future research are discussed in this concluding chapter. The discussion considers the contributions made to evidence, knowledge, theory, methodology, practice and philosophy.

Contribution to Evidence

DC/S model. The review of the DC/S model and depression risk (Chapter 3) in concert with the empirical studies revealed that claims about causation remain equivocal. On the one hand, the review strengthened the claim that strain is causally implicated in depression risk via the consideration of more recent enquiries in large representative samples. At the same time, the comprehensive nature of the review revealed that more often than not, support was not *fully* obtained. Rather, support was less likely with the examination of main effects as opposed to a combined index of strain and less likely too upon the use of objective than self-report measures for depression and strain. These observations together with the lack of consistent support for the strain hypothesis in the current series of studies highlighted that joint instances of high demands and low control are not clearly linked to clinical depression.

The literature review and empirical studies however distinctly showed that the iso-strain hypothesis was not supported by the evidence. Similarly, the largely non-significant buffer hypothesis for depression confirmed summaries of the evidence for a general notion of psychological (Häusser et al., 2010; Van der Doef & Maes, 1999) and physical ill-health (Van der Doef & Maes, 1998). This was an important collation of the evidence given the subsequent caution indicated about the necessity for joint or complex interactions between (occupational) stressors in the prediction of depression and health risk more widely.

By contrast, the significant effect of high job demands after one year adds to the growing indication that the demands main effect is the most robust DC/S model prediction for depression risk (Bonde et al., 2008). The consistent contemporaneous associations between control and support and depression ratings across the studies and Chapter 3 review largely confirmed the earlier cross-sectional self-report evidence for mental health outcomes more broadly (Häusser et al., 2010; Van der Doef & Maes, 1999). The analysis on the sub-dimensions of control and support provided a more thorough evaluation of the DCS model than previously carried out for depression (Bonde, 2008; Netterstrøm et al., 2008) or even general mental health (Clark et al., 2012; Häusser et al., 2010; Nieuwenhuijsen et al., 2010; Van der Doef & Maes, 1999). The inconsistent support revealed that effects are not robust for these sub-concepts.

The lack of prospective support for the control main effect while inconsistent with more recent self-report investigations (e.g., Magnusson-Hanson et al., 2009; Strazdins et al., 2011), was in line with the non-significant trend noted in longitudinal studies that utilised objective indices for control. The prospective analysis of the support main effect while also unsupported was an important contribution given the paucity of its test in prospective depression risk. The review highlighted further that it was the most inconsistently supported DCS model main effect, when assessed prospectively. Thus, in addition to the contribution of the empirical evidence, the review added a context in which to interpret the accumulating data.

SIA to stress and wellbeing in the workplace. The empirical studies notably strengthened the evidence for social identification as an explanatory mechanism in the OS process. Specifically, the longitudinal associations between ratings of workgroup identification and subsequent social support and control added concrete support to the inferences made with cross-sectional research about the causal role of social identification in the experience of stressors (e.g., Haslam et al., 2009; Jimmieson et al., 2010; Sani et al., 2012). The novel evaluation of reverse effects also clarified that the predominant pathway was from social identification toward occupational stressors and not vice versa (Study 3, Chapter 9). This was also the first known enquiry to document the relationship after controlling for baseline depression or in other words the data showed that pre-existing depression did not bias the association. To strengthen the claim that social identification with workgroups directly facilitates

support and control at work, it is recommended that future investigations adjust for baseline mental health.

The research also extended support for the function of social support and decision latitude as mediators of workplace identification and mental health. The validity of the claim was strengthened with the assessment of the clinical endpoints of depression, anxiety and general distress, as the relationship had previously been established with a non-specific notion and created measure of subjective distress (Haslam et al., 2005). Furthermore, the pathway involving decision latitude represented the first known investigation with this stressor, which enabled a broader evaluation of the social identity approach to stress and wellbeing in the workplace. The evaluation of direct and indirect associations via workplace control and support could be broadened still with the use of different targets of workplace identification, such as professional and organisational identification.

A further contribution was the explicit enquiry into whether workgroup identification was implicated in depression risk to a greater extent than in other health outcomes. The evaluation extended generalisability of the proposed phenomenon, initially demonstrated with depressed and anxious clients' social identity with their therapy group (Cruwys et al., 2014b), to a more enduring target of identity. In addition, the study of both stress and anxiety using the DASS21 strengthened the claim as the initial evaluation utilised a comparatively narrower definition of anxiety (Cruwys et al., 2014b). The evidence confirmed the trend documented by Bizumic et al (2009) in terms of a stronger association between workplace identification and depression compared to stress and anxiety, although the results here were significant rather than non-significant for the latter states. As the obtained results were based on comparatively larger sample and replicated in two studies, strengthened evidence was presented for the parsimonious expectation of low social identification as a general health risk factor (Haslam, 2004; van Dick & Haslam, 2012) that is especially implicated in depression (Cruwys et al., 2014a).

An immediate research task however would be to clarify causality as the notion that social identification is equivalently implicated in health risk through stressors and especially relevant to the direct risk of depression was supported by cross-sectional and not prospective data. There is a great deal of potential to expand the evaluation of the SIA to stress and wellbeing

in the workplace to a range of physical health conditions. The assessment of cardiovascular disease risk is particularly appealing given its established relationship with depression (Nicholas et al., 2006; Van der Kooy et al., 2007) and the Demand Control model (Kivimaki et al., 2012) and the emerging associations between social identification and cardiovascular reactivity; in a simulated cognitively demanding task (Gallagher, Meaney, & Muldoon, 2014) and cardiovascular disease recovery; as an outcome of family identification (Haslam et al., 2005). The evaluation of OS-related physical health outcomes would greatly extend the generalisability of this model beyond common mental health endpoints.

The non-significant relations between social identification and occupational stressors in Studies 2 and 3 also contributed evidence toward speculated associations. The evidence did not support the overall idea that high social identification is a health hazard (Avanzi et al., 2012; van Dick & Haslam, 2012). However, the trend of a positive association between high social identification and high demands (Study 3) supports further enquiry into whether over-identification may be problematic for employees experiencing particular stressors such as high demands. As a separate point, the lack of gender differences on ratings of workgroup identification and depression contributed refuting evidence to speculation that depression risk among men compared to women may be accounted for by the greater sense of identity derived from work (Blackmore et al., 2007; Houtman et al., 2005). As above, a more complete evaluation of the idea might be supported by testing other targets of workplace identification such as professional identification as well as the cross-cultural relevance of social identification at work to health risk.

The evidence also did not support the idea that pre-existing mental illness negatively affects the likelihood for social identification (Cruwys et al., 2014a; Wegge et al., 2012). The explicit consideration of this competing explanation provided the first known evidence to suggest that vulnerabilities such as negative affect or a recent history of a mood or anxiety disorder do not affect the capacity for workplace identification after six months or one year. The significance of the evidence however is not clear as the longitudinal data neither supported the reverse relationship between low social identification at baseline and prospective mental illness risk. These findings raise the priority for future empirical investigations to clarify the nature of

concurrent associations between social identification and mental distress including the consideration of competing explanations, as extensively discussed in Chapter 8.

The study of social identification also facilitated the exploration of the assumed but rarely tested notion of social identification as a multi-factorial construct. Specifically, the analysis of the Leach et al (2008) multidimensional scale contributed evidence to the assumption that both the cognitive and emotive components of social identification affect strain. This was the first known data to reveal that the emotive component of identification as defined by Leach et al (2008) was especially relevant to understanding the direct link between social identification and mental health risk as well as the indirect pathway via workplace support and control. This extended earlier evidence that used a narrower definition of affective and cognitive (school) identification and depression (Cameron, 1999) and also expanded the relevance to social identification at work. The novel finding that cognitive representations of workgroup identification were linked to occupational stressors to a greater extent than to mental health indices confirmed speculation that certain dimensions of social identification may be more or less relevant to various experiences (Cameron, 1999; Leach et al., 2008). The evidence explicitly raised the idea that particular facets of social (workplace) identification may be pertinent to certain experiences within the occupational stress process.

Methodological Limitations

It is acknowledged that the interpretation of the evidence is constrained by a number of methodological limitations. First, the sample size, particularly for the longitudinal examinations, did not provide sufficient power to comfortably examine the hypotheses of interest. To explain, sufficient power was obtained to detect medium-sized but not small-sized effects or the adequate examination the complete measurement model. Accordingly, inadequate power may have hampered the ability to detect effects. Sample size and retention are therefore acknowledged as relative weaknesses of the research. Generalisability is also limited to employees with the psychological and material resources to have sustained employment throughout the study period.

A general caveat for the current program of research was that the documented relationships reflected self-reported experiences and not objective accounts of occupational stressors or health risk as put forward by the theoretical models. As extensively discussed in

Study 1 and acknowledged in the discussion of Study 2 and 3, this design feature entices the account of inflated or spurious relations as an explanation for the findings. Attempts to manage the risk of common method variance were undertaken with the assessment of negative affect, prospective design in Study 2 and 3 and direct evaluation of alternate interpretations in Study 3.

To improve the evaluation, the objective measurement of the occupational environment and clinical diagnostic testing is indicated. This recommendation has become somewhat of a fixture in discussions on occupational stress research limitations (e.g., Bonde et al., 2009; DeSanto Iennaco et al., 2009; Grynderup et al., 2012; Kivimäki et al., 2010; Rau et al., 2010). However, given that the self-report tool is unlikely to be abandoned in the data gathering process, the continued synthesis of data on self-report associations and correspondence with the growing number of objective assessments, as attempted in Chapter 3, would progress knowledge about occupational stress and health risk.

Contribution to Knowledge about Occupational Stress in Australia

A notable contribution of the thesis was the data gathered about employees' experience of occupational stress in Australia. The synthesis of the available information illuminated the inadequate rigour of the assessment of the DCS model and depression risk within the Australian workforce (Chapter 3, Study 1). The summary facilitated the subsequent accumulation of theoretically driven and methodologically sound evidence on OS and depression in three independent samples of over 1200 Australian employees. The data linking specific occupational stressors to depression risk complemented the Australian evidence base that had largely focussed on economic evaluations of stressors through estimates of sickness absence (Medibank & KMPG Econtech, 2008), productivity loss (Medibank & KMPG Econtech, 2011), compensation claims (Safe Work Australia, 2013; 2015; 2016) and projected savings (LaMontagne et al., 2010). The use of the widely validated JCQ scale also permitted the calculation of meaningful scores for the level of reported job demands, control and support, with comparable international data. Mean levels of workplace identification were also found to be on par with Leach and colleagues' (2008) normative data. The benefit of such information may not be immediate but might assist in the development of Australian norms or benchmarks that together with more recent data (e.g., Strazdins et al., 2011; Hall et al., 2013) could be used to build empirically informed risk profiles.

To add, the assessment of OS in the Australian Public Service (Study 1, Study 2) supported the generalisability of the results to one of Australia's largest employers (Commonwealth of Australia, 2014). The data was also valuable as links between OS and depression within the public service have largely been drawn from other nations, most notably from British civil servants in the Whitehall II series of studies (e.g., Stansfeld et al., 2012). In addition to contributing data that can be compared to public servants in other nations, this examination provided direct evidence about the relevance of OS within the Australian public service. This undertaking significantly enriched the empirical base within the APS which had previously been; informed by a select range of hypotheses, assessed with an index of general distress, conducted on a small sample (Macklin, Smith, & Dollard, 2006) or as part of a mixed public and private company sample (Strazdins et al., 2011) or a general population sample with estimates extrapolated from other samples (LaMontagne et al., 2008). As alluded to, this represented the first known exclusive enquiry into APS employees' experience of OS as defined by the DCS model, SIA and depression and anxiety risk.

Importantly too, the DC/S model and SIA were shown to be relevant to other Australian workplace structures, as results were largely consistent among the university sample (Study 3). The use of the ANZSCO code clarified that generalisability may be extended to the occupational categories of managers, professionals and clerical and administrative workers. In addition, despite the relatively small individual sample sizes of the three studies in comparison to that typically published (e.g., Smith et al., 2012; Stansfeld et al., 2012; Wang et al., 2012a), the accumulated data confirmed the broad utility of the DCS model and SIA within the Australian occupational climate.

The results however revealed gender effects that contrasted research arising from other nations. Specifically, the lack of gender differences on ratings of occupational stressors was inconsistent with the norms in several European countries where women reported higher levels of psychological demands and lower decision latitude compared to men (Karasek et al., 1985). It could be interpreted that current psychosocial occupational conditions in Australia are relatively equivalent between genders, particularly within managerial, professional and administrative roles. However, it is unclear whether the results reflected the experiences of the specific sample, occupational groups, workplaces, or the Australian climate at the time. This is raised given that

higher ratings of demands (Macklin et al., 2006) and strain among women have been documented in other Australian samples (d'Souza et al., 2003; LaMontagne et al., 2008). Further evidence on gender differences (or lack thereof) across the broader contemporary Australian occupational climate would assist in appraising the significance of the generated findings.

A key contribution to Australian research was the evaluation of causal relations through longitudinal design (Study 2, Study 3). The current results were the first known to demonstrate in the Australian work context that workplace identification causally preceded workplace control and support ratings. The lack of prospective support, with the exception of high job demands in Study 2 only, suggested that clear evidence for the direct causal role of DC/S model stressors in the mental health risk of Australians is outstanding. The discussion on Australian research also raised the lack of prospective analyses on the social support main effect and depression. Thus further longitudinal testing of both models in the Australian workforce is strongly recommended.

A further consideration revealed by the longitudinal investigation was the dynamic nature of the occupational environment. For example, a restructure or change in supervisor or workgroup was experienced by up to 21% of the sample after six months and 41% after twelve months. Accordingly, future large scale prospective research within the Australian workforce may wish to factor exposure duration or at least track stable and modified exposures to more effectively reflect and capture the potential influence of the Australian occupational environment in health risk.

Contribution to Theory

Contribution to stress theories. The prospective support for the demands main effect (Study 2) and not for the control and support main effects raises thought about whether workplace demands may affect depression through a different process than other stressors. To speculate, the results may suggest that demands operate via a stimulus mechanism as depicted in the engineering approach to stress (Cox, 1978; Jex et al., 1992) whereas other processes such as control, support and social identification may be more subject to other influences such as appraisal processes (Lazarus & Folkman, 1984). To elaborate, the effect of low control and support on ill-health may be more variable (based on psychological factors) whilst high demand

may more clearly result in a 'breaking point' as evidenced by ill-health. Alternatively, from a purely appraisal perspective, compared to low support for example, a high workload may have a more commonly shared meaning and therefore present as problematic to a larger number of people (Scott & Howard, 1970). Evidence for this may be gleaned from the relatively high reliability of the demand scale, albeit relative to norms. The Job Demands-Resources model (of occupational stress) in fact expects chronic job demands to alone result in exhaustion, energy depletion and illness (Bakker & Demerouti, 2007). The findings contribute evidence to a range of theories. Clarity about the underlying processes of the demand main effect would be fruitful.

The stronger association between stressors and depression compared to that between stressors and generalised stress and anxiety may suggest that occupational stressors affect health outcomes in varying capacities, unlike that proposed in the General Adaptation Syndrome (Selye, 1956). However, given that OS models such as the DC/S model have also explained a range of health conditions such as cardiovascular disease (Kivimäki et al., 2012), musculoskeletal injury (Lang et al., 2012) and gastrointestinal disorders (Nixon et al., 2011), it could suggest a common mechanism, although for a specific set of health conditions. Continued reflection about the relevance of findings to underlying stress theory, as described in Chapter 2, may assist in forming appropriate expectations about occupational stress theories.

Contribution to the DC/S model. This research challenged arguably the central claim of the DC/S model which implicates joint rather than individual occupational stressors as the key precipitant of health risk (Karasek, 1979; Karasek & Theorell, 1990). Instead, the longitudinal demands main effect (Study 2) and literature review on depression (Chapter 3) raised that high demands may be the critical stressor. This would imply that a single occupational stressor as opposed to joint stressors such as strain or iso-strain may be sufficient to elevate health risk. To add to this alternate proposition, particular features of OS might also be more or less relevant to health risk in certain instances following the finding that different dimensions of decision latitude and social support were significant in different cross-sectional studies and for different indices of distress. In addition to the query raised about the adequacy of single stressors to pose the highest of health risks, the data drew into consideration interest about the required chronicity of stressor exposure. Specifically, the novel data in which high demands predicted depression after one year but not six months could suggest that health risk, at least for particular stressors, is not directly

affected until after a period of at least six months of exposure. Methodological explanations are discussed later however these findings point to theoretical matters worthwhile exploring.

The lack of prospective support in the current research and findings in the literature with regard to the control and support main effect continue to illuminate that causality is equivocal for mental health risk. Although in a strict sense the DCS model was not supported, the associations found and accumulated evidence point to its continued consideration. It would be fruitful for future theorising to clarify the significance of the emergent robust demand main effect, inconsistent control main effect and lack of reliable evidence for the social support and iso-strain effect, particularly longitudinally. It might also be constructive to revisit the conceptualisation of support and thus iso-strain to clarify whether the experience of low levels of active support or isolation is the key stress-inducing property and whether these terms represent equivalent or distinct phenomenon. The varied results according to subscales, clinical endpoints and exposure duration, also call for greater theoretical guidance about the conditions under which the DC/S model might best predict health risk. These gaps could be informed by further theorising within the DC/S model as well as other frameworks. An original contribution of the thesis was the pursuit of further theoretical clarity on DC/S model processes through the adjunct evaluation of the social identity approach (SIA) to stress and wellbeing in the workplace.

Contribution of the SIA to the DC/S model. The consideration of the social identity approach to stress and wellbeing in the workplace extended thinking about the processes through which occupational stressors may arise and affect health risk. The general notion introduced was that employees' psychological connection to their workgroup members shape their experience of the occupational environment and its capacity to affect health risk (Haslam et al., 2004; Haslam & van Dick, 2011; van Dick & Haslam, 2012). The SIA stimulated thought and exploration of whether social identification may be the key stressor of the psychosocial occupational environment. Following the biopsychosocial view of health and evidence for the demand main effect, it was concluded that SI may be a critical rather than essential element to health risk.

More pertinent to this thesis, the SIA enhanced DCS model expectations about the main effect of support. The argument was introduced that workplace support would be endorsed and effective to the extent that employees identified with the support provider (Chapter 5). In other

words, this approach introduced the notion that employees perceive and interpret instances of social interaction as supportive to the extent that the support provider is considered to be a part of their social identity. The SIA corroborated Karasek and Theorell's (1990) speculation that support may reflect social cohesion and a positive sense of identity although provided a more comprehensive formulation of processes underlying social relations (Haslam, 2004; Haslam & van Dick, 2011; van Dick & Haslam, 2012; Tajfel & Turner, 1979; Turner et al., 1994).

The thesis in turn utilised the framework to develop the idea that social identification could through similar mechanisms influence predictions for workplace control (Chapter 6). The novel argument was put forward that decision latitude, and its components of skill discretion and decision authority, were a function of social identification. Specifically, a positive relationship between social identification and decision latitude was expected such that low identification with workgroup members would lead to low decision latitude and that high identification would conversely facilitate high decision latitude. In turn social workplace identification was expected to respectively disable or enable that control to influence employees' wellbeing.

The opinion about the underlying process was developed further given the conceptual similarity viewed between the concept of decision authority and the social justice notion of 'voice'. Following the well-established idea that the provision of 'voice' or input underscores positive interpersonal experiences (Tyler & Lind, 1992), maintains identification (Tyler & Blader, 2003), reduces uncertainty (van den Bos & Lind, 2002), and meets expectations about just or moral treatment (Folger & Cropanzano, 2001), it was considered that such non-instrumental processes may also explain the subsequent protective effect of input over work tasks (decision authority) on health risk. These ideas were subsequently generalised to the processes underlying skill discretion and decision latitude as a more general concept.

Recommendations for Further Theoretical Development of the SIA in OS Research

While not the focus of the current thesis, theorising about social identification could be extended to the demands dimension of the DC/S model. The claim that group memberships shape the experience of occupational stressors (van Dick & Haslam, 2012) could plausibly include the shaping of psychological demands in the workplace. In support of this idea, Haslam and colleagues' (2005) data showed that employees' identification with their occupational group

(bar staff or bomb disposal workers) linked to their perception of the ‘stressfulness’ of their own and other group’s occupational roles. Ratings of the ‘perceived stressfulness’ of the work; a measure that was generated for the study, may be compatible with the notion of psychosocial work demands. Of note, the current studies revealed a non-significant association between workplace demands and social identification and so this association may be more complex than a simple positive linear relationship. Accordingly, future research on this stressor might best proceed by considering other important features of social identification such as norms, salience and fit (Turner et al., 1994). This recommendation would also be relevant for the development of knowledge about social identification processes in workplace control and support as well as the complete DC/S model of stress and productivity.

Insight into the mechanisms through which social identification may influence OS could also be enhanced with the associated consideration of the social identity approach to leadership (Haslam, Reicher, & Platow, 2011; Hogg, 2001; Turner & Haslam, 2001; van Knippenberg & Hogg, 2003). In brief, this perspective articulates that leaders have the capacity to influence followers as they embody, create, maintain and advance the group identity (see Steffens et al., 2014). While influence has typically been discussed in terms of attitudes and behaviours, the evidence presented here of a positive association between workgroup identification and occupational stressors and strains could support the theoretical extension of influence to directly include stress outcomes. This perspective could generate hypotheses about whether supervisors may be uniquely positioned to provide support and influence health due to their perceived role as representatives of the group for example or whether colleague support may occur as certain co-workers embody leadership qualities that facilitate influence. These considerations highlight the crucial place of theory in advancing knowledge about seemingly intuitive relationships.

In fact, the SIA is viewed to have great potential to extend the conceptualisation of OS more broadly. The SIA could be applied to enhance predictions of other frameworks such as the Effort-Reward Imbalance model (Siegrist, 1996), Demands-Resources model (Bakker & Demerouti, 2007) or Hobfoll’s Conservation of Resources theory (Hobfoll, 1989; Hobfoll & Shirom, 2001). For example, social identification may determine the access to and effect of resources or rewards such as recognition and in turn reduced health risk. The approach also appears compatible with the ERI model’s underlying view of work as contributing to an

individual's sense of belonging to a social network, social identity, and through these purported resources, regulation of self-esteem and self-efficacy (Siegrist, 1996, 1998). The study of group processes might also provide a broader account of specific stressors such as workplace bullying, for which associations are now being noted (Escartin, Ullrich, Zapf, Schlüter, & van Dick, 2013).

In the related area of workplace interventions, a key process identified of successful programs is the insight gathered by employees about shared experiences which in turn has been speculated to have facilitated support among colleagues, group cohesion and joint efforts to change working conditions, among other things (Arnenson & Ekberg, 2005). Clearly, the direct consideration of SIA within OS intervention research could provide an empirical lens for guiding and interpreting such effects. These various ideas could also be synthesised into the recent unifying psychosocial safety climate framework (Dollard & McTernan, 2011) where risks and resources are understood within the context of the workplace's climate of psychological health and safety. In sum, the initial theorising and preliminary data on social identification in the experience of control and support at work lays groundwork for future research to more coherently integrate the SIA within the traditional OS space.

Contribution to and Recommendations for Future Research on the SIA

The dual examination of the DCS model and SIA facilitated several theoretical contributions to the SIA. First, the explicit expectation that social identification would increase workplace support through both emotional and instrumental means was notable as workplace support has typically been considered in generic or instrumental forms (van Dick & Haslam, 2012, see also Chapter 5). This account contributed an enhanced view of the facilitative role of social identification in various facets of social support (emotional and instrumental and supervisory and collegial forms) and subsequent health outcomes.

The development of hypotheses about the influence of social identification in decision latitude and subsequent health risk was a prominent contribution not just to DC/S model theorising but also to the SIA. To add here, the predictions extended the relevance of social identification to further occupational and health phenomenon. Importantly, the ideas derived from a sound theoretical base. To recap, even though the predictions were a direct extension of the expectations for workplace support, they were also considered consistent with the underlying

theory on primary and secondary appraisal processes (Lazarus & Folkman, 1984), socially-informed appraisals (Haslam, 2004) and stress in the occupational environment (van Dick & Haslam, 2012). The link between social identification and the specific components of control; decision authority and skill discretion, were also respectively grounded in the well-developed ideas on voice (see Tyler & Blader, 2003) and available evidence on performance (Stone et al., 1997, Stone et al, 1999; Stone, 2002). However, the contended perspective emphasised the function of social identification as an antecedent of objective and experienced instances of control as opposed to a consequence of related concepts. Also, the lack of clear support for the proposed relationship between social identification and skill discretion calls for further contemplation about why social identification may affect some stress processes and not others.

A further contribution to the SIA to stress and wellbeing was the explicit proposition of reciprocal relations between social workplace identification, occupational stressors and health risk (Chapter 8). While the idea of reciprocal relations between occupational stressors, organisational identification, and emotional health is not new (Wegge et al., 2012), the discussion provided a basis for understanding the specific proposition of reciprocal associations between the characteristics of workplace control and support, workgroup identification and mental health. The idea was advanced further with the discussion of specific mechanisms through which reversed associations might occur. This encompassed vulnerability factors associated with mental illness specifically (Cruwys et al., 2014a; Sacco, 1999; Wegge et al., 2012), general perceptual biases (de Lange et al., 2004; Zapf et al., 1996), and a ‘spiral’ of loss (Hobfoll, 1989, 2001). This discourse was considered an advance to the simple acknowledgment that reversed associations were a limitation to the interpretation of results.

The lack of prospective support for either direction of association between social identification and mental ill-health could be better understood with theoretical clarity about the expected causal process. This work recognised that unlike the DC/S model, the SIA to stress and wellbeing did not appear to emphasise stressor chronicity in its conceptualisation (van Dick & Haslam, 2012). It was speculated that perhaps only a brief exposure to low identification might be sufficient or even necessary to elevate health risk (Chapter 5) or that reversed effects, should they exist, may not be enduring (Chapter 9). These theoretical notions offered a means to explain both the non-significant results obtained after six months and one year and the available evidence

which showed support after relatively brief periods of exposure of weeks (e.g., Reicher & Haslam, 2006) and months (e.g., Haslam et al., 2009).

The idea was also entertained that the mechanism of influence may not necessarily weight on stressor chronicity rather on contextual processes such as perceiver readiness, comparative and normative fit and permeability of group boundaries (Turner et al., 1994). Chronic exposure to low social identification may nonetheless be a plausible mechanism for health risk: as while the SIA views social identity as dynamic, stability may also result when the context, in this instance the psychosocial occupational environment, is also stable (Turner et al., 1994). Accordingly, the position on stressor chronicity may be a worthwhile theoretical parameter to define within the SIA to stress and wellbeing in the workplace.

The research also provoked thought about the hypothesis that social identification is particularly significant in the health risk of depression (Cruwys et al., 2014a). On the one hand, the contemporaneous correlations between workgroup identification and mental health indices supported this notion (Study 2, Study 3). At the same time, the similar magnitude of association for the indirect relationship via support and control raised the idea that while social identification may especially instigate the direct risk of depression it might be equivalently implicated in precursors to general health risk. Future research might wish to investigate this synthesis of predictions among wider domains of stress and health outcomes with the view of advancing inferences about the shared and unique factors in health risk.

The research raised recommendations for theoretical development on a range of other associated matters. The exploratory analysis of the Leach et al (2008) scale suggests that the SIA could be enhanced with consideration as to whether particular dimensions of social identification are particularly relevant at various points in the occupational stress process. As specific hypotheses were not developed for this thesis, direct contemplation about such relationships could deepen the understanding of key processes and ignite further enquiry. For example, it might be interesting to evaluate whether particular dimensions of identification, such as ‘centrality’, may be more detrimental to stress than others, such as ‘solidarity’. The acknowledged potential detriment of high or over-identification (Avanzi et al., 2012; Wegge et al., 2011) calls for its explicit integration within the SIA to stress and wellbeing. Expectations

about the risks and facilitative properties of high social identification in (occupational) stress could also be developed through attention to the content of identities (Jetten, Haslam, Haslam, Dingle, & Jones, 2014).

A final benefit may be to present clear expectations about the function of social identification in strain and wellbeing. To explain, the review of evidence (Chapter 5, Chapter 6) revealed that social identification was studied in various capacities; as a mediator (Bizumic et al., 2009), mediated variable (Haslam et al., 2005), moderator (Frisch et al., 2014; Haslam et al., 2004; Häusser et al., 2012; Jimmieson et al., 2010), main effect (Escartin et al., 2013), including as superior to actual acts of social support (Sani et al., 2012), curvilinear (Avanzi et al., 2012) and as a dependent variable (Wegge et al., 2011). While perhaps a tedious point, clarity about the key expected role(s) of social identification in the stress process would aid the synthesis of accumulating knowledge and the direction of future fruitful enquiry.

Contribution to Methodology

Measurement of Constructs. As highlighted above, the use of the Leach et al (2008) multi-dimensional measure of social identification facilitated novel information about OS and mental health. To add here, the predictive validity of the scale was extended to well-established measures of occupational stressors (JCQ, Karasek et al., 1988) and mental ill-health (DASS21, Lovibond & Lovibond, 1995a). Also, the factor structure of self-investment suggested that the concept of centrality might be a somewhat more distinct concept than that of satisfaction and solidarity. The continued reporting on psychometrics would advance knowledge about the construct of social identification and its function in occupational stress.

The discussion too on the psychometrics of the Job Content Questionnaire highlighted a consistently higher than expected (good versus poor) reliability of the demands subscale (Karasek et al., 1998). This suggested that compared to international norms demands was construed as a more homogenous construct among the employees sampled. The significance of this finding would be aided by enquiry about the performance of the measure in further samples of (Australian) public service and university employees. The use of an alternate rating scale might also advance the assessment of stressors given the critique that the JCQ captures the subjective opinion about objective demands (Sanne et al., 2005).

The evaluation of the decision latitude and social support subscales permitted a clearer assessment of the propositions of the DC/S model and SIA. The finding that decision latitude and social support consistently linked to depression ratings while the significance of subscales varied raises the importance of considering the extent to which power may explain the robustness of relationships, or lack thereof. The links with social identification demonstrated that the relationship might best be captured using the complete construct of decision latitude and separate consideration of supervisory and collegial support. These findings highlight the insight afforded by treating the subscales as independent constructs and the opportunity for methodology to guide theory building.

The research also provided important data about the Depression Anxiety and Stress Scale-Short form (DASS21) in research and clinical practice. The three empirical studies add to Crawford and colleagues' (2011) data for the Australian adult general population which was underrepresented by participants with university education. The data confirmed the negligible association of the DASS21 with education, age and gender, which was notable as the norms proposed by Lovibond and Lovibond (1995b) derived from a more restricted population of first-year undergraduate students.

The contribution of psychometric data on the DASS21 among the Australian adult working population complemented earlier work that accepted the use of the DASS21 in a Dutch occupational sample absent from work following the diagnosis of work-related mental health concerns (Nieuwenhuijsen et al., 2003). Although the DASS21 is routinely used in Australian clinical practice (Crawford et al., 2011) and specifically in occupational stress management (WorkCover New South Wales & Australian Psychological Society, 2013) it had not previously been used on Australian employees to track OS-related depression as defined by the DCS model and SIA. The data could subsequently contribute toward the development of normative benchmarks on OS and depression which could aid in its prediction and interpretation.

The data also led to a call for caution around claims about the correspondence between DASS21 ratings and clinical disorders following the consistent observation of absent gender differences. Surprisingly, Lovibond and Lovibond (1995a, 1995b) did not discuss this point nor did other studies reporting on the psychometrics of the instrument (Henry & Crawford, 2005;

Nieuwenhuijsen et al., 2003; Sinclair et al., 2012). This outcome was considered striking given the fact that depressive and anxiety conditions are more prevalent among females than males (APA, 2013). The consideration was subsequently put forward that gender differences perhaps may not exist for certain cognitive symptoms of depression or physiological forms of anxiety captured by the DASS. For the key outcome of depression, it would be interesting to determine in a single study whether the inclusion of an additional measure such as the CES-D or BDI-II would shed light about gender differences across a wider range of symptoms. While this might lead to an overload of questions about depression, which could be managed with a multi-wave assessment, employing additional well-selected instruments could also extend knowledge about the DASS21 and more fundamentally about gender differences in mood disorders and occupational stress.

In addition to gender differences, the use of the DASS21 facilitated more detailed considerations about the relationship between occupational stressors and mental health. In particular, the non-significant contemporaneous association between ratings of demands and depression in three independent samples raised that high demands might not directly correspond to the concomitant experience of cognitive dimensions of depression, such as worthlessness or poor future outlook, but might instead be expressed through simultaneous physiological signs of distress, as captured by the stress and anxiety dimensions. As far as known, this idea has not been raised as the majority of rating scales employed in OS research such as the BDI, CES-D and HADS include items such as sleep and appetite disturbance that overlap across a range of mental health conditions. The continued use of the DASS21 in OS research would support effort to conduct a more differentiated assessment of mental health.

Statistical techniques. The use of Tobit regression (Study 1) directly factored the non-normal distribution of depression and was a novel method introduced into this research area. Depression was more normally distributed in the longitudinal studies and so structural equations modeling was considered appropriate and even superior to the largely correlational or regression based analyses performed in the referenced SIA research. Nonetheless, the consideration of alternate statistical software such as MPlus could support the management of non-normal data for the commonly studied mental health outcomes of depression and anxiety, especially as the latter was highly skewed.

A subsequent recommendation would be to analyse variance and not just mean scores using the beta rather than normal distribution. To explain, Smithson and Verkuilen (2006) showed that higher ratings of DASS21 Stress were associated with increased variability in Anxiety ratings. This was interpreted to reflect the greater likelihood that stress ratings would be high when anxiety symptoms were highly endorsed compared to the likelihood that anxiety ratings would be high upon elevated stress ratings, owing to the supposed greater variability in stress responses. As heteroscedasticity was also observed in this series of studies, mechanisms of OS risk could be elucidated further through the direct examination of such phenomenon. For example, it might be the case that employees endorsing high levels of depressive symptoms may be more likely to experience high demands than it is for employees reporting high demands to necessarily experience high depression levels. The idea that demands are more predictive of depression at higher rather than lower levels of depression may also explain the non-significant results in samples with the limited inclusion of depressed cases. Thus the analysis of variance particularly in studies with small sample sizes could concretely inform about the inconsistency in support for hypotheses.

Formulation of hypotheses. This research also raised that differing formulations of the DC/S model hypotheses can lead to different conclusions. Specifically, the review (Chapter 3) revealed that support for the strain and iso-strain hypothesis in depression risk was more likely in studies employing the quadrant approach compared to studies that evaluated the main effects model, especially for iso-strain. For studies employing the quadrant approach this illuminated the risk of masking main effects. It also cast doubt about the actual support of each independent effect as well as the necessity of joint effects in elevating health risk. The attention to these methodological points was an important contribution to the assessment of the key premise of the DC/S model.

The awareness of this anomaly was timely as the quadrant approach has only recently gained popular use in the evaluation of depression particularly for the iso-strain hypothesis (Häusser et al., 2010; Van der Doef & Maes, 1999). The assessment of independent main effects in addition to or instead of the quadrant formulation would also support accurate claims about the manner in which occupational stressors exert an effect of health risk. Specifically, it remains to be conclusively determined whether the joint effects of strain and iso-strain outperform a

single main effect or main effects alone. By contrast, continued research on joint effects as represented by the buffer hypothesis or interaction effect do not appear fruitful following the non-significant result in Study 1 and literature review that revealed a largely non-supportive effect in health risk (Chapter 3). However a potentially informative area to examine may be the buffering capacity of social identification on occupational stressors and health risk following supportive results in other domains of stress research (Haslam et al., 2004; Häusser, Kattenstroth, van Dick, & Mojzisch, 2012; Platow et al., 2007).

Adjustments. The review of Chapter 3 highlighted the lack of consensus around relevant adjustments in the study of depression. The following categories were put forward as a means to classify the variety of covariates examined: a) depression history or psychological vulnerability; b) demographics; c) health, and; d) workplace factors. These categories could be used to catalogue the effects of various risk factors. This classification may further aid the interpretation of results and in turn inform consensus about the adjustments necessary to support conclusiveness about the direct impact of occupational stress in depression risk.

The consideration of adjustments in the evaluation of the SIA to stress and wellbeing was itself considered an advance in assessment. Specifically, the contemporaneous positive association between social identification and mental health ratings that remained beyond the adjustment for psychological vulnerability via NA (Study 2, Study 3) and the link between social identification and prospective control and support ratings beyond the effect of NA and auto-correlations (Study 3), strengthened causal claims and added substantial weight to the interpretation of largely unadjusted cross-sectional data. These contributions, the latter in particular, was conducted with a level of methodological rigour that matched classic OS studies, leading to strengthened persuasion about the relevance of social identification in occupational stress. Accordingly, it is strongly recommended that future investigations of the SIA in stress and wellbeing at work adjust for personality and health risk factors.

Prospective design. The prospective design (Study 2, Study 3) enabled a superior assessment of the DCS model and SIA compared to the reviewed cross-sectional analyses. The classic call for further causal testing through longitudinal analyses is reinforced here. This recommendation is considered especially important for advancing knowledge about the SIA in

OS as direct evaluations of causal effects, particularly in the context of chronic exposure, remain largely uncharted. Multi-wave assessments could also support the continued evaluation of OS. Building from the current research, it would be of interest to examine both short and longer time lags potentially again at six months, one year and after several years. This might assist in clarifying the duration of stressor exposure necessary to translate into health risk which would advance theory as well as offer practical guidance for the preventative management of OS. Given the high mental health auto-correlations in Study 2 and Study 3 a multi-wave assessment could shed light on factors that affect earlier levels of clinical disturbance. In fact a multi-wave design was conducted in Study 2 however poor sample retention rendered the analysis unfeasible.

Web-based data collection. As one of the first known web-based studies on this topic, a number of challenges were revealed that could aid further enquiries conducted online. The discussion in the empirical studies is extended here through a number of recommendations. First, in order to ascertain the reliability and validity of online measures, the relative equivalence between online and pen-and-paper versions of the utilised measures is advised. Second, the pursuit of direct knowledge about the nature and extent of bias in online recruitment methods is suggested. Also, as natural conditions can vary between workstations and worksites the comparison of results to that determined in the traditional test environment of take-home surveys or assigned sessions to hand-complete surveys would aid in clarifying the extent and nature of any such bias. This study also revealed an over-representation of supervisors and so it would be informative to determine whether online surveys in this context tend to attract particular groups.

The low response rate particularly for the follow-up survey raised curiosity about whether the online method may have affected participation. Views about confidentiality may be worthwhile exploring. Another specific consideration would be to clarify the extent to which the fair match rate of the Yurek et al (2008) scale could be attributed to its novel use in online occupational stress research. The results suggest that future surveys consider revisions to the tool or additional or alternate techniques to support data matching and participant retention in the online occupational environment. In sum, to effectively invest in research within the contemporary occupational environment, direct enquiry into the web-based collection of OS data is suggested in order to guide the selection of optimal instruments, testing conditions and recruitment and retention methods.

Sample. The reporting of sample characteristics showed that on the whole, neither individual nor occupational demographics affected representation in the follow-up sample. This raises a hypothesis of whether previously identified factors associated with reduced participation in surveys or employment such as mental ill-health, demographic or occupational features may be less likely to affect survey engagement at six months to one year compared to extended periods such as ten years (see Stansfeld et al., 2012). To gain clarity on this methodological nuance, future investigations may wish to report on the composition of follow-up respondents.

To ensure sufficient power to detect effects, research with larger samples is encouraged. This classic recommendation was recognised as no easy feat. To highlight, only a relatively small initial and follow-up sample was obtained despite a very large sample pool and the use of either a standardised approach of contacting all APS workplaces (Study 2) or the more personalised approach of inviting employees to participate via a representative of the workplace (Study 3). The present research facilitated an appreciation of the wider and more complex socio-cultural system in which design elements such as sample recruitment and retention are embedded. Future research efforts, while ideally to be carried out among general population samples, may be best responded to as part of a wider OS management strategy and generalised accordingly.

Contribution to Practice

This research presents a number of evidence-based recommendations for primary, secondary and tertiary interventions that are aimed at managing depression in the workplace.

Primary intervention. The strongest recommendation supported by theory (DC/S model; Karasek, 1979; Karasek & Theorell, 1990), the accumulated evidence (Chapter 3) and generated evidence (Study 2) is for manageable job demands to be structured into the design of work. Given that prospective associations were determined after one year (Study 2) but not six months (Study 3) job designs that incorporate chronic exposure to high demands in excess of six months may be considered a direct risk to depression. This latter proposal is nonetheless tentative given its base in the generated evidence only. This information would be highly relevant to stakeholders concerned with; the design of healthy occupational environments, associated policy and the legislation and regulation of occupational psychosocial risk factors.

The discourse on social identification (Chapter 5, 6) and associations with mental ill-health and workplace control and support (Study 2, Study 3) drew into spotlight the provocative idea that low workplace identification is a psychosocial risk factor. Accordingly, workplace identification could be addressed as part of a wider risk management strategy that involves the identification, assessment and management of cultural or interpersonal hazards (Cox, 1993; Leka & Jain, 2010). For example, the salience or level of social identification at work might be used to gauge an early warning sign or risk indicator for OS management. As this implication necessitates deliberation, the data at present could be used for psycho-education. For example, organisations with an interest in healthy and productive work design may benefit from knowledge that employees' existing social identification with their workplace can predict their experience of the well-recognised occupational stressors of low support and control as well as concurrent strain.

While it is also premature to indicate social identification interventions to reduce the incidence of occupational stress, employees' psychological connection with their immediate workgroup might be considered as a potential resource to draw upon to maximise protection from health risk. The ramifications of this simple suggestion are huge as it suggests that occupational stress prevention might be achieved by drawing on the resources and influence of groups as opposed to targeting individuals in isolation. Separately, it also suggests that classic recommendations for greater workplace support are not merely about encouraging 'genuine' supportive interactions (Johnson & Hall, 1998; Karasek & Theorell, 1990) or increasing the physical proximity between employees or objective instances of support but rather concern the development of conditions that support employees' psychological connection to their workgroups (Jetten et al., 2014). Furthermore, the finding that links between social identification and support and control were more robust at six than 12 months could suggest that influence could be expected to occur within shorter time frames. This idea is merely speculative with the chief intent to raise the potential practical significance of these results.

Together with the strong theoretical backing of the SIA, the associations also suggest that existing primary interventions could be enhanced with the perspective that employees' psychological group membership with others at work is a crucial precursor to address. This is considered particularly important as organisational interventions, while sound in theory, are not

reliably effective in their desired effects on mental health (Bhui, Dinos, Stansfeld & White, 2012; LaMontagne et al., 2007). In addition, given that primary interventions are rarely directed at all components of a theoretical framework, social identification could appeal as a practical target of early intervention with expected flow-on effects to stressors and strain. The management of depression could particularly advance with the social identity approach given initial theorising (Cruwys et al., 2014a) and the stronger associations found among the strain correlates.

The relationship between workplace identification and depression is notable too as it suggests that the burden of disability due to depression may also be accounted for by poor social identification at work. This point could be used to elevate the business case for addressing social identification and depression in the workplace at a primary level, particularly as the financial burden of depression is estimated to largely derive from work-related impacts (WHO, 2008). Finally, the review and empirical studies revealed that despite theorising and popular discourse, the studied occupational stressors were not universal in predicting employees' health risk. Accordingly, these primary level implications are to be considered in light of the relevance to individualised workplace evaluations of OS.

Secondary intervention. The discussion about alternate explanations for the association between occupational stressors and strain (Chapter 8) and evidence gathered (Study 3) also shape ideas to support at-risk groups for depression. The simple negative association between depression and subsequent decision authority and supervisor support ratings suggest additional thought about the design and expectations of primary interventions. For example, employees' capacity to perceive or enact authority over work tasks may be affected by background distress and so additional or alternate means to support efficacy in the workplace could be considered. Similarly, the recommendation for employees to be offered more support may not suffice as the capacity to receive the resource may be affected by general, sub-clinical or clinical distress.

The results also challenge thinking about whether the supervisor is the most appropriate representative to influence wellbeing with already distressed or at-risk employees. Accordingly, a close assessment of the at-risk employees' support structure and functioning would be indicated. This could include employees' identification with support providers, their experience of objective instances of support as well as others' response to the at-risk employee. It is

acknowledged that the suggestions for secondary interventions were supported only by crude associations. However, in the context of the literature reviewed and best practice guidelines which include a response to individual factors (La Montagne et al., 2014; Leka, Jain, Cox, & Kortum, 2011) these ideas are regarded as worthwhile reflections.

Tertiary intervention. This research attracts immediate implications for the assessment of OS among employees, particularly within the Australian workforce. As the DASS21 is routinely used in Australian clinical practice (Crawford et al., 2011) including in the direct assessment of OS-related complaints and claims (WorkCover New South Wales & Australian Psychological Society, 2013), practitioners may benefit from knowledge about the association with common occupational stressors. To elaborate, clients' ratings of high depression may indicate further evaluation of and attendance to: the ability to have input into workload (decision authority), skill use, the opportunities for professional development (skill discretion), relationships with co-workers and the supervisor (support) and the types of workgroup memberships (social identification) especially affective ties (self-investment component). A history of job demand levels for at least one year would also be indicated for high current ratings of depression.

A particularly innovative approach to clinical assessment and treatment would be to use expressions of (low) social identification to probe further about occupational experiences such as control and support. Caution about the validity of self-report however would be indicated especially given the crude negative association between depression and prospective supervisor support and decision authority ratings, although this information could also encourage the generation and exploration of hypotheses about such associations. These assessments could ultimately inform therapeutic goals and recommendations to third party providers.

The empirical evidence could also inform other costly avenues of rehabilitation. The finding that job demands were associated with depression risk after 12 and not six months could have direct implications for the acceptance of compensation claims that involve short exposure durations. The research separately raises that social identification may be a plausible means to influence key factors implicated in successful return to work programs, such as workplace support and control (Plaisier et al., 2012). This idea is an important extrapolation given that return-to-work initiatives are a major focus of rehabilitation (Leka et al., 2011; WorkCover New

South Wales & Australian Psychological Society, 2013). These suggestions of course await direct research to substantiate their transfer into practice.

Contribution to Philosophy

The practical recommendations offered are clarified here in light of their philosophical considerations. The standpoint is reiterated particularly for tertiary interventions that the approach adopted weights toward the achievement of an optimal occupational environment as opposed to the adaptation to stressful conditions. An illustrative point wished to be raised is that the results of this research viewed in light of this philosophical framework have shaped the author's own clinical practice. To explain, while in a tertiary intervention setting the approach has where relevant broadened a traditional focus on clients' personality and cognitive biases to the engagement of clients with their workplace systems to attain change to their occupational environment. For example, goals included gaining clarity about task priorities (work demands), negotiating task type (decision authority) in order to exercise skills (skill discretion), the maintenance of a comfortable level of integration with work colleagues and a workable relation with the supervisor or another trusted leader. The adopted tertiary management of OS, in terms of its conceptualisation, the feedback given to clients and referrers, types of interventions and markers of progress, illustrate the practical implications that may follow from the philosophical and empirically supported view of OS that derives from socio-cultural factors (Karasek & Theorell, 1990; van Dick & Haslam, 2012).

With the introduction of the social identity approach to the realm of OS the position on stressor origin is worth underscoring. To elaborate, the convincing link drawn between social identification and control and support ratings may be too easily construed as directing efforts towards the change of employees' perceptions. Therefore, the philosophical stance of the social identity approach to stress and wellbeing in the workplace (Haslam & van Dick, 2011; van Dick & Haslam, 2012) has been discussed to ensure that top-down efforts of enriching social identity and interpersonal experiences are not disregarded in favour of managing employee perceptions.

A notable contribution to the socio-structural view of OS and its management derived from the development of predictions for workplace control. Social identification interventions were clarified as supporting employees' experience of healthy occupational conditions as

opposed to the suggested modification of perceptions of fair conditions or procedures. This caution arose from the evidence base on voice and fairness that holds that “what ultimately matters for fairness judgments is not the objective level of outcomes or the objective characteristics of procedures, but instead the subjective evaluations of the variables that underlie fairness judgments” (p. 958, Lind et al., 1990). Thus while this prediction was developed in part from the lens of procedural fairness and contributes to the philosophical view of control as reflecting interpersonal processes, the philosophical standpoint in the introduced OS context was emphasised as supporting the creation of “viable, fulfilling, and sustainable groups that provide members with the psychological and material resources to manage stress effectively and appropriately” (p.345, Haslam & van Dick, 2011; see also Haslam et al., 2003).

It is recognised that this view and the resultant practical recommendations are not simple to actualise, embedded as they are within broader politics (Haslam, 2004; Jetten et al., 2014; Karasek & Theorell, 1990; Reicher et al., 2005). Nonetheless, the discussion on philosophy was merited as important to guide future research and intervention efforts that at least protect against misguided interpretations that may follow from the generated results.

Conclusion

This research endeavoured to understand and advance knowledge about occupational stress and depression particularly within Australia. The dual study of the demand-control-support model and social identity approach to stress and wellbeing in the workplace facilitated unique insights into occupational stress. The prospective evidence for high demands in depression risk after one year and social identification and control and support after six months supports future investment in reaching conclusiveness about these processes. The empirical reviews, findings and discussions, raised interest in the potential for social identification to expand the understanding of OS and invigorate its management. The more tedious points on methodology, theory and philosophy, served to direct research toward the formation of a sound empirical base from which to inform the management of occupational stress. It is with hope that this thesis served as one such contribution.

References

- Abramson, L. Y., Seligman, M. E., & Teasdale, J. D. (1978). Learned helplessness in humans: critique and reformulation. *Journal of Abnormal Psychology*, 87(1), 49-74. doi: 10.1037/0021-843X.87.1.49
- AbuAlRub, R. F. (2004). Job stress, job performance, and social support among hospital nurses. *Journal of Nursing Scholarship*, 36(1), 73-78. doi:10.1111/j.1547-5069.2004.04016.x
- Ahola, K., & Hakanen, J. (2007). Job strain, burnout, and depressive symptoms: a prospective study among dentists. *Journal of Affective Disorders*, 104(1), 103-110. doi: 10.1016/j.jad.2007.03.004
- Allen, T. D., Herst, D. E., Bruck, C. S., & Sutton, M. (2000). Consequences associated with work-to-family conflict: a review and agenda for future research. *Journal of Occupational Health Psychology*, 5(2), 278-308. doi: 10.1037//1076-8998.5.2.278
- Alonso, J., Angermeyer, M. C., Bernert, S., Bruffaerts, R., Brugha, T. S., Bryson, H., ... & Haro, J. M. (2004). Prevalence of mental disorders in Europe: results from the European Study of the Epidemiology of Mental Disorders (ESEMeD) project. *Acta Psychiatrica Scandinavica*, 109(s420), 21-27. doi:10.1111/j.1600-0047.2004.00327.x
- Amato, P. R. (2001). Children of divorce in the 1990s: an update of the Amato and Keith (1991) meta-analysis. *Journal of Family Psychology*, 15(3), 355-370. doi: 10.1037/0893-3200.15.3.355
- American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). Washington, DC: Author.
- Andel, R., Crowe, M., Hahn, E. A., Mortimer, J. A., Pedersen, N. L., Fratiglioni, L., ... & Gatz, M. (2012). Work-related stress may increase the risk of vascular dementia. *Journal of the American Geriatrics Society*, 60(1), 60-67. doi:10.1111/j.1532-5415.2011.03777.x
- Andersen, I., Thielen, K., Nygaard, E., & Diderichsen, F. (2009). Social inequality in the prevalence of depressive disorders. *Journal of Epidemiology and Community Health*, 63(7), 575-581. doi: 10.1136/jech.2008.082719

Anderson, R. J., Freedland, K. E., Clouse, R. E., & Lustman, P. J. (2001). The prevalence of comorbid depression in adults with diabetes a meta-analysis. *Diabetes Care*, 24(6), 1069-1078. doi: 10.2337/diacare.24.6.1069

Andrea, H., Bültmann, U., van Amelsvoort, L. G., & Kant, Y. (2009). The incidence of anxiety and depression among employees- the role of psychosocial work characteristics. *Depression and Anxiety*, 26(11), 1040-1048. doi:10.1002/da.20516

Andrews, G., Brugha, T., Thase, M. E., Duffy, F. F., Rucci, P., & Slade, T. (2007). Dimensionality and the category of major depressive episode. *International Journal of Methods in Psychiatric Research*, 16(S1), S41-S51. doi: 10.1002/mpr.216

Antonovsky, A. (1991). The structural sources of salutogenic strengths. In C.L. Cooper and R. Payne (Eds.), *Personality and Stress: Individual differences in the stress process* (pp. 67-104). Oxford, England: John Wiley & Sons.

Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment*, 10 (2), 176-181. doi:10.1037/1040-3590.10.2.176

Arneson, H., & Ekberg, K. (2005). Evaluation of empowerment processes in a workplace health promotion intervention based on learning in Sweden. *Health Promotion International*, 20(4), 351-359. doi: 10.1093/heapro/dai023

Aronsson, G., & Gustafsson, K. (2005). Sickness absenteeism: prevalence, attendance pressure factors, and an outline of a model for research. *Journal of Occupational and Environmental Medicine*, 47(9), 958-966. doi: 10.1097/01.jom.0000177219.75677.17

Ashforth, B. E., & Johnson, S. A. (2001). Which hat to wear? The relative salience of multiple identities in organizational contexts. In M. A. Hogg & D. J. Terry (Eds.), *Social identity processes in organizational contexts* (pp. 31-48). Philadelphia: Psychology Press.

Ashforth, B. E., & Mael, F. A. (1998). The power of resistance: sustaining valued identities. In R.M. Kramer & M.A. Neele (Eds.), *Power and Influence in Organizations* (pp.89-119). Thousand Oaks, CA: Sage.

Ashforth, B. E., & Mael, F. (1989). Social identity theory and the organization. *Academy of Management Review*, 14(1), 20-39. doi: 10.1097/01.jom.0000177219.75677.17

Ashforth, B. E., Harrison, S. H., & Corley, K. G. (2008). Identification in organizations: an examination of four fundamental questions. *Journal of Management*, 34(3), 325-374. doi:10.1177/0149206308316059

Austin, P. C., Escobar, M., & Kopec, J. A. (2000). The use of the tobit model for analyzing measures of health status. *Quality of Life Research*, 9(8), 901-910. doi: 10.1023/A:1008938326604

Australian Bureau of Statistics. (2008). National survey of mental health and wellbeing: summary of results, 2007 (Report No. 4326.0). Retrieved from the Australian Bureau of Statistics website [http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/6AE6DA447F985FC2CA2574EA00122BD6/\\$File/43260_2007.pdf](http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/6AE6DA447F985FC2CA2574EA00122BD6/$File/43260_2007.pdf)

Australian Bureau of Statistics. (2009). *ANZSCO- Australian and New Zealand Standard Classification of Occupations* (Report No. 1220.0). Retrieved from the Australian Bureau of Statistics website <http://www.abs.gov.au/ANZSCO>

Australian Bureau of Statistics. (2010). Australian Labour Market Statistics, Trends in Hours Worked (Report No. 6105.0). Retrieved from the Australian Bureau of Statistics website <http://www.abs.gov.au/ausstats/abs@.nsf/featurearticlesbytitle/67AB5016DD143FA6CA2578680014A9D9?OpenDocument>

Australian Bureau of Statistics. (2011). Work and health (Report No. 4102.0 Australian Social Trends). Retrieved from the Australian Bureau of Statistics website [http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/027334AFFAAA92AECA257960000D5FE7/\\$File/41020_workandhealth_jun2011.pdf](http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/027334AFFAAA92AECA257960000D5FE7/$File/41020_workandhealth_jun2011.pdf)

Australian Bureau of Statistics. (2013). Heart disease (Report No. 4338.0 Profiles of Health, Australia 2011-2013). Retrieved from the Australian Bureau of Statistics website <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4338.0~2011-13~Main%20Features~Heart%20disease~10005>

Australian Bureau of Statistics. (2016). *Labour force, September key figures* (Report No. 6202.0). Retrieved from the Australian Bureau of Statistics website <http://www.abs.gov.au/ausstats/abs@.nsf/mf/6202.0>

Australian Government. (2011). *Budget 2011-2012. Health overview- delivering better hospitals, mental health and health services*. Accessed from the Australian Government Budget website <http://budget.gov.au/2011-12/content/overview/html/index.htm>

Australian Institute of Health and Welfare. (2011). *Cardiovascular disease: Australian facts 2011* (Report No. CVD 53). Canberra: Author.

Australian Psychological Society. (2013). *Stress and wellbeing in Australia survey 2013*. Retrieved from the Australian Psychological Society website <https://www.psychology.org.au/Assets/Files/Stress%20and%20wellbeing%20in%20Australia%20survey%202013.pdf>

Australian Psychological Society. (2015). *Stress and wellbeing: how Australians are coping with life*. Retrieved from the Australian Psychological Society website <https://www.psychology.org.au/Assets/Files/PW15-SR.pdf>

Australian Psychological Society. (2016). *2017 Workplace Excellence Awards*. Retrieved from the Australian Psychological Society Workplace Excellence Awards website <http://www.workplaceexcellenceawards.com.au/contact-us/>

Australian Public Service Commission. (2009). *APS at a glance- all staff*. Retrieved from the Australian Public Service Commission website <http://www.apsc.gov.au/about-the-apsc/parliamentary/aps-statistical-bulletin/2008-09/main>

Australian Public Service Commission. (2011). *APS Agencies- size and function*. Retrieved from the Australian Public Service Commission website <https://stateoftheservice.apsc.gov.au/learn-more/aps-agencies-size-and-function/>

Australian Public Service Commission. (2014). *As one working together: promoting mental health and wellbeing at work*. Retrieved from the Australian Public Service Commission website http://www.apsc.gov.au/_data/assets/pdf_file/0006/56994/working-together-mental-health-wellbeing-accessible.pdf

Australian Safety and Compensation Council. (2005). *Work-related mental disorders in Australia*. Retrieved from the Safe Work Australia website http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/416/Workrelated_Mental_Disorders_Australia.pdf

Avanzi, L., van Dick, R., Fraccaroli, F., & Sarchielli, G. (2012). The downside of organizational identification: relations between identification, workaholism and well-being. *Work & Stress*, 26(3), 289-307. doi:10.1080/02678373.2012.712291

Backé, E. M., Seidler, A., Latza, U., Rossnagel, K., & Schumann, B. (2012). The role of psychosocial stress at work for the development of cardiovascular diseases: a systematic review. *International Archives of Occupational and Environmental Health*, 85(1), 67-79. doi: 10.1007/s00420-011-0643-6

Baillien, E., De Cuyper, N., & De Witte, H. (2011). Job autonomy and workload as antecedents of workplace bullying: a two-wave test of Karasek's Job Demand Control Model for targets and perpetrators. *Journal of Occupational and Organizational Psychology*, 84(1), 191-208. doi:10.1348/096317910X508371

Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: state of the art. *Journal of Managerial Psychology*, 22(3), 309-328. doi: 10.1108/02683940710733115

Bakker, A. B., Van Emmerik, H., & Van Riet, P. (2008). How job demands, resources, and burnout predict objective performance: a constructive replication. *Anxiety, Stress, & Coping*, 21(3), 309-324. doi:10.1080/10615800801958637

Balducci, C., Cecchin, M., & Fraccaroli, F. (2012). The impact of role stressors on workplace bullying in both victims and perpetrators, controlling for personal vulnerability factors: a longitudinal analysis. *Work & Stress*, 26(3), 195-212. doi: 10.1080/02678373.2012.714543

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191-215. doi: 10.1016/0146-6402(78)90002-4

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Barnett, P. A., & Gotlib, I. H. (1988). Psychosocial functioning and depression: distinguishing among antecedents, concomitants, and consequences. *Psychological Bulletin*, 104(1), 97-126. doi:10.1037/0033-2909.104.1.97

Baron, J., & Siepmann, M. (2000). Techniques for creating and using Web questionnaires in research and teaching. In M.H. Bimbaum (Ed.), *Psychological Experiments on the Internet* (pp. 235-265). San Diego, CA: Academic Press.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182. doi:10.1037/0022-3514.51.6.1173

Bar-On, R., Brown, J. M., Kirkcaldy, B. D., & Thome, E. P. (2000). Emotional expression and implications for occupational stress; an application of the Emotional Quotient Inventory (EQ-i). *Personality and Individual Differences*, 28(6), 1107-1118. doi: 10.1016/S0191-8869(99)00160-9

Barrett, P. (2007). Structural equation modelling: adjudging model fit. *Personality and Individual Differences*, 42(5), 815-824. doi:10.1016/j.paid.2006.09.018

Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. *Human Relations*, 61(8), 1139-1160. doi: 10.1177/0018726708094863

Basner, M., Babisch, W., Davis, A., Brink, M., Clark, C., Janssen, S., & Stansfeld, S. (2014). Auditory and non-auditory effects of noise on health. *The Lancet*, 383(9925), 1325-1332. doi: 10.1016/S0140-6736(13)61613-X

Bauer, G. & Jenny, G. (2007). Development, implementation and dissemination of occupational health management (OHM): Putting salutogenesis into practice. In S. McIntre & J. Houdmont (Eds.), *Occupational Health Psychology. European Perspectives on Research, Education and Practice* (pp.219 – 250). Castelo da Maia, Portugal: ISMAI.

Baumeister, R. F. (1986). *Identity: Cultural Change and the Struggle for Self*. New York: Oxford University Press.

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497-529. DOI: 10.1037/0033-2909.117.3.497

Baune, B. T., Adrian, I., & Jacobi, F. (2007). Medical disorders affect health outcome and general functioning depending on comorbid major depression in the general population. *Journal of Psychosomatic Research*, 62(2), 109-118. doi:10.1016/j.jpsychores.2006.09.014

Beck, A. T. (1970). *Depression: Clinical, Experimental, and Theoretical aspects*. Philadelphia: University of Pennsylvania Press.

Beck, A. T., & Alford, B. A. (2009). *Depression: Causes and Treatment*. Philadelphia: University of Pennsylvania Press.

Belin, A., Zamparutti, T., Tull, K., Hernandez, G., & Graveling, R. (2011). Directorate General for Internal Policies, Employment and Social Affairs. Policy department A: Economic and Scientific policy. *Occupational Health and Safety Risks for the most Vulnerable Workers*. Brussels: European Parliament.

Belkic, K. L., Landsbergis, P. A., Schnall, P. L., & Baker, D. (2004). Is job strain a major source of cardiovascular disease risk? *Scandinavian Journal of Work, Environment & Health*, 30(2), 85-128. doi: 10.5271/sjweh.769

Bentler, P. M., & Chou, C. P. (1987). Practical issues in structural modeling. *Sociological Methods & Research*, 16(1), 78-117. doi:10.1177/0049124187016001004

beyond blue. (2015). *Mental health in the workplace: beyondblue national workplace program*. Retrieved from the Heads Up website https://www.headsup.org.au/docs/default-source/default-document-library/bl-0538_nwp-brochure.pdf?sfvrsn=2

Bhui, K. S., Dinos, S., Stansfeld, S. A., & White, P. D. (2012). A synthesis of the evidence for managing stress at work: a review of the reviews reporting on anxiety, depression, and absenteeism. *Journal of Environmental and Public Health*, 2012, 1-21. doi: 10.1155/2012/515874

Billings, A. G., & Moos, R. H. (1984). Coping, stress, and social resources among adults with unipolar depression. *Journal of Personality and Social Psychology*, 46(4), 877-891. doi:10.1037//0022-3514.46.4.877

Biron, C., Brun, J. P., Ivers, H., & Cooper, C. (2006). At work but ill: psychosocial work environment and well-being determinants of presenteeism propensity. *Journal of Public Mental Health*, 5(4), 26-37. doi: 10.1108/17465729200600029

Bizumic, B., Reynolds, K. J., & Meyers, B. (2012). Predicting social identification over time: the role of group and personality factors. *Personality and Individual Differences*, 53(4), 453-458. doi:10.1016/j.paid.2012.04.009

Bizumic, B., Reynolds, K. J., Turner, J. C., Bromhead, D., & Subasic, E. (2009). The role of the group in individual functioning: school identification and the psychological well-being of staff and students. *Applied Psychology*, 58(1), 171-192. doi: 10.1111/j.1464-0597.2008.00387.x

Bjelland, I., Krokstad, S., Mykletun, A., Dahl, A. A., Tell, G. S., & Tambs, K. (2008). Does a higher educational level protect against anxiety and depression? The HUNT study. *Social Science & Medicine*, 66(6), 1334-1345. doi: 10.1016/j.socscimed.2007.12.019

Blackmore, E. R., Stansfeld, S. A., Weller, I., Munce, S., Zagorski, B. M., & Stewart, D. E. (2007). Major depressive episodes and work stress: results from a national population survey. *American Journal of Public Health*, 97(11), 2088-2093. doi: 10.2105/AJPH.2006.104406

Blader, S. L., & Tyler, T. R. (2003). What constitutes fairness in work settings? A four component model of procedural justice. *Human Resource Management Review*, 13(1), 107-126. doi: 10.1177/0146167203029006007

Blader, S. L., & Tyler, T. R. (2009). Testing and extending the group engagement model: linkages between social identity, procedural justice, economic outcomes, and extra-role behavior. *Journal of Applied Psychology*, 94(2), 445-464. doi: 10.1037/a0013935

Blair-West, G. W., Mellsop, G. W., & Eyeson-Annan, M. L. (1997). Down-rating lifetime suicide risk in major depression. *Acta Psychiatrica Scandinavica*, 95(3), 259-263. doi: 10.1111/j.1600-0447.1997.tb09629.x

Bliese, P. D., & Jex, S. M. (1999). Incorporating multiple levels of analysis into occupational stress research. *Work & Stress*, 13(1), 1-6. doi: 10.1080/026783799296147

Bollen, K. A. (1989). A new incremental fit index for general structural equation models. *Sociological Methods & Research*, 17(3), 303-316. doi: 10.1177/0049124189017003004

Bollen, K. A., & Stine, R. (1990). Direct and indirect effects: classical and bootstrap estimates of variability. *Sociological Methodology*, 20(1), 15-140. doi: 10.1177/0049124189017003004

Bond, F. W., & Bunce, D. (2000). Mediators of change in emotion-focused and problem-focused worksite stress management interventions. *Journal of Occupational Health Psychology*, 5(1), 156-163. doi: 10.1037/1076-8998.5.1.156

Bond, F. W., & Bunce, D. (2001). Job control mediates change in a work reorganization intervention for stress reduction. *Journal of Occupational Health Psychology*, 6(4), 290-302. doi: 10.1037/1076-8998.6.4.290

Bond, F. W., & Bunce, D. (2003). The role of acceptance and job control in mental health, job satisfaction, and work performance. *Journal of Applied Psychology*, 88(6), 1057-67. doi: 10.1037/0021-9010.88.6.1057

Bond, F. W., & Hayes, S. C. (2002). ACT at work. In F. Bond & W. Dryden (Eds.), *Handbook of Brief Cognitive Behaviour Therapy* (pp.117-140). Chichester, England: Wiley.

Bond, F. W., Flaxman, P. E., van Veldhoven, M. J. P. M., & Biron, M. (2010). The impact of psychological flexibility and acceptance and commitment therapy (ACT) on health and productivity at work. In J. Houdmont, & S. Leka (Eds.), *Contemporary Occupational Health Psychology: Global Perspectives on Research and Practice* (pp. 296-313). Oxford, UK: Wiley-Blackwell. doi: 10.1002/9780470661550.ch15

Bonde, J. P. E. (2008). Psychosocial factors at work and risk of depression: a systematic review of the epidemiological evidence. *Occupational and Environmental Medicine*, 65(7), 438-445. doi: 10.1136/oem.2007.038430

Bonde, J. P. E., Munch-Hansen, T., Wieclaw, J., Westergaard-Nielsen, N., & Agerbo, E. (2009). Psychosocial work environment and antidepressant medication: a prospective cohort study. *BMC Public Health*, 9(1), 262-271. doi: 10.1186/1471-2458-9-262

Booth, T., Murray, A. L., Marples, K., & Batey, M. (2013). What role does neuroticism play in the association between negative job characteristics and anxiety and depression? *Personality and Individual Differences*, 55(4), 422-427. doi: 10.1016/j.paid.2013.04.001

Boren, J. P., & Alberts, J. K. (2011). *The Impact of an Enacted Social Support Training Intervention on Work-life Interaction and Stress in a Sample of Working Adults*. Paper presented at the annual meeting of the National Communication Association, New Orleans, LA.

Bottomley, C., Nazareth, I., Torres-González, F., Švab, I., Maaroos, H. I., Geerlings, M. I., ... & King, M. (2010). Comparison of risk factors for the onset and maintenance of depression. *The British Journal of Psychiatry*, 196(1), 13-17. doi: 10.1192/bjp.bp.109.067116

Bourke, C., Douglas, K., & Porter, R. (2010). Processing of facial emotion expression in major depression: a review. *Australian and New Zealand Journal of Psychiatry*, 44(8), 681-696. doi: 10.3109/00048674.2010.496359

Branscombe, N. R., Schmitt, M. T., & Harvey, R. D. (1999). Perceiving pervasive discrimination among African Americans: implications for group identification and well-being. *Journal of Personality and Social Psychology*, 77(1), 135-149. doi: 10.1177/0146167202282006

Brewer, M. B. (1996). When contact is not enough: social identity and intergroup cooperation. *International Journal of Intercultural relations*, 20(3), 291-303. doi:10.1016/0147-1767(96)00020-X

Brief, A. P., & George, J. M. (1991). Psychological stress and the workplace: a brief comment on Lazarus' outlook. *Journal of Social Behaviour and Personality*, 6(7), 15–20.

Brief, A. P., Burke, M. J., George, J. M., Robinson, B. S., & Webster, J. (1988). Should negative affectivity remain an unmeasured variable in the study of job stress? *Journal of Applied Psychology*, 73(2), 193-198. doi: 10.1037/0021-9010.73.2.193

Brisson, C., Blanchette, C., Guimont, C., Dion, G., Moisan, J., Vézina, M., ... & Macaronsse, L. (1998). Reliability and validity of the French version of the 18-item Karasek Job Content Questionnaire. *Work & Stress*, 12(4), 322-336. doi: 10.1080/02678379808256870

Brisson, C., Larocque, B., Moisan, J., Vézina, M., & Dagenais, G. R. (2000). Psychosocial factors at work, smoking, sedentary behavior, and body mass index: prevalence study among 6995 white collar workers. *Journal of Occupational and Environmental Medicine*, 42(1), 40-46.

Bromet, E. J., Dew, M. A., Parkinson, M. S., & Schulberg, H. C. (1988). Predictive effects of occupational and marital stress on the mental health of a male work force. *Journal of Organizational Behavior*, 9, 1–13. doi: 10.1002/job.4030090102

Broom, D. H., D'souza, R. M., Strazdins, L., Butterworth, P., Parslow, R., & Rodgers, B. (2006). The lesser evil: bad jobs or unemployment? A survey of mid-aged Australians. *Social Science & Medicine*, 63(3), 575-586. doi: 0.1016/j.socscimed.2006.02.003

Brown, R., Condor, S., Mathews, A., & Wade, G. Williams, J. (1986). Explaining intergroup differentiation in an industrial organization. *Journal of Occupational Psychology*, 59(4), 273-286. doi: 10.1111/j.2044-8325.1986.tb00230.x

Brown, T. A., Chorpita, B. F., Korotitsch, W., & Barlow, D. H. (1997). Psychometric properties of the Depression Anxiety Stress Scales (DASS) in clinical samples. *Behaviour Research and Therapy*, 35(1), 79-89.

- Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. *Sociological Methods Research*, 21(2), 230-258. doi: 10.1177/0049124192021002005
- Brun, J., & Cooper, C. (2009). *Missing pieces: 7 ways to improve employee well-being and organizational effectiveness*. New York: Palgrave Macmillan.
- Brunner, E. J., Chandola, T., & Marmot, M. G. (2007). Prospective effect of job strain on general and central obesity in the Whitehall II Study. *American Journal of Epidemiology*, 165(7), 828-837. doi: 10.1093/aje/kwk058
- Bulmer, M. G. (1979). *Principles of Statistics*. New York: Dover.
- Bültmann, U., Kant, I. J., Van Den Brandt, P. A., & Kasl, S. V. (2002). Psychosocial work characteristics as risk factors for the onset of fatigue and psychological distress: prospective results from the Maastricht Cohort Study. *Psychological Medicine*, 32(2), 333-345. doi: 10.1017/S0033291701005098
- Burcusa, S. L., & Iacono, W. G. (2007). Risk for recurrence in depression. *Clinical Psychology Review*, 27(8), 959-985. doi: 10.1016/j.cpr.2007.02.005
- Burke, P. J. (1991). Identity processes and social stress. *American Sociological Review*, 56(6), 836-849. doi: 10.2307/2096259
- Burnham, K. P., & Anderson, D. R. (2004). Multimodel inference understanding AIC and BIC in model selection. *Sociological Methods & Research*, 33(2), 261-304. doi: 10.1177/0049124104268644
- Burton, J. (2010). WHO healthy workplace framework and model: background and supporting literature and practices. Geneva: World Health Organization.
- Burton, W. N., Pransky, G., Conti, D. J., Chen, C. Y., & Edington, D. W. (2004). The association of medical conditions and presenteeism. *Journal of Occupational and Environmental Medicine*, 46(6), S38-S45. doi: 10.1097/01.jom.0000126687.49652.44
- Butterworth, P., Leach, L. S., Strazdins, L., Olesen, S. C., Rodgers, B., & Broom, D. H. (2011). The psychosocial quality of work determines whether employment has benefits for

mental health: results from a longitudinal national household panel survey. *Occupational and Environmental Medicine*, 68(11), 806-812. doi:10.1136/oem.2010.059030

Byrne, B. M. (2013). *Structural Equation Modeling with EQS: Basic concepts, Applications and Programming* (2nd Ed.). New Jersey: Taylor and Francis.

Calnan, M., Wainwright, D., & Almond, S. (2000). Job strain, effort-reward imbalance and mental distress: a study of occupations in general medical practice. *Work & Stress*, 14(4), 297-311. doi:10.1080/02678370110040920

Caltabiano, M.L., Byrne, D., Martin, P.R., & Sarafino, E.P. (2002). *Health Psychology: Biopsychosocial interactions*. Milton, QLD: John Wiley & Sons.

Cameron, J. E. (2004). A three-factor model of social identity. *Self and identity*, 3(3), 239-262. doi:10.1080/13576500444000047

Campos-Serna, J., Ronda-Pérez, E., Artazcoz, L., Moen, B. E., & Benavides, F. G. (2013). Gender inequalities in occupational health related to the unequal distribution of working and employment conditions: a systematic review. *International Journal for Equity in Health*, 12(1), 57-75. doi: 10.1186/1475-9276-12-5

Cannon, W.B. (1929). Organization for physiological homeostasis. *Physiological Reviews*, 9(3), 399–431.

Caplan, R. D. (1971). *Organizational stress and individual strain: a social-psychological study of risk factors in coronary heart disease among administrators, engineers, and scientists*. Unpublished doctoral thesis. Retrieved from <http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19720005404.pdf>

Caplan, R. D. (1983). Person-environment fit: past, present, and future. In C.L. Cooper & R. Payne (Eds.), *Stress Research* (pp. 35-78). London: Wiley.

Caplan R.D., Cobb, S., French, J.R, Harrison, R.Y., & Pinneau, S. (1980). *Job demands and worker health: main effects and occupational differences*. Ann Arbor: Survey Research Centre, Institute for Social Research, University of Michigan.

Caplan, R. D., & Harrison, R. V. (1993). Person-environment fit theory: some history, recent developments, and future directions. *Journal of Social Issues*, 49(4), 253-275. doi: 10.1111/j.1540-4560.1993.tb01192.x

Carmines, E. G., & McIver, J. P. (1981). Analyzing models with unobserved variables: Analysis of covariance structures. In G. W. Bohrnstedt & E. F. Borgatta (Eds.), *Social Measurement: Current Issues* (pp. 65-115). Beverly Hills, CA: Sage.

Cascio, W. F. (2000). Managing a virtual workplace. *The Academy of Management Executive*, 14(3), 81-90. doi: 10.5465/AME.2000.4468068

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. doi: 10.1037/1072-5245.11.2.149

Cavanagh, J. T., Carson, A. J., Sharpe, M., & Lawrie, S. M. (2003). Psychological autopsy studies of suicide: a systematic review. *Psychological Medicine*, 33(03), 395-405. doi: 10.1017/S0033291702006943

Caverley, N., Cunningham, J. B., & MacGregor, J. N. (2007). Sickness presenteeism, sickness absenteeism, and health following restructuring in a public service organization. *Journal of Management Studies*, 44(2), 304-319. doi: 10.1111/j.1467-6486.2007.00690.x

Chen, P. Y., & Spector, P. E. (1991). Negative affectivity as the underlying cause of correlations between stressors and strains. *Journal of Applied Psychology*, 76(3), 398-407. doi:10.1037//0021-9010.76.3.398

Chen, P. Y., & Spector, P. E. (1992). Relationships of work stressors with aggression, withdrawal, theft and substance use: an exploratory study. *Journal of Occupational and Organizational Psychology*, 65(3), 177-184. doi: 10.1111/j.2044-8325.1992.tb00495.x

Chen, S. W., Wang, P. C., Hsin, P. L., Oates, A., Sun, I. W., & Liu, S. I. (2011). Job stress models, depressive disorders and work performance of engineers in microelectronics industry. *International Archives of Occupational and Environmental Health*, 84(1), 91-103. doi: 10.1007/s00420-010-0538-y

Cheung, M. F., & Law, M. C. (2008). Relationships of organizational justice and organizational identification: the mediating effects of perceived organizational support in Hong Kong. *Asia Pacific Business Review*, 14(2), 213-231. doi:10.1080/13602380701430879

Choenarom, C., Williams, R. A., & Hagerty, B. M. (2005). The role of sense of belonging and social support on stress and depression in individuals with depression. *Archives of Psychiatric Nursing*, 19(1), 18-29. doi: 10.1016/j.apnu.2004.11.003

Cicchetti, D. V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychological Assessment*, 6(4), 284-290. doi: 10.1037/1040-3590.6.4.284

Clara, I. P., Cox, B. J., & Enns, M. W. (2001). Confirmatory factor analysis of the Depression Anxiety Stress Scales in depressed and anxious patients. *Journal of Psychopathology and Behavioral Assessment*, 23, 61- 67. doi:10.1023/A:1011095624717

Clark, C., Pike, C., McManus, S., Harris, J., Bebbington, P., Brugha, T., ... & Stansfeld, S. (2012). The contribution of work and non-work stressors to common mental disorders in the 2007 Adult Psychiatric Morbidity Survey. *Psychological Medicine*, 42(4), 829-842. doi: 10.1017/S0033291711001759

Clausen, T., Nielsen, K., Carneiro, I. G., & Borg, V. (2012). Job demands, job resources and long-term sickness absence in the Danish eldercare services: a prospective analysis of register-based outcomes. *Journal of Advanced Nursing*, 68(1), 127-136. doi: 10.1111/j.1365-2648.2011.05724.x

Clays, E., De Bacquer, D., Leynen, F., Kornitzer, M., Kittel, F., & De Backer, G. (2007). Job stress and depression symptoms in middle-aged workers - prospective results from the Belstress study. *Scandinavian Journal of Work, Environment & Health*, 33(4), 252-259. doi: 10.5271/sjweh.1140

Clumeck, N., Kempenaers, C., Godin, I., Dramaix, M., Kornitzer, M., Linkowski, P., & Kittel, F. (2009). Working conditions predict incidence of long-term spells of sick leave due to depression: results from the Belstress I prospective study. *Journal of Epidemiology and Community Health*, 63(4), 286-292. doi:10.1136/jech.2008.079384

Cobanoglu, C., Warde, B., & Moreo, P. J. (2001). A comparison of mail, fax and web-based survey methods. *International Journal of Market Research*, 43(4), 441-452. doi: 10.1177/0193841X09340214

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum.

Cohen, S. (2004). Social relationships and health. *American Psychologist*, 59(8), 676-684. doi: 10.1037/0003-066X.59.8.676

Cohen, S. D., Norris, L., Acquaviva, K., Peterson, R. A., & Kimmel, P. L. (2007). Screening, diagnosis, and treatment of depression in patients with end-stage renal disease. *Clinical Journal of the American Society of Nephrology*, 2(6), 1332-1342. doi: 10.2215/CJN.03951106

Cohen, S., & McKay, G. (1984). Social support, stress and the buffering hypothesis: a theoretical analysis. In A. Baum, S.E. Taylor & J.E. Singer (Eds.), *Handbook of Psychology and Health* (pp. 253-267). Hillsdale, NJ: Lawrence Erlbaum.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, 98(2), 310-357. doi: 10.1037/0033-2909.98.2.310

Cohen, S., Kessler, R. C., & Gordon, L. U. (1997). *Measuring stress: a guide for health and social scientists*. New York: Oxford University Press.

Cohen-Charash, Y., & Spector, P. E. (2001). The role of justice in organizations: a meta-analysis. *Organizational Behavior and Human Decision Processes*, 86(2), 278-321. doi: 10.1006/obhd.2001.2958

Cohidon, C., Santin, G., Imbernon, E., & Goldberg, M. (2010). Working conditions and depressive symptoms in the 2003 decennial health survey: the role of the occupational category. *Social Psychiatry and Psychiatric Epidemiology*, 45(12), 1135-1147. doi: 10.1007/s00127-009-0157-7

Colquitt, J. A., Conlon, D. E., Wesson, M. J., Porter, C. O., & Ng, K. Y. (2001). Justice at the millennium: a meta-analytic review of 25 years of organizational justice research. *Journal of Applied Psychology*, 86(3), 425-445. doi: 10.1037//0021-9010.86.3.425

Comcare. (2009). *Effective health and wellbeing programs*. Retrieved from the Comcare website

https://www.comcare.gov.au/_data/assets/pdf_file/0011/70220/Effective_Health_and_Wellbeing_Programs_Pub_82_PDF,3.63_MB.pdf

Comcare. (2016). *Work-related mental stress*. Retrieved from the Comcare website https://www.comcare.gov.au/preventing/hazards/psychosocial_hazards/work-related_mental_stress

Commonwealth of Australia. (2012). *Workplace bullying: we just want it to stop*. Retrieved from the Parliament of Australia website. <http://www.aphref.aph.gov.au-house-committee-ee-bullying-report-fullreport.pdf>

Commonwealth of Australia. (2014). *Towards responsible government: appendix to the report of the National Commission of Audit*. Retrieved from the Australian Government National Commission of Audit website http://www.ncoa.gov.au/report/docs/appendix_volume%203.pdf

Conway, J. M., & Lance, C. E. (2010). What reviewers should expect from authors regarding common method bias in organizational research. *Journal of Business and Psychology*, 25(3), 325-334. doi: 10.1007/s10869-010-9181-6

Cook, R., Billings, D., Hersch, R., Back, A., & Hendrickson, A. (2007). A field test of a web-based workplace health promotion program to improve dietary practices, reduce stress, and increase physical activity: randomized controlled trial. *Journal of Medical Internet Research*, 9(2), e17. doi: 10.2196/jmir.9.2.e17

Cooper, C. L., & Cartwright, S. (1997). An intervention strategy for workplace stress. *Journal of Psychosomatic Research*, 43(1), 7-16. doi:10.1016/S0022-3999(96)00392-3

Cooper, C. L., & Payne, R. (1989). *Causes, coping and consequences of stress at work*. Chichester, West Sussex: Wiley.

Cosgrove, M. P., Sargeant, L. A., Caleyachetty, R., & Griffin, S. J. (2012). Work-related stress and Type 2 diabetes: systematic review and meta-analysis. *Occupational Medicine*, 62(3), 167-173. doi: 10.1093/occmed/kqs002

Couper, M. P. (2000). Web surveys: a review of issues and approaches. *The Public Opinion Quarterly*, 64(4), 464-494. doi: 10.1086/318641

Courvoisier, D. S., & Perneger, T. V. (2010). Validation of alternative formulations of job strain. *Journal of Occupational Health*, 52(1), 5-13. doi: 10.1539/joh.L9084

Cox, T. (1978). *Stress*. London: Macmillan.

Cox, T. (1993). *Stress research and stress management: putting theory to work* (Report No 61). Suffolk, England: Health and Safety Executive.

Cox, T. & Griffiths, A. (1995). The nature and measurement of work stress: theory and practice. In J.R. Wilson & E.N. Corlett (Eds.), *Evaluation of human work: a practical ergonomics methodology*. London: Taylor & Francis.

Cox, T. & Griffiths, A. (2005). The nature and measurement of work-related stress: theory and practice. In Wilson, J.R. & Corlett, N. (Eds.), *Evaluation of human work* (3rd ed). Abingdon, UK: Routledge.

Cox, T. & Griffiths, A. (2010). Work-related stress: a theoretical perspective. In S. Leka & J. Houdmont (Eds.), *Occupational Health Psychology* (pp. 31-56). Oxford: Wiley-Blackwell.

Cox, T., Griffiths, A., & Rial-Gonzalez, E. (2000). *Research on work related stress*. Luxembourg: Office for Official Publications of the European Communities.

Coyne, J. C. (1976). Depression and the response of others. *Journal of Abnormal Psychology*, 85(2), 186-193. doi: 10.1037/0021-843X.85.2.186

Crane, M. F., & Platow, M. J. (2010). Deviance as adherence to injunctive group norms: the overlooked role of social identification in deviance. *British Journal of Social Psychology*, 49(4), 827-847. doi: 10.1348/014466609X481416.

Crawford, J. R., & Henry, J. D. (2003). The Depression Anxiety Stress Scales (DASS): Normative data and latent structure in a large non-clinical sample. *British Journal of Clinical Psychology*, 42(2), 111-131. doi: 10.1348/014466503321903544

Crawford, J. R., & Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, 43(3), 245-265. doi: 10.1348/0144665031752934

Crawford, J., Cayley, C., Lovibond, P. F., Wilson, P. H., & Hartley, C. (2011). Percentile Norms and Accompanying Interval Estimates from an Australian General Adult Population Sample for Self-Report Mood Scales (BAI, BDI, CRS-D, CES-D, DASS, DASS-21, STAI-X, STAI-Y, SRDS, and SRAS). *Australian Psychologist*, 46(1), 3-14. doi: 10.1111/j.1742-9544.2010.00003.x

Crouter, A. C., & Bumpus, M. F. (2001). Linking parents' work stress to children's and adolescents' psychological adjustment. *Current Directions in Psychological Science*, 10(5), 156-159. doi: 10.1111/j.1742-9544.2010.00003.x

Cruwys, T., Haslam, S. A., Dingle, G. A., Haslam, C., & Jetten, J. (2014a). Depression and social identity: an integrative review. *Personality and Social Psychology Review*, 18(3), 215-238. doi:10.1177/1088868314523839

Cruwys, T., Haslam, S. A., Dingle, G. A., Jetten, J., Hornsey, M. J., Chong, E. D., & Oei, T. P. (2014b). Feeling connected again: interventions that increase social identification reduce depression symptoms in community and clinical settings. *Journal of Affective Disorders*, 159, 139-146. doi: 10.1016/j.jad.2014.02.019i

Curran, P. J., West, S. G., & Finch, J. F. (1996). The robustness of test statistics to non-normality and specification error in confirmatory factor analysis. *Psychological Methods*, 1(1), 16-29. doi: 10.1037/1082-989X.1.1.16

d'Errico, A., Cardano, M., Landriscina, T., Marinacci, C., Pasian, S., Petrelli, A., & Costa, G. (2011). Workplace stress and prescription of antidepressant medications: a prospective

study on a sample of Italian workers. *International Archives of Occupational and Environmental Health*, 84(4), 413-424. doi:10.1007/s00420-010-0586-3

Dagher, R. K., McGovern, P. M., Dowd, B. E., & Lundberg, U. (2011). Postpartum depressive symptoms and the combined load of paid and unpaid work: a longitudinal analysis. *International Archives of Occupational and Environmental Health*, 84(7), 735-743. doi: 10.1007/s00420-011-0626-7

Daniels, K., & Guppy, A. (1994). Occupational stress, social support, job control, and psychological well-being. *Human Relations*, 47(12), 1523-1544. doi: 10.1177/001872679404701205

Daniels, K., & Harris, C. (2005). A daily diary study of coping in the context of the job demands–control–support model. *Journal of Vocational Behavior*, 66(2), 219-237. doi: 10.1016/j.jvb.2004.10.004

Darr, W., & Johns, G. (2008). Work strain, health, and absenteeism: a meta-analysis. *Journal of Occupational Health Psychology*, 13(4), 293. doi:10.1037/a0012639

Davis, S., Hooke, G. R., & Page, A. C. (2006). Identifying and targeting predictors of drop-out from group cognitive behaviour therapy. *Australian Journal of Psychology*, 58(1), 48-56. doi: 10.1080/00049530500504096

De Cremer, D., Van Knippenberg, D., Van Dijk, E., & Van Leeuwen, E. (2008). Cooperating if one's goals are collective-based: social identification effects in social dilemmas as a function of goal transformation. *Journal of Applied Social Psychology*, 38(6), 1562-1579. doi: 10.1111/j.1559-1816.2008.00359.x

de Jonge, J., Reuvers, M. M., Houtman, I. L., Bongers, P. M., & Kompier, M. A. (2000). Linear and nonlinear relations between psychosocial job characteristics, subjective outcomes, and sickness absence: baseline results from SMASH. *Journal of Occupational Health Psychology*, 5(2), 256-268. doi: 10.1037//1076-8998.5.2.256

de Lange, A. H., Kompier, M. A., Taris, T. W., Geurts, S. A., Beckers, D. G., Houtman, I. L., & Bongers, P. M. (2009). A hard day's night: a longitudinal study on the relationships among

job demands and job control, sleep quality and fatigue. *Journal of Sleep Research*, 18(3), 374-383. doi: 10.1111/j.1365-2869.2009.00735.x

de Lange, A. H., Taris, T. W., Kompier, M. A., Houtman, I. L., & Bongers, P. M. (2002). Effects of stable and changing demand-control histories on worker health. *Scandinavian Journal of Work, Environment & Health*, 28(2), 94-108. doi: 10.1111/j.1365-2869.2009.00735.x

de Lange, A. H., Taris, T. W., Kompier, M. A., Houtman, I. L., & Bongers, P. M. (2003). "The very best of the millennium": longitudinal research and the demand-control-(support) model. *Journal of Occupational Health Psychology*, 8(4), 282. doi: 10.1037/1076-8998.8.4.282

de Lange, A. H., Taris, T. W., Kompier, M. A., Houtman, I. L., & Bongers, P. M. (2004). The relationships between work characteristics and mental health: examining normal, reversed and reciprocal relationships in a 4-wave study. *Work & Stress*, 18(2), 149-166. doi:10.1080/02678370412331270860

de Lange, A. H., Taris, T. W., Kompier, M. A., Houtman, I. L., & Bongers, P. M. (2005). Different mechanisms to explain the reversed effects of mental health on work characteristics. *Scandinavian Journal of Work, Environment & Health*, 31(1), 3-14. doi:10.5271/sjweh.843

de Jong, T. M., Overholser, J. C., & Stockmeier, C. A. (2010). Apples to oranges? A direct comparison between suicide attempters and suicide completers. *Journal of Affective Disorders*, 124(1), 90-97. doi: 10.1016/j.jad.2009.10.020.

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. doi: 10.1037/0021-9010.86.3.499

Demerouti, E., Le Blanc, P. M., Bakker, A. B., Schaufeli, W. B., & Hox, J. (2009). Present but sick: a three-wave study on job demands, presenteeism and burnout. *Career Development International*, 14(1), 50-68. doi:10.1108/13620430910933574

DeSanto Iennaco, J. D., Cullen, M. R., Cantley, L., Slade, M. D., Fiellin, M., & Kasl, S. V. (2009). Effects of externally rated job demand and control on depression diagnosis claims in

an industrial cohort. *American Journal of Epidemiology*, 171(3), 303-311. doi: 10.1093/aje/kwp359

Dewe, P.J, Cox, T., & Ferguson, E. (1993). Individual strategies for coping with stress at work: a review. *Work & Stress*, 7(1), 5-15. doi: 10.1177/0021886388241005

Dewe, P. J., O'Driscoll, M. P., & Cooper, C. L. (2010). *Coping with work stress: a review and critique*. Oxford: Wiley-Blackwell.

Dewe, P. J., O'Driscoll, M. P., & Cooper, C. L. (2012). Theories of psychological stress at work. In R.J. Gatchel & I.Z. Schultz (Eds.), *Handbook of occupational health and wellness* (pp. 23-38). New York: Springer.

Dewe, P., & Trenberth, L. (2012). Exploring the relationships between appraisals of stressful encounters and the associated emotions in a work setting. *Work & Stress*, 26(2), 161-174. doi: 10.1348/09631790376964724

Diana, F. I., Su, H., Winters, P. C., & Liang, H. (2010). Association of workplace chronic and acute stressors with employee weight status: data from worksites in turmoil. *Journal of Occupational and Environmental Medicine*, 52(Suppl 1), S34-S41. doi: 10.1097/JOM.0b013e3181c88525

Dietrich, S., Deckert, S., Ceynowa, M., Hegerl, U., & Stengler, K. (2012). Depression in the workplace: a systematic review of evidence-based prevention strategies. *International Archives of Occupational and Environmental Health*, 85(1), 1-11. doi:10.1007/s00420-011-0634-7

Di Iorio, D., Henley, E., & Doughty, A. (2000). A survey of primary care physician practice patterns and adherence to acute low back problem guidelines. *Archives of Family Medicine*, 9(10), 1015-1021. doi: 10.1001/archfami.9.10.1015

Direct Health Solutions. (2009). *National health and absence survey*. Retrieved from the Direct Health Solutions website <http://dhs.net.au/>

Dohrenwend, B. S., & Dohrenwend, B. P. (1974). *Stressful life events: their nature and effects*. Oxford: John Wiley & Sons.

Dollard, M. F., & McTernan, W. (2011). Psychosocial safety climate: a multilevel theory of work stress in the health and community service sector. *Epidemiology and Psychiatric Sciences*, 20(4), 287-293. doi:10.1017/S2045796011000588

Dollard, M. F., & Winefield, A. H. (1996). Managing occupational stress: A national and international perspective. *International Journal of Stress Management*, 3(2), 69-83. doi: 10.1007/BF01857716

Dollard, M. F., & Winefield, A. H. (2002). Mental health: overemployment, underemployment, unemployment and healthy jobs. *Australian e-Journal for the Advancement of Mental Health*, 1(3), 170-195. doi: 10.5172/jamh.1.3.170

Dooley, D., Prause, J., & Ham-Rowbottom, K. A. (2000). Underemployment and depression: longitudinal relationships. *Journal of Health and Social Behavior*, 41(4), 421-436. doi:10.2307/2676295

Doosje, B., Branscombe, N. R., Spears, R., & Manstead, A. S. (1998). Guilty by association: when one's group has a negative history. *Journal of Personality and Social Psychology*, 75(4), 872-88. doi: 10.1037/0022-3514.75.4.872

Doosje, B., Ellemers, N., & Spears, R. (1995). Perceived intragroup variability as a function of group status and identification. *Journal of Experimental Social Psychology*, 31(5), 410-436. doi:10.1006/jesp.1995.1018

Dormann, C., & Zapf, D. (2002). Social stressors at work, irritation, and depressive symptoms: Accounting for unmeasured third variables in a multi-wave study. *Journal of Occupational and Organizational Psychology*, 75(1), 33-58. doi: 10.1348/096317902167630

Dragano, N., He, Y., Moebus, S., Jöckel, K. H., Erbel, R., & Siegrist, J. (2008). Two models of job stress and depressive symptoms. *Social Psychiatry and Psychiatric Epidemiology*, 43(1), 72-78.

Dumont, K., & Waldzus, S. (2014). Group-based guilt and reparation in the context of social change. *Journal of Applied Social Psychology*, 44(4), 331-341. doi:10.1007/s00127-007-0267-z

Edimansyah, B. A., Rusli, B. N., Naing, L., Mohamed Rusli, B.A., Winn, T., & Tengku Mohamed Ariff, B.R.H. (2008). Self-perceived depression, anxiety, stress and their relationships with psychosocial job factors in male automotive assembly workers. *Industrial Health*, 46(1), 90-100. doi: 10.1111/jasp.12224

Eisenberger, R., Stinglhamber, F., Vandenberghe, C., Sucharski, I. L., & Rhoades, L. (2002). Perceived supervisor support: contributions to perceived organizational support and employee retention. *Journal of Applied Psychology*, 87(3), 565-573. doi: 10.1037//0021-9010.87.3.565

Ellemers, N., De Gilder, D., & Haslam, S. A. (2004). Motivating individuals and groups at work: a social identity perspective on leadership and group performance. *Academy of Management Review*, 29(3), 459-478. doi: 10.5465/AMR.2004.13670967

Ellemers, N., Kortekaas, P., & Ouwerkerk, J. W. (1999). Self-categorisation, commitment to the group and group self-esteem as related but distinct aspects of social identity. *European Journal of Social Psychology*, 29(23), 371-389. doi: 10.1002/(SICI)1099-0992(199903/05)29:2/3<371::AID-EJSP932>3.0.CO;2-U

Elovainio, M., Kivimäki, M., & Vahtera, J. (2002). Organizational justice: evidence of a new psychosocial predictor of health. *American Journal of Public Health*, 92(1), 105-108. doi:10.1136/jech.2003.019026

Ertel, K. A., Koenen, K. C., & Berkman, L. F. (2008). Incorporating home demands into models of job strain: Findings from the Work, Family & Health Network. *Journal of Occupational and Environmental Medicine*, 50(11), 1244-1252. doi: 10.1097/JOM.0b013e31818c308d

Ertürk, A. (2010). Exploring predictors of organizational identification: moderating role of trust on the associations between empowerment, organizational support, and identification. *European Journal of Work and Organizational Psychology*, 19(4), 409-441. doi:10.1080/13594320902834149

Escartín, J., Ullrich, J., Zapf, D., Schlüter, E., & van Dick, R. (2013). Individual and group level effects of social identification on workplace bullying. *European Journal of Work and Organizational Psychology*, 22(2), 182-193. doi: 10.1080/1359432X.2011.647407

European Agency for Safety and Health at Work. (2014). *Calculating the costs of work-related stress and psychosocial risks - a literature review*. Retrieved from the European Agency for Safety and Health at Work website https://osha.europa.eu/en/tools-and-publications/publications/literature_reviews/calculating-the-cost-of-work-related-stress-and-psychosocial-risks

European Commission. (2000). *Guidance on work-related stress: "Spice of life- or kiss of death?"*. Belgium: Office for Official Publications of the European Communities.

European Commission. (2011). *Report on the implementation of the European social partners' Framework Agreement on work-related stress*. Retrieved from the European Agency for Safety and Health at Work website <https://osha.europa.eu/en/legislation/guidelines/framework-agreement-on-work-related-stress>

Fandiño-Losada, A., Forsell, Y., & Lundberg, I. (2013). Demands, skill discretion, decision authority and social climate at work as determinants of major depression in a 3-year follow-up study. *International Archives of Occupational and Environmental Health*, 86(5), 591-605. doi: 10.1007/s00420-012-0791-3

Faragher, E. B., Cass, M., & Cooper, C. L. (2005). The relationship between job satisfaction and health: a meta-analysis. *Occupational and Environmental Medicine*, 62(2), 105-112. doi:10.1136/oem.2002.006734

Feldt, T. (1997). The role of sense of coherence in well-being at work: analysis of main and moderator effects. *Work & Stress*, 11(2), 134-147. doi:10.1080/02678379708256830

Fidell, S., Mestre, V., Schomer, P., Berry, B., Gjestland, T., Vallet, M., & Reid, T. (2011). A first-principles model for estimating the prevalence of annoyance with aircraft noise exposure. *The Journal of the Acoustical Society of America*, 130(2), 791-806. doi: 10.1121/1.3605673

Finity Consulting. (2014). *ACT Worker's compensation review of scheme performance to 30 June 2013*. Retrieved from the ACT government Chief Minister, Treasury and Economic Development Directorate website. <http://www.cmd.act.gov.au/governance/private/wc-review-scheme-performance>

Firth-Cozens, J., & Hardy, G. E. (1992). Occupational stress, clinical treatment and changes in job perceptions. *Journal of Occupational and Organizational Psychology*, 65(2), 81-88. doi: 10.1111/j.2044-8325.1992.tb00486.x

Flynn, N., James, J.E. (2009). Relative effects of demand and control on task-related cardiovascular reactivity, task perceptions, performance accuracy and mood. *International Journal of Psychophysiology* 72(2), 217–227. doi: 10.1016/j.ijpsycho.2008.12.006

Folger, R. (1977). Distributive and procedural justice: combined impact of voice and improvement on experienced inequity. *Journal of Personality and Social Psychology*, 35(2), 108-119. doi: 10.1037/0022-3514.35.2.108

Folger, R., & Cropanzano, R. (2001). Fairness theory: justice as accountability. In J. Greenberg & R. Cropanzo (Eds.), *Advances in Organizational Justice* (pp.1-55). Stanford: Stanford University Press.

Folkman, S. (2008). The case for positive emotions in the stress process. *Anxiety, Stress, and Coping*, 21(1), 3-14. doi: 10.1080/10615800701740457

Forgas, J. P. (1990). Affective influences on individual and group judgments. *European Journal of Social Psychology*, 20(5), 441-453. doi: 10.1002/ejsp.2420200506

Forgas, J. P., & Bower, G. H. (1987). Mood effects on person-perception judgments. *Journal of Personality and Social Psychology*, 53(1), 53-60. doi:10.1037/0022-3514.53.1.53

Frank E, Carpenter LL, Kupfer DJ. Sex differences in recurrent depression: are there any that are significant? *American Journal of Psychiatry*, 145 (1), 41- 45. doi:10.1176/ajp.145.1.41

Fransson, E. I., Heikkilä, K., Nyberg, S. T., Zins, M., Westerlund, H., Westerholm, P., ... & Suominen, S. (2012). Job strain as a risk factor for leisure-time physical inactivity: an

individual-participant meta-analysis of up to 170,000 men and women The IPD-Work Consortium. *American Journal of Epidemiology*, 176(12), 1078-1089. doi: 10.1093/aje/kws336

French, J. R., & Kahn, R. L. (1962). A programmatic approach to studying the industrial environment and mental health. *Journal of Social Issues*, 18 (3), 1-47. doi: 10.1111/j.1540-4560.1962.tb00415.x

French, J. R., Caplan, R. D., & Van Harrison, R. (1982). *The mechanisms of job stress and strain*. Chichester: Wiley.

French, J. R., Rodgers, W., & Cobb, S. (1974). Adjustment as person-environment fit. In G. V. Coelho, D. A. Hamburg, & J. E. Adams (Eds.), *Coping and Adaptation* (pp. 316-333). New York: Basic Books.

Frese, M. (1999). Social support as a moderator of the relationship between work stressors and psychological dysfunctioning: a longitudinal study with objective measures. *Journal of Occupational Health Psychology*, 4(3), 179-192. doi: 10.1037/1076-8998.4.3.179

Frequently Asked Questions: National Means and International Comparisons. (no date). Retrieved from www.jcqcenter.org

Frisch, J. U., Häusser, J. A., van Dick, R., & Mojzisch, A. (2014). Making support work: the interplay between social support and social identity. *Journal of Experimental Social Psychology*, 55, 154-161. doi: 10.1016/j.jesp.2014.06.009

Frone, M. R. (2008). Are work stressors related to employee substance use? The importance of temporal context assessments of alcohol and illicit drug use. *Journal of Applied Psychology*, 93(1), 199-206. doi: 10.1037/0021-9010.93.1.199

Frone, M. R., Russell, M., & Cooper, M. L. (1992). Antecedents and outcomes of work-family conflict: testing a model of the work-family interface. *Journal of Applied Psychology*, 77(1), 65-78. doi: 10.1037//0021-9010.77.1.65

Frone, M.R. (2003). Work-family balance. In J.C. Quick & L.E. Tetrick (Eds.), *Handbook of Occupational Health Psychology* (pp. 143-162). Washington, DC: American Psychological Association.

Furlan, A. D., Gnam, W. H., Carnide, N., Irvin, E., Amick III, B. C., DeRango, K., ... & Bültmann, U. (2012). Systematic review of intervention practices for depression in the workplace. *Journal of Occupational Rehabilitation*, 22(3), 312-321. doi: 10.1007/s10926-011-9340-2

Gaddy, M. A., & Ingram, R. E. (2014). A meta-analytic review of mood-congruent implicit memory in depressed mood. *Clinical Psychology Review*, 34(5), 402-416. doi: 10.1016/j.cpr.2014.06.001

Gallagher, S., Meaney, S., & Muldoon, O. T. (2014). Social identity influences stress appraisals and cardiovascular reactions to acute stress exposure. *British Journal of Health Psychology*, 19(3), 566-579. doi: 10.1111/bjhp.12056

Gallop, G. (2007). Towards a new era of strategic government. In John Wanna (Eds.), *A Passion for Policy: Essays in Public Sector Reform* (pp. 75-89). Canberra, Australia: ANU E-Press.

Gangwisch, J. E., Heymsfield, S. B., Boden-Albala, B., Buijs, R. M., Kreier, F., Pickering, T. G., ... & Malaspina, D. (2006). Short sleep duration as a risk factor for hypertension analyses of the first national health and nutrition examination survey. *Hypertension*, 47(5), 833-839. doi: 10.1161/01.HYP.0000217362.34748.e0

Ganster, D. C. (1989). Worker control and well-being: a review of research in the workplace. In S.L Sauter, J.J Hurrell, & C.L Cooper (Eds.), *Job control and worker health* (pp. 3-23). Chichester: Wiley.

Garbarino, S., Cuomo, G., Chiorri, C., & Magnavita, N. (2013). Association of work-related stress with mental health problems in a special police force unit. *BMJ Open*, 3(7), e002791. doi:10.1136/bmjopen-2013-002791

Gates, M. G., Parr, M. B., & Hughen, J. E. (2012). Enhancing nursing knowledge using high-fidelity simulation. *Journal of Nursing Education*, 51(1), 9-15. doi: 10.3928/01484834-20111116-01

Gaynes, B. N., West, S. L., Ford, C. A., Frame, P., Klein, J., & Lohr, K. N. (2004). Screening for suicide risk in adults: a summary of the evidence for the US Preventive Services Task Force. *Annals of Internal Medicine*, 140(10), 822-835. doi: 10.7326/0003-4819-140-10-200405180-00023

George, L. K., Blazer, D. G., Hughes, D. C., & Fowler, N. (1989). Social support and the outcome of major depression. *The British Journal of Psychiatry*, 154(4), 478-485. doi: 10.1192/bjp.154.4.478

Gibb, B. E., & Coles, M. E. (2005). Cognitive vulnerability-stress models of psychopathology: a developmental perspective. In G.L. Hankin, & J.R. Abela (Eds.), *Development of psychopathology: a vulnerability-stress perspective* (pp. 104-135). Thousand Oaks, CA: Sage.

Gilboa, S., Shirom, A., Fried, Y., & Cooper, C. (2008). A meta-analysis of work demand stressors and job performance: examining main and moderating effects. *Personnel Psychology*, 61(2), 227-271. doi: 10.1111/j.1744-6570.2008.00113.x

Glassman, A. H. (2007). Depression and cardiovascular comorbidity. *Dialogues in Clinical Neuroscience*, 9(1), 9-17.

Glozier, N., Hackett, M. L., Parag, V., Anderson, C. S., & Auckland Regional Community Stroke (ARCOS) Study Group. (2008). The influence of psychiatric morbidity on return to paid work after stroke in younger adults: the Auckland Regional Community Stroke (ARCOS) Study, 2002 to 2003. *Stroke*, 39(5), 1526-1532. doi: 10.1161/STROKEAHA.107.503219

Godard, C., Chevalier, A., Lecrubier, Y., & Lahon, G. (2006). APRAND programme: an intervention to prevent relapses of anxiety and depressive disorders. First results of a medical health promotion intervention in a population of employees. *European Psychiatry*, 21(7), 451-459. doi: 10.1016/j.eurpsy.2006.03.001

Godin, I., Kornitzer, M., Clumeck, N., Linkowski, P., Valente, F., & Kittel, F. (2009). Gender specificity in the prediction of clinically diagnosed depression. *Social Psychiatry and Psychiatric Epidemiology*, 44(7), 592-600. doi: 10.1007/s00127-008-0465-3

Goldberg, D. (2000). Plato versus Aristotle: categorical and dimensional models for common mental disorders. *Comprehensive Psychiatry*, 41(2), 8-13. doi: 10.1192/bjp.bp.109.072405

Goldman, H.H., & Drake, E.R. (2006). Mood disorders and workplace performance: half a loaf. *American Journal of Psychiatry*, 163(9), 1490-1491. doi: 10.1176/ajp.2006.163.9.1490

Goldstein, D. S. (2010). Adrenal responses to stress. *Cellular and Molecular Neurobiology*, 30(8), 1433-1440. doi: 10.1007/s10571-010-9606-9

Gosselin, E., Lemyre, L., & Corneil, W. (2013). Presenteeism and absenteeism: Differentiated understanding of related phenomena. *Journal of Occupational Health Psychology*, 18(1), 75-86. doi: 10.1037/a0030932

Gotlib, I. H., & Hammen, C. L. (1992). *Psychological aspects of depression: toward a cognitive-interpersonal integration*. Chichester: John Wiley & Sons.

Gotlib, I. H., & Krasnoperova, E. (1998). Biased information processing as a vulnerability factor for depression. *Behavior Therapy*, 29(4), 603-617. doi: 10.1037/0021-843X.116.1.135

Grant, A. M., Berg, J. M., & Cable, D. M. (2014). Job titles as identity badges: How self-reflective titles can reduce emotional exhaustion. *Academy of Management Journal*, 57(4), 1201-1225. doi: 10.5465/amj.2012.0338

Grant, S., & Langan-Fox, J. (2006). Occupational stress, coping and strain: the combined/interactive effect of the Big Five traits. *Personality and Individual Differences*, 41(4), 719-732. doi: 10.1016/j.paid.2006.03.008

Gray-Stanley, J. A., Muramatsu, N., Heller, T., Hughes, S., Johnson, T. P., & Ramirez-Valles, J. (2010). Work stress and depression among direct support professionals: the role of

work support and locus of control. *Journal of Intellectual Disability Research*, 54(8), 749-761. doi: 10.1111/j.1365-2788.2010.01303.x

Greenberg, N., Carr, J. A., & Summers, C. H. (2002). Causes and consequences of stress. *Integrative and Comparative Biology*, 42(3), 508-516. doi: 10.1093/icb/42.3.508

Greenberg, P. E., Fournier, A. A., Sisitsky, T., Pike, C. T., & Kessler, R. C. (2015). The economic burden of adults with major depressive disorder in the United States (2005 and 2010). *The Journal of Clinical Psychiatry*, 76(2), 155-162. doi: 10.4088/JCP.14m09298

Greene, W. (2004). Fixed effects and bias due to the incidental parameters problem in the Tobit model. *Econometric Reviews*, 23(2), 125-147. doi:10.1081/ETC-120039606

Greenhaus, J. H., & Beutell, N. J. (1985). Sources of conflict between work and family roles. *Academy of Management Review*, 10(1), 76-88. doi: 10.5465/AMR.1985.4277352

Griffin, J. M., Greiner, B. A., Stansfeld, S. A., & Marmot, M. (2007). The effect of self-reported and observed job conditions on depression and anxiety symptoms: a comparison of theoretical models. *Journal of Occupational Health Psychology*, 12(4), 334-349. doi: 10.1037/1076-8998.12.4.334

Grynderup, M. B., Mors, O., Hansen, Å. M., Andersen, J. H., Bonde, J. P., Kærgaard, A., ... & Kolstad, H. A. (2012). A two-year follow-up study of risk of depression according to work-unit measures of psychological demands and decision latitude. *Scandinavian Journal of Work, Environment & Health*, 38(6), 527-536. doi: 10.5271/sjweh.3316

Grzywacz, J. G., & Marks, N. F. (2000). Reconceptualizing the work-family interface: an ecological perspective on the correlates of positive and negative spillover between work and family. *Journal of Occupational Health Psychology*, 5(1), 111-126. doi: 10.1037/1076-8998.5.1.111

Gustafsson, K., & Marklund, S. (2011). Consequences of sickness presence and sickness absence on health and work ability: a Swedish prospective cohort study. *International Journal of Occupational Medicine and Environmental Health*, 24(2), 153-165. doi: 10.2478/s13382-011-0013-3

Gvion, Y., & Apter, A. (2012). Suicide and suicidal behavior. *Public Health Reviews*, 34(2), 1-20.

Hackman, J. R., & Lawler, E. E. (1971). Employee reactions to job characteristics. *Journal of Applied Psychology*, 55(3), 259-286. doi: 10.1037/h0031152.

Hackman, J. R., & Oldham, G. R. (1976). Motivation through the design of work: test of a theory. *Organizational Behavior and Human Performance*, 16(2), 250-279. doi: 10.1016/0030-5073(76)90016-7.

Hackman, J. R., & Oldham, G. R. (1980). *Work redesign*. Reading, MA: Addison-Wesley.

Haefel, G. J., Voelz, Z. R., & Joiner, Jr, T. E. (2007). Vulnerability to depressive symptoms: clarifying the role of excessive reassurance seeking and perceived social support in an interpersonal model of depression. *Cognition and Emotion*, 21(3), 681-688. doi:10.1080/02699930600684922

Hagerty, B. M., Lynch-Sauer, J., Patusky, K. L., Bouwsema, M., & Collier, P. (1992). Sense of belonging: a vital mental health concept. *Archives of Psychiatric Nursing*, 6(3), 172-177. doi: 10.1016/0883-9417(92)90028-H

Hagerty, B. M., Williams, R. A., Coyne, J. C., & Early, M. R. (1996). Sense of belonging and indicators of social and psychological functioning. *Archives of Psychiatric Nursing*, 10(4), 235-244. doi:10.1016/S0883-9417(96)80029-X

Hall, G. B., Dollard, M. F., Winefield, A. H., Dormann, C., & Bakker, A. B. (2013). Psychosocial safety climate buffers effects of job demands on depression and positive organizational behaviors. *Anxiety, Stress & Coping*, 26(4), 355-377. doi: 10.1080/10615806.2012.700477

Hammen, C. (2005). Stress and depression. *Annual Review of Clinical Psychology*, 1, 293-319. doi: 10.1146/annurev.clinpsy.1.102803.143938

Hammen, C., Davila, J., Brown, G., Ellicott, A., & Gitlin, M. (1992). Psychiatric history and stress: predictors of severity of unipolar depression. *Journal of Abnormal Psychology*, 101(1), 45-52. doi:10.1037/0021-843X.101.1.45

Hansen, C. D., & Andersen, J. H. (2008). Going ill to work-what personal circumstances, attitudes and work-related factors are associated with sickness presenteeism? *Social Science & Medicine*, 67(6), 956-964. doi: 10.1016/j.socscimed.2008.05.022

Hanson, L. L. M., Åkerstedt, T., Näswall, K., Leineweber, C., Theorell, T., & Westerlund, H. (2011). Cross-lagged relationships between workplace demands, control, support, and sleep problems. *Sleep*, 34(10), 1403-1410. doi: 10.5665/SLEEP.1288

Hanton, S., Wagstaff, C. R., & Fletcher, D. (2012). Cognitive appraisals of stressors encountered in sport organizations. *International Journal of Sport and Exercise Psychology*, 10(4), 276-289. doi: 10.1080/1612197X.2012.682376

Harris, C., Daniels, K., & Briner, R. B. (2004). How do work stress and coping work? Toward a fundamental theoretical reappraisal. *British Journal of Guidance & Counselling*, 32(2), 223-234. doi: 10.1080/03069880410001692256

Harrison, C. K., Stone, J., Shapiro, J., Yee, S., Boyd, J. A., & Rullan, V. (2009). The role of gender identities and stereotype salience with the academic performance of male and female college athletes. *Journal of Sport & Social Issues*, 33(1), 78-96. doi: 10.1177/0193723508328902

Hart, P.M. & Cooper, C.L. (2001). Occupational stress: toward a more integrated framework. In N. Anderson, D.S. Ones, H.K. Sinangil, & C. Viswesvaran (Eds.), *Handbook of Industrial, Work and Organizational Psychology* (pp. 93- 114). London: Sage.

Harvey, S.B., Joyce, S., Tan, L., Johnson, A., Nguyen, H., Modini, M., & Groth, M. (2014). *Developing a mentally healthy workplace: a review of the literature* (A report for the National Mental Health Commission and the Mentally Healthy Workplace Alliance). Retrieved from the Heads Up website https://www.headsup.org.au/docs/default-source/resources/developing-a-mentally-healthy-workplace_final-november-2014.pdf?sfvrsn=8

Haslam, S. A. (2004). Stress. In S.A Haslam (2004), *Psychology in Organizations* (pp.183-206). London and Thousand Oaks: Sage.

Haslam, S. A., & Reicher, S. (2006). Stressing the group: social identity and the unfolding dynamics of responses to stress. *Journal of Applied Psychology*, 91(5), 1037-1052. doi: 10.1037/0021-9010.91.5.1037

Haslam, S. A., Eggins, R. A., & Reynolds, K. J. (2003). The ASPIRe model: actualizing social and personal identity resources to enhance organizational outcomes. *Journal of Occupational and Organizational Psychology*, 76(1), 83-113. doi: 10.1348/096317903321208907

Haslam, S. A., Jetten, J., O'Brien, A., & Jacobs, E. (2004). Social identity, social influence and reactions to potentially stressful tasks: support for the self-categorization model of stress. *Stress and Health*, 20(1), 3-9. doi: 10.1002/smi.995

Haslam, S. A., Jetten, J., Postmes, T., & Haslam, C. (2009a). Social identity, health and well-being: an emerging agenda for applied psychology. *Applied Psychology*, 58(1), 1-23. doi: 10.1111/j.1464-0597.2008.00379.x

Haslam, S. A., Jetten, J., & Waghorn, C. (2009b). Social identification, stress and citizenship in teams: a five - phase longitudinal study. *Stress and Health*, 25(1), 21-30. doi: 10.1002/smi.1221

Haslam, S. A., O'Brien, A., Jetten, J., Vormedal, K., & Penna, S. (2005). Taking the strain: social identity, social support, and the experience of stress. *British Journal of Social Psychology*, 44(3), 355-370. doi: 10.1348/014466605X37468

Haslam, S. A., Reicher, S. D., & Levine, M. (2012). When other people are heaven, when other people are hell: how social identity determines the nature and impact of social support. In J. Jetten, C. Haslam, & S.A. Haslam (Eds.), *The social cure: identity, health and well-being* (pp. 157-174). New York: Psychology Press.

Haslam, S. A. & van Dick, R. (2011). A social identity approach to workplace stress. In D. De Cremer, R. van Dick, & K. Murnighan (Eds.), *Social psychology and organizations* (pp. 325-352). New York: Taylor & Francis.

Häusser, J. A., Kattenstroth, M., van Dick, R., & Mojzisch, A. (2012). “We” are not stressed: social identity in groups buffers neuroendocrine stress reactions. *Journal of Experimental Social Psychology*, 48(4), 973-977. doi:10.1016/j.jesp.2012.02.020

Häusser, 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), 1-35. doi:10.1080/02678371003683747

Hayes, A. F., & Scharkow, M. (2013). The relative trustworthiness of inferential tests of the indirect effect in statistical mediation analysis: does method really matter? *Psychological Science*, 24(10), 1918-1927. doi: 10.1177/0956797613480187

He, H., Pham, H. Q., Baruch, Y., & Zhu, W. (2014). Perceived organizational support and organizational identification: joint moderating effects of employee exchange ideology and employee investment. *The International Journal of Human Resource Management*, 25(20), 2772-2795. doi:10.1080/09585192.2014.908315

Health and Safety at Work Act. (1974). Retrieved from the UK legislation website <http://www.legislation.gov.uk/ukpga/1974/37/contents>

Health and Safety Executive. (2004). *Real solutions, real people: a managers' guide to tackling workrelated stress*. Sudbury: Author.

Health and Safety Executive. (2007). *Managing the causes of work-related stress: a step-by-step approach using the Management Standards*. Retrieved from the Health and Safety Executive website. <http://www.hse.gov.uk/pUbns/priced/hsg218.pdf>

Heikkilä, K., Nyberg, S. T., Theorell, T., Fransson, E. I., Alfredsson, L., Bjorner, J. B., ... & Dragano, N. (2013). Work stress and risk of cancer: meta-analysis of 5700 incident cancer events in 116 000 European men and women. *British Medical Journal*, 346, 165-175. doi: 10.1136/bmj.f165.

Heikkinen M.E, Isometsa, T.E., Martutunen, M.J., Aro H.M., & Lonnqvist J.K. (1995). Social factors in suicide. *British Journal of Psychiatry*, 167, 747–753. doi: 10.1192/bjp.167.6.747

Henderson, J., Henderson, G., Lavikainen, J. & McDaid, D. (2004) *Actions against depression: improving mental health and wellbeing by combating the adverse health, social and economic consequences of depression*. Luxembourg: European Commission.

Henderson, M., Glozier, N., & Elliott, K. H. (2005). Long term sickness absence. *British Medical Journal*, 330, 803-804. doi: 10.1136/bmj.330.7495.802

Henderson M., Harvey, S.B., Overland, S., Mykletun, A., & Hotopf, M. (2011). Work and common psychiatric disorders. *Journal of the Royal Society of Medicine*. 104(5), 198–207. doi: 10.1258/jrsm.2011.100231

Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, 44(2), 227-239. doi: 10.1348/014466505X29657

Hoaglin, D. C., & Iglewicz, B. (1987). Fine-tuning some resistant rules for outlier labeling. *Journal of the American Statistical Association*, 82(400), 1147-1149. doi: 10.2307/2289392

Hobfoll, S. E. (1989). Conservation of resources: a new attempt at conceptualizing stress. *American Psychologist*, 44(3), 513-524. doi: 10.1037/0003-066X.44.3.513

Hobfoll, S. E., & Shirom, A. (2001). Conservation of resources theory: applications to stress and management in the workplace. In R.T. Golembiewski (Ed.), *Handbook of organizational behavior* (pp.57-80). New York: Marcel Dekker.

Hodgins, D. C., Williams, R., & Munro, G. (2009). Workplace responsibility, stress, alcohol availability and norms as predictors of alcohol consumption-related problems among employed workers. *Substance Use & Misuse*, 44(14), 2062-2069. doi: 10.3109/10826080902855173

Hogan, B. E., Linden, W., & Najarian, B. (2002). Social support interventions: do they work? *Clinical Psychology Review*, 22(3), 381-440. doi: 10.1016/S02373-7358(01)00102-7

Hogg, M. A. (2001). A social identity theory of leadership. *Personality and social Psychology Review*, 5(3), 184-200. doi: 10.1207/S15327957PSPR0503_1

Hogg, M. A., & Terry, D. (2001). The role of norms and group membership in social influence processes. In J. P. Forgas and K. D. Williams (Ed.), *Social Influence: Direct and Indirect Processes* (pp. 253-270) Philadelphia, PA: Psychology Press

Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: a meta-analytic review. *PLOS Medicine*, 7(7), Article e1000316. doi: 10.1371/journal.pmed.1000316

Honig, F. (1995). When you can't ask their names: linking anonymous respondents with the Hogben number. *Australian Journal of Public Health*, 19(1), 94-96. doi: 10.1111/j.1753-6405.1995.tb00305.x

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural Equation Modelling: guidelines for Determining Model Fit. *Electronic Journal of Business Research Methods*, 6(1), 53-60.

Horton, R. A., & Lipscomb, H. J. (2011). Depressive symptoms in women working in a poultry-processing plant: A longitudinal analysis. *American Journal of Industrial Medicine*, 54(10), 791-799. doi: 10.1002/ajim.2099

Houdmont, J., Cox, T., & Griffiths, A. (2010). Work-related stress case definitions and prevalence rates in national surveys. *Occupational Medicine*, 60(8), 658-661. doi: 10.1093/occmed/kqq138

House, J. S., Kahn, R. L., McLeod, J. D., & Williams, D. (1985). Measures and concepts of social support. In S. Cohen, & L.S. Syme (Eds.) *Social support and health* (pp.83-108). San Diego, CA: Academic Press.

House, J. S., Landis, K. R., & Umberson, D. (1988). Social relationships and health. *Science*, 241(4865), 540-545.

Houtman, I., Jettinghof, K., & Cedillo, L. (2007). *Raising awareness of stress at work in developing countries: a modern hazard in a traditional working environment: advice to employers and worker representatives*. France: World Health Organization

Howell, R. T., Rodzon, K. S., Kurai, M., & Sanchez, A. H. (2010). A validation of well-being and happiness surveys for administration via the internet. *Behavior Research Methods*, 42(3), 775-784. doi: 10.3758/BRM.42.3.775

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling: a Multidisciplinary Journal*, 6(1), 1-55. doi:10.1080/10705519909540118

Hülsheger, U. R., & Schewe, A. F. (2011). On the costs and benefits of emotional labor: a meta-analysis of three decades of research. *Journal of Occupational Health Psychology*, 16(3), 361-389. doi: 10.1037/a0022876

Hülsheger, U. R., Lang, J. W., & Maier, G. W. (2010). Emotional labor, strain, and performance: testing reciprocal relationships in a longitudinal panel study. *Journal of Occupational Health Psychology*, 15(4), 505-521. doi: 10.1037/a0021003

Hyde, J. S., Fennema, E., & Lamon, S. J. (1990). Gender differences in mathematics performance: a meta-analysis. *Psychological Bulletin*, 107(2), 139-155. doi: 10.1037/a0021276

Ibrahim, S., Smith, P., & Muntaner, C. (2009). A multi-group cross-lagged analyses of work stressors and health using Canadian National sample. *Social Science & Medicine*, 68(1), 49-59. doi: 10.1016/j.socscimed.2008.10.019

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(1), 19-28. doi: 10.1016/j.ssci.2011.06.005

Iglewicz, B., & Hoaglin, D. C. (1987). Use of boxplots for process evaluation. *Journal of Quality Technology*, 19(4), 180-190.

Inoue, A., Kawakami, N., Haratani, T., Kobayashi, F., Ishizaki, M., Hayashi, T., ... & Masumoto, T. (2010). Job stressors and long-term sick leave due to depressive disorders among Japanese male employees: findings from the Japan Work Stress and Health Cohort study. *Journal of Epidemiology and Community Health*, 64(3), 229-235. doi: 10.1136/jech.2008.085548

International Labour Organization. (2011). *ILO decent work country programme: a guidebook*. Geneva, Switzerland: Author.

Irving, J. A., Dobkin, P. L., & Park, J. (2009). Cultivating mindfulness in health care professionals: a review of empirical studies of mindfulness-based stress reduction (MBSR). *Complementary Therapies in Clinical Practice*, 15(2), 61-66. doi: 10.1016/j.ctcp.2009.01.002

Jackson, J. W. (2002). Intergroup attitudes as a function of different dimensions of group identification and perceived intergroup conflict. *Self and Identity*, 1, 11-33. doi: 10.1080/152988602317232777

Jacoby, W. G. (2000). Loess: a nonparametric, graphical tool for depicting relationships between variables. *Electoral Studies*, 19(4), 577-613. doi: 10.1016/S0261-3794(99)00028-1

James, L. R., James, L. A., & Ashe, D. K. (1990). The meaning of organizations: the role of cognition and values. In B. Schnieder (Ed.), *Organizational climate and culture* (pp.40-84). Chichester: John Wiley & Sons

Jans, L., Postmes, T., & Van der Zee, K. I. (2011). The induction of shared identity: the positive role of individual distinctiveness for groups. *Personality and Social Psychology Bulletin*, 37(8), 1130-1141. doi: 10.1177/0146167211407342

Jetten, J., Haslam, C., Haslam, S. A., Dingle, G., & Jones, J. M. (2014). How groups affect our health and well-being: the path from theory to policy. *Social Issues and Policy Review*, 8(1), 103-130. doi: 10.1111/sipr.12003

Jex, S. M., & Bliese, P. D. (1999). Efficacy beliefs as a moderator of the impact of work-related stressors: a multilevel study. *Journal of Applied Psychology*, 84(3), 349-361. doi: 10.1037//0021-9010.84.3.349

Jex, S. M., Beehr, T. A., & Roberts, C. K. (1992). The meaning of occupational stress items to survey respondents. *Journal of Applied Psychology*, 77(5), 623-628. doi: 10.1037//0021-9010.77.5.623

Jimmieson, N. L., McKimmie, B. M., Hannam, R. L., & Gallagher, J. (2010). An investigation of the stress-buffering effects of social support in the occupational stress process as a function of team identification. *Group Dynamics: Theory, Research, and Practice*, 14(4), 350-367. doi:10.1037/a0018631

Johns, G. (2002). Absenteeism and mental health. In J.C. Thomas & M. Hersen (Eds.), *Handbook of Mental Health in the Workplace* (pp. 437-55). Thousand Oaks: Sage.

Johns, G. (2010). Presenteeism in the workplace: a review and research agenda. *Journal of Organizational Behavior*, 31(4), 519-542. doi: 10.1002/job.630

Johnson, J. V. (1986). The impact of workplace social support, job demands and work control upon cardiovascular disease in Sweden. *Environmental and Organizational Psychology Research Monographs I*. Stockholm: Stockholm University.

Johnson, J. V., & Hall, E. M. (1988). Job strain, workplace social support, and cardiovascular disease: a cross-sectional study of a random sample of the Swedish working population. *American Journal of Public Health*, 78(10), 1336-1342. doi: 10.2105/AJPH.78.10.1336

Johnson, J. V., Hall, E. M., & Theorell, T. (1989). Combined effects of job strain and social isolation on cardiovascular disease morbidity and mortality in a random sample of the Swedish male working population. *Scandinavian Journal of Work, Environment & Health*, 15(4), 271-279. doi:10.5271/sjweh.1852

Johnson, S., Li, J., Kendall, G., Strazdins, L., & Jacoby, P. (2013). Mothers' and fathers' work hours, child gender, and behavior in middle childhood. *Journal of Marriage and Family*, 75(1), 56-74. doi: 10.1111/j.1741-3737.2012.01030.x

Joiner, T., Coyne, J. C., & Blalock, J. (1999). On the interpersonal nature of depression: Overview and synthesis. In T. Joiner & J.C. Coyne (Eds.), *The interactional nature of depression: advances in interpersonal approaches* (pp. 3-19). Washington, DC: American Psychological Association.

Jones, F., O'Connor, D. B., Conner, M., McMillan, B., & Ferguson, E. (2007). Impact of daily mood, work hours, and iso-strain variables on self-reported health behaviors. *Journal of Applied Psychology*, 92(6), 1731-1740. doi: 10.1037/0021-9010.92.6.1731

Jonge, J., Dormann, C., Janssen, P. P., Dollard, M. F., Landeweerd, J. A., & Nijhuis, F. J. (2001). Testing reciprocal relationships between job characteristics and psychological well-being: a cross-lagged structural equation model. *Journal of Occupational and Organizational Psychology*, 74(1), 29-46. doi: 10.1348/096317901167217

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Chicago: Scientific Software International.

Jourdain, G., & Vézina, M. (2014). How psychological stress in the workplace influences presenteeism propensity: a test of the demand–control–support model. *European Journal of Work and Organizational Psychology*, 23(4), 483-496. doi: 10.1080/1359432X.2012.754573

Judd, L. L., Paulus, M. P., Wells, K. B., & Rapaport, M. H. (1996). Socioeconomic burden of subsyndromal depressive symptoms and major depression in a sample of the general population. *American Journal of Psychiatry*, 153(11), 1411-1417. doi: 10.1176/ajp.153.11.1411

Kahn & Byosiére (1992) Kahn, R. L., & Byosiére, P. (1992). Stress in organizations. In M. D. Dunnette & L. M. Hough. (Eds.), *Handbook of industrial and organizational psychology* (2nd ed., pp. 571 – 650). Palo Alto, CA: Consulting Psychologists Press

Kahn, R. L. (1981). *Work and health*. New York: John Wiley & Sons

Kahn, R. L., & Quinn, R. P. (1970). Role stress: a framework for analysis. In A. McLean (Ed.), *Mental health and work organization* (pp. 50-115). Chicago: Rand McNally

Kahn, R. L., Wolfe, D. M., Quinn, R. P., Snoek, J. D., & Rosenthal, R. A. (1964). *Organizational stress: studies in role conflict and ambiguity*. Oxford, England: John Wiley.

Kain, J., & Jex, S. (2010). Karasek's (1979) job demands-control model: a summary of current issues and recommendations for future research. In P.L. Perrewé, & D.C. Ganster (Ed.), *New Developments in Theoretical and Conceptual Approaches to Job Stress*

(*Research in Occupational Stress and Well-being, Volume 8*) (pp. 237-268). Bingley, UK: Emerald Group Publishing Limited. doi: 10.1108/S1479-3555(2010)0000008009

Karasek R.A, 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(4):322-355.

Karasek, R.A, Choi, B., Ostergren, P. O., Ferrario, M., & De Smet, P. (2007). Testing two methods to create comparable scale scores between the Job Content Questionnaire (JCQ) and JCQ-like questionnaires in the European JACE Study. *International Journal of Behavioral Medicine*, 14(4), 189-201. doi: 10.1080/10705500701638336

Karasek, R.A, Gordon, G., Pietrokovsky, C., Frese, M., Pieper C, Schwartz, J..., Schirer, D. (1985). *Job Content Questionnaire: Questionnaire and Users' Guide*. Lowell: University of Massachusetts.

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

Karpansalo, M., Kauhanen, J., Lakka, T. A., Manninen, P., Kaplan, G. A., & Salonen, J. T. (2005). Depression and early retirement: prospective population based study in middle aged men. *Journal of Epidemiology and Community Health*, 59(1), 70-74. doi: 10.1136/jech.2003.010702

Karpansalo, M., Kauhanen, J., Lakka, T. A., Manninen, P., Kaplan, G. A., & Salonen, J. T. (2005). Depression and early retirement: prospective population based study in middle aged men. *Journal of Epidemiology and Community Health*, 59(1), 70-74. doi 10.1136/jech.2003.010702

Kawakami, N., Haratani, T., & Araki, S. (1992). Effects of perceived job stress on depressive symptoms in blue-collar workers of an electrical factory in Japan. *Scandinavian Journal of Work, Environment & Health*, 18(3), 195-200. doi:10.5271/sjweh.1588

Keenan, K., Feng, X., Hipwell, A., & Klostermann, S. (2009). Depression begets depression: comparing the predictive utility of depression and anxiety symptoms to later

depression. *Journal of Child Psychology and Psychiatry*, 50(9), 1167-1175. doi 10.1111/j.1469-7610.2009.02080.x

Kelly, B. (1998). Preserving moral integrity: A follow-up study with new graduate nurses. *Journal of Advanced Nursing*, 28(5), 1134-1145. doi: 10.1046/j.1365-2648.1998.00810.x

Kendler, K. S., Kuhn, J., & Prescott, C. A. (2004). The interrelationship of neuroticism, sex, and stressful life events in the prediction of episodes of major depression. *American Journal of Psychiatry*, 161(4), 631-636. doi: 10.1176/appi.ajp.161.4.631

Kessler, R. (1997). The effects of stressful life events on depression. *Annual Review of Psychology*, 48, 191-214. doi: 10.1146/annurev.psych.48.1.191

Kessler, R. C., & McLeod, J. D. (1985). *Social support and mental health in community samples*. San Diego: Academic Press.

Kessler, R. C., & Üstün, T. B. (2004). The world mental health (WMH) survey initiative version of the world health organization (WHO) composite international diagnostic interview (CIDI). *International Journal of Methods in Psychiatric Research*, 13(2), 93-121.

Kessler, R. C., & Wang, P. S. (2002). Epidemiology of depression. In I.H. Gotlib & C.L. Hammen (Eds.), *Handbook of Depression* (pp. 5-22). New York: Guildford.

Kessler, R. C., Birnbaum, H. G., Shahly, V., Bromet, E., Hwang, I., McLaughlin, K. A., ... & Haro, J. M. (2010). Age differences in the prevalence and co-morbidity of DSM-IV major depressive episodes: results from the WHO World Mental Health Survey Initiative. *Depression and Anxiety*, 27(4), 351-364. doi: 10.1002/da.20634

Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, 62(6), 617-627. doi:10.1001/archpsyc.62.6.617

Kessler, R. C., Merikangas, K. R., & Wang, P. S. (2008). The prevalence and correlates of workplace depression in the national comorbidity survey replication. *Journal of Occupational and Environmental Medicine*, 50(4), 381-390. doi: 10.1097/JOM.0b013e31816ba9b8

Kessler, R. C., Walters, E. E., & Forthofer, M. S. (1998). The social consequences of psychiatric disorders, III: probability of marital stability. *American Journal of Psychiatry*, 155(8), 1092-1096. doi: 10.1176/ajp.155.8.10

Kim, H. Y. (2013). Statistical notes for clinical researchers: assessing normal distribution (2) using skewness and kurtosis. *Restorative Dentistry & Endodontics*, 38(1), 52-54. doi: 10.5395/rde.2013.38.1.52

Kivimäki, M., Hotopf, M., & Henderson, M. (2010). Do stressful working conditions cause psychiatric disorders? *Occupational Medicine*, 60(2), 86-87. doi: 10.1093/occmed/kqp183

Kivimäki, M., Nyberg, S. T., Batty, G. D., Fransson, E. I., Heikkilä, K., Alfredsson, L., ... & Clays, E. (2012). Job strain as a risk factor for coronary heart disease: a collaborative meta-analysis of individual participant data. *The Lancet*, 380(9852), 1491-1497. doi: 10.1016/S0140-6736(12)60994-5

Kivimäki, M., Vahtera, J., Kawachi, I., Ferrie, J. E., Oksanen, T., Joensuu, M., ... & Virtanen, M. (2010). Psychosocial work environment as a risk factor for absence with a psychiatric diagnosis: an instrumental-variables analysis. *American Journal of Epidemiology*, 172(2), 167-172. doi: 10.1093/aje/kwq094

Kivimäki, M., Virtanen, M., Elovainio, M., Kouvonen, A., Väänänen, A., & Vahtera, J. (2006). Work stress in the etiology of coronary heart disease- a meta-analysis. *Scandinavian Journal of Work, Environment & Health*, 32(6), 431-442. doi: 10.5271/sjweh.1049

Kline, R. B. (2011). Principles and practice of structural equation modeling. New York: Guilford Press.

Knight, C., & Haslam, S. A. (2010a). Your place or mine? Organizational identification and comfort as mediators of relationships between the managerial control of workspace and employees' satisfaction and well-being. *British Journal of Management*, 21(3), 717-735. doi: 10.1111/j.1467-8551.2009.00683.x

Knight, C., & Haslam, S. A. (2010b). The relative merits of lean, enriched, and empowered offices: an experimental examination of the impact of workspace management

strategies on well-being and productivity. *Journal of Experimental Psychology*, 16(2), 158-172. doi: 10.1037/a0019292

Knol, M. J., Twisk, J. W. R., Beekman, A. T. F., Heine, R. J., Snoek, F. J., & Pouwer, F. (2006). Depression as a risk factor for the onset of type 2 diabetes mellitus. A meta-analysis. *Diabetologia*, 49(5), 837-845. doi: 10.1007/s00125-006-0159-x

Kobasa, S. C. (1979). Stressful life events, personality, and health: an inquiry into hardiness. *Journal of Personality and Social Psychology*, 37(1), 1-11. doi: 10.1037//0022-3514.37.1.1

Kolstad, H. A., Hansen, Å. M., Kærgaard, A., Thomsen, J. F., Kaerlev, L., Mikkelsen, S., ... & Andersen, J. H. (2011). Job strain and the risk of depression: is reporting biased? *American Journal of Epidemiology*, 173(1), 94-102. doi: 10.1093/aje/kwq318

Kompier, M. A., & Taris, T. W. (2011). Understanding the causal relations between psychosocial factors at work and health—a circular process. *Scandinavian Journal of Work, Environment & Health*, 259-261. doi: 10.5271/sjweh.3172

Kouvonen, A., Kivimäki, M., Elovainio, M., Virtanen, M., Linna, A., & Vahtera, J. (2005). Job strain and leisure-time physical activity in female and male public sector employees. *Preventive Medicine*, 41(2), 532-539. doi: 10.1016/j.ypmed.2005.01.004

Kouvonen, A., Oksanen, T., Vahtera, J., Stafford, M., Wilkinson, R., Schneider, J., ... & Elovainio, M. (2008). Low workplace social capital as a predictor of depression: the Finnish public sector study. *American Journal of Epidemiology*, 167(10), 1143-1151. doi: 10.1093/aje/kwn067

Kristensen, T. (1995). The demand-control-support model: methodological challenges for future research. *Stress Medicine*, 11(1), 17-26. doi: 10.1002/smi.2460110104

Kristensen, T. S. (1996). Job stress and cardiovascular disease: a theoretic critical review. *Journal of Occupational Health Psychology*, 1(3), 246-260. doi: 10.1037//1076-8998.1.3.246

Kristjansson, A. L., Sigfusdottir, I. D., Sigfusson, J., & Allegrante, J. P. (2014). Self-generated identification codes in longitudinal prevention research with adolescents: a pilot study of matched and unmatched subjects. *Prevention Science, 15*(2), 205-212. doi: 10.1007/s11121-013-0372-z

Kuehner, C. (2003). Gender differences in unipolar depression: an update of epidemiological findings and possible explanations. *Acta Psychiatrica Scandinavica, 108*(3), 163-174. doi: 10.1034/j.1600-0447.2003.00204.x

Kuppens, T., & Yzerbyt, V. Y. (2014). When are emotions related to group-based appraisals? A comparison between group-based emotions and general group emotions. *Personality and Social Psychology Bulletin, 40*(12), 1563-1588. doi: 10.1177/0146167214551542

Kupriyanov, R., & Zhdanov, R. (2014). The eustress concept: problems and outlooks. *World Journal of Medical Science, 11*(2), 179-185. doi: 10.5829/idosi.wjms.2014.11.2.8433

Laaksonen, M., Pitkaniemi, J., Rahkonen, O., & Lahelma, E. (2010). Work arrangements, physical working conditions, and psychosocial working conditions as risk factors for sickness absence: Bayesian analysis of prospective data. *Annals of epidemiology, 20*(5), 332-338. doi: 10.1016/j.annepidem.2010.02.004.

Lagerveld, S. E., Bültmann, U., Franche, R. L., Van Dijk, F. J. H., Vlasveld, M. C., Van der Feltz-Cornelis, C. M., ... & Nieuwenhuijsen, K. (2010). Factors associated with work participation and work functioning in depressed workers: a systematic review. *Journal of Occupational Rehabilitation, 20*(3), 275-292. doi: 10.1007/s10926-009-9224-x.

LaMontagne, A. D., Keegel, T., & Vallance, D. (2007). Protecting and promoting mental health in the workplace: developing a systems approach to job stress. *Health Promotion Journal of Australia, 18*(3), 221-228.

LaMontagne, 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 Health, 13(3), 268-280. doi:
10.1179/oeh.2007.13.3.268

LaMontagne, A. D., Keegel, T., Vallance, D., Ostry, A., & Wolfe, R. (2008). Job strain-attributable depression in a sample of working Australians: assessing the contribution to health inequalities. *BioMed Central Public Health*, 8(1), 181-190. doi: 10.1186/1471-2458-8-18

LaMontagne, A.D, & Keegel, T. (2012). *Reducing stress in the workplace* (An evidence review: full report). Melbourne: Victorian Health Promotion Foundation.

LaMontagne, A. D., Krnjacki, L., Kavanagh, A. M., & Bentley, R. (2013). Psychosocial working conditions in a representative sample of working Australians 2001–2008: an analysis of changes in inequalities over time. *Occupational and Environmental Medicine*, 70(9), 639-647. doi: 10.1136/oemed-2012-101171

LaMontagne, A. D., Sanderson, K., & Cocker, F. (2010). *Estimating the economic benefits of eliminating job strain as a risk factor for depression*. Melbourne: Victorian Health Promotion Foundation.

Lang, J., Ochsmann, E., Kraus, T., & Lang, J. W. (2012). Psychosocial work stressors as antecedents of musculoskeletal problems: a systematic review and meta-analysis of stability-adjusted longitudinal studies. *Social Science & Medicine*, 75(7), 1163-1174. doi: 10.1016/j.socscimed.2012.04.01

Latrofa, M., Vaes, J., Pastore, M., & Cadinu, M. (2009). “United we stand, divided we fall!” The protective function of self-stereotyping for stigmatised members’ psychological well-being. *Applied Psychology*, 58(1), 84-104. doi: 10.1111/j.1464-0597.2008.00383.x

Lazarus, R. S. (1966). *Psychological stress and the coping process*. New York: McGraw-Hill.

Lazarus, R. S. (2000). Toward better research on stress and coping. *American Psychologist*, 55(6), 665- 673. doi: 10.1037//0003-066X.55.6.665

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.

Lazarus, R. S., Deese, J., & Osler, S. F. (1952). The effects of psychological stress upon performance. *Psychological Bulletin*, 49(4), 293- 317. doi: 10.1037/h0061145

Leach, C. W., Mosquera, P. M. R., Vliek, M. L., & Hirt, E. (2010). Group devaluation and group identification. *Journal of Social Issues*, 66(3), 535-552. doi: 10.1111/j.1540-4560.2010.01661.x

Leach, C. W., Van Zomeren, M., Zebel, S., Vliek, M. L., Pennekamp, S. F., Doosje, B., ... & Spears, R. (2008). Group-level self-definition and self-investment: a hierarchical (multicomponent) model of in-group identification. *Journal of Personality and Social Psychology*, 95(1), 144-165. doi: 10.1037/0022-3514.95.1.144

Leach, L. S., & Butterworth, P. (2012). Psychosocial adversities at work are associated with poorer quality marriage-like relationships. *Journal of Population Research*, 29(4), 351-372. doi:10.1007/s12546-012-9088-3

Lee, H., Ahn, H., Miller, A., Park, C. G., & Kim, S. J. (2012). Acculturative stress, work-related psychosocial factors and depression in Korean-Chinese migrant workers in Korea. *Journal of Occupational Health*, 54(3), 206-214. doi: 10.1539/joh.11-0206-OA

Lee, J. H., Kang, W., Yaang, S. R., Choy, N., & Lee, C. R. (2009). Cohort study for the effect of chronic noise exposure on blood pressure among male workers in Busan, Korea. *American Journal of Industrial Medicine*, 52(6), 509-517. doi: 10.1002/ajim.20692

Leka, S., & Cox, T. (2008). *PRIMA-EF: Guidance on the European Framework for Psychosocial Risk Management: a resource for employers and worker representatives*. Geneva: World Health Organization.

Leka, S., Griffiths, A., & Cox, T. (2003). *Work organisation and stress* (Protecting worker's health series No.3). Geneva: World Health Organization.

Leka, S., & Jain, A. (2010). *Health impact of psychosocial hazards at work: an overview*. Geneva: World Health Organization.

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(2), 137-143. doi: 10.1539/joh.O10010

Lépine, J. P., & Briley, M. (2004). The epidemiology of pain in depression. *Human Psychopharmacology: Clinical and Experimental*, 19(S1), S3-S7. doi: 10.1002/hup.618

Lewig, K. A., & Dollard, M. F. (2001). Social construction of work stress: Australian newsprint media portrayal of stress at work, 1997–98. *Work & Stress*, 15(2), 179-190. doi: 10.1080/02678370110066986

Lewig, K. A., & Dollard, M. F. (2003). Emotional dissonance, emotional exhaustion and job satisfaction in call centre workers. *European Journal of Work and Organizational Psychology*, 12(4), 366-392. doi: 10.1080/13594320344000200

Lifeline & ORIMA Research. (2015). *Lifeline Australia: National Stress Poll*. Canberra: Author.

Lind, E. A., & Tyler, T. R. (1988). *The social psychology of procedural justice*. New York: Plenum Press. doi: 10.2307/2073346

Liu, R. T., & Alloy, L. B. (2010). Stress generation in depression: A systematic review of the empirical literature and recommendations for future study. *Clinical Psychology Review*, 30(5), 582-593. doi: 10.1016/j.cpr.2010.04.010

Long, J. S. (1997). *Regression models for categorical and limited dependent variables*. Thousand Oaks, CA: Sage.

Lorant, V., Delière, D., Eaton, W., Robert, A., Philpott, P., & Ansseau, M. (2003). Socioeconomic inequalities in depression: a meta-analysis. *American Journal of Epidemiology*, 157(2), 98-112. doi: 10.1093/aje/kwf182

Lovibond, P. F., & Lovibond, S. H. (1995a). The structure of negative emotional states: comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy*, 33(3), 335-343. [http://dx.doi.org/10.1016/0005-7967\(94\)00075-U](http://dx.doi.org/10.1016/0005-7967(94)00075-U)

Lovibond, P. F., & Lovibond, S. H. (1995b). Manual for the Depression Anxiety and Stress Scales. Sydney: Psychology Foundation Monograph.

Luchman, J. N., & González-Morales, M. G. (2013). Demands, control, and support: a meta-analytic review of work characteristics interrelationships. *Journal of Occupational Health Psychology, 18*(1), 37-52. doi: 10.1037/a003054

Luhtanen, R., & Crocker, J. (1992). A collective self-esteem scale: self-evaluation of one's social identity. *Personality and Social Psychology Bulletin, 18*, 302–318. doi: 10.1177/0146167292183006

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1*(2), 130-149. doi: 10.1037//1082-989X.1.2.130

MacCallum, R. C., Zhang, S., Preacher, K. J., & Rucker, D. D. (2002). On the practice of dichotomization of quantitative variables. *Psychological Methods, 7*(1), 19-40. doi: 10.1037//1082-989X.7.1.19.

Macklin, D. S., Smith, L. A., & Dollard, M. F. (2006). Public and private sector work stress: Workers compensation, levels of distress and job satisfaction, and the demand-control-support model. *Australian Journal of Psychology, 58*(3), 130-143. doi: 10.1080/00049530600940190

Mael, F., & Ashforth, B. E. (1992). Alumni and their alma mater: a partial test of the reformulated model of organizational identification. *Journal of Organizational Behavior, 13*(2), 103-123. doi: 10.1002/job.4030130202

Magee, C., Stefanic, N., Caputi, P., & Iverson, D. (2011). Occupational factors and sick leave in Australian employees. *Journal of Occupational and Environmental Medicine, 53*(6), 627-632. doi: 10.1097/JOM.0b013e31821df4cf.

Magnusson-Hanson, L. L. M., Theorell, T., Bech, P., Rugulies, R., Burr, H., Hyde, M., ... & Westerlund, H. (2009). Psychosocial working conditions and depressive symptoms among Swedish employees. *International Archives of Occupational and Environmental Health, 82*(8), 951-960. doi: 10.1007/s00420-009-0406-9

Mak, A. S., & Mueller, J. (2001). Negative affectivity, perceived occupational stress, and health during organisational restructuring: a follow-up study. *Psychology and Health*, 16(1), 125-137. doi: 10.1080/08870440108405494

Mäntyniemi, A., Oksanen, T., Salo, P., Virtanen, M., Sjösten, N., Pentti, J., ... & Vahtera, J. (2012). Job strain and the risk of disability pension due to musculoskeletal disorders, depression or coronary heart disease: a prospective cohort study of 69 842 employees. *Occupational and Environmental Medicine*, 69(8), 574-581. doi:10.1136/oemed-2011-100411

Marchand, A., Demers, A., & Durand, P. (2005). Does work really cause distress? The contribution of occupational structure and work organization to the experience of psychological distress. *Social Science & Medicine*, 61(1), 1-14. doi: 10.1016/j.socscimed.2004.11.037

Mark, G. M., & Smith, A. P. (2008). Stress models: a review and suggested new direction. In J. Houdmont, & S. Leka (Eds.), *Occupational Health Psychology, European Perspectives On Research, Education and Practice* (pp. 111-144). Nottingham: Nottingham University Press.

Mark, G., & Smith, A. P. (2012). Occupational stress, job characteristics, coping, and the mental health of nurses. *British Journal of Health Psychology*, 17(3), 505-521. doi: 10.1111/j.2044-8287.2011.02051.x

Marmot, M. G., Stansfeld, S., Patel, C., North, F., Head, J., White, I., ... & Smith, G. D. (1991). Health inequalities among British civil servants: the Whitehall II study. *The Lancet*, 337(8754), 1387-1393. doi: 10.1016/0140-6736(91)93068-K

Marmot, M., Ryff, C. D., Bumpass, L. L., Shipley, M., & Marks, N. F. (1997). Social inequalities in health: next questions and converging evidence. *Social Science & Medicine*, 44(6), 901-910. doi:10.1016/S0277-9536(96)00194-3

Marmot, M., Siegrist, J., & Theorell, T., & Feeny, A. (1999). Health and the psychosocial environment at work. In M. Marmot & R. Wilkinson (Eds.), *Social determinants of health* (pp.105-131). Oxford: Oxford University Press.

Martin, A., Sanderson, K., & Cocker, F. (2009). Meta-analysis of the effects of health promotion intervention in the workplace on depression and anxiety symptoms. *Scandinavian Journal of Work, Environment & Health*, 7-18. doi:10.5271/sjweh.1295

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, 50(4), 370-396. <http://dx.doi.org/10.1037/h0054346>

Maslow, A. H. (1954). *Motivation and Personality*. New York: Addison Wesley Longman.

Mason, J. W. (1971). A re-evaluation of the concept of 'non-specificity' in stress theory. *Journal of Psychiatric Research*, 8(3), 323-333. doi:10.1016/0022-3956(71)90028-8

Masson, T., & Fritsche, I. (2014). Adherence to climate change-related ingroup norms: do dimensions of group identification matter? *European Journal of Social Psychology*, 44(5), 455-465. doi: 10.1002/ejsp.2036

Matrix. (2013). *Economic analysis of workplace mental health promotion and mental disorder prevention programmes and of their potential contribution to EU health, social and economic policy*. Retrieved from the European Commission website
http://ec.europa.eu/health/mental_health/docs/matrix_economic_analysis_mh_promotion_en.pdf

Matt, G. E., Vázquez, C., & Campbell, W. K. (1992). Mood-congruent recall of affectively toned stimuli: a meta-analytic review. *Clinical Psychology Review*, 12(2), 227-255. doi: 10.1016/0272-7358(92)90116-P

Mausner-Dorsch, H., & Eaton, W. W. (2000). Psychosocial work environment and depression: epidemiologic assessment of the demand-control model. *American Journal of Public Health*, 90(11), 1765. doi: 10.2105/AJPH.90.11.1765

McAlister, A., & Gordon, N. P. (1986). Attrition bias in a cohort study of substance abuse onset and prevention. *Evaluation Review*, 10(6), 853-59. doi: 10.1177/0193841X8601000609

McCormack, W. T., & Garvan, C. W. (2014). Team-based learning instruction for responsible conduct of research positively impacts ethical decision-making. *Accountability in Research*, 21(1), 34-49. doi: 10.1080/08989621.2013.822267

McCraty, R., Atkinson, M., Lipsenthal, L., & Arguelles, L. (2009). New hope for correctional officers: an innovative program for reducing stress and health risks. *Applied Psychophysiology and Biofeedback*, 34(4), 251-272. doi: 10.1007/s10484-009-9087-0

McDonald, M., & Bubna-Litic, D. (2012). Applied social psychology: a critical theoretical perspective. *Social and Personality Psychology Compass*, 6(12), 853-864. doi: 10.1111/spc3.12004

McGrath, J. E. (1976). Stress and behavior in organizations. In M. Dunnette (Ed.), *Handbook of Industrial and Organizational Psychology* (pp. 1351-1396). Chicago: Rand McNally.

McTernan, W. P., Dollard, M. F., & LaMontagne, A. D. (2013). Depression in the workplace: an economic cost analysis of depression-related productivity loss attributable to job strain and bullying. *Work & Stress*, 27(4), 321-338. doi: 10.1080/02678373.2013.846948

Medibank & KMPG Econtech (2008). *The cost of workplace stress in Australia*. Retrieved from Medibank <http://www.medibank.com.au/client/documents/pdfs/the-cost-of-workplace-stress.pdf>

Medibank & KPMG Econtech (2011). *Sick at Work: the cost of presenteeism to your business and the economy*. Retrieved from Medibank http://www.medibank.com.au/client/documents/pdfs/sick_at_work.pdf

Melchior, M., Caspi, A., Milne, B. J., Danese, A., Poulton, R., & Moffitt, T. E. (2007). Work stress precipitates depression and anxiety in young, working women and men. *Psychological Medicine*, 37(08), 1119-1129. doi: 10.1017/S0033291707000414

Michel, A., Stegmaier, R., & Sonntag, K. (2010). I scratch your back—you scratch mine. Do procedural justice and organizational identification matter for employees' cooperation during change? *Journal of Change Management*, 10(1), 41-59. doi: 10.1080/14697010903549432

Michelsen, H., & Bildt, C. (2003). Psychosocial conditions on and off the job and psychological ill health: depressive symptoms, impaired psychological wellbeing, heavy consumption of alcohol. *Occupational and Environmental Medicine*, 60(7), 489-496. doi: 10.1136/oem.60.7.489

Michie, S. (2002). Causes and management of stress at work. *Occupational and Environmental Medicine*, 59(1), 67-72. doi:10.1136/oem.59.1.67

Mikkelsen, A., & Saksvik, P. Ø. (1999). Impact of a participatory organizational intervention on job characteristics and job stress. *International Journal of Health Services*, 29(4), 871-893. doi: 10.2190/KLPQ-FTH3-WHH5-PPP1

Miller, G., Rohleder, N., & Cole, S. W. (2009). Chronic interpersonal stress predicts activation of pro-and anti-inflammatory signaling pathways six months later. *Psychosomatic Medicine*, 71(1), 57. doi: 10.1097/PSY.0b013e318190d7de

Miller, L. R., & Cano, A. (2009). Comorbid chronic pain and depression: who is at risk? *The Journal of Pain*, 10(6), 619-627. doi: 10.1016/j.jpain.2008.12.007

Mineka, S., Watson, D., & Clark, L. A. (1998). Comorbidity of anxiety and unipolar mood disorders. *Annual Review of Psychology*, 49(1), 377-412. doi: 10.1146/annurev.psych.49.1.377

Mitchell, A. J., Vaze, A., & Rao, S. (2009). Clinical diagnosis of depression in primary care: a meta-analysis. *The Lancet*, 374(9690), 609-619. doi: 10.1016/S0140-6736(09)60879-5

Mitchell, T. R., & James, L. R. (2001). Building better theory: time and the specification of when things happen. *Academy of Management Review*, 26(4), 530-547. doi: 10.5465/AMR.2001.5393889

Mooney, A., Oliver, C., & Smith, M. (2009). *Impact of family breakdown on children's well-being: evidence review* (Report: DCSF-RR113). London: University of London.

Moreno-Jiménez, B., Rodríguez-Muñoz, A., Garrosa-Hernández, E., & Blanco-Donoso, L. M. (2014). Development and validation of the Occupational Hardiness Questionnaire. *Psicothema*, 26(2), 207-214. doi: 10.7334/psicothema2013.49

Motowidlo, S. J., Packard, J. S., & Manning, M. R. (1986). Occupational stress: its causes and consequences for job performance. *Journal of Applied Psychology*, 71(4), 618. . doi:10.1037//0021-9010.71.4.618

Moussavi, S., Chatterji, S., Verdes, E., Tandon, A., Patel, V., & Ustun, B. (2007). Depression, chronic diseases, and decrements in health: results from the World Health Surveys. *The Lancet*, 370(9590), 851-858. doi: 10.1016/S0140-6736(07)61415-9

Mueller, C. W., & Lawler, E. J. (1999). Commitment to nested organizational units: some basic principles and preliminary findings. *Social Psychology Quarterly*, 62(4), 325-346.

Mundt, C., Reck, C., Backenstrass, M., Kronmüller, K., & Fiedler, P. (2000). Reconfirming the role of life events for the timing of depressive episodes: a two-year prospective follow-up study. *Journal of Affective Disorders*, 59(1), 23-30. doi: 10.1016/S0165-0327(99)00127-5

Murcia, M., Chastang, J. F., & Niedhammer, I. (2013). Psychosocial work factors, major depressive and generalised anxiety disorders: results from the French national SIP study. *Journal of Affective Disorders*, 146(3), 319-327. doi: 10.1016/j.jad.2012.09.014

Murphy, L. R. (1984). Occupational stress management: a review and appraisal. *Journal of Occupational Psychology*, 57(1), 1-15. doi: 10.1111/j.2044-8325.1984.tb00143.x

Murphy, L.R. (1988). Workplace Interventions for Stress Reduction. In C.L. Cooper & R. Payne. *Causes, coping and consequences of stress at work* (pp. 301-342). Chichester: Wiley & Sons.

Musselman, D. L., Evans, D. L., & Nemeroff, C. B. (1998). The relationship of depression to cardiovascular disease: epidemiology, biology, and treatment. *Archives of General Psychiatry*, 55(7), 580-592. doi: 10.1001/archpsyc.55.7.58

Mykletun, A., & Harvey, S. B. (2012). Prevention of mental disorders: a new era for workplace mental health. *Occupational and Environmental Medicine*, 69(12), 868-869. doi: 10.1136/oemed-2012-100846

Mykletun, A., Overland, S., Dahl, A. A., Krokstad, S., Bjerkeset, O., Glozier, N., ... & Prince, M. (2006). A population-based cohort study of the effect of common mental disorders on disability pension awards. *American Journal of Psychiatry*, 163(8), 1412-1418. doi: 10.1176/ajp.2006.163.8.1412

Nageishi, Y. (2015). A critical review of Selye's stress theory: the statistical analyses of Selye's own experimental data disprove it. *Psychology*, 6(14), 1786-1794. doi: 10.4236/psych.2015.614175.

National Mental Health Commission. (2014). *Contributing Lives, Thriving Communities - Report of the National Review of Mental Health Programmes and Services*. Retrieved from the Australian Government National Mental Health Commission website <http://www.mentalhealthcommission.gov.au/our-reports/contributing-lives,-thriving-communities-review-of-mental-health-programmes-and-services.aspx>

Nelson, D. L., & Burke, R. J. (2002). A framework for examining gender, work stress, and health. In D. L. Nelson, & R. J. Burke (Eds.), *Gender, work stress and health* (pp.3-14). Washington, DC: American Psychological Association.

Netterstrøm, B., Conrad, N., Bech, P., Fink, P., Olsen, O., Rugulies, R., & Stansfeld, S. (2008). The relation between work-related psychosocial factors and the development of depression. *Epidemiologic Reviews*, 30(1), 118-132. doi: 10.1093/epirev/mxn004

Ng, D. M., & Jeffery, R. W. (2003). Relationships between perceived stress and health behaviors in a sample of working adults. *Health Psychology*, 22(6), 638. doi:10.1037/0278-6133.22.6.638

Ng, F., Trauer, T., Dodd, S., Callaly, T., Campbell, S., & Berk, M. (2007). The validity of the 21-item version of the Depression Anxiety Stress Scales as a routine clinical outcome measure. *Acta Neuropsychiatrica*, 19(5), 304-310. doi:10.1111/j.1601-5215.2007.00217.x

Nicholson, A., Kuper, H., & Hemingway, H. (2006). Depression as an aetiologic and prognostic factor in coronary heart disease: a meta-analysis of 6362 events among 146 538 participants in 54 observational studies. *European Heart Journal*, 27(23), 2763-2774. doi: 10.1093/eurheartj/ehl338

- Niedhammer, I., Chastang, J. F., David, S., Barouhriel, L., & Barrandon, G. (2013). Psychosocial work environment and mental health: Job-strain and effort-reward imbalance models in a context of major organizational changes. *International Journal of Occupational and Environmental Health*, 12(2), 111-119. doi:10.1179/oeh.2006.12.2.111
- Niedhammer, I., Goldberg, M., Leclerc, A., Bugel, I., & David, S. (1998). Psychosocial factors at work and subsequent depressive symptoms in the Gazel cohort. *Scandinavian Journal of Work, Environment & Health*, 197-205. doi:10.5271/sjweh.299
- Nielsen, M. L., Kristensen, T. S., & Smith-Hansen, L. (2002). The Intervention Project on Absence and Well-being (IPAW): design and results from the baseline of a 5-year study. *Work & Stress*, 16(3), 191-206. doi: 10.1080/02678370210164003
- Nieuwenhuijsen, K., Bruinvels, D., & Frings-Dresen, M. (2010). Psychosocial work environment and stress-related disorders, a systematic review. *Occupational Medicine*, 60(4), 277-286. doi: 10.1093/occmed/kqq081
- Nieuwenhuijsen, K., Verbeek, J. H. A. M., De Boer, A. G. E. M., Blonk, R. W. B., & Van Dijk, F. J. H. (2004). Supervisory behaviour as a predictor of return to work in employees absent from work due to mental health problems. *Occupational and Environmental Medicine*, 61(10), 817-823. doi: 10.1136/oem.2003.009688
- Nieuwenhuijsen, K., Verbeek, J. H. A. M., Siemerink, J. C., & Tummers-Nijssen, D. (2003). Quality of rehabilitation among workers with adjustment disorders according to practice guidelines; a retrospective cohort study. *Occupational and Environmental Medicine*, 60(S1), i21-i25. doi:10.1136/oem.60.suppl_1.i21
- National Institute of Occupational Safety and Health (1999). *Stress at work* (Report No 99-101). Cincinnati, OH: Author.
- Nixon, A. E., Mazzola, J. J., Bauer, J., Krueger, J. R., & Spector, P. E. (2011). Can work make you sick? A meta-analysis of the relationships between job stressors and physical symptoms. *Work & Stress*, 25(1), 1-22. doi:10.1080/02678373.2011.569175

Noblet, A. J., & Rodwell, J. J. (2009). Integrating job stress and social exchange theories to predict employee strain in reformed public sector contexts. *Journal of Public Administration Research and Theory*, 19(3), 555-578. doi: 10.1093/jopart/mun019

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory*. New York: McGraw Hill.

Nyberg, S. T., Fransson, E. I., Heikkilä, K., Ahola, K., Alfredsson, L., Bjorner, J. B., ... & Hamer, M. (2014). Job strain as a risk factor for type 2 diabetes: a pooled analysis of 124,808 men and women. *Diabetes Care*, 37(8), 2268-2275. <http://dx.doi.org/10.2337/dc13-2936>

Nyberg, S. T., Fransson, E. I., Heikkilä, K., Alfredsson, L., Casini, A., Clays, E., ... & Hamer, M. (2013). Job strain and cardiovascular disease risk factors: meta-analysis of individual-participant data from 47,000 men and women. *PLOS One*, 8(6), Article e67323. doi: 10.1371/journal.pone.0067323

Nyberg, S. T., Heikkilä, K., Fransson, E. I., Alfredsson, L., De Bacquer, D., Bjorner, J. B., ... & Clays, E. (2012). Job strain in relation to body mass index: pooled analysis of 160 000 adults from 13 cohort studies. *Journal of Internal Medicine*, 272(1), 65-73. doi: 10.1111/j.1365-2796.2011.02482.x

O'Brien, A., Terry, D. J., & Jimmieson, N. L. (2008). Negative affectivity and responses to work stressors: an experimental study. *Anxiety, Stress, and Coping*, 21(1), 55-83. doi: 10.1080/10615800701529504

Oginska-Bulik, N. (2005). Emotional intelligence in the workplace: exploring its effects on occupational stress and health outcomes in human service workers. *International Journal of Occupational Medicine and Environmental Health*, 18(2), 167-175.

Öhrström, E., Rylander, R., & Björkman, M. (1988). Effects of night time road traffic noise - an overview of laboratory and field studies on noise dose and subjective noise sensitivity. *Journal of Sound and Vibration*, 127(3), 441-448. doi: 10.1016/0022-460X(88)90368-9

Olesen, S. C., Butterworth, P., & Rodgers, B. (2012). Is poor mental health a risk factor for retirement? Findings from a longitudinal population survey. *Social Psychiatry and Psychiatric Epidemiology*, 47(5), 735-744. doi: 10.1007/s00127-011-0375-7

Organisation for Economic Co-operation and Development. (2015). *How's life? 2015: measuring well-being*. Paris: OECD Publishing. http://dx.doi.org/10.1787/how_life-2015-en

Ouwerkerk, J. W., Ellemers, N., & De Gilder, D. (1999). Social identification, affective commitment and individual effort on behalf of the group. In N. Ellemers, R. Spears, & B.J. Doosje (Eds.), *Social identity: Context, commitment, content* (pp.184-204). Oxford, UK: Blackwell.

Pahkin, K., Väänänen, A., Koskinen, A., Bergbom, B., & Kouvonen, A. (2011). Organizational change and employees' mental health: the protective role of sense of coherence. *Journal of Occupational and Environmental Medicine*, 53(2), 118-123. doi: 10.1097/JOM.0b013e318206f0cb.

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(4), 389-416. doi: 10.1002/job.198

Parkes, K. R. (1982). Occupational stress among student nurses: a natural experiment. *Journal of Applied Psychology*, 6, 784-796. <http://dx.doi.org/10.1037/0021-9010.67.6.784>

Parkes, K. R. (1990). Coping, negative affectivity, and the work environment: additive and interactive predictors of mental health. *Journal of Applied Psychology*, 75(4), 399-409. doi: 10.1037/0021-9010.75.4.399

Parslow, R. A., Jorm, A. F., Christensen, H., Broom, D. H., Strazdins, L., & MD'Souza, R. (2004). The impact of employee level and work stress on mental health and GP service use: an analysis of a sample of Australian government employees. *BMC Public Health*, 4(1), 41-50. doi: 10.1186/1471-2458-4-41

Paterniti, S., Niedhammer, I., Lang, T., & Consoli, S. M. (2002). Psychosocial factors at work, personality traits and depressive symptoms. *The British Journal of Psychiatry*, 181(2), 111-117. doi:10.1192/bjp.181.2.111

Patten, S. B., Wang, J. L., Williams, J. V., Lavorato, D. H., Khaled, S. M., & Bulloch, A. G. (2010). Predictors of the longitudinal course of major depression in a Canadian population sample. *The Canadian Journal of Psychiatry*, 55(10), 669-676. doi: 10.1177/070674371005501006

Pelfrene, E., Vlerick, P., Mak, R. P., De Smet, P., Kornitzer, M., & De Backer, G. (2001). Scale reliability and validity of the Karasek's job demand-control-support model in the Belstress study. *Work & Stress*, 15(4), 297-313. doi:10.1080/02678370110086399

Pelletier, K. R., Rodenburg, A., Vinther, A., Chikamoto, Y., King, A. C., & Farquhar, J. W. (1999). Managing job strain: a randomized, controlled trial of an intervention conducted by mail and telephone. *Journal of Occupational and Environmental Medicine*, 41(4), 216-223. doi: 10.4278/0890-1171-12.3.166

Peters, K., Tevichapong, P., Haslam, S. A., & Postmes, T. (2010). Making the organization fly: organizational identification and citizenship in full-service and low-cost airlines. *Journal of Personnel Psychology*, 9(3), 145. doi: 10.1027/1866-5888/a000013

Phinney, J. S. (1992). The multigroup ethnic identity measure a new scale for use with diverse groups. *Journal of Adolescent Research*, 7(2), 156-176. doi: 10.1177/074355489272003

Piccinelli, M., & Wilkinson, G. (2000). Gender differences in depression. *The British Journal of Psychiatry*, 177(6), 486-492. doi: 10.1192/bjp.177.6.486

Plaisier, I., de Bruijn, J. G., de Graaf, R., ten Have, M., Beekman, A. T., & Penninx, B. W. (2007). The contribution of working conditions and social support to the onset of depressive and anxiety disorders among male and female employees. *Social Science & Medicine*, 64(2), 401-410. doi: 10.1016/j.socscimed.2006.09.008

Plaisier, I., de Graaf, R., de Bruijn, J., Smit, J., van Dyck, R., Beekman, A., & Penninx, B. (2012). Depressive and anxiety disorders on-the-job: the importance of job characteristics for good work functioning in persons with depressive and anxiety disorders. *Psychiatry Research*, 200(2), 382-388. doi: 10.1016/j.psychres.2012.07.016

Platow, M. J., Haslam, S. A., Foddy, M., & Grace, D. M. (2003). Leadership as the outcome of self-categorization processes. In D. Van Knippenberg, & M.A. Hogg (Eds.), *Leadership and power: Identity processes in groups and organizations* (pp. 34-47). London: Sage.

Platow, M. J., Voudouris, N. J., Gilford, N., Jamieson, R., Najdovski, L., Papaleo, N., ... & Terry, L. (2007). In-group reassurance in a pain setting produces lower levels of physiological arousal: direct support for a self-categorization analysis of social influence. *European Journal of Social Psychology*, 37(4), 649-660. doi: 10.1002/ejsp.381

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879. doi: 10.1037/0021-9010.88.5.879

Pomaki, G., Maes, S., & ter Doest, L. (2004). Work conditions and employees' self-set goals: goal processes enhance prediction of psychological distress and well-being. *Personality and Social Psychology Bulletin*, 30(6), 685-694. doi: 10.1177/0146167204263970

Postmes, T., Haslam, S. A., & Jans, L. (2013). A single-item measure of social identification: Reliability, validity, and utility. *British Journal of Social Psychology*, 52(4), 597-617. doi: 10.1111/bjso.12006

Pratt, M. G. (1998). To be or not to be? Central questions in organizational identification. In D.A. Whetten & P.C. Godfrey (Eds.), *Identity in Organizations* (pp.171-207). Thousand Oaks, CA: Sage.

Pratt, M. G. (2001). Social identity dynamics in modern organizations: an organizational psychology/organizational behavior perspective. In M.A. Hogg & D.J. Terry (Eds.), *Social Identity Processes in Organizational Contexts* (pp. 13-30). Philadelphia: Psychology Press.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, and Computers*, 36(4), 717-731. doi: 10.3758/BF03206553

PricewaterhouseCoopers. (2010). *Workplace wellness in Australia. Aligning actions with aims: optimizing the benefits of workplace wellness*. Sydney: Author.

PricewaterhouseCoopers. (2014). *Creating a mentally healthy workplace: return on investment analysis*. Retrieved from the Australian Policy Online website <http://apo.org.au/node/39705>

Rantanen, J., Kinnunen, U., Feldt, T., & Pulkkinen, L. (2008). Work–family conflict and psychological well-being: Stability and cross-lagged relations within one-and six-year follow-ups. *Journal of Vocational Behavior*, 73(1), 37-51. doi:10.1016/j.jvb.2008.01.001

Rau, R., Morling, K., & Rösler, U. (2010). Is there a relationship between major depression and both objectively assessed and perceived demands and control? *Work & Stress*, 24(1), 88-106. doi: 10.1080/02678371003661164

Rees, C. S., Breen, L. J., Cusack, L., & Hegney, D. (2015). Understanding individual resilience in the workplace: the international collaboration of workforce resilience model. *Frontiers in Psychology*, 6(Article 73), 1-7. doi: 10.3389/fpsyg.2015.00073

Rehkopf, D. H., Kuper, H., & Marmot, M. G. (2010). Discrepancy between objective and subjective measures of job stress and sickness absence. *Scandinavian Journal of Work, Environment & Health*, 449-457.

Reicher, S., Haslam, S. A., & Hopkins, N. (2005). Social identity and the dynamics of leadership: Leaders and followers as collaborative agents in the transformation of social reality. *The Leadership Quarterly*, 16(4), 547-568. doi:10.1016/j.leaqua.2005.06.007

Reichers, A. E. (1985). A review and reconceptualization of organizational commitment. *Academy of Management Review*, 10(3), 465-476. doi: 10.5465/AMR.1985.4278960

Reysen, S., Katzarska-Miller, I., Nesbit, S. M., & Pierce, L. (2013). Further validation of a single-item measure of social identification. *European Journal of Social Psychology*, 43(6), 463-470. doi: 10.1002/ejsp.1973

Riketta, M. (2005). Organizational identification: a meta-analysis. *Journal of Vocational Behavior*, 66(2), 358-384. doi: 10.1016/j.jvb.2004.05.005

Riketta, M., & Van Dick, R. (2005). Foci of attachment in organizations: a meta-analytic comparison of the strength and correlates of workgroup versus organizational identification and commitment. *Journal of Vocational Behavior*, 67(3), 490-510. doi: 10.1016/j.jvb.2004.06.001

Rizzo, J. R., House, R. J., & Lirtzman, S. I. (1970). Role conflict and ambiguity in complex organizations. *Administrative Science Quarterly*, 150-163. doi: 10.2307/2391486

Robinson, B. E., Flowers, C., & Carroll, J. (2001). Work stress and marriage: a theoretical model examining the relationship between workaholism and marital cohesion. *International Journal of Stress Management*, 8(2), 165-175. doi: 10.1023/A:1009533415030

Rodriguez-Muñoz, A., Sanz-Vergel, A. I., Demerouti, E., & Bakker, A. B. (2012). Reciprocal relationships between job demands, job resources, and recovery opportunities. *Journal of Personnel Psychology*, 11(2), 86-94. doi: 10.1027/1866-5888/a000049

Rodwell, J., & Martin, A. (2013). The importance of the supervisor for the mental health and work attitudes of Australian aged care nurses. *International Psychogeriatrics*, 25(03), 382-389. doi: 10.1017/S1041610212001883

Rosch, P.J. (2001). The quandary of job stress compensation. *Health and Stress: the newsletter of the American Institute of Stress*, 3(1), 1-4.

Rosen, C. C., Chang, C. H., Djurdjevic, E., & Eatough, E. (2010). Occupational stressors and job performance: an updated review and recommendations. In P.L. Perrewé & D.C. Ganster (Eds.), *New Developments in Theoretical and Conceptual Approaches to Job Stress* (pp. 1-60). Bingley, UK: Emerald Group.

Rosenthal, T., & Alter, A. (2012). Occupational stress and hypertension. *Journal of the American Society of Hypertension*, 6(1), 2-22. doi: 10.1016/j.jash.2011.09.002

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs*, 80(1), 1-28. doi: 10.1037/h0092976

Rugulies, R., Bültmann, U., Aust, B., & Burr, H. (2006). Psychosocial work environment and incidence of severe depressive symptoms: prospective findings from a 5-year follow-up of the Danish work environment cohort study. *American Journal of Epidemiology*, 163(10), 877-887. doi: 10.1093/aje/kwj119

Rydstedt, L. W., Devereux, J., & Sverke, M. (2007). Comparing and combining the demand-control-support model and the effort reward imbalance model to predict long-term mental strain. *European Journal of Work and Organizational Psychology*, 16(3), 261-278. doi: 10.1080/13594320601182311.

Rydstedt, L. W., Ferrie, J., & Head, J. (2006). Is there support for curvilinear relationships between psychosocial work characteristics and mental well-being? Cross-sectional and long-term data from the Whitehall II study. *Work & Stress*, 20(1), 6-20. doi: 10.1080/0267837060066811

Rydstedt, L. W., Johnsen, S. Å. K., Lundh, M., & Devereux, J. J. (2013). The conceptual roles of negative and positive affectivity in the stressor-strain relationship. *Europe's Journal of Psychology*, 9(1), 93-103. doi:10.5964/ejop.v9i1.537

Ryland, E., & Greenfield, S. (1991). Work stress and wellbeing: an investigation of Antonovsky's sense of coherence model. *Journal of Social Behavior and Personality*, 6(7), 39-54.

Sacco, W. P., Dumont, C. P., & Dow, M. G. (1993). Attributional, perceptual, and affective responses to depressed and nondepressed marital partners. *Journal of Consulting and Clinical Psychology*, 61(6), 1076-1082. doi: 10.1037//0022-006X.61.6.1076

Sacco, W.P. (1999). A social-cognitive model of interpersonal processes in depression. In T. E. Joiner & J. C. Coyne (Eds.), *The interactional nature of depression: advances in interpersonal approaches* (pp. 329-362). Washington, DC: American Psychological Association.

Safe Work Australia. (2002). *National OHS Strategy 2002-2012*. Retrieved from the Safe Work Australia website
http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/230/NationalOHSSStrategy_2002-2012.pdf

Safe Work Australia (2013). *The incidence of accepted workers' compensation claims for mental stress in Australia*. Retrieved from the Safe Work Australia website <http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/769/The-Incidence-Accepted-WC-Claims-Mental-Stress-Australia.pdf>

Safe Work Australia. (2015). *The cost of work-related injury and illness for Australian employers, workers and the community: 2012-2013*. Retrieved from the Safe Work Australia website <http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/cost-injury-illness-2012-13>

Safe Work Australia. (2016). *Australian Workers' Compensation Statistics, 2013-2014*. Retrieved from the Safe Work Australia website <http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/australian-workers-compensation-statistics-2011-2012> [note that while the URL title date is incorrect it leads to the correct publication]

Sanderson, K., Tilse, E., Nicholson, J., Oldenburg, B., & Graves, N. (2007). Which presenteeism measures are more sensitive to depression and anxiety? *Journal of Affective Disorders*, 101(1), 65-74. doi: 10.1016/j.jad.2006.10.024

Sani, F., Herrera, M., Wakefield, J. R., Boroch, O., & Gulyas, C. (2012). Comparing social contact group identification as predictors of mental health. *British Journal of Social Psychology*, 51(4), 781-790. doi: 10.1111/j.2044-8309.2012.02101.x

Sanne, B., Mykletun, A., Dahl, A. A., Moen, B. E., & Tell, G. S. (2005). Testing the job demand-control-support model with anxiety and depression as outcomes: the Hordaland Health Study. *Occupational Medicine*, 55(6), 463-473. doi: 10.1093/occmed/kqi071

Sartorius, N., Üstün, T. B., Lecrubier, Y., & Wittchen, H. U. (1996). Depression comorbid with anxiety: results from the WHO study on psychological disorders in primary health care. *The British Journal of Psychiatry (Supplement)*, 30, 38-43.

Schaefer, J. A., & Moos, R. H. (1996). Effects of work stressors and work climate on long-term care staff's job morale and functioning. *Research in Nursing & Health*, 19(1), 63-73. doi: 10.1002/(SICI)1098-240X(199602)19:1<63::AID-NUR7>3.0.CO;2-J

Schaubroeck, J., & Green, S. G. (1989). Confirmatory factor analytic procedures for assessing change during organizational entry. *Journal of Applied Psychology*, 74(6), 892. doi: 10.1037/0021-9010.74.6.892

Schaubroeck, J., Ganster, D. C., & Fox, M. L. (1992). Dispositional affect and work-related stress. *Journal of Applied Psychology*, 77(3), 322-325. doi:10.1037/0021-9010.77.3.322

Schmader, T. (2002). Gender identification moderates stereotype threat effects on women's math performance. *Journal of Experimental Social Psychology*, 38(2), 194-201. doi: 10.1006/jesp.2001.1500

Schmidt, W. C. (1997). World-Wide Web survey research made easy with WWW Survey Assistant. *Behavior Research Methods*, 29(2), 303-304. doi: 10.3758/BF03204832

Schneider, B., Ehrhart, M. G., & Macey, W. H. (2013). Organizational climate and culture. *Annual Review of Psychology*, 64, 361-388. doi: 10.1146/annurev-psych-113011-143809

Schonfeld, I. S. (1992). A longitudinal study of occupational stressors and depressive symptoms in first-year female teachers. *Teaching and Teacher Education*, 8(2), 151-158. doi: 10.1016/0742-051X(92)90005-N

Schuler, R. S. (1980). Definition and conceptualization of stress in organizations. *Organizational behavior and human performance*, 25(2), 184-215. doi: 10.1016/0030-5073(80)90063-X

Schwarzer, R., & Hallum, S. (2008). Perceived teacher self-efficacy as a predictor of job stress and burnout: Mediation analyses. *Applied Psychology*, 57(s1), 152-171. doi: 10.1111/j.1464-0597.2008.00359.x

Schwarzer, R., & Leppin, A. (1989). Social support and health: a meta-analysis. *Psychology and Health*, 3(1), 1-15. doi:10.1080/08870448908400361

Scott, R., & Howard, A. (1970). Models of stress. In S. Levine & N.A. Scotch (Eds.), *Social Stress* (pp. 259-278). Chicago: Aldine.

Segerstrom, S. C., & Miller, G. E. (2004). Psychological stress and the human immune system: a meta-analytic study of 30 years of inquiry. *Psychological Bulletin*, 130(4), 601-630. doi: 10.1037/0033-2909.130.4.601

Seligman, M. E. (1975). *Helplessness: on depression, development, and death*. San Francisco: W.H Freeman.

Selye, H. (1936). A syndrome produced by diverse nocuous agents. *Nature*, 138(3479), 32-32. doi:10.1038/138032a0

Selye, H. (1950). Stress and the general adaptation syndrome. *British Medical Journal*, 1(4667), 1383-1392. <http://dx.doi.org/10.1136/bmj.1.4667.1383>

Selye, H. (1956). *The stress of life*. New York: McGraw Hill.

Selye, H. (1975). *Stress without distress*. New York: Lippencott and Crowell.

Shain, M., & Kramer, D. M. (2004). Health promotion in the workplace: framing the concept; reviewing the evidence. *Occupational and Environmental Medicine*, 61(7), 643-648. doi:10.1136/oem.2004.013193

Shea, T. L., Tennant, A., & Pallant, J. F. (2009). Rasch model analysis of the Depression, Anxiety and Stress Scales (DASS). *BMC Psychiatry*, 9(1), 21-31. doi: 10.1186/1471-244X-9-21

Shields, M. (1999). Long working hours and health [1994-1997 data]. *Health Reports*, 11(2), 33-48.

Shields, M. (2006). Stress and depression in the employed population. *Health Reports*, 17(4), 11-29.

Siegrist, J. (1996). Adverse health effects of high-effort/low-reward conditions. *Journal of Occupational Health Psychology*, 1(1), 27-41. doi: 10.1037//1076-8998.1.1.27

Siegrist, J. (1998). Adverse health effects of effort-reward imbalance at work: theory, empirical support and implications for prevention. In C.L. Cooper (Ed.), *Theories of Organizational Stress* (pp. 190-204). Oxford: Oxford University Press.

Siegrist, J., Wahrendorf, M., Von Dem Knesebeck, O., Jürges, H., & Börsch-Supan, A. (2007). Quality of work, well-being, and intended early retirement of older employees-baseline results from the SHARE Study. *The European Journal of Public Health*, 17(1), 62-68. doi: 10.1093/eurpub/ckl084

Silverstein, B. (1999). Gender difference in the prevalence of clinical depression: the role played by depression associated with somatic symptoms. *American Journal of Psychiatry*, 156(3), 480-482. doi: 10.1176/ajp.156.3.480

Sinclair, S. J., Siefert, C. J., Slavin-Mulford, J. M., Stein, M. B., Renna, M., & Blais, M. A. (2012). Psychometric evaluation and normative data for the depression, anxiety, and stress scales-21 (DASS-21) in a nonclinical sample of US adults. *Evaluation & the Health Professions*, 35(3), 259-279. doi: 10.1177/0163278711424282

Sinokki, M., Hinkka, K., Ahola, K., Koskinen, S., Kivimäki, M., Honkonen, T., ... & Virtanen, M. (2009). The association of social support at work and in private life with mental health and antidepressant use: the Health 2000 Study. *Journal of Affective Disorders*, 115(1), 36-45. doi: 10.1016/j.jad.2008.07.009

Slade, T., Johnston, A., Oakley Browne, M. A., Andrews, G., & Whiteford, H. (2009). 2007 National Survey of Mental Health and Wellbeing: methods and key findings. *Australian and New Zealand Journal of Psychiatry*, 43(7), 594-605. doi: 10.1080/00048670902970882

Small, S. A., & Riley, D. (1990). Toward a multidimensional assessment of work spillover into family life. *Journal of Marriage and the Family*, 51-61. doi: 10.2307/352837

Smith, E. R., Murphy, J., & Coats, S. (1999). Attachment to groups: theory and measurement. *Journal of Personality and Social Psychology*, 77, 94-110. doi: 10.1037//0022-3514.77.1.94

Smith, L. G., Amiot, C. E., Callan, V. J., Terry, D. J., & Smith, J. R. (2012). Getting new staff to stay: the mediating role of organizational identification. *British Journal of Management*, 23(1), 45-64. doi:10.1111/j.1467-8551.2010.00728.x

Smith, P. M., & Bielecky, A. (2012). The impact of changes in job strain and its components on the risk of depression. *American Journal of Public Health, 102*(2), 352-358. doi: 10.2105/AJPH.2011.300376

Smithson, M., & Merkle, E. C. (2013). *Generalized linear models for categorical and continuous limited dependent variables*. Florida: CRC Press.

Smithson, M., & Verkuilen, J. (2006). A better lemon squeezer? Maximum-likelihood regression with beta-distributed dependent variables. *Psychological Methods, 11*(1), 54-71. doi: 10.1037/1082-989X.11.1.54

Söderfeldt, M., Söderfeldt, B., Ohlson, C. G., Theorell, T., & Jones, I. (2000). The impact of sense of coherence and high-demand/low-control job environment on self-reported health, burnout and psychophysiological stress indicators. *Work & Stress, 14*(1), 1-15. doi: 10.1080/026783700417195

Sonnentag, S. & Frese, M. (2003). Stress in organizations. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Comprehensive handbook of psychology, Volume 12: industrial and organizational psychology* (pp. 453-491). Hoboken: Wiley.

Sparks, K., & Cooper, C. L. (1999). Occupational differences in the work-strain relationship: towards the use of situation-specific models. *Journal of Occupational and Organizational Psychology, 72*(2), 219-229. doi: 10.1348/096317999166617

Sparks, K., Cooper, C., Fried, Y., & Shirom, A. (1997). The effects of hours of work on health: a meta-analytic review. *Journal of Occupational and Organizational psychology, 70*(4), 391-408. doi: 10.1111/j.2044-8325.1997.tb00656.x

Spector, P. E. (1988). Development of the work locus of control scale. *Journal of Occupational Psychology, 61*(4), 335-340. doi: 10.1111/j.2044-8325.1988.tb00470.x

Spector, P. E. (1988). Development of the work locus of control scale. *Journal of Occupational Psychology, 61*(4), 335-340. doi: 10.1111/j.2044-8325.1988.tb00470.x

Spector, P. E. (2006). Method variance in organizational research truth or urban legend? *Organizational Research Methods, 9*(2), 221-232. doi: 10.1177/1094428105284955

Spector, P. E., Chen, P. Y., & O'Connell, B. J. (2000). A longitudinal study of relations between job stressors and job strains while controlling for prior negative affectivity and strains. *Journal of Applied psychology*, 85(2), 211. doi: 10.1037//0021-9010.85.2.211

Spector, P. E., Zapf, D., Chen, P. Y., & Frese, M. (2000). Why negative affectivity should not be controlled in job stress research: don't throw out the baby with the bath water. *Journal of Organizational Behavior*, 21(1), 79-95. doi: 10.1002/(SICI)1099-1379(200002)21:1<79::AID-JOB964>3.0.CO;2-G

Spencer, S. J., Steele, C. M., & Quinn, D. M. (1999). Stereotype threat and women's math performance. *Journal of Experimental Social Psychology*, 35(1), 4-28. doi: 10.1177/0146167203029006010

Spijker, J., de Graaf, R., Bijl, R. V., Beekman, A. T., Ormel, J., & Nolen, W. A. (2004). Determinants of persistence of major depressive episodes in the general population. Results from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Journal of Affective Disorders*, 81(3), 231-240. doi: 10.1016/j.jad.2003.08.005

Stansfeld, S. A., & Candy, B. (2006). Psychosocial work environment and mental health-a meta-analytic review. *Scandinavian Journal of Work, Environment & Health*, 32(6), 443-462. doi:10.5271/sjweh.1050

Stansfeld, S. A., Clark, C., Caldwell, T., Rodgers, B., & Power, C. (2008). Psychosocial work characteristics and anxiety and depressive disorders in midlife: the effects of prior psychological distress. *Occupational and Environmental Medicine*, 65(9), 634-642. doi: 10.1136/oem.2007.036640.

Stansfeld, S. A., Fuhrer, R., Shipley, M. J., & Marmot, M. G. (1999). Work characteristics predict psychiatric disorder: prospective results from the Whitehall II Study. *Occupational and Environmental Medicine*, 56(5), 302-307. doi:10.1136/oem.56.5.302

Stansfeld, S. A., Haines, M. M., Burr, M., Berry, B., & Lercher, P. (2000). A review of environmental noise and mental health. *Noise and Health*, 2(8), 1-8.

Stansfeld, S. A., Head, J., Fuhrer, R., Wardle, J., & Cattell, V. (2003). Social inequalities in depressive symptoms and physical functioning in the Whitehall II study: exploring a common cause explanation. *Journal of Epidemiology and Community Health*, 57(5), 361-367. doi: 10.1136/jech.57.5.36

Stansfeld, S. A., Head, J., & Marmot, M. G. (1997). Explaining social class differences in depression and well-being. *Social Psychiatry and Psychiatric Epidemiology*, 33(1), 1-9. doi: 10.1007/s001270050014

Stansfeld, S. A., & Matheson, M. P. (2003). Noise pollution: non-auditory effects on health. *British Medical Bulletin*, 68(1), 243-257. doi: 10.1093/bmb/ldg033

Stansfeld, S. A., Shipley, M. J., Head, J., & Fuhrer, R. (2012). Repeated job strain and the risk of depression: longitudinal analyses from the Whitehall II study. *American Journal of Public Health*, 102(12), 2360-2366. doi: 10.2105/AJPH.2011.300589

Stanton, A. L., Revenson, T. A., & Tennen, H. (2007). Health psychology: psychological adjustment to chronic disease. *Annual Review of Psychology*, 58, 565-592. doi: 10.1146/annurev.psych.58.110405.085615

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, 69(5), 797-811. doi: 10.1037/0022-3514.69.5.797

Steer, R. A., Beck, A. T., & Brown, G. (1989). Sex differences on the revised Beck Depression Inventory for outpatients with affective disorders. *Journal of Personality Assessment*, 53(4), 693-702. doi: 10.1207/s15327752jpa5304_6

Steffens, N. K., Haslam, S. A., Reicher, S. D., Platow, M. J., Fransen, K., Yang, J., ... & Boen, F. (2014). Leadership as social identity management: introducing the Identity Leadership Inventory (ILI) to assess and validate a four-dimensional model. *The Leadership Quarterly*, 25(5), 1001-1024. doi:10.1016/j.leaqua.2014.05.002

Steger, M. F., & Kashdan, T. B. (2009). Depression and everyday social activity, belonging, and well-being. *Journal of Counseling Psychology*, 56(2), 289-300. doi: 10.1037/a0015416

Stein, M. B., Cox, B. J., Afifi, T. O., Belik, S. L., & Sareen, J. (2006). Does co-morbid depressive illness magnify the impact of chronic physical illness? A population-based perspective. *Psychological Medicine*, 36(05), 587-596. doi: 10.1017/S0033291706007239

Step toe, A., Feldman, P. J., Kunz, S., Owen, N., Willemssen, G., & Marmot, M. (2002). Stress responsivity and socioeconomic status. A mechanism for increased cardiovascular disease risk? *European Heart Journal*, 23(22), 1757-1763. doi: 10.1053/eurhj.2001.3233

Step toe, A., & Kivimäki, M. (2012). Stress and cardiovascular disease. *Nature Reviews Cardiology*, 9(6), 360-370. doi:10.1038/nrcardio.2012.45

Step toe, A., & Marmot, M. (2002). The role of psychobiological pathways in socioeconomic inequalities in cardiovascular disease risk. *European Heart Journal*, 23(1), 13-25. doi:10.1053/eurhj.2001.2611

Stewart, W. F., Ricci, J. A., Chee, E., Hahn, S. R., & Morganstein, D. (2003). Cost of lost productive work time among US workers with depression. *JAMA*, 289(23), 3135-3144. doi: 10.1001/jama.289.23.3135

Stice, E., Ragan, J., & Randall, P. (2004). Prospective relations between social support and depression: differential direction of effects for parent and peer support? *Journal of Abnormal Psychology*, 113(1), 155-159. doi: 10.1037/0021-843X.113.1.155

Stoetzer, U., Ahlberg, G., Johansson, G., Bergman, P., Hallsten, L., Forsell, Y., & Lundberg, I. (2009). Problematic interpersonal relationships at work and depression: a Swedish prospective cohort study. *Journal of Occupational Health*, 51(2), 144-151. doi: 10.1539/joh.L8134

Stommel, M., Given, B. A., Given, C. W., Kalaian, H. A., Schulz, R., & McCorkle, R. (1993). Gender bias in the measurement properties of the Center for Epidemiologic Studies

Depression Scale (CES-D). *Psychiatry Research*, 49(3), 239-250. doi: 10.1016/0165-1781(93)90064-N

Stone, J. (2002). Battling doubt by avoiding practice: the effects of stereotype threat on self-handicapping in white athletes. *Personality and Social Psychology Bulletin*, 28(12), 1667-1678. doi: 10.1177/014616702237648

Stone, J., Lynch, C. I., Sjomeling, M., & Darley, J. M. (1999). Stereotype threat effects on black and white athletic performance. *Journal of Personality and Social Psychology*, 77(6), 1213. doi: 10.1037/0022-3514.77.6.1213

Stone, J., Perry, W., & Darley, J. M. (1997). "White Men Can't Jump": evidence for the Perceptual Confirmation of Racial Stereotypes Following a Basketball Game. *Basic and Applied Social Psychology*, 19(3), 291-306. doi: 10.1207/s15324834basps1903_2

Story, L. B., & Repetti, R. (2006). Daily occupational stressors and marital behavior. *Journal of Family Psychology*, 20(4), 690-700. doi:10.1037/0893-3200.20.4.690

Strazdins, L., D'Souza, R. M., Clements, M., Broom, D. H., Rodgers, B., & Berry, H. L. (2011). Could better jobs improve mental health? A prospective study of change in work conditions and mental health in mid-aged adults. *Journal of Epidemiology and Community Health*, 65(6), 529-534. doi:10.1136/jech.2009.093732

Strazdins, L., D'Souza, R. M., L-Y Lim, L., Broom, D. H., & Rodgers, B. (2004). Job strain, job insecurity, and health: rethinking the relationship. *Journal of Occupational Health Psychology*, 9(4), 296-305. doi: 10.1037/1076-8998.9.4.296

Streiner, D. L. (2003). Starting at the beginning: an introduction to coefficient alpha and internal consistency. *Journal of Personality Assessment*, 80(1), 99-103. doi:10.1207/S15327752JPA8001_18

Stroup, D. F., Berlin, J. A., Morton, S. C., Olkin, I., Williamson, G. D., Rennie, D., ... & Thacker, S. B. (2000). Meta-analysis of observational studies in epidemiology: a proposal for reporting. *JAMA*, 283(15), 2008-2012. doi:10.1001/jama.283.15.2008

Sundbom, L. (1971). *Work site conditions for the working population*. Stockholm, Sweden: Lågkingomstutredningen, Allamämanna Förlaget.

Sverke, M., Hellgren, J., & Näswall, K. (2002). No security: a meta-analysis and review of job insecurity and its consequences. *Journal of Occupational Health Psychology*, 7(3), 242-264. doi: 10.1037/1076-8998.7.3.242

Swedish Government Communication. (2015). *A work environment strategy for modern working life 2016–2020* (Report No. 2015/16:80). Retrieved from the Swedish Government website <http://www.government.se/contentassets/95678f8dfcea4ece916e5b7950f2260f/a-work-environment-strategy-for-modern-working-life-20162020>

Swedish Work Authority (2015). *The Swedish Work Environment Authority: provisions and general recommendations on organisational and social work environment*. Retrieved from the Swedish Work Environment Authority website http://www.ucrs.uu.se/digitalAssets/31/31330_1organisational-and-social-work-environment-afs2015-4.pdf

Swendsen, J. D., & Merikangas, K. R. (2000). The comorbidity of depression and substance use disorders. *Clinical Psychology Review*, 20(2), 173-189. doi:10.1016/S0272-7358(99)00026-4

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Allyn & Bacon.

Tajfel, H. (1972). Some developments in European social psychology. *European Journal of Social Psychology*, 2(3), 307-321. doi: 10.1002/ejsp.2420020307

Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W.G. Austin, & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp.33-37). Monterey, CA: Brooks/Cole.

Takaki, J., Taniguchi, T., Fukuoka, E., Fujii, Y., Tsutsumi, A., Nakajima, K., & Hirokawa, K. (2010). Workplace bullying could play important roles in the relationships between job strain and symptoms of depression and sleep disturbance. *Journal of Occupational Health*, 52(6), 367-374. doi: 10.1539/joh.L1008

Tan, L., Wang, M. J., Modini, M., Joyce, S., Mykletun, A., Christensen, H., & Harvey, S. B. (2014). Preventing the development of depression at work: a systematic review and meta-analysis of universal interventions in the workplace. *BMC Medicine*, 12(1), 74-85. doi:10.1186/1741-7015-12-74

Tang, K. (2014). A reciprocal interplay between psychosocial job stressors and worker well-being? A systematic review of the “reversed” effect. *Scandinavian Journal of Work, Environment, & Health*, 40(5), 441-445. doi: 10.5271/sjweh.3431

Taris, T. W. (2006). Bricks without clay: on urban myths in occupational health psychology. *Work & Stress*, 20(2), 99-104. doi: 10.1080/02678370600893410

Teasdale, J. D., Segal, Z. V., Williams, J. M. G., Ridgeway, V. A., Soulsby, J. M., & Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology*, 68(4), 615-623. doi: 10.1037//0022-006X.68.4.615

Tennant, C. (2001). Work-related stress and depressive disorders. *Journal of Psychosomatic Research*, 51(5), 697-704. doi: 10.1016/S0022-3999(01)00255-0

Tennant, C. (2002). Life events, stress and depression: a review of recent findings. *Australian and New Zealand Journal of Psychiatry*, 36(2), 173-182. doi: 10.1046/j.1440-1614.2002.01007.x

The Australian Safety and Compensation Council. (2005). *Work-related mental disorders in Australia*. Retrieved from the Safe Work Australia website http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/416/Workrelated_Mental_Disorders_Australia.pdf

Theorell, T. (1976). Selected illnesses and somatic factors in relation to two psychosocial stress indices- a prospective study on middle-aged construction building workers. *Journal of Psychosomatic Research*, 20(1), 7-20. doi: 10.1016/0022-3999(76)90095-7

Theorell, T. (2003). To be able to exert control over one's own situation: a necessary condition for coping with stressors. In J.C. Quick & L.E. Tetrick (Eds.), *Handbook of*

Occupational Health Psychology (pp.201-219). Washington: American Psychological Association.

Theorell, T. (2007). Psychosocial factors in research on work conditions and health in Sweden. *Scandinavian Journal of Work, Environment & Health*, 33(S1), 20-26.

Theorell, T., Hammarström, A., Aronsson, G., Bendz, L. T., Grape, T., Hogstedt, C., ... & Hall, C. (2015). A systematic review including meta-analysis of work environment and depressive symptoms. *BMC Public Health*, 15(1), 738-752. doi: 10.1186/s12889-015-1954-4

Thibaut, J. W., & Walker, L. (1975). *Procedural justice: a psychological analysis*. Hillsdale, NJ: L. Erlbaum Associates.

Thielen, K., Nygaard, E., Rugulies, R., & Diderichsen, F. (2010). Job stress and the use of antidepressant medicine: a 3.5-year follow-up study among Danish employees. *Occupational and Environmental Medicine*, 68(3), 205-210. doi: 10.1136/oem.2010.057943

Thoits, P. A. (2011). Mechanisms linking social ties and support to physical and mental. *Journal of Health and Social Behavior*, 52(2), 145-161. doi: 10.1177/0022146510395592

Thompson, S. (1996). Non-auditory health effects of noise: updated review. In *Proceedings of Inter-Noise* (pp. 2177-2182). Liverpool, UK: Institute of Acoustics.

Toker, S., Shirom, A., Melamed, S., & Armon, G. (2012). Work characteristics as predictors of diabetes incidence among apparently healthy employees. *Journal of Occupational Health Psychology*, 17(3), 259-267. doi: 10.1037/a0028401

Tokuyama, M., Nakao, K., Seto, M., Watanabe, A., & Takeda, M. (2003). Predictors of first-onset major depressive episodes among white-collar workers. *Psychiatry and Clinical Neurosciences*, 57(5), 523-531. doi: 10.1046/j.1440-1819.2003.01158.x

Toohey, J. (1993). Quality of working life project: report on the study of occupational stress in Commonwealth Government employment. In *Proceedings of The Second National Rehabilitation Conference* (pp.312-325). Sydney: CRS.

Totterdell, P., Wood, S., & Wall, T. (2006). An intra-individual test of the demands-control model: a weekly diary study of psychological strain in portfolio workers. *Journal of Occupational and Organizational Psychology*, 79(1), 63-84. doi: 10.1348/096317905X52616

Trubshaw, E. A., & Dollard, M. F. (2001). Representation of work stress in an Australian public hospital. A case study. *AAOHN journal: official journal of the American Association of Occupational Health Nurses*, 49(9), 437-444. doi: 10.1177/216507990104900907

Tsutsumi, A., Kayaba, K., Theorell, T., & Siegrist, J. (2001). Association between job stress and depression among Japanese employees threatened by job loss in a comparison between two complementary job-stress models. *Scandinavian Journal of Work, Environment & Health*, 146-153. doi:10.5271/sjweh.602

Tucker, J. S., Sinclair, R. R., Mohr, C. D., Adler, A. B., Thomas, J. L., & Salvi, A. D. (2009). Stress and counterproductive work behavior: Multiple relationships between demands, control, and soldier indiscipline over time. *Journal of Occupational Health Psychology*, 14(3), 257-271. doi: 10.1037/a0014951.

Turner, J. C. (1991). *Social influence*. Belmont, CA: Wadsworth Publishing.

Turner, J. C. (2005). Explaining the nature of power: a three-process theory. *European Journal of Social Psychology*, 35(1), 1-22. doi: 10.1002/ejsp.244

Turner, J. C., & Haslam, S. A. (2001). Social identity, organizations, and leadership. In M.E. Turner (Ed.), *Groups at work: Advances in theory and research* (pp. 25-65). Hillsdale, NJ: Erlbaum.

Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. (1987). *Rediscovering the social group: a self-categorization theory*. Oxford: Blackwell.

Turner, J. C., Oakes, P. J., Haslam, S. A., & McGarty, C. (1994). Self and collective: cognition and social context. *Personality and Social Psychology Bulletin*, 20(5), 454-454. doi: 10.1177/0146167294205002

Tyler, T. R., & Blader, S. L. (2000). *Cooperation in groups: procedural justice, social identity, and behavioral engagement*. Philadelphia: Psychology Press.

Tyler, T. R., & Blader, S. L. (2001). Identity and cooperative behavior in groups. *Group Processes and Intergroup Relations*, 4(3), 207-226. doi: 10.1177/1368430201004003003

Tyler, T. R., & Blader, S. L. (2003). The group engagement model: procedural justice, social identity, and cooperative behavior. *Personality and Social Psychology Review*, 7(4), 349-361. doi: 10.1207/S15327957PSPR0704_07

Tyler, T. R., & Lind, E. A. (1992). A relational model of authority in groups. *Advances in Experimental Social Psychology*, 25, 115-191. doi: 10.1016/S0065-2601(08)60283-X

van den Bos, K., & Lind, E. A. (2002). Uncertainty management by means of fairness judgments. *Advances in Experimental Social Psychology*, 34, 1-60. doi: 10.1016/S0065-2601(02)80003-X

van der Doef, M., & Maes, S. (1998). The job demand-control (-support) model and physical health outcomes: a review of the strain and buffer hypotheses. *Psychology and Health*, 13(5), 909-936. doi:10.1080/08870449808407440

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(2), 87-114. doi: 10.1080/026783799296084

van der Kooy, K., van Hout, H., Marwijk, H., Marten, H., Stehouwer, C., & Beekman, A. (2007). Depression and the risk for cardiovascular diseases: systematic review and meta-analysis. *International Journal of Geriatric Psychiatry*, 22(7), 613-626. doi: 10.1002/gps.1723

van Dick, R., & Wagner, U. (2002). Social identification among school teachers: dimensions, foci, and correlates. *European Journal of Work and Organizational Psychology*, 11(2), 129-149. doi: 10.1080/13594320143000889

van Dick, R. & Haslam, S. A. (2012). Stress and well-being in the workplace: support for key propositions from the social identity approach. In J. Jetten, C. Haslam & S. A. Haslam (Eds.), *The Social Cure: Identity, Health, and Well-being* (pp. 175-194). London & New York: Psychology Press.

van Dick, R., Wagner, U., Stellmacher, J., & Christ, O. (2004). The utility of a broader conceptualization of organizational identification: which aspects really matter? *Journal of Occupational and Organizational psychology*, 77(2), 171-191. doi: 10.1348/096317904774202135

van Dyne, L., Jehn, K. A., & Cummings, A. (2002). Differential effects of strain on two forms of work performance: individual employee sales and creativity. *Journal of Organizational Behavior*, 23(1), 57-74. doi: 10.1002/job.127

van Knippenberg, D. (2000). Work motivation and performance: a social identity perspective. *Applied Psychology*, 49(3), 357-371. doi: 10.1111/1464-0597.00020

van Knippenberg, D., & Hogg, M. A. (2003). A social identity model of leadership effectiveness in organizations. *Research in Organizational Behavior*, 25, 243-295. doi: 10.1016/S0191-3085(03)25006-1

van Knippenberg, D., & Schie, E. (2000). Foci and correlates of organizational identification. *Journal of Occupational and Organizational psychology*, 73(2), 137-147. doi: 10.1348/096317900166949

van Melle, J. P., De Jonge, P., Spijkerman, T. A., Tijssen, J. G., Ormel, J., van Veldhuisen, D. J., ... & van Den Berg, M. P. (2004). Prognostic association of depression following myocardial infarction with mortality and cardiovascular events: a meta-analysis. *Psychosomatic Medicine*, 66(6), 814-822. doi: 10.1097/01.psy.0000146294.82810.9c

van Os, J., Park, S. B. G., & Jones, P. B. (2001). Neuroticism, life events and mental health: evidence for person-environment correlation. *The British Journal of Psychiatry*, 178(40), s72-s77. doi: 10.1192/bjp.178.40.s72

van Veelen, R., Otten, S., & Hansen, N. (2013). A personal touch to diversity: self-anchoring increases minority members' identification in a diverse group. *Group Processes & Intergroup Relations*, 16(6), 671-683. doi: 10.1177/1368430212473167

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 & Medicine*, 60(5), 1117-1131. doi: 10.1016/j.socscimed.2004.06.043

van Vegchel, N., de Jonge, J., & Landsbergis, P. A. (2005). Occupational stress in (inter) action: the interplay between job demands and job resources. *Journal of Organizational Behavior*, 26(5), 535-560. doi: 10.1002/job.327

Vandenberg, R. J., & Self, R. M. (1993). Assessing newcomers' changing commitments to the organization during the first 6 months of work. *Journal of Applied Psychology*, 78(4), 557-568. doi: 10.1037/0021-9010.78.4.557

Varca, P. E. (1999). Work stress and customer service delivery. *Journal of Services Marketing*, 13(3), 229-241. doi:10.1108/08876049910273853

Veldhoven, M. V., Jonge, J. D., Broersen, S., Kompier, M., & Meijman, T. (2002). Specific relationships between psychosocial job conditions and job-related stress: a three-level analytic approach. *Work & Stress*, 16(3), 207-228. doi: 10.1080/02678370210166399

Vermeulen, M., & Mustard, C. (2000). Gender differences in job strain, social support at work, and psychological distress. *Journal of Occupational Health Psychology*, 5(4), 428-440. doi: 10.1037//1076-8 998.5.4.428.

Viner, R. (1999). Putting stress in life. Hans Selye and the making of stress theory. *Social Studies of Science*, 29(3), 391-410. doi: 10.1177/030631299029003003

Virtanen, M., Heikkilä, K., Jokela, M., Ferrie, J. E., Batty, G. D., Vahtera, J., & Kivimäki, M. (2012). Long working hours and coronary heart disease: a systematic review and meta-analysis. *American Journal of Epidemiology*, 176(7), 586-596. doi: 10.1093/aje/kws139

Virtanen, M., Stansfeld, S. A., Fuhrer, R., Ferrie, J. E., & Kivimäki, M. (2012). Overtime work as a predictor of major depressive episode: a 5-year follow-up of the Whitehall II study. *PLOS One*, 7(1), Article e30719. doi:10.1371/journal.pone.0030719

Viswesvaran, C., Sanchez, J. I., & Fisher, J. (1999). The role of social support in the process of work stress: a meta-analysis. *Journal of Vocational Behavior*, 54(2), 314-334. doi:10.1006/jvbe.1998.1661

von Elm, E., Altman, D.G., Egger, M., Pocock, S.J., Gøtzsche, P.C., Vandenbroucke, J.P; STROBE Initiative. (2008). The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. *Journal of Clinical Epidemiology*, 61(4), 344-349. doi:10.1016/j.jclinepi.2007.11.008

Waghorn, G., Chant, D., & Lloyd, C. (2006). Labor force activity among Australians with musculoskeletal disorders comorbid with depression and anxiety disorders. *Journal of Occupational Rehabilitation*, 16(2), 235-246. doi: 10.1007/s10926-006-9018-3

Waghorn, G., Chant, D., & Lloyd, C. (2006). Labor force activity among Australians with musculoskeletal disorders comorbid with depression and anxiety disorders. *Journal of Occupational Rehabilitation*, 16(2), 235-246. doi: 10.1007/s10926-006-9018-3

Wainwright, D., & Calnan, M. (2002). *Work stress: the making of a modern epidemic*. Buckingham: Open University Press.

Wang, H. X., Wahlberg, M., Karp, A., Winblad, B., & Fratiglioni, L. (2012). Psychosocial stress at work is associated with increased dementia risk in late life. *Alzheimer's & Dementia*, 8(2), 114-120. doi:10.1016/j.jalz.2011.03.001

Wang, J. (2004). Perceived work stress and major depressive episodes in a population of employed Canadians over 18 years old. *The Journal of Nervous and Mental Disease*, 192(2), 160-163. doi: 10.1097/01.nmd.0000110242.97744.bc

Wang, J. (2005). Work stress as a risk factor for major depressive episode(s). *Psychological Medicine*, 35(6), 865-871. doi: doi: 10.1017/S0033291704003241

Wang, J., Patten, S. B., Currie, S., Sareen, J., & Schmitz, N. (2012a). A population-based longitudinal study on work environmental factors and the risk of major depressive disorder. *American Journal of Epidemiology*, 176(1), 52-59. doi: 10.1093/aje/kwr473

Wang, J., Schmitz, N., Dewa, C., & Stansfeld, S. (2009). Changes in perceived job strain and the risk of major depression: results from a population-based longitudinal study. *American Journal of Epidemiology*, 169(9), 1085-1091. doi: 10.1093/aje/kwp037

Wang, J., Smailes, E., Sareen, J., Schmitz, N., Fick, G., & Patten, S. (2012b). Three job-related stress models and depression: a population-based study. *Social Psychiatry and Psychiatric Epidemiology*, 47(2), 185-193. doi: 10.1007/s00127-011-0340-5

Wang, P. S., Beck, A. L., Berglund, P., McKenas, D. K., Pronk, N. P., Simon, G. E., & Kessler, R. C. (2014). Effects of major depression on moment-in-time work performance. *American Journal of Psychiatry*, 161(10), 1885-1891. doi: 10.1176/aip.161.10.1885

Wardle, J., Chida, Y., Gibson, E. L., Whitaker, K. L., & Steptoe, A. (2011). Stress and adiposity: a meta-analysis of longitudinal studies. *Obesity*, 19(4), 771-778. doi: 10.1038/oby.2010.241

Wardle, J., Steptoe, A., Oliver, G., & Lipsey, Z. (2000). Stress, dietary restraint and food intake. *Journal of Psychosomatic Research*, 48(2), 195-202. doi: 10.1016/S0022-3999(00)00076-3

Warr, P. (1987). *Work, unemployment, and mental health*. New York: Oxford University.

Warr, P. (1990). The measurement of well-being and other aspects of mental health. *Journal of Occupational Psychology*, 63(3), 193-210. doi: 10.1111/j.2044-8325.1990.tb00521.x

Warr, P. (1994). A conceptual framework for the study of work and mental health. *Work & Stress*, 8(2), 84-97. doi:10.1080/02678379408259982

Watson, D., & Clark, L. A. (1984). Negative affectivity: the disposition to experience aversive emotional states. *Psychological Bulletin*, 96(3), 465-490. doi: 10.1037/0033-2909.96.3.465

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063-1070. doi: 10.1037/0022-3514.54.6.1063

Watson, D., Pennebaker, J. W., & Folger, R. (1987). Beyond negative affectivity: measuring stress and satisfaction in the workplace. *Journal of Organizational Behavior Management*, 8(2), 141-158. doi:10.1300/J075v08n02_09

Wegge, J., Jeppesen, H. J., Weber, W. G., Pearce, C. L., Silva, S. A., Pundt, A., ... & Piecha, A. (2011). Promoting work motivation in organizations. *Journal of Personnel Psychology*, 9(4), 154–171. doi: 10.1027/1866-5888/a000025

Wegge, J., Schuh, S. C., & Dick, R. (2012). ‘I feel bad’, ‘We feel good’?- Emotions as a driver for personal and organizational identity and organizational identification as a resource for serving unfriendly customers. *Stress and Health*, 28(2), 123-136. doi: 10.1002/smi.1412.

Weigl, M., Hornung, S., Petru, R., Glaser, J., & Angerer, P. (2012). Depressive symptoms in junior doctors: a follow-up study on work-related determinants. *International Archives of Occupational and Environmental Health*, 85(5), 559-570. doi: 10.1007/s00420-011-0706-8

Weissman, M. M., Bland, R. C., Canino, G. J., Faravelli, C., Greenwald, S., Hwu, H. G., ... & Lépine, J. P. (1996). Cross-national epidemiology of major depression and bipolar disorder. *JAMA*, 276(4), 293-299. doi:10.1001/jama.1996.03540040037030

Wethington, E., Glanz, K., & Schwartz, M. D. (2015). Stress, coping, and health behavior. In K. Glanz, B.K. Rimer, & K. Viswanath (Eds.), *Health behavior: theory, research, and practice* (pp. 223-242). San Francisco, CA: Wiley.

Whitehead, W. E., Palsson, O., & Jones, K. R. (2002). Systematic review of the comorbidity of irritable bowel syndrome with other disorders: what are the causes and implications? *Gastroenterology*, 122(4), 1140-1156. doi: 10.1053/gast.2002.32392

Wieclaw, J., Agerbo, E., Mortensen, P. B., Burr, H., Tuchsén, F., & Bonde, J. P. (2008). Psychosocial working conditions and the risk of depression and anxiety disorders in the Danish workforce. *BMC Public Health*, 8(1), 280-289. doi:10.1186/1471-2458-8-280

Wiley, M. G. (1991). Gender, work, and stress: the potential impact of role-identity salience and commitment. *The Sociological Quarterly*, 32(4), 495-510. doi: 10.1111/j.1533-8525.1991.tb00150.x

Wilmot, E. G., Edwardson, C. L., Achana, F. A., Davies, M. J., Gorely, T., Gray, L. J., ... & Biddle, S. J. (2012). Sedentary time in adults and the association with diabetes, cardiovascular disease and death: systematic review and meta-analysis. *Diabetologia*, 55(11), 2895-2905. doi: 10.1007/s00125-012-2677-z.

Wit, A. P., & Wilke, H. A. (1992). The effect of social categorization on cooperation in three types of social dilemmas. *Journal of Economic Psychology*, 13(1), 135-151. doi:10.1016/0167-4870(92)90056-D

Wolever, R. Q., Bobinet, K. J., McCabe, K., Mackenzie, E. R., Fekete, E., Kusnick, C. A., & Baime, M. (2012). Effective and viable mind-body stress reduction in the workplace: a randomized controlled trial. *Journal of Occupational Health Psychology*, 17(2), 246-258. doi: 10.1037/a0027278

Wright, B. J. (2008). Comparing the job strain and job demand-control-support models in direct-care disability workers: support for support. *Journal of Occupational and Environmental Medicine*, 50(3), 316-323. doi: 10.1097/JOM.0b013e31815f2523.

WorkCover NSW & Australian Psychological Society. (2013). *Workcover NSW Psychologists' and Counsellors' Training Workbook*. Presented by T. O'Neill, & A. Levine. North Ryde, Sydney.

World Health Organization. (2007). Raising awareness of stress at work in developing countries (Protecting workers health series No. 6). Geneva, Switzerland: Author.

World Health Organization. (2008). *The global burden of disease: 2004 update*. Geneva, Switzerland: Author.

Work Health and Safety Act. (2011). Retrieved from the Australian Government Register of Legislation website <https://www.legislation.gov.au/Series/C2011A00137>

Work Health and Safety Act Regulations. (2011). Retrieved from the Australian Government Register of Legislation website <https://www.legislation.gov.au/Series/F2011L02664>

Wu, W., & Weaver, D. (1997). On-line democracy or on-line demagoguery? Public opinion “polls” on the Internet. *The Harvard International Journal of Press/Politics*, 2(4), 71-86. doi: 10.1177/1081180X97002004006

Wulsin, L. R., & Singal, B. M. (2003). Do depressive symptoms increase the risk for the onset of coronary disease? A systematic quantitative review. *Psychosomatic Medicine*, 65(2), 201-210. doi: 10.1097/01.PSY.0000058371.50240.E3

Yang, L.Q., Levine, E.L., Xu, X., & Lopez-Rivas, G.E. (2009). Surveying via the net vs. hard copy: a cautionary note. *Ergometrika*, 6(1), 20-39.

Yang, X., Telama, R., Hirvensalo, M., Hintsanen, M., Hintsu, T., Pulkki-Råback, L., ... & Raitakari, O. T. (2012). Moderating effects of leisure-time physical activity on the association between job strain and depressive symptoms: the Cardiovascular Risk in Young Finns Study. *Journal of Occupational and Environmental Medicine*, 54(3), 303-309. doi: 10.1097/JOM.0b013e318240df39

Ylipaavalniemi, J., Kivimäki, M., Elovainio, M., Virtanen, M., Keltikangas-Järvinen, L., & Vahtera, J. (2005). Psychosocial work characteristics and incidence of newly diagnosed depression: a prospective cohort study of three different models. *Social Science & Medicine*, 61(1), 111-122. doi: 10.1016/j.socscimed.2004.11.038

Young, M. A., Scheftner, W. A., Fawcett, J., & Klerman, G. L. (1990). Gender differences in the clinical features of unipolar major depressive disorder. *The Journal of Nervous and Mental Disease*, 178(3), 200-203. doi: 10.1097/NMD.0b013e3181594cb7

Young, W.C. & Budynas, R.G. (2002). *Roark's formulas for stress and strain*. New York: McGraw-Hill.

Yu, S. F., Nakata, A., Gu, G. Z., Swanson, N. G., Zhou, W. H., He, L. H., & Sheng, W. A. N. G. (2013). Co-effect of demand-control-support model and effort-reward imbalance model on depression risk estimation in humans: findings from Henan province of China. *Biomedical and Environmental Sciences*, 26(12), 962-971. doi: 10.3967/bes2013.031

Yurek, L. A., Vasey, J., & Havens, D. S. (2008). The use of subject-generated identification codes in longitudinal research. *Evaluation Review*. doi: 10.1177/0193841X08316676

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), 145-169. doi: 10.1037//1076-8998.1.2.145

Zhang, B., & Wing, Y. K. (2006). Sex differences in insomnia: a meta-analysis. *Sleep*, 29(1), 85-93.

Appendix A: Study 1 Advertisement to Employees

Study Advertisement

The [redacted] has agreed to participate in an important research project being conducted at the Australian National University. Our participation means only that we will advertise the study details and hyperlink of the online questionnaire to our employees. See below for the advertisement. It is your absolute choice to participate in the research. Employees of the Department will not know of your decision to participate, and researchers at the Australian National University will not have access to the personal information of our employees.

Work and Wellbeing Research



Access to the Research Questionnaire

By clicking the hyperlink below you will be directed to the information page of the questionnaire, which contains similar details as presented here. If you decide to participate, click the begin button, otherwise you can withdraw from the study at any time by exiting the questionnaire. In such case your responses will not be submitted.

HYPERLINK TO THE RESEARCH STUDY:

<https://apollo.anu.edu.au/default.asp?pid=3066>

What is the purpose of this Study?

This online research questionnaire intends to advance the understanding of the relationship between work and wellbeing. This knowledge is of current and widespread international interest, and has the potential to provide new direction in the field of occupational psychology. The immediate outcome of this research will form the basis of a PhD thesis in Psychology, but the results may further be published in scientific journals.

What is required from me?

This questionnaire will ask you to comment about work, the value of work, distress and wellbeing. You are not required to provide any identifying information such as your name or workplace. Your workplace will not know your response since once you have successfully submitted the questionnaire your results are collated with others in a large data pool. This questionnaire will take you around 30 minutes to complete.

Why have I been asked to participate?

You are asked to participate because you work in a department which is representative of the Australian public service workforce. Your participation in this study is extremely valuable, however you are not under any obligation from your department or the ANU to begin or complete the questionnaire, and you can withdraw at any time without reason. Also, if you do not want to answer a question, you are not obliged to. However once you have successfully submitted your responses it will not be possible to access or remove them because they directly pool with others.

Who to contact if I have any questions?

If you have any further questions or concerns about the research, feel free to contact either myself, the primary researcher, Suzi Keser, on 6125 2147 or Suzi.Keser@anu.edu.au ; my supervisor, Professor Don Byrne, on (02) 6125 5111 or Don.Byrne@anu.edu.au ; or the ANU Human Research Ethics Committee on (02) 6125 7945 or Human.Ethics.Officer@anu.edu.au. If you are interested in the overall results of this study please contact the primary researcher. Note that because of the anonymous nature of this study, individual feedback can not be given.

Appendix B - Study 1 Work and Well Being Questionnaire



ANUBIS — ANU Polling Online Admin

1 2 3 4 5 6 7

Section 1. Your work

The first set of questions asks you to describe your current work situation.

Please answer each question by checking off the one answer that best describes your work situation. Sometimes none of the answers fit exactly. In such instances, please choose the answer that comes the closest.

Answer each question as it applies to how you feel right NOW in your CURRENT job.

	Strongly DISAGREE	Disagree	Agree	Strongly AGREE
Q1. My job requires that I learn new things	☐	☐	☐	☐
Q2. My job involves a lot of repetitive work	☐	☐	☐	☐
Q3. My job requires me to be creative	☐	☐	☐	☐
Q4. My job allows me to make a lot of decisions on my own	☐	☐	☐	☐
Q5. My job requires a high level of skill or expertise	☐	☐	☐	☐
Q6. On my job, I have very little freedom to decide how I do my work	☐	☐	☐	☐
Q7. I get to do a variety of different things at work	☐	☐	☐	☐
	Strongly DISAGREE	Disagree	Agree	Strongly AGREE
Q8. I have a lot to say about what happens on my job	☐	☐	☐	☐
Q9. I have the opportunity to develop my own abilities	☐	☐	☐	☐
Q10. I am able to get information from others at work when needed	☐	☐	☐	☐
Q11. I am able to influence others in the workplace	☐	☐	☐	☐
Q12. I am able to get along with others at work	☐	☐	☐	☐
Q13. I know how others are involved at work	☐	☐	☐	☐
Q14. I am able to communicate effectively with others at work	☐	☐	☐	☐

The next set of questions asks you to describe what you are like when you are faced with tough work situations.

For each statement, please select the response that best describes how you feel.

	Strongly DISAGREE	Disagree	Agree	Strongly AGREE
Q15. I respond to the workplace in the most appropriate way	☐	☐	☐	☐
Q16. I prevent tough work situations from making me feel bad	☐	☐	☐	☐
Q17. I think about alternative solutions when things don't go my way at work	☐	☐	☐	☐
Q18. I am able to carry on in the way that I think is best	☐	☐	☐	☐
Q19. I maintain self-control when things are tough at work	☐	☐	☐	☐

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Section 2. Control at work

In the previous section you indicated what your work is like and what you are like when you face challenging work situations.

In this section you are asked to indicate how IMPORTANT each of the above factors are for you, in giving you CONTROL at work.

For each statement select the response that best describes how you feel right NOW in your CURRENT job

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Q20. To gain a sense of control at work, it is important that I learn new things	☐	☐	☐	☐	☐
Q21. To gain a sense of control at work, it is important that I don't have a lot of repetitive work	☐	☐	☐	☐	☐
Q22. To gain a sense of control at work, it is important for me to be creative	☐	☐	☐	☐	☐
Q23. To gain a sense of control at work, it is important for me to make a lot of decisions on my own	☐	☐	☐	☐	☐
Q24. To gain a sense of control at work, it is important for me to have a high level of skill/expertise	☐	☐	☐	☐	☐
Q25. To gain a sense of control at work, it is important for me to have freedom to decide how I do my work	☐	☐	☐	☐	☐
Q26. To gain a sense of control at work, it is important that I have a variety of things to do at work	☐	☐	☐	☐	☐
Q27. To gain a sense of control at work, it is important that I have a lot of say about what happens on my job	☐	☐	☐	☐	☐
Q28. To gain a sense of control at work, it is important that I develop my abilities	☐	☐	☐	☐	☐
Q29. To gain a sense of control at work, it is important that I get information from others at work when needed	☐	☐	☐	☐	☐
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Q30. To gain a sense of control at work, it is important that I am able to influence others in the workplace	☐	☐	☐	☐	☐
Q31. To gain a sense of control at work, it is important that I get along with others	☐	☐	☐	☐	☐
Q32. To gain a sense of control at work, it is important that I know how others are involved	☐	☐	☐	☐	☐
Q33. To gain a sense of control at work, it is important for me to communicate effectively with others at work	☐	☐	☐	☐	☐
Q34. To gain a sense of control at work, it is important that I respond appropriately to the workplace	☐	☐	☐	☐	☐
Q35. To gain a sense of control at work, it is important that I prevent stressful work situations from making me feel bad	☐	☐	☐	☐	☐
Q36. To gain a sense of control at work, it is important that I think about alternative solutions when things at work don't go my way	☐	☐	☐	☐	☐

Q37. To gain a sense of control at work, it is important that I carry on in the way that I think is best	☐	☐	☐	☐	☐
Q38. To gain a sense of control at work, it is important that I maintain self-control	☐	☐	☐	☐	☐
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Section 3. Work Support

The next set of questions asks you about the support you receive from others when you are faced with tough work situations.

For each statement, please select the answer that best describes how you feel about the support you receive from your co-workers

Please answer the questions as they relate to how you feel right NOW in your CURRENT job

	Strongly DISAGREE	Disagree	Agree	Strongly AGREE
Q39. My co-workers provide help with my work when needed	☐	☐	☐	☐
Q40. My co-workers are willing to listen to my work-related problems when I need them to	☐	☐	☐	☐
Q41. My co-workers help me feel better when I experience work-related problems	☐	☐	☐	☐
Q42. My co-workers can be relied upon when things get tough at work	☐	☐	☐	☐
Q43. My co-workers are able to provide me the help that I need from them	☐	☐	☐	☐
Q44. It is easy to talk to my co-workers about work problems	☐	☐	☐	☐

For each of the following statements, please select the answer that best describes how you feel about the support you receive from your SUPERVISOR when you are faced with tough work situations.

Q45. Note. If you do not have a supervisor-please indicate this by marking the box below, and proceed to Q.52

☐ I don't have a supervisor

	Strongly DISAGREE	Disagree	Agree	Strongly AGREE
Q46. My supervisor provides help with my work when needed	☐	☐	☐	☐
Q47. My supervisor is willing to listen to my work-related problems when I need them to	☐	☐	☐	☐
Q48. My supervisor helps me feel better when I experience work-related problems	☐	☐	☐	☐
Q49. My supervisor can be relied upon when things get tough at work	☐	☐	☐	☐
Q50. My supervisor is able to provide the help that I need from them	☐	☐	☐	☐
Q51. It is easy to talk to my supervisor about work problems	☐	☐	☐	☐

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Section 4. Work demands

The next set of questions asks you to indicate whether you experience different types of demands at work.

Please answer each question by checking off the one answer that best fits your work situation. Sometimes none of the answers fit exactly. Please choose the answer that comes the closest.

Answer each question as it relates to how you feel right NOW in your CURRENT job.

	Strongly DISAGREE	Disagree	Agree	Strongly AGREE
Q52. My job requires working very fast	☐	☐	☐	☐
Q53. My job requires working very hard	☐	☐	☐	☐
Q54. I am not required to do an excessive amount of work	☐	☐	☐	☐
Q55. I have enough time to get my work done	☐	☐	☐	☐
Q56. At work I am free from conflicting job demands that others make	☐	☐	☐	☐
	Strongly DISAGREE	Disagree	Agree	Strongly AGREE
Q57. I experience difficult personalities at work	☐	☐	☐	☐
Q58. I often experience a clash with the way I and others work	☐	☐	☐	☐
Q59. I experience difficulties getting along with others at work	☐	☐	☐	☐
Q60. I experience conflict with the ideas of others at work	☐	☐	☐	☐
Q61. At work, others often yell at me	☐	☐	☐	☐
Q62. People are often rude to me at work	☐	☐	☐	☐
Q63. People do nasty things to me at work	☐	☐	☐	☐
Q64. I often get into arguments with others at work	☐	☐	☐	☐
	Strongly DISAGREE	Disagree	Agree	Strongly AGREE
Q65. My work requires me to suppress my natural reactions to the work environment	☐	☐	☐	☐
Q66. My job requires me never to lose my temper	☐	☐	☐	☐
Q67. Even at times when I feel very irritated, I am not allowed to show it in any way	☐	☐	☐	☐
Q68. I am never allowed to show impatience at work	☐	☐	☐	☐
Q69. My work requires me to weigh up every word before saying it	☐	☐	☐	☐
Q70. I am never allowed to lose my self-control at work	☐	☐	☐	☐

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Section 5. Importance of Work demands

In the previous section you indicated whether you experienced various work demands.
 In this section you are asked to indicate how important these work demands are to you.

For each statement select the response that best describes how you feel.

Answer each question as it relates to how you feel right NOW in your CURRENT job.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Q71. It is important for me to work very fast	☐	☐	☐	☐	☐
Q72. It is important for me to work very hard	☐	☐	☐	☐	☐
Q73. It is important for me to do an excessive amount of work	☐	☐	☐	☐	☐
Q74. It is important for me to have enough time to get my work done	☐	☐	☐	☐	☐
Q75. It is important that I am free from conflicting job demands that others make	☐	☐	☐	☐	☐
Q76. It is important for me to not experience difficult personalities at work	☐	☐	☐	☐	☐
Q77. It is important for me to not clash with the way others work	☐	☐	☐	☐	☐
Q78. It is important for me to get along with others at work	☐	☐	☐	☐	☐
Q79. It is important for me to be free from conflict with others at work	☐	☐	☐	☐	☐
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Q80. It is important that others don't yell at me at work	☐	☐	☐	☐	☐
Q81. It is important that people are not rude to me at work	☐	☐	☐	☐	☐
Q82. It is important that others don't do nasty things to me at work	☐	☐	☐	☐	☐
Q83. It is important that I don't get into arguments with others at work	☐	☐	☐	☐	☐
Q84. It is important for me never to lose my temper at work	☐	☐	☐	☐	☐
Q85. It is important that I never show that I am irritated at work	☐	☐	☐	☐	☐
Q86. It is important that I never show that I am impatient at work	☐	☐	☐	☐	☐
Q87. It is important for me to weigh out every word before I say things at work	☐	☐	☐	☐	☐
Q88. It is important that I don't lose my self-control at work	☐	☐	☐	☐	☐
Q89. It is important for me to restrain my natural reactions to the work environment	☐	☐	☐	☐	☐

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	enough for me						
Q108.	I rarely live up to my standards	☐	☐	☐	☐	☐	☐
Q109.	Doing my best never seems to be enough	☐	☐	☐	☐	☐	☐
Q110.	I am never satisfied with my accomplishments	☐	☐	☐	☐	☐	☐
Q111.	I often worry about not measuring up to my own expectations	☐	☐	☐	☐	☐	☐
		Strongly Disagree	Disagree	Somewhat Disagree	NEUTRAL	Somewhat Agree	Strongly Agree
Q112.	My performance rarely measures up to my standards	☐	☐	☐	☐	☐	☐
Q113.	I am not satisfied even when I know I have done my best	☐	☐	☐	☐	☐	☐
Q114.	I am seldom able to meet my own standards for performance	☐	☐	☐	☐	☐	☐
Q115.	I am hardly ever satisfied with my performance	☐	☐	☐	☐	☐	☐
Q116.	I hardly ever feel that what I've done is good enough	☐	☐	☐	☐	☐	☐
Q117.	I often feel disappointed after completing a task because I know I could have done better	☐	☐	☐	☐	☐	☐

The next set of questions ask you to indicate how you feel in general, that is how you feel on average.

For each feeling, please select the response that best describes how frequent you experience it on average.

On average I feel:

	Not at all/very slightly	A little	Moderately	Quite a bit	Most of the time
Q118. Irritable	☐	☐	☐	☐	☐
Q119. Guilty	☐	☐	☐	☐	☐
Q120. Ashamed	☐	☐	☐	☐	☐
Q121. Scared	☐	☐	☐	☐	☐
Q122. Nervous	☐	☐	☐	☐	☐
	Not at all/very slightly	A little	Moderately	Quite a bit	Most of the time
Q123. Hostile	☐	☐	☐	☐	☐
Q124. Upset	☐	☐	☐	☐	☐
Q125. Jittery/Tense	☐	☐	☐	☐	☐
Q126. Distressed	☐	☐	☐	☐	☐
Q127. Afraid	☐	☐	☐	☐	☐

The final set of questions are demographics....

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Section 7. General Information

The final set of questions asks you provide some general details about yourself

Q128. What is your gender?

☐ Female ☐ Male

Q129. What is your age?

years

Q130. What is your present relationship status?

- ☐ Married/defacto/partner
☐ Separated/divorced/widowed
☐ Single

Q131. What is your highest level of completed education?

- ☐ Primary School-uncompleted high school
☐ High School
☐ Technical/trade certificate
☐ Diploma
☐ Undergraduate degree
☐ Postgraduate degree
☐ Other, please specify

Q132. How long have you been at your current workplace?

- ☐ Less than 1 year
☐ 1–5 years
☐ 6–10 years
☐ 11–20 years
☐ over 20 years

Q133. Please describe your current job position in as much detail as you would like:

Q134. Please specify how long have you been in your current position:

years

months

Q135. Please specify if you also have supervisory responsibility:

- ☐ Yes
☐ No

Q136. If you have supervisory responsibility, please indicate how many people you directly supervise?

You have reached the end. Your responses will be contributing to scientific knowledge. Thank you.

Appendix C: Study 1 Feedback Report to Workplaces

Work and Well-being



THE AUSTRALIAN NATIONAL UNIVERSITY



Research Report

The participants

ACT government employees
Average age: 42
- range: 18 to 67 years
Well educated:
- 23% post-college qualifications
- 57% University degree
74% female
475 participants

Stress & Depression

Stress and depression are part of our normal reactions.

It is when these reactions are prolonged and intense that they begin to be problematic.

In particular, increased stress is associated with increased risk of depression.

This research examined work factors that were associated with a *reduced* risk of stress and depression.

This report describes the features of the work environment that were associated with a reduced risk of stress and depression. This knowledge informs researchers in understanding how to target these health outcomes earlier.

The degree of stress and depression reported by participants is summarised in Table 1. The majority of participants indicated an absence of or normal levels of stress and depression. Elevated levels of stress were reported by approximately 42% and 34% reported elevated depression.

Health Outcome	Prevalence (%) in each category				
	Normal	Mild	Moderate	Considerable	Excessive
Stress	57.9%	13.3%	12.6%	10.3%	5.9%
Depression	66.3%	9.9%	9.7%	4.2%	9.9%

Table 1. Prevalence of self-reported stress and depression

Please note that elevated scores indicate levels of distress greater than would be expected in the majority of the population, and do not necessarily correspond with a disorder or diagnostic state. Instead, scores toward the higher end on this screening measure simply indicate a higher risk of having clinical levels of stress and depression.

Work Demands

Demands describes the amount of work, whether there is sufficient time to complete tasks and the presence of conflicting demands.

Work Control

Control refers to the opportunity for skill use and development, and a variety of work, together with input and influence over decisions about work tasks.

Work Support

Support from colleagues and supervisors involves both emotional support (listening, venting, understanding) and practical assistance with work tasks.

FUTURE RESEARCH

Stage 2 of this research will determine how individual differences interact with work demands, control and support, so that intervention can be more targeted.

Thank you for supporting ANU research

The work environment, defined in terms of manageable demands and control, and adequate support, was associated with a *reduced risk* of stress and depression.

The risk of depression was reduced as:

- * Control was increased, regardless of the level of work demands
- * Control was increased when employees felt stressed
- * Work demands were moderate, as opposed to being too little or too high
- * Colleague support was increased
- * Stress was reduced

Increased control was the work characteristic most strongly associated with reduced depression risk.

The risk of stress was reduced as:

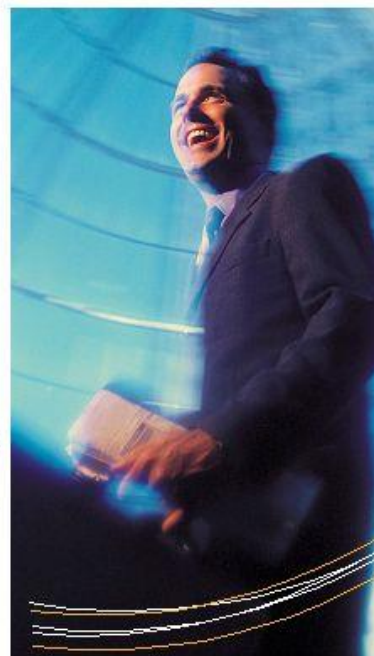
- * Colleague support was increased
- * Supervisor support was increased
- * Work demands were manageable

Manageable demands was the work characteristic most strongly associated with reduced stress risk.

MAIN MESSAGES

The research suggests that the following considerations may protect against stress and/or depression:

- * Increasing colleague support
- * Increasing supervisor support
- * Ensuring that employees have a reasonable work load; not too little and not too much
- * Increasing employee's ability to perform in terms of developing and applying their skills
- * Increasing control at work, particularly when employees feel stressed



Appendix D: Study 2 Online Participant Information Page

INFORMATION PAGE

This questionnaire asks you to select responses that represent your views about work, wellbeing and distress. Your responses will be combined with those of other ANU employees to advance knowledge about Work and Wellbeing. Feedback about overall results will be provided to the ANU Occupational Health and Safety division. You are not asked to provide identifying information such as your name or workplace. You will be asked to create a unique code solely for the researcher to match your responses at the 6-month follow-up. The information you provide will directly transfer into a large data file, held only by the primary researcher. Confidentiality will be ensured as far as the law allows. The results of this inquiry will form the basis of a PhD degree in Clinical Psychology and may also be published in scientific journals or presented at conferences.

This questionnaire will take around 10-15 minutes to complete. You can close the survey and return to it at a later time. Also, you are not required to answer any question that you do not want to answer. The follow-up survey will take approximately 10 minutes. Although your participation is extremely valuable, you can withdraw at any time without reason or penalty, in which case your results automatically do not submit. You are not obliged to begin or complete the questionnaire. If this research distresses you or you want to find out more about distress you can contact your GP or Lifeline on 13 11 14. If you have any further questions about the research, you are welcome to contact either myself, the primary researcher, Suzi Keser, on 6125 8497; the supervisor, Professor Don Byrne, on (02) 6125 5111; or the ANU Human Research Ethics Committee on (02) 6125 7945. If you are interested in the overall results of this study, please contact the primary researcher. Note that because of the anonymous nature of the survey, individual feedback cannot be given.

PRIVACY STATEMENT

Security of the website

Users should be aware that the World Wide Web is an insecure public network that gives rise to a potential risk that a user's transactions are being viewed, intercepted or modified by third parties or that data which the user downloads may contain computer viruses or other defects.

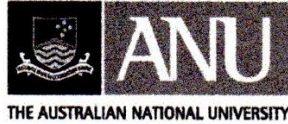
Purpose of data collection

This information is being sought for a research project entitled Work and Wellbeing. The researcher is Suzi Keser, School of Psychology, Building 39, The Australian National University, Ph. 6125 8497. The study aims to advance knowledge about work and wellbeing. The information you provide will only be used for the purpose for which you have provided it. It will not be disclosed without your consent.

Security of the data

The data will be kept secure by directly transferring into a large data file accessible with a username and password, available only to the primary researcher. On completion of the research, the data will be stored on file and kept for seven years, in accordance with Australian Research Council (ARC) regulations. Any publication of research results will not include any names of workplaces. Results will be reported on a group, not individual basis. As the web can be an insecure medium you may choose to complete this survey in a pencil-and-paper version. Please contact the researcher to arrange this if preferred.

Appendix E: Study 2 Invitation to Workplaces



Researcher: Suzi Keser
Ph: 612 52147
E-mail: Suzi.Keser@anu.edu.au

Supervisor: Professor Don Byrne
Ph: 612 53974
Email: Don.Byrne@anu.edu.au

Dear Sir/Madam

Re: Australian National University Work and Wellbeing Research

My name is Suzi Keser and I am a PhD candidate from the School of Psychology at the Australian National University.

I am contacting you as the Manager of Human Resources to seek your co-operation and that of the

in participating in an important research study about work and wellbeing. This study seeks to develop a clearer understanding of the relationship between the value and meaning of work, and both distress and wellbeing. This has not yet been explored in any real depth and has the potential to inform a revised direction for occupational psychology research and ultimately practice. The study will be conducted in the ACT and seeks to obtain a representative sample of the Australian public service workforce.

Participation in this study simply involves the advertisement of the study to the employees of your Department (see attached). The advertisement outlines the nature of the Department's participation, a brief project description and the hyperlink to the study-which takes the form of an online questionnaire. I would, of course, provide you with the advertisement, but ask of you to send it in an email circulation to the employees of your department. The questionnaire itself requires participants to select predetermined responses that are most representative of their views. Employees may choose to participate at their own discretion and can withdraw at any time without explanation. Further, employees will not be asked to provide any identifying information such as their name or workplace. This study has ANU Human Ethics Approval.

This research is completely dependent on the co-operation and goodwill of departments. Therefore, your assistance and contribution in this way is extremely valuable. I aim to make this process as convenient as possible to you. At the conclusion of the study, and in return for your participation, I would be able to provide a detailed summary and evaluation of the research results.

I will contact you in the coming week to confirm your interest. Nevertheless if you would like to confirm your interest or ask any questions, please feel free to contact either me or my supervisor at the above contact details. I do look forward to your response and anticipated co-operation.

Yours Sincerely,

Suzi Keser
PhD candidate
The Australian National University

Appendix F: Study 2 Information and Consent Form

Work and Wellbeing Research: Information Sheet

Information about the nature of the *Work and Wellbeing* research study is described below:

Purpose of the Research

This research aims to advance knowledge about the relationship between work, wellbeing and distress. The immediate contribution of this research is toward a PhD thesis in Clinical Psychology however the results may be further published in scientific journals or presented at conferences.

The Nature of the Organisation's Participation

Participation simply involves the advertisement of the research study to employees. This advertisement may take the form of an email circulation or intranet display. The advertisement contains information about the nature of the organisation's participation, a brief project description and the hyperlink to the online participant information page and survey.

The name of your organisation will not be published. In return for participation, a detailed summary and evaluation of the results will be provided. Confidentiality will be ensured as far as the law allows.

Participation in this research is voluntary and your organisation can withdraw at any time without reason or penalty.

The Nature of Employees' Participation

Participation on the part of employees involves completing an online questionnaire about work, wellbeing and distress. Participants will be required to mainly select pre-determined responses that best reflect their views. Demographic information will also be obtained. This will take approximately ten to fifteen minutes to complete at stage one and approximately ten minutes to complete at the six month follow-up. Participants are not required to provide their name or the name of their organisation. Participants are informed that participation is at their discretion and they can withdraw at any time without reason or penalty. Participants are presented with full information about the nature of their participation upon login to the online survey. A copy of this information is provided below.

Contact Information

If you would like to discuss any aspect of this research, please contact either myself, the primary researcher, Suzi Keser, on 6125 8497 or Suzi.Keser@anu.edu.au ; the supervisor, Professor Don Byrne, on (02) 6125 5111 or Don.Byrne@anu.edu.au ; or the ANU Human Research Ethics Committee on (02) 6125 7945 or Human.Ethics.Officer@anu.edu.au.

Please read and keep this information. To participate, do return the accompanying consent form. Your consent form will be kept securely in a locked filing cabinet at the Australian National University. This will be kept for 7 years in accordance with Australian Research Council regulations.

Work and Wellbeing Research: Consent Form

The following information is a copy of that provided in the information sheet. To participate, please sign and return the attached consent form.

Purpose of the Research

This research aims to advance knowledge about the relationship between work, wellbeing and distress. The immediate contribution of this research is toward a PhD thesis in Clinical Psychology however the results may be further published in scientific journals or presented at conferences.

The Nature of the Organisation's Participation

Participation simply involves the advertisement of the research study to employees. This advertisement may take the form of an email circulation or intranet display. The advertisement contains information about the nature of the organisation's participation, a brief project description and the hyperlink to the online participant information page and survey.

The name of your organisation will not be published. In return for participation, a detailed summary and evaluation of the results will be provided. Confidentiality will be ensured as far as the law allows.

Participation in this research is voluntary and your organisation can withdraw at any time without reason or penalty.

The Nature of Employees' Participation

Participation on the part of employees involves completing an online questionnaire about work, wellbeing and distress. Participants will be required to mainly select pre-determined responses that best reflect their views. Demographic information will also be obtained. This will take approximately ten to fifteen minutes to complete at stage one and approximately ten minutes to complete at the six month follow-up. Participants are not required to provide their name or the name of their organisation. Participants are informed that participation is at their discretion and they can withdraw at any time without reason or penalty. Participants are presented with full information about the nature of their participation upon login to the online survey. A copy of this information is provided below.

Contact Information

If you would like to discuss any aspect of this research, please contact either myself, the primary researcher, Suzi Keser, on 6125 8497 or Suzi.Keser@anu.edu.au ; the supervisor, Professor Don Byrne, on (02) 6125 5111 or Don.Byrne@anu.edu.au ; or the ANU Human Research Ethics Committee on (02) 6125 7945 or Human.Ethics.Officer@anu.edu.au.

Please read and keep this information. To participate, do return the accompanying consent form. Your consent form will be kept securely in a locked filing cabinet at the Australian National University. This will be kept for 7 years in accordance with Australian Research Council regulations.

I have read and understood the information sheet provided and agree for the organisation (organisation.....) to take part in the Work and Wellbeing research. I understand that participation is completely voluntary, and that we may withdraw from the study at any time without any explanation. I have been advised that the results of the project may be published but that details of the organisation and participants will remain confidential as far as the law allows.

Name: Signature: Date:

Appendix G: Study 3 Workplace Invitation



Wednesday 10 May 2011

Mr
Director of Human Resources

Suzi Keser
BSc(Psych) Hons ANU
Assoc MAPS
PhD (Clinical Psychology) Candidate
Primary Researcher

Department of Psychology

P: +61 2 6125 8497
F: +61 2 6125 0499
Suzi.Keser@anu.edu.au

Professor Don Byrne
Supervisor

P: + 6125 3974
Don.Byrne@anu.edu.au

Canberra ACT 0200 Australia
www.anu.edu.au

CRICOS Provider No. 00120C

Dear

Re: Australian National University Work and Wellbeing Research

Researchers from the Department of Psychology at the Australian National University are seeking to advance knowledge about the relationship between Work and Wellbeing. I am contacting to seek your support in this important research study.

Participation in this research simply involves the advertisement of the study to the employees of the university. The advertisement will be provided and can be circulated via email and/or intranet display.

The research itself takes the form of an online questionnaire that requires participants to select coded responses that are most representative of their views. The questionnaire takes around 10-15 minutes to complete, and will also be administered at six months follow-up. Employees may choose to participate at their own discretion and can withdraw at any time without explanation. Further, employees will not be asked to provide any identifying information such as their name or workplace. This study has ANU Human Ethics Committee Approval (Protocol: 2010/087).

This research is being conducted as part of a PhD in Clinical Psychology and is the final study in a line of research seeking to clarify how work and emotional wellbeing might relate. The research is concerned with clarifying links between central workplace characteristics (work demands, control, and support) and mental health outcomes (stress, anxiety, and depression risk). In addition, aspects of team functioning and organisational identification are considered, as research has identified these features as potentially

predictive of employees' experience of work and wellbeing¹². This latter perspective is a relatively novel approach to the study of mental health in the workplace.

A key component of this research is the six month follow-up period, as there is only limited information about long-term links between work and wellbeing. The follow up period will also provide clarity on 'how' and 'why' such links exist.

This research seeks to gain an understanding of these relationships across a range of occupational groups. Therefore, the participation of *[your]* employees is highly sought after as the *[your workplace]* represents an organisation with a diverse range of employees (i.e. managers, professionals, administrative staff, services staff).

In return for participation, I will provide a detailed evaluation of the research results. This will include feedback on how employees' sense of stress and wellbeing may be addressed within *[your workplace]*, across a range of employee types.

Your participation in this research would be deeply appreciated. If you would like to clarify any aspect of this research, either I or the supervisor, Professor Don Byrne, would look forward to discussing further with you.

Sincerely,

Suzi Keser
PhD (Clinical Psychology) Candidate

¹² Haslam. et al. (2009). *Applied Psychology*, 58(1), 1-23.

Appendix H: Study 3 Workplace Feedback Report

Work and Wellbeing



Research Progress Report

Primary Investigator: Suzi Keser (PhD Clinical Psychology Candidate, Psychologist)
Supervisors: Professor Don Byrne, Associate Professor Kate Reynolds

This report indicates the level of psychological wellbeing self-reported by participants, and describes the features of the work environment that were associated with wellbeing. This information provides an indication of the mechanisms that may promote psychological wellbeing in the workplace.

The level of psychological wellbeing reported by participants is summarised in Tables 1 and 2. The majority of participants indicated an absence of, or normal levels of stress, anxiety and depression. Elevated levels of stress were reported by around 23% of the sample, around 15% reported elevated anxiety, and 28% elevated depression.

Table 1. Prevalence of self-reported stress in the sample

Wellbeing Outcome	Prevalence (%) in each category				
	Normal	Mild	Moderate	Considerable	Excessive
Stress	77.7%	8.6%	8.2%	4.7%	0.8%

Table 2. Prevalence of self-reported anxiety and depression in the sample

Wellbeing Outcome	Prevalence (%) in each category				
	Normal	Mild	Moderate	Considerable	Excessive
Anxiety*	84.7%	3.7%	7.2%	1.7%	2.7%
Depression	71.5%	10.8%	8.8%	4.7%	4.2%

Please note that elevated scores do not necessarily correspond with a disorder or diagnosis. Rather, they indicate levels of distress that are greater than would be expected in the majority of the population. The scores toward the higher end of this screening measure simply indicate a higher risk of having clinical levels of distress.

*Due to the small percentage of participants reporting elevated anxiety, the results concerning anxiety should be considered with caution. It is worth noting here however that anxiety disorders are in fact the most common mental health issue facing Australians (ABS, 2007).

Thank you for contributing substantial knowledge about workplace wellbeing.

It is anticipated that such research may guide effective management of this issue.

Participants

- 610 employees
- 60% full-time employees
- Average age: 43 (±12 years)
- 64% female
- Job Category:
 - Manager 13%
 - Professional 49%
 - Clerical/Administrative 31%
 - Other/unspecified 7%
- 76% university educated
- 32% in academic positions

Stress, Anxiety, and Depression

Stress, anxiety and feelings of depression are part of the normal range of human emotions.

It is when these reactions are prolonged and heightened that significant impact can follow for the individual and workplace.

The effects of significant distress can present in the workplace in various ways; through absenteeism, presenteeism and disengagement, with associated financial costs. This positions psychological wellbeing at work as an important outcome of interest.



Work Demand

Demand describes the amount of work, whether there is sufficient time to complete tasks and the presence of conflicting demands.

Work Control

Control refers to the opportunity for skill use and development, and variety of work, together with input and influence over decisions about work tasks.

Supervisor Support

Support from the supervisor involves emotional support, (listening, understanding) practical assistance with work tasks and facilitating team work.

Identity-based Leadership

Identity-based leadership describes the degree to which employees perceive their leader, or supervisor, to be a part of and representative of their workgroup, as opposed to being unique and different from group members.

Workgroup Identity

Workgroup identity captures the extent to which employees define themselves as psychologically belonging to their workgroup. This occurs through a bond, satisfaction with and commitment to the group.

Organisational Identity

Organisational identity defines the extent to which employees experience their workplace as a valued aspect of their identity.

This research represents the first attempt to examine the role of the above workplace concepts on psychological wellbeing over a long-term six month period.

The work environment, defined in terms of employees' perceptions of manageable demands, adequate work control and support, and workplace identity, was linked to self-reported psychological wellbeing.

- ◆ The risk for elevated **stress** and **anxiety** reduced most as **supervisor support** increased.
- ◆ The risk for **stress** reduced further as employees considered their supervisor to be a **part of the team** and **representative** of the **group identity**.
- ◆ The risk for elevated **stress** and **anxiety** also reduced as **work demands** were more manageable.
- ◆ The risk for elevated **depression** and **anxiety** decreased as employees experienced a greater sense of **control** over their work.
- ◆ The risk for **depression** reduced further as employees indicated a stronger sense of **connection, satisfaction** and **commitment** to their workgroup.
- ◆ The risk for elevated **depression** also decreased as employees considered the ANU to be a meaningful aspect of their **self-definition**.

This information is summarised in Table 3

Table 3. Significant associations between workplace characteristics and wellbeing outcomes

Wellbeing Outcome	Workplace Characteristic
Stress	Work Demand Supervisor Support Identity-based leadership
Anxiety*	Work Demand Work Control Supervisor Support Workgroup Identity Identity-based leadership
Depression	Work Control Workgroup Identity Organisational Identity

Supervisor support emerged as the workplace characteristic most strongly associated with psychological wellbeing

MAIN MESSAGES

This research suggests that the following considerations may support employees' psychological wellbeing in the workplace:

- ◆ Developing a reasonable workload with clear expectations (work demand)
- ◆ Strengthening supervisors' capacity to facilitate team work and be attentive to the needs of individual employees (supervisor support)
- ◆ Enhancing employees' recognition of their supervisor as being a 'part of the team' and a representative of the workgroup identity, (identity-based leadership) in order to enhance the experience and benefit of support
- ◆ Maintaining employees' ability to perform by way of developing and applying their skills (work control).
- ◆ Supporting employees' opportunities to have a say and make decisions about their work (work control)
- ◆ Fostering employees' experience of a bond, sense of commitment and similarity to their workgroups; developing an attitude of 'us rather than I' (workgroup identity) in order to facilitate employees' sense of control over work.
- ◆ Connecting employees to the value of belonging to the ANU (organisational identity)

Appendix I: Study 3 Advertisement to Employees



Research Advertisement

Researchers from the Psychology Department at The Australian National University are undertaking a leading study on working in teams and wellbeing.

Despite much effort, we are not entirely clear about what makes a workplace healthy and productive for both individuals and workplaces. This research represents an attempt to unravel 'how' and 'why' working in teams relates to wellbeing.

It is also the case that there is very little follow-up research. This makes it difficult to understand the relationship between work and long term wellbeing.

So, what are the key aspects to a "healthy" workplace? What are the long term effects?

Help us find out by taking part in this research. You will be asked to mainly select check boxes to answer these questions. It takes about 10-15 minutes to complete now, and about 10 minutes at the follow-up in 6 months.

The survey does not require confidential information such as your name.

All employees are encouraged to take part in this research by completing the voluntary online survey below

https://anupsych.qualtrics.com/SE/?SID=SV_3K1GYvtBeYf6Ty

Further information about the research can be found by following the link. Alternatively, please call Suzi Keser on 02 6125 8497 or email lsuzi.keser@anu.edu.au

