Workplace stress in Victoria:
Developing a systems approach

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Workplace Stress in Victoria: Developing a Systems Approach

Report to the Victorian Health Promotion Foundation
May 2006

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Table of Contents

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FOREWORD

In recent years we have seen a rise in stress across all spheres of life, particularly in the workplace. Approximately 7.7 million Australians spend one-quarter to one-third of their waking lives at work so it is not surprising that we are seeing workplace stress emerging as a major cause of physical and mental health problems.

The direct cost of workplace injury and disease in Australia has been estimated at over $7 billion per year nationally. Research shows clear links between an individual's occupation and their health, with distinct differences between the experiences of blue-collar and white-collar workers, men and women and older and younger employees. Numerous studies have also documented the relationship between people's working conditions and their health behaviours such as smoking, unhealthy eating and lack of exercise. Economists have demonstrated that economic factors such as income and labour market status are also prime contributors to the psychological and physical health of individuals.

The Victorian Health Promotion Foundation (VicHealth), as part of its *Mental Health and Wellbeing Plan 2005-2007*, is exploring the links between work, stress and broader health outcomes to gauge the extent of the problem and identify ways of addressing it. VicHealth has commissioned a University of Melbourne team, led by Associate Professor Anthony LaMontagne, to work with our Mental Health and Wellbeing unit to review national and international job stress research and investigate the effectiveness of using a 'systems' rather than 'individualistic' approach to address the issue.

The resulting report: *Workplace Stress in Victoria: Developing a Systems Approach*, offers compelling evidence that job stress is substantial contributor to the burden of mental illness, cardio-vascular disease and other physical and mental health problems. More importantly, this report also outlines ways forward to address these issues. Notably, the intervention review demonstrates that VicHealth's use of the determinants, or systems, approach to a range of other health issues is also the most effective approach to dealing with issues of workplace stress. We are pleased to see that VicHealth's general approach to health promotion also adds value to understanding and responding to this growing concern for working Victorians and their employers.

We believe this report will provide valuable knowledge for agencies and organisations, large and small, trying to understand and minimise job stress. I look forward to seeing some of the innovative solutions to workplace stress which will surely arise from this valuable and comprehensive research.

Dr. Rob Moodie
Chief Executive Officer

ABBREVIATIONS USED

ACCI	Australian Chamber of Commerce and Industry
AIG	Australian Industry Group
ACTU	Australian Council of Trade Unions
BMI	Body Mass Index
CVD	Cardiovascular disease
CWB	Counterproductive work behaviours
DCM	Demand/control model
EBA	Enterprise Bargaining Agreement
ERI	Effort/reward imbalance
ETU	Electrical Trades Union
HR	Human resources
HSR	Health and safety representative
IHD	Ischemic heart disease
OECD	Organisation for Economic Co-operation and Development
OHS	Occupational health and safety
OCB	Organisational citizenship behaviours
OR	Odds ratio
PAR	Population attributable risk
TCFUA	Textiles Clothing and Footwear Union of Australia
VECCI	Victorian Employers Chamber of Commerce & Industry
VTHC	Victorian Trades Hall Council
VWA	Victorian Work Cover Authority
WHO	World Health Organization
WC	Workers' compensation

EXECUTIVE SUMMARY

Job stress is a large and growing concern for working Victorians. *Workplace Stress in Victoria: Developing a Systems Approach* was commissioned by the Victorian Health Promotion Foundation and developed by a University of Melbourne team led by Associate Professor Anthony LaMontagne in consultation with VicHealth's Mental Health & Wellbeing Unit. As reflected in the chapter structure of the report, the report's aims of the report were to:

- Review the evidence that job stress is related to adverse effects on worker and organisational health;
- Review the evidence that a systems approach to addressing job stress is more effective than other alternatives;
- Assess prevalent practice in Victoria in terms of stakeholder views and activities on job stress;
- Assess patterns of job stress exposure among working Victorians;
- Estimate the contribution of job stress to ill health among working Victorians.

Chapter 1 provides a primer on job stress and how it is measured, and summarises the epidemiological evidence on the effects of job stress on individual and organisational health. The most widely used measures of job stress come from Karasek's demand/control model and Siegrist's effort/reward imbalance model. Job stress measures from each of these models have been linked to a wide range of physical and mental health outcomes. In the well-known Whitehall studies, both of these measures have been shown to predict subsequent effects on physical and mental health (for examples, cardiovascular disease and depression). These findings have also been replicated in numerous prospective studies. Job strain – the combination of high job demands and low job control – increases the risks of cardiovascular disease (CVD) in men from 1.2 to 4-fold, and increases the risks of depression and anxiety at least 2- to 3-fold in women. These estimates are after adjustment for other known risk factors, including negative personality and socio-economic position.

Published estimates of the proportion of cardiovascular disease attributable to job strain in men range from 7–16% for job strain assessed at a single point, and up to 35% for long-term exposure. Similar or larger attributable fractions are foreseeable for depression and anxiety in women, although none have been published as yet (see new estimates in Chapter 5). Job stress has also been linked to a range of organisational impacts, such as increased absenteeism, employee turnover and workers' compensation rates.

In summary, there is strong epidemiologic evidence that job stress predicts mental illness and mental health problems, cardiovascular disease and various other adverse health outcomes. Job stress is a substantial public health problem, accounting for large preventable disease burdens, and deserving of a commensurate public health response.

Chapter 2 presents a comprehensive review of the job stress intervention evaluation literature. Ninety-five systematically evaluated interventions were rated in terms of the degree of systems approach used. Briefly, *High* systems approach was defined as intervention that was both organisationally and individually focused, versus *Moderate*

(organisational only) or *Low* (individual only). The 95 studies were comparatively assessed with respect to evaluation findings, with the following conclusions reached:

> **Conclusion 1:** *Studies of interventions using High systems approaches represent a growing proportion of the job stress intervention evaluation literature, possibly reflecting the growing application of such approaches in practice internationally.*
>
> **Conclusion 2:** *Individually-focused, Low systems approaches are effective at the individual level, favourably affecting a range of individual level outcomes.*
>
> **Conclusion 3:** *Individually-focused, Low systems approach job stress interventions tend not to have favourable impacts at the organisational level.*
>
> **Conclusion 4:** *Organisationally-focused High and Moderate systems approach job stress interventions have favourable impacts at both the individual and the organisational levels.*

In summary, we conclude that systems approaches to job stress are more effective than other alternatives, and that benefits accrue both to individuals (for example, better health) and to organisations (for example, lower absenteeism). Further study is needed to develop the job stress intervention evidence base to guide policy and practice. Local studies that include organisational outcomes, such as absenteeism and economic measures, would be particularly valuable for encouraging organisations to adopt systems approaches in Victoria. The growing evidence base for systems approaches to job stress provides a timely opportunity for advocacy and information dissemination in Victoria, particularly in light of the qualitative and quantitative findings on job stress in Victoria detailed in Chapters 3-5 below.

Chapter 3 presents the findings of an in-depth interview study of prevalent views and activities in the area of job stress in Victoria. A wide range of relevant stakeholder groups were interviewed including employers and employer groups, trade unions and other worker advocates, researchers and the Victorian WorkCover Authority (total of 41 individuals in 29 interviews). These stakeholders operate within a context shaped by occupational health & safety (OHS) law, which imposes specific obligations on employers to control risk (including risks to psychological health). The OHS regulator, the Victorian WorkCover Authority (VWA), is responsible for monitoring and enforcing compliance with this duty. The interviews showed that the situation is currently dominated by individually-focused understandings of the problem as well as individually-focused interventions. Nevertheless, the inadequacy of current approaches is recognised by the full range of stakeholders, and they are receptive to guidance on alternatives. Findings also indicate that a number of workplaces are achieving aspects of a systems approach to job stress, at least to some extent. However, there is currently only limited leadership on systems or public health approaches to support movement in this direction. This indicates a critical opportunity to advance systems approaches to job stress in Victoria.

The data presented in this and other chapters of the report suggest that a key strategy to achieve this would be the preparation of practical guidance materials on what to do. In particular, this should address the clear gaps in current practice, such as for marginalised workers (e.g., labour hire, outworkers). It must also address the exacerbation of job stress by non-work related issues such as family responsibilities. Currently, employers' concern for workers' compensation liability makes it hard to direct focus to the primary prevention level, including by WorkSafe Victoria. Finally, it will be critical to encourage recognition of the

diversity of manifestations of job stress. Job stress is not isolated to the public sector and is manifest in many ways, not just as "stress claims."

Chapter 4 presents the results of an empirical study comparing job stress exposure patterns to patterns of stress-related workers' compensation claims. We used the most widely studied job stress measure, termed 'job strain' – the combination of high job demand and low job control. Job strain has been predictively linked to elevated risks of cardiovascular disease, depression, and other serious health outcomes. Job strain exposure data was collected in the Victorian Job Stress Study from a representative sample of working Victorians (N = 1,101). Victorian worker's compensation (WC) data for the same year as the VJSS survey (2003) were obtained from the National Occupational Health & Safety Commission (NOHSC).

There were some areas of concordance between patterns of job strain and stress-related workers' compensation claims. For example, both job strain and claims rates were higher among females, and both were highest in the health and community services sector. But there were also important discrepancies. For example, job strain is most prevalent among younger workers in low status occupations, but claims rates are highest among middle-aged workers in higher status occupations. The sector with the highest prevalence of job strain for both males and females was accommodation, cafes and restaurants; WC stress claims from this sector, however, were not elevated. This demonstrates that workers' compensation insurance statistics – the primary drivers for most intervention efforts to date – are inadequate for the purpose of identifying the highest priorities for job stress intervention on a population level. Workers compensation statistics under-represent highly exposed groups in lower socio-economic positions. These findings offer a public health evidence-based complement to WC statistics for guiding policy and practice in this area.

Chapter 5 provides an estimate of the contribution of job stress to ill health among working Victorians. We combined job strain exposure patterns from the Victorian Job Stress Survey with published estimates of job stress-associated risks of cardiovascular disease and depression to yield estimates of the proportions of CVD and depression attributable to job strain among working Victorians. For men, the proportion of CVD attributable to job strain could exceed one-third, whereas for women it may be up to roughly one-seventh of all CVD cases. For depression, the high-end estimates are reversed for men and women, with job strain accounting for as much as one-third in rates of depression among women, versus up to one-fifth for men. These estimates indicate that job stress represents a substantial public health problem in Victoria. Further, job strain and associated CVD and depression risks are inequitably distributed, with lower skill level working Victorians most likely to be adversely affected.

In conclusion, this report provides compelling justification for action in the area of job stress. In short, we have demonstrated that job stress is a serious public health problem that can be addressed effectively using a systems approach. We have also identified barriers and facilitators to action, as well as evidence of a critical opportunity to advocate for systems solutions to this problem. Finally, we have identified new priorities for job stress intervention along with evidence that job stress is a significant contributor to health inequities in Victoria. A substantial and inequitable disease burden could be addressed by applying a systems approach to job stress in Victoria.

Chapter 1

Job Stress & Health:

A Review of the Epidemiologic Evidence

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CANADA

Job Stress & Health: Introduction

Job stress is a widespread concern in Australia and other OECD countries. Further, it is a concern across all employment sectors as well as occupational levels, and is a commonly reported cause of occupational illness and associated organisational outcomes (e.g., lost work days, turnover rates). In Europe, stress-related problems are the second most commonly-reported cause of occupational illness, following musculoskeletal complaints.[1] It is important to note that recent research has shown that the job stress is a major factor in the aetiology of musculoskeletal disease. Roughly one fourth of workers in the EU reported job stress as affecting their health in the 2000 European Foundation survey.[1] Smaller—but still significant—percentages reported having experienced other adverse psychosocial exposures in the previous year, including bullying (9%), unwanted sexual attention (2%), acts of violence from people at work (2%), and acts of violence from other people (4%). Comparable figures are not available for Australian workers; however, they are likely to be similar.

Further, there is evidence that job strain—the combination of high job demands with low job control and the most widely studied job stressor—has been increasing in prevalence in Europe as well as the US.[2 3] Comparable population-based job stress surveillance data is not available in Australia, but trends are likely to be similar to other OECD countries. In summary, job stress and other psychosocial hazards are widely prevalent and represent a growing concern to working people, the business community, and society.

Job Stress Concepts & Measures

The various theories and models of job stress all propose that the stress process originates with exposure to *stressors*.[4 5] *Stressors* arising in the work environments are classified as *psychosocial* (e.g., time pressure) and/or *physical* (e.g., noise).[5] In the discussion that follows we describe the job stress process according to the widely used and accepted University of Michigan job stress model.[5] In brief, exposure to *stressors* (either psychosocial or physical) can lead to *perceived stress*. *Perceived stress* can, in turn, lead to *short-term responses* to stress. These *short term responses* can be physiological (e.g., elevated blood pressure), psychological (e.g., tenseness), or behavioural (e.g., smoking as a form of coping). *Short-term responses* can then lead to *enduring health outcomes* of a physiological (e.g., coronary heart disease), psychological (e.g., anxiety disorder), or behavioural (e.g., nicotine addiction, alcoholism) nature.

Each of these steps in the stress process can be affected by a wide range of modifying variables (social, psychological, biophysical, behavioural and genetic factors). In addition, the process is not simply linear, as feedback loops may occur between different steps (e.g., enduring health outcomes may lead to increased vulnerability to continuing job stressors). In addition, physical and psychosocial stressors can interact to increase vulnerability to enduring health effects of job stress.[6] Notable examples in this regard are noise[7] and ergonomic exposures.[4] Finally, recent evidence suggests that the effects of job stress on enduring health outcomes may be greater among lower socio-economic or occupational status groups.[8 9]

There are three theoretical- frameworks, or models, for measuring psychosocial and physical stressors that have been most widely validated and utilized in epidemiological studies of job stress (Table 1). These models mainly focus on measuring stressors present at

the task or organisational level in the work environment.[4 10] While they originate from diverse disciplines, including psychology, sociology, and occupational health, they are all currently widely used in public health research and practice.

Karasek & Theorell's demand/control model (DCM) is the most widely studied (Table 1).[11] The DCM focuses on task-level job characteristics. It postulates that perceived stress among workers arises from the interaction of low control with high demands which, according to the model produces "job strain". Further, the model postulates that low levels of support from co-workers and supervisors, in conjunction with low control and high demand (i.e., a work environment condition named 'iso-strain') is particularly hazardous.[12] Finally, this model also posits that work can be health-promoting for workers in jobs with both high demand and high job control ("active jobs").

Table 1: Job Stress Models & Measures

Model	Measures
Demand/Control [13]	• Core construct scales of psychological demand, decision latitude or "job control" (composed of the sum of two equally weighted scales of decision authority and skill discretion) • Demand and control scores analysed as ordinal measures, or grouped into high and low (usually at the median) and crossed to create four categories of: • Low strain (low demand, high control) • Active (high demand, high control) • Passive (low demand, low control) • High strain (high demand, low control)
Effort/Reward Imbalance[14]	• Core construct scales of effort, reward, and overcommitment • Effort/reward ratio of equally weighted scales analysed either as ordinal measures, or categorically as ratio > 1, while controlling for: • Overcommitment (high/low)
Organisational Justice [15]	• Core construct scales procedural justice and relational justice • Scores analysed either as ordinal measures, or grouped into high and low and analysed categorically

Siegrist's effort/reward imbalance (ERI) model is the second most widely studied (Table 1).[14 16] Siegrist conceptualizes and measures work characteristics more broadly than the demand/control model. The ERI model focuses on the reciprocity of exchange at work where high cost/low gain conditions (i.e., high effort and low reward, so called "effort/reward imbalance") are considered particularly stressful. Rewards are financial, self-

esteem, and occupational status control (e.g., job stability, ability to advance in career). Further, the ERI model acknowledges a role for personality traits, and includes a measure of the individual's need for control and approval called "overcommitment."

Most recently, measures of organisational justice or equity has been put forth as a complement to the DCM and ERI models (Table 1).[15] Organisational justice includes procedural and relational components. Procedural justice refers generally to the perceived fairness or equity of decision-making within the organisation. Relational justice assesses the degree of perceived fairness and respect accorded to an individual by his or her supervisor. Prior research showed that perceived justice was associated with people's feelings and behaviours in social interactions. A Finnish research group led by Kivimaki then extended this finding, demonstrating in a series of cross-sectional and longitudinal studies that low perceived justice is also harmful to worker health.[15 17-19]

The DCM, ERI, and organisational justice measures of job stress overlap to some extent, but also have complementary, independent relationships with adverse health outcomes.[19-21] Taken as a whole, they can be seen as providing concrete measures of three relationships that have long been posited as important determinants of the mental and physical health of working people: the relationship between the worker and his or her job, between the worker and other people at work, and between the worker and the organisation.[22] While most recent attention has focused on how deficiencies in these areas are harmful, these measures also specify how work can be satisfying and health promoting. Once again, these concepts have long been know, as summarised by Brook[22] from this a 1959 source:[23] satisfying and health promoting work includes interesting and challenging duties, genuine responsibility, opportunity for achievement by the individual, recognition for such achievement, and scope for individual advancement and growth.

Job Stress & Physical Health

The link between occupational stress and adverse effects on physical and mental health has been well substantiated in a rapidly growing international literature of empirical studies.[24-26] In terms of physical health outcomes, cardiovascular disease (CVD) has been studied to the greatest extent.[26] Numerous cross-sectional studies have linked occupational stress with physiological risk factors for CVD (e.g., hypertension, atherogenic lipids, elevated fibrinogen, overweight/body mass index) and with CVD outcomes (e.g., myocardial infarction, angina pectoris, doctor-diagnosed ischemia).[3 24-26] In addition, job strain and effort-reward imbalance have been shown to predict subsequent CVD outcomes after controlling for established CVD risk factors (e.g., smoking, overweight, etc.) in more than a dozen prospective cohort studies, including the widely known Whitehall I & II studies.[20 24 25 27-30] For example, a recent prospective cohort study[28] found a doubling of CVD risk among industrial employees in high stress jobs as measured by either Karasek's demand/control or Siegrist's effort/reward imbalance models. Using different measures, the recently published multi-country "InterHeart" case control study (N~25,000) found a doubling of risk for acute myocardial infarction from job stress as well as additional risk from non-work stress.[31] This study included Australian subjects and found that risk patterns were consistent across regions, in different ethnic groups, and in men and women.

In the most comprehensive systematic review of job stress and CVD to date, effect sizes for job strain as a risk factor for CVD ranged from a 1.2—4.0 fold increase for men and a 1.2—1.6 fold increase for women (after adjustment for known confounders).[26] Belkic et al

note that these are likely underestimates of effect size, as biases to the null dominated in the contributing studies (page 107).[26] Odds Ratios for effort/reward imbalance in relation to coronary heart disease range from 1.5-6.1.[25] The evidence base for men is larger, and demonstrates strong and consistent evidence of association. The evidence base for women, on the other hand, is more sparse and less consistent. Adjusting for various personality traits (e.g., negative affectivity) and mental states (e.g., minor psychiatric disorder) has shown little effect on the relationship between job stress and CVD outcomes,[32] with the possible exception of "overcommitment to work" (an ERI model measure) substantially increasing job strain-associated risk in women (e.g., Odds Ratio increasing from 1.2 to 2.2 in one study, reviewed by Belkic et al,[26] page 114).

Other physical health problems linked with job stress include musculoskeletal disorders, immune deficiency disorders, gastrointestinal disorders. These have been reviewed elsewhere and are beyond the scope of this brief review.[10]

Job Stress & Mental Health

Job stress has been linked to increased risk for wide range of mental health outcomes. These range from increased visits for psychiatric treatment, to various measures of general mental health and psychological distress, anxiety disorders, and three forms of depression.[26 33 34] Table 2 presents a summary of mental health outcomes linked to job stress. While the majority of studies are cross-sectional, there is a growing number of longitudinal or prospective studies in which measurement of job stressors preceded the development of mental health outcomes among study subjects, thus strengthening causal inference.[33 35-48] A detailed narrative review of 20 years of empirical research on demand/control model measures (job demands, job control, and job strain) and mental health found considerable support for the negative effects of high demands and low control on psychological well-being.[49] A recent systematic literature review has linked psychological ill health (including anxiety, depression, and emotional exhaustion) and sickness absence to a range of job factors, including management style, work overload and pressure, lack of control over work, and unclear work role.[50] Although these reviews cite some conflicting studies, they find strong evidence overall for job stress as a risk factor for several adverse mental health outcomes.

One of the best-designed studies—a prospective study of 668 Dutch employees over 4 waves of data collection (1994 through 1997)[39]—tested normal (job characteristics affect mental health) and reversed (mental health influences work characteristics) relationships between job stress and mental health. Primary work characteristics were assessed using demand-control model measures of psychologic demands, job control, job strain, and social support. While some evidence of reciprocal causal relationships between work characteristics and mental health was found, the effects of work characteristics *on* mental health were causally dominant. These investigators also assessed time lags between exposure and effect and found that a 1 year time lag yielded the best model fit (i.e., adverse effects on mental health can occur from 1 year of exposure).

To date, we are not aware of any systematic reviews or meta-analyses of job stress in relation to mental health outcomes. Because depression represents a major and growing contributor to the global burden of disease, we have focused on this mental health outcome for illustrative purposes. Some cross-sectional studies have found large effect sizes for depression, such as a US study that presented high adjusted Odds Ratios for job strain and

major depressive episode (OR = 7.0), job strain and depressive episode (OR = 4.1), and job strain and dysphoria (OR = 2.9) among women.[34] That study found no significant associations among men. Longitudinal studies, by contrast, tend to find smaller effect sizes. In a four-year longitudinal study of depression outcomes in Swedish workers that also examined the role of non-occupational factors such as coping ability and stressful life events, job strain remained significantly associated with sub-clinical depression (RR = 2.8) in the final multivariate analysis for women.[46] In the French longitudinal GAZEL study, Neidhammer et al found that the demand/control model measures of high psychological demands (OR = 1.77 men, 1.37 women), low job control (OR = 1.38 men, 1.41 women), and low social support (OR = 1.58 men, 1.29 women) predicted subsequent depressive symptoms at 1-year follow-up. [36] All effects were statistically significant and were unchanged after adjustment for potential confounders. The same pattern of relationships (again with little difference between men and women) were confirmed on 3-year follow-up in the same study.[51] . These studies contrast with a recently published longitudinal Finnish study of 4815 hospital personnel. Although this study found significant associations between organisational justice and depression, it found no association between job strain and depression.[52]

Turning to more general mental health outcomes, a Canadian longitudinal study of female nurses indicated significant effects of job strain on psychological distress (OR = 1.98) and emotional exhaustion (Maslach burnout scale) (OR = 5.0), after adjusting for "Type A behaviour" as a personality trait, domestic load, recent stressful life events, and social support outside work.[53] A UK study[35] looked into the relationship between personality and negative affectivity and the risk of poor mental health (defined as General Health Questionnaire score greater than or equal to 5) from workplace factors. Results showed that personality had little consequence on mental health in relation to job control (OR = 1.27 in men and OR = 1.19 in women for association between job control and mental health). Adjusting for negative affectivity increased the effects of job demands in women (OR = 1.9 from 1.48) but caused no change in men (OR = 1.36).[35]

The international literature includes a limited number of Australian studies. Two notable recent studies examined cross-sectional associations between job strain (demand-control model), job insecurity, and mental health among 1,188 employed professionals in the ACT aged 40-44 years.[54 55] After adjustment for a range of confounders and negative affectivity, they found statistically significant independent associations of job strain with depression (OR = 2.54) and anxiety (OR = 3.15). In the same models, job insecurity showed even greater statistically significant independent associations (i.e., in addition to job strain) of high job insecurity with poor self-rated health (OR = 3.72), depression (OR = 3.49), and anxiety (OR = 3.29). Based on the findings of this study, these investigators created a new measure called "job pressure" combining job strain with job insecurity; this measure classifies individuals across a 5-point gradient of low to extreme job pressure.[55] Job pressure showed a better fit with physical and mental health outcomes than job strain and job insecurity as distinct variables.[55] Further, this graded measure of job pressure demonstrated a dose-related increase in associated health outcome risks. Most notably, middle ranges of job pressure (in relation to low) showed associations with anxiety and depression comparable to job strain and job insecurity (adjusted OR in range of 2-3), but a substantial increase in risk estimates with extreme job pressure (adjusted OR = 13.9) for depression and for anxiety (adjusted OR = 12.9). These findings highlight the substantial health risks of the rising trends in combined exposures to job stress and job insecurity—even among mid-career professionals of middle to upper socio-economic status.

Table 2. Etiologic Studies of Job Stress and Mental Health

Mental Health Outcome	Job Stress Measures Used
Depression[1] • Major depressive episode • Depressive syndrome • Dysphoria • Depressive symptoms	• Demand-control model (job strain, decision authority, psychologic demands, social support)[34 36 38-42 46 54 56-60] • Effort-reward imbalance[59 61] • Job pressure[55] • Organisational justice[52] • Work overload, organizational structure and climate, and role conflict (review)[62] • Job satisfaction (review) [63]
Anxiety	• Demand-control model [54 57 59 64] • Effort-reward imbalance[59] • Job pressure[55] • Work overload, organizational structure and climate, and role conflict (review)[62]Demand-control, social support, role clarity (review)[50] • Job satisfaction (review)[63]
General Mental Health • Short Form-12 (SF-12) • Short Form-36 (SF-36) • General Health Questionnaire (GHQ) • Psychiatric Symptom Index (PSI)	• Demand-control model [33 35 44 45 48 53 65] • Effort-reward imbalance[29 33 35] • Organizational justice [66-69] • Review (including demand-control, social support, role clarity)[50] • Job structure (job complexity, pressures, rewards) [70] • Job stress, mental load, and strain caused by schedule [71]
Burnout, Emotional Distress & Emotional Exhaustion	• Demand/control model [37 39 53 56 72] • Organizational justice[73] • Review (including demand-control, social support, role clarity)[50] • Review of job satisfaction studies[63]
Suicide	• Specific stressful workplace events, such as layoffs, downsizing, and demotions[74-79]

Several other Australian studies led by HR Winefield, AH Winefield, and MF Dollard have focused in particular on the health of community services sector workers (e.g., teachers, academic staff of universities, correctional officers).[80-82] In this sector, the most common job stress-related outcomes documented are negative emotional and psychological states and disorders (e.g., emotional exhaustion, psychological distress, anxiety, depression). Another study of a medium-sized public sector organisation in Australia found that job control and social support at work were related to job satisfaction and psychological health.[83]

[1] Depression has been measured using a number of self-rated scales, such as the CES-D (Center for Epidemiologic Studies), Zung, and Diagnostic Interview Schedule.

Job Stress & Organisational Health

A range of organisational outcomes have been linked to job stress and stress-related illness (Table 3). For example, a recent systematic literature review has linked psychological ill health (including anxiety, depression, and emotional exhaustion) and sickness absence to the following key psychosocial work factors: long hours worked, work overload and pressure, and the effects of these on personal lives; lack of control over work; lack of participation in decision making; poor social support; and unclear management and work role.[50] These outcomes (Table 3) represent potential levers for convincing employers to adopt a systems approach to job stress—improvements in these areas tend to occur only when intervention is organisationally-focused, and not when intervention is solely focused at the individual level (as outlined in detail in chapter 3 below).

Absenteeism and sickness absence are the most widely studied organisational outcomes in intervention studies (Table 3). Job stress is a substantial contributor to absenteeism. Some estimate as much as 60% of absenteeism as attributable to stress-related disorders.[84] With the exception of one study, various job stress measures were related to higher absence. In a 3-year longitudinal study, Smulders & Nijhuis found high job control predictive of lower absence, but—unexpectedly—high demand was predictive of lower absence. High demand was suggested to operate in this instance as "pressure to attend."[85]

Table 3. Job Stress and Organizational Outcomes

Organizational Outcome	Job Stress Measures Used
Job satisfaction	• Demand-control model[39 83 86] • Organizational justice[73 87-89]
Absenteeism and sickness absence	• Demand-control model[56 58 59 85 90 91] • Effort-reward imbalance[59] • Organizational justice [66-68 92] • Review (including demand-control, social support, role clarity)[50]
Turnover	• Organizational justice[93-97]
Job performance • Organizational Citizenship Behaviors[2] • Counterproductive Work Behaviors[3] • Work effectiveness	• Demand-control[98] • Organizational justice[73 98-101]
Accident and Injury rates	• Demand-control[102-105]
Health Care Expenditures and Workers' Compensation Claims	• Worker reported stress [106 107]

[2] Organizational citizenship behaviours (OCB) are discretionary in nature, not recognized by the formal reward system, and in the aggregate contribute to the efficient and effective functioning of the organization.

[3] Counterproductive work behaviors (CWB) such as aggression, interpersonal conflict, sabotage, and theft are behaviors that are intended to have a detrimental effect on organizations and their members.

Job Stress and Health Behaviours

The indirect effects of work on health are less well characterized, but evidence is accumulating on the relationships between working conditions and health behaviours, or between 'job risks' and 'life risks'.[108 109] Numerous studies have documented relationships between working conditions (such as safety risks, hazardous substance exposures, and job stress) and health behaviours (such as smoking, sedentary behaviour, diet, and alcohol consumption).[110-114] A current cross-sectional study of a representative sample of working Victorians (same study as described in Chapter 4) found significant relationships between job stress and smoking after adjustment for physical job demand, other occupational hazards, and demographics. For men (n = 526), being a smoker was related to job strain (OR = 2.16). For women (n = 575), 'active' jobs (high demand and high control) were protective (OR = 0.44), whereas physical demand (OR = 1.82) increased the likelihood of being a smoker. Since most smokers take up smoking by their late teens or early 20s, these results suggest that job stress operates as a barrier to cessation for working Victorians.[115] In the same Victorian study, longer (36-50/week) or excessive hour (51+ hours/week) were associated with significant increases in body-mass index in men.[116]

In one of the few prospective studies in this area, decreasing job stress over time was associated with a decrease in cigarette smoking among bus drivers.[113] More recently, a prospective study of UK civil servants has shown that effort-reward imbalance is a risk factor for alcohol dependence in men.[117] In short, the traditional view of job risks and life risks as separate and independent requires revision. Rather, job risks and life risks are related to each other as well as being independent contributors to injury and disease. Thus, opportunities exist for integrating job stress and health promotion interventions in this area.[109]

Challenges to Job Stress—Health Outcome Associations

Strictly speaking, observational (i.e., non-experimental studies) epidemiologic studies cannot formally prove that associations are causal. Two principal challenges have been raised in the epidemiologic literature with regard to job stress—health outcomes associations: that the associations could be artifactual due to confounding by negative personality traits (i.e., those people who report high stress levels do so because of negative personality traits, and those traits are what cause the adverse health outcomes) or by social class (i.e., job stress is more prevalent among lower social/occupational classes, but so is social disadvantage, and social disadvantage is the more important factor).

The issue of personality traits has been addressed by controlling for such traits in studies of the job stress-health outcome relationships. As described above, negative affectivity has been ruled out as a significant contributors to job stress-cardiovascular disease associations.[32] The hostility component of type-A behaviour, however, has been associated with low levels of job control; thus adjustment for hostility lowers effect sizes somewhat for CHD in association with low job control (reviewed by Belkic et al 2004[26], page 114). With respect to mental health outcomes, negative personality traits have also been associated with high job strain and low job control[54] (also reviewed by Belkic et al 2004[26], page 114). Accordingly, most peer-reviewed job stress-health outcome studies include measure and adjust for negative personality traits (e.g., negative affectivity, [32] hostility[17]). However, it should also be noted that there is evidence that long term exposure to job stress and other

work characteristics can lead to deterioration of personality,[70] as been shown empirically in a South Australian study of correctional officers.[118] Thus, Karasek has consistently argued that controlling for personality traits results in an underestimation of effect size (to the extent that personality traits are part of the causal pathway). In short, personality traits are accounted for in most job stress—likely resulting in underestimates of effect sizes.[4] Adjustment for personality traits sometimes attenuates the effect size, but does not eliminate, job stress—health outcome relationships.

Some measures of job stress are known to increase with decreasing socio-economic status. For example, low job control and high physical demands are more common among lower status occupations, whereas higher psychologic demands combined with greater job control (so-called "active" or health-promoting jobs) are more common among well-educated white collar workers. This pattern is observed generally in the international literature (reviewed by Belkic,[26] page 111) and is also apparent in our current survey of working Victorian adults (see Chapter 4 on Victorian job strain profiles). Given the strong social gradients in chronic (e.g., coronary heart disease) as well as other health outcomes, some researchers have raised concerns about whether lower social disadvantage confounds the relationships observed between high job stress and adverse health outcomes. [119] [120]

This can be addressed in two ways. First, by controlling or adjusting for socio-economic position in analyses of job stress—health outcome relationships. For example, most positive studies of job stress and heart disease have controlled for social class (reviewed by Belkic,[26] pages 111-112). Alternatively, one can assess whether job stress is associated with health outcomes within a socio-economically homogeneous group. This was done elegantly by Strazdins et al in a recent Australian study.[55] They restricted their sample to a relatively well-off and high social status group—professionals and managers aged 40-44, and still found strong associations between job stress and adverse physical and mental health outcomes. Thus job stress—health outcome associations are not due to confounding by social class or material disadvantage.

Estimating the Job-Stress Related Disease and Injury Burden

General population-based estimates of the proportion of CVD attributable to job stress are on the order of 7-16% among men for job strain assessed at a single point, and up to 35% for long-term exposure to low job control.[121] A generally accepted conservative estimate is 10%, which would increase if restricted to people under age 70. Inclusion of other psycho-social hazards which have been linked to CVD would expand these estimates (e.g., shift work,[122] [123] and long working hours[124] [125]).

Comprehensive estimates of the job stress related health burden would need to include the full range of associated health outcomes, such as depression, anxiety, and other mental health outcomes; work-related suicide; the contribution of job stress to injuries; contributions of job stress to behavioural disorders (e.g., alcoholism, nicotine addiction); and more. No such comprehensive estimates are available. However, the same job strain exposures that predict a doubling or more of CVD risk, predict similar excess risks of depression and anxiety. Thus, the proportions of burdens for those widely prevalent and increasing health concerns in Australia[126] and internationally[127] would be similar to those

[4] Note that controlling for health behaviours such as smoking and alcohol consumption—which to some extent are job stress related—also results in underestimation of effect sizes in health outcome studies.

above for CVD. Compensated 'psychological injury' and other stress-related claims, despite their rise in Australia in recent years, [128] represent only a small fraction of job stress-related adverse health outcomes.[129 130] In summary, the epidemiologic evidence indicates that job stress is rapidly emerging as the single greatest cause of work-related disease and injury, and as a significant contributor to the overall burden of disease in society.

Conclusions

In summary, various measures of work-related stress predict serious adverse effects on physical and mental health outcomes, even after accounting for other established causes of the same outcomes. Effect sizes for leading chronic diseases such as CVD, depression, and anxiety disorders are approximately doubled by exposure to job stress. . Given the widespread prevalence of job stress among working people, this translates to large preventable burdens of common chronic physical and mental health disease outcomes. Organisations are also adversely affected through effects on absenteeism, turnover, productivity, and other human and financial costs. Job stress is a large and growing public health problem, warranting a commensurate public health response.

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Chapter 2

A Comprehensive Review of the Job Stress Intervention Evaluation Literature:

Assessing the Evidence of Effectiveness for a Systems Approach

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INTRODUCTION

Job stress intervention activity has grown rapidly over the last two decades, paralleling the growth in recognition and acceptance of the far-reaching impacts of job stress on individual and organisational health (reviewed in chapter 1). This has been reflected in the rapid growth in the job stress intervention research literature, which has been reviewed in various ways from a range of perspectives over the last decade.[1-19]

Our goal in this study was to comprehensively review the international job stress intervention literature to identify models of international best practice. In so doing, we have built from the most recent comprehensive review,[13] and included assessment of the degree to which a systems approach was applied, hypothesising that systems approaches yield the best results both for individual and organisational health. Systems approaches in public health and occupational health—as elaborated in further detail below and represented pictorially in Figure 1—emphasise primary prevention (problems at their source), integrate primary prevention with other levels (secondary and tertiary), include meaningful participation of groups targeted by intervention, and are context-sensitive.[1]

Job stress interventions can be classified as primary, secondary, or tertiary.[20-23] In brief, ***primary preventive interventions are proactive***, aiming to prevent the occurrence of illness among healthy individuals. These address sources of stress in the workplace, or stressors, through alterations in physical or psychosocial work environment, or through organizational changes.[24] Examples include changes in work pacing and job redesign, and the formation of joint labour/management health & safety committees. Primary preventive interventions may also be referred to as 'stress prevention.[13 25] ***Secondary interventions are ameliorative***, aiming to modify an individual's response to stressors, targeting the individual with the underlying assumption that focusing on individuals' responses to stressors should be done in addition to—or in preference to—removing or reducing stressors. Examples of secondary prevention interventions include stress management classes to help employees to either modify or control their appraisal of stressful situations, such as the development of muscle relaxation or meditation skills. Finally, ***tertiary interventions are reactive***, aiming to minimize the effects of stress-related problems once they have occurred, through 'treatment' or management of symptoms or disease. These include efforts to help employees to cope more effectively with reactions to stressful conditions, counselling (such as in the form of employee assistance programs), and return-to-work and other rehabilitation programs. 'Stress management' generally refers to secondary and tertiary interventions.[13 25]

In occupational health, the 'hierarchy of controls' is another articulation of these same principles for the prevention and control of occupational exposure and disease. The 'hierarchy' states in brief that the further upstream one is from an adverse health outcome, the greater the prevention effectiveness.[26 27] Accordingly, the physical work environment and other aspects of the organisation have greater preventive potential as intervention targets than individual employees. Hence, primary prevention is more effective than secondary, and secondary is more effective than tertiary. Importantly, however, these are not mutually exclusive and can be used combination.[28] For occupational stress, primary prevention through improvements in the work environment is complemented by secondary prevention to address individual factors and detect any effects of work stress in a timely fashion such that rehabilitation or tertiary intervention programs can be maximally effective.[9] At the organisational level or above, stress-related problems identified through secondary or tertiary-level programs should feed back to primary prevention efforts on job stressors. In

summary, systems approach job stress intervention principles are consonant with broader public health and occupational health principles.

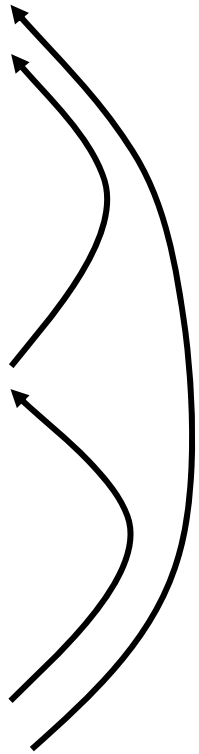
Finally, a fundamental premise of public health—and the 'new public health' in particular—is that in addressing public health problems, the participation of those most affected in the formulation and implementation of responses is essential.[29] This principle is also specifically incorporated into the WHO's Ottawa charter on health promotion[30] as well as other workplace health-specific charters and declarations, such as the WHO's Health Workplace Guidelines [31] and the European Network for Workplace Health Promotion's Luxembourg Declaration.[32] Further, participation addresses some of the core constructs of job stress, such as job control, organisational justice, and mutual respect and support across various levels within an organisation.[4] Participation is a particularly important principle in job stress intervention.[25]

Participation also helps to optimise the fit of the intervention to the context at hand, and provides a means for integrating participants' context expertise with the content expertise of the OHS or other professionals or researchers who usually direct the intervention. This is crucial because organisations usually require unique solutions to job stress problems, even if the process of intervention may be more generic.[25] More traditional and complementary means of tailoring an intervention to context include needs assessment or risk assessment, through which information about the problem and appropriate intervention strategies are determined through systematic data collection.

The systems approach typology described is broadly synonymous with most other 'best practice' models, all of which acknowledge the need to address both work organisational and individual levels.[3 4 6 8-10 12-14 25 33] Some use 'systems' terminology.[1 4 34] Others describe similar approaches as 'comprehensive',[16] 'comprehensive stress prevention and management',[13] combined 'work-directed' and 'worker-directed',[19] 'health promotion settings or determinants',[35-37] and 'healthy' or 'learning organisations'.[38 39]

This paper details how we translated our definition of a systems approach into a method for assessing the extent to which such an approach was applied in a given intervention study, how we conducted a comprehensive search and critical review, our review findings, and implications for policy and practice.

Figure 1. A Systems Approach to Job Stress

Intervention Level		Addresses/Targets:				
Definition & Description	**Effect-iveness**		**I/O/E**	**Examples**	**Historical Tradition**	**Systems Integration**
1° --Primary • **Preventive, proactive** • Goal: reducing potential RFs or altering the nature of the stressor before ee experience stress-related symptoms or disease	+++	• Stressors at their source; organisation of work; working conditions	**E** **O**	• Job redesign, workload reduction, improved communication	OHS, PH	
2° -- Secondary • **Ameliorative** • Goal: To help equip people with knowledge, skills, and resources to cope with stressful conditions	++	• Employee responses to stressors (perceived stress or strain)	**O** **I**	• Cognitive behavioural therapy, coping classes, anger management	Psych, OHS	
3° -- Tertiary • **Reactive** • Goal: To treat, compensate, and rehabilitate ee with enduring stress-related symptoms or disease	+	• Enduring adverse health effects of job stress	**I**	• WC system, Return-to-work programs, occupational therapy, medical therapy	Clinical	

REVIEW METHODOLOGY

Search Strategy

Our search was designed to complement, extend, and update the most recent comprehensive job stress intervention review, the 2003 *Beacons of Excellence* review from the UK.[13] The *Beacons of Excellence* searches were conducted in September of 2001. These authors searched Medline and PsychInfo databases using key words 'stress management', 'stress prevention', 'stress intervention', and 'anxiety management', and restricted the search to post-1990 studies. This yielded 629 studies to which were added studies obtained from several review articles. After applying their selection criteria, most of which we have adapted below, they ended up with 75 job stress intervention studies suitable for detailed review.

We have revised the search strategy to be more suitable for the occupational health and medicine literature as well as the psychological and social science literature (*Beacons* search terms seemed more suited to these). First, we used the search terms "occupational stress," "job stress," "work stress," "stress management," "intervention," and "evaluation," limiting results to articles (excluding reviews) published in the English language from 1990 through 2005. We searched Medline (to cover occupational health and medicine, and other public health sources) and ISI Web of Science (to cover psychological and social sciences). While there can be overlap between these two databases, they have specific complementarities beyond covering different disciplinary bases (e.g., a prominent journal in the field, *Work & Stress,* is not covered by Medline but is covered by ISI).[40]

Medline and ISI Web of Science searches were conducted in April 2005, limiting results to articles published in the English language between 1990-2005, using the terms "occupational stress," "job stress," "work stress," "stress management," "intervention," and "evaluation." The combination of occupational stress, job stress and work stress was limited by the combination of intervention, evaluation, and stress management. This generated 51 results in ISI and 116 results in Medline. The Medline search was then limited to exclude review articles, leaving 91 results. When combined with the Medline search, 7 duplicates were found, leaving 135 results (Table 1).

Table 1: Electronic Search Results for Peer-Reviewed Journal Articles

	ISI search	Medline search
Search term Group 1:		
Occupational stress	982	338
Job stress	756	325
Work stress	549	323
Search term Group 2:		
Intervention	91 479	77474
Evaluation	>100 000	174192
Stress management	845	680
Combining search term groups	51	116
Removal of reviews from Medline	51	91
Merge ISI and Medline	142	
Removal of duplicates	135	
Articles to review	135	

These articles were then reviewed manually to determine whether they were intervention studies or not (detailed in 'Inclusion Criteria' section below). Qualifying intervention studies were then crossed with the 75 job stress intervention studies identified in the *Beacons of Excellence* review (also included in this review), and complemented by other studies identified by investigators, their professional networks, and in other published job stress intervention reviews.

Inclusion Criteria

This review focused on job stress intervention studies that reported on some form of intervention evaluation. We defined job stress intervention (JSI) studies as those expressly aiming to alter the sources of, responses to, or effects of job stress.[1] In addition, much has been learned—in most cases about interventions that *increase* work stress—from natural experiments documenting the impacts of changes in job stressors or job stress over time (such as company downsizing or restructuring).[9 41] While natural experimental studies were not comprehensively reviewed, we include discussion of some exemplary studies providing valuable intervention insights under a separate heading in the Results section.

The full list of studies from electronic searches and other sources was subjected to the following qualifying criteria:

- Reported on a job stress intervention (many etiologic studies turned up in electronic searches that had to be culled);
- Reported on intervention evaluation of some sort, including qualitative and action research studies, and those without control or comparison groups (further detail below under Causal Inference Rating section). While we had hoped to also include developmental intervention studies [42 43] in order to capture intervention development insights gleaned from careful and systematic problem characterisation (e.g., in arriving at justification for a systems approach), we found that we needed to limit the scope of the review for feasibility reasons;
- Minimum sample size of 30 individuals;
- Interventions including employees or contractors independent of pre-existing susceptibilities, complaints, or illnesses (e.g., Firth-Cozens et al., 1992[44] excluded

patient populations, van der Klink et al., 2001[11] included only employees reporting stress-related symptoms).

Intervention studies that meet these inclusion criteria were reviewed in detail, and summarised in table form. As such, we included studies with a very wide range of designs and outcomes measured—from qualitative case studies to quantitative randomised controlled trials. Further, non-peer reviewed reports, books, book chapters, etc. were reviewed as well as peer-reviewed journal articles.

Critical Review & Assessment of JSI Studies

Each study was critically reviewed as described below by at least two reviewers, and in some cases three (where needed to resolve differences in assigned ratings, or to help distill findings).

Interventions are briefly summarised in tabular form in two ways: a "Systems Approach Rating," and description of "Intervention Level(s)" and "Duration". Studies were assigned a simple High/Moderate/Low rating of the degree to which a systems approach was applied. "High" was assigned to those studies where primary prevention was the predominant approach, and this was integrated with either secondary (e.g., based on risk assessment or other needs assessment, primary preventive interventions are directed at the organisation and environment, and secondary interventions are included where risk assessment suggests they are likely to arise) or tertiary prevention (e.g., using Workers' Compensation experience to help direct and tailor primary preventive activities). In addition, as employee and other stakeholder participation and the conduct of needs or risk assessment are key elements of a systems approach, these are noted in the same column in addition to the H/M/L rating. A "Moderate" Systems Approach rating was assigned to those studies conducting primary prevention activities, but nothing else. Finally, a rating of "Low" was assigned to studies that included little or no primary preventive interventions.

We also assessed and tabulated intervention targets.[22 23 45] "Intervention Level(s)" were tabulated as addressing aspects of the physical work environment (E) (e.g., noise levels), the organization (O) (e.g., job redesign, workload reduction), the individual worker (I) (e.g., coping skills training, Employee Assistance programs), or the interface of the organisation with individual workers (O/I) (e.g., mechanisms for employee participation, co-worker support groups). These are related, but not equivalent to, primary/secondary/tertiary intervention levels, and thus provide complementary intervention description. The duration of the intervention and timing of evaluation data collection were also noted where available.

Evaluation features were summarised in terms of comparison or control groups and measures used, the degree to which study design enabled attribution of observed effects to intervention, and principal findings. We rated the degree to which causal inference is supported by study design (i.e., the degree of confidence in attributing observed effects to the intervention and not other factors) using criteria adapted from Kompier & Cooper 1999[6] and Murphy 1996.[2] As applied by Jordan et al. in the recent Beacons of Excellence Review,[13] we have included only those studies that report evaluation of some sort, thus requiring a 3-star or higher rating:

* = evidence that is descriptive, anecdotal, or authoritative;

** = evidence obtained without intervention but that might include long-term or dramatic results from general dissemination of information or medical agent into a population;

*** = evidence obtained without a control group or randomization but with evaluation;

**** = evidence obtained from a properly conducted study with pre and post measures and a control group but without randomization;

***** = evidence obtained from a properly conducted study with pre and post measures and a randomized control group.

Finally, principal findings were summarized in narrative form.

RESULTS & DISCUSSION

In total, 95 intervention studies were included, critically reviewed, and summarised in Appendix Tables I and II. Appendix Table III summarises four studies reporting (in seven publications[38 39 46-49]) on interventions across multiple independent worksites or organisations. These were tabulated separately because the various worksites applied varying degrees of systems approaches that could not be distinguished from each other in the publications.

Many studies identified in the electronic searches were excluded due to recommending (but not including) intervention evaluation, not conducting systematic evaluation (less than 3 star study design rating), focusing on patient or other restricted populations, and sample sizes less than 30. For those studies that were excluded at the retrieval and review stage, a table summarising reasons for their exclusion is available from the authors.

Across the included studies as a whole, we observed a wide range of intervention targets (physical work environment, organisation, organisation/individual interface, and individual) and durations (ranging from hours to years). Evaluation measures or outcomes also ranged widely, including stressors (e.g., job control, workload), short-term impacts (symptoms), and longer-term impacts (e.g., depression, sickness absence rates). The greatest concentration of studies comes from Europe and the UK.

Comparison of High to Low Systems Approaches

We rated 31 studies as having a *High* systems approach (31/95 = 33%), versus 15 *Moderate* (16%), and 49 *Low* (51%). In comparison to previous reviews, this indicates a growing percentage of *High* systems approaches. The *Beacons of Excellence* study rated only 9 of 75 (12%) studies as demonstrating best practice 'comprehensive stress prevention and management' (a designation similar to our *High* systems approach).

> Conclusion 1: *Studies of interventions using High systems approaches represent a growing proportion of the job stress intervention evaluation literature, possibly reflecting growing application of such approaches in practice internationally.*

Comparing *High* versus *Low*-rated studies shows that *High* studies tend to have longer intervention and evaluation follow-up times, usually on the order of months to years versus hours to months (Appendix Tables I-III). Evaluation outcome measures tend to reflect intervention targets (Table 2). Thus, studies rated *High* more often targeted and measured organisational or environmental outcomes (93%), and *Low* rated studies more often targeted and evaluated outcomes at the individual level (88%). Participation in intervention development or implementation, needs assessment before intervention, and integration of job stress intervention with health promotion were more often features of *High*-rated studies in comparison to *Low* (Appendix Tables I-III).

Table 2. Individual- versus Organisational-Level: Outcomes Assessed and Favourable Findings, by Systems Rating Level

Systems Rating	N	One or More Outcome Assessed at Individual Level* (# of studies)	Percent Reporting Favourable Changes in Individual Outcomes of Those Where Measured	One or More Outcome Assessed at Organisational Level**	Percent Reporting Favourable Org Outcomes of Those Where Measured)
HIGH	31	22 22/31 = 71%	17 17/22 = 77%	29 29/31 = 93%	27 27/29 = 93%
MODERATE	15	8 8/15 = 53%	6 6/8 = 75%	15 15/15 = 100%	10 10/15 = 67%
LOW	49	43 43/49 = 88%	37 37/43 = 86%	21 21/49 = 43%	8 8/21 = 38%
TOTALS	95	73	60/73 = 82%	65	45/65 = 67%

***Individual Level** corresponds roughly to secondary prevention targets (such as coping skills, physical and mental health measures, and health behaviours)

****Organisational-Level** corresponds roughly to primary prevention targets, including working conditions (e.g., demand/control model job stress measures), physical work environment (noise levels), and those more widely known as 'organisational' outcomes (see Chapter 1, Table 3: these include job satisfaction, absenteeism, turnover, productivity, job performance, accident and injury rates, Workers' Compensation costs/rates, healthcare expenditures)

Causal Inference Ratings: Taken as a whole, the level of causal inference ratings for the studies reviewed was fairly balanced across the three rating levels (Table 3, bottom row). In studies rated *High*, the most common rating was three stars (usually longitudinal with pre- and post-intervention measures), with controlled (non-random assignment to intervention versus control—four stars) studies intermediate in frequency, and experimental (random assignment to intervention versus control—5 stars) studies the least common. This pattern was reversed in *Low*-rated studies (Table 3), most likely reflecting the relative feasibility challenges of each (far more feasible to randomly assign individuals than organisations to treatment groups). It should be noted that there were some 3 star rated studies with very low causal inference (for examples, three studies that reported after-only evaluations without pre-intervention assessment [50-52]). Nevertheless, these patterns (Table 3) indicate that the evidence base for *High* systems approaches is both smaller and lower in terms of causal inference than for *Low* rated studies.

Table 3: Causal Inference Ratings by Level of Systems Approach

	3-*** (No comparison groups)	4-*** (Quasi-experimental)	5-*** (Experimental)	Totals
HIGH	13	11	7	31
MODERATE	6	4	5	15
LOW	14	16	19	49
	33	31	31	95

Relative effectiveness of varying systems level approaches: We now turn to a comparison of evaluation findings between *High* and *Low* studies. The third row of Table 2 shows that *Low*-rated studies usually assess individual-level outcomes (88%), and usually report favourable changes in one or more of these outcomes (86% of those including individual level measures). Further, the evidence base here is fairly strong, supported by a larger literature and stronger study designs (higher causal inference ratings than for *High* systems approaches). This general pattern has also been observed in previous reviews. Examples of individual-focussed interventions include progressive muscle relaxation, meditation, and cognitive behavioural skill training. Examples of individual-level outcomes include somatic symptoms, physiological changes (e.g., blood pressure, cholesterol levels), skills (e.g., coping ability), and psychological outcomes (e.g., general mental health, anxiety).

Conclusion 2: *Individually-focused, Low systems approaches are effective at the individual level, favourably affecting a range of individual-level outcomes.*

Low-rated studies tended not to evaluate organisational-level outcomes (43%), and tended not to have favourable impacts at that level (38% of those evaluating organisational-level measures) (Table 2). Organisational level in our usage includes working conditions as well as those traditionally referred to as such (e.g., absenteeism, employee turnover, injury rates, and productivity—as summarised in Table 3, Chapter 2). For example, in a randomised controlled study, Peters et al.. observed some favourable changes in health behaviours, but no effects on absenteeism or a combined measure of job morale, job satisfaction, and productivity (Appendix Table II, page 36).[53] Further, in those studies where favourable individual-level impacts have been observed and followed up some time after intervention, the effects can backslide over time. For example, Pelletier et al.. in a randomised controlled study of a telephone-based stress management intervention found that intervention-associated decreases in somatization and anxiety that were evident at 6 months were no longer evident at one year follow-up.[54] This may, in part, be explained by return of favourably affected employees to unchanged (i.e., still stressful) work environments, resulting in the beneficial effects of individual intervention being eroded.[20 55] Further, in some cases, evidence of the benefits of individual approaches is mixed. For instance, in a critical review of individually-focused job stress management interventions measuring blood pressure as an outcome (20 studies), Murphy found that 1/3 of participants failed to learn relaxation or other techniques, and that benefits were observed in both intervention and control groups: average decrease among intervention groups was 7.8 mm Hg, versus 4.9 in controls.[2]

Conclusion 3: *Individually-focused, Low systems approach job stress interventions tend not to have favourable impacts at the organisational level.*

This conclusion is supported by numerous other comprehensive job stress intervention reviews.[2 4 5 9 12-14 17 19 55]

High-rated studies are less likely to assess individual-level outcomes than *Low*, but not markedly so (71% versus 88%, Table 2). More importantly, *High*-rated studies are similar to *Low* with respect to favourable impacts at the individual level (77% versus 88% of those studies in which individual-level outcomes measured, Table 2). *Moderate*-rated studies also show comparable likelihood of favourable impacts at the individual level. Sharper differences emerge when comparing organisational level evaluation and effectiveness (right side of Table 2). Most *High*-rated studies measured (93%) and found favourable impacts (93% of those where measured) at the organisational level. Similarly, *Moderate*-rated studies invariably measured (15 of 15 studies) and often found favourable impacts (67% of those where measured). This indicates a sharp contrast arises between *High*/*Moderate* versus *Low*-rated studies in relation to organisational impacts.

> Conclusion 4: *Organisationally-focused High and Moderate systems approach job stress interventions have favourable impacts at both the individual and the organisational levels.*

The most common organisation outcome measured was absenteeism or sickness absence. Of the *High* studies in which this was measured (n = 10, either as an organisational rate or self-reported), almost all reported decreases during or following intervention (9 of 10). For one, the finding was ambiguous—absence rate 'not decreasing' in an uncontrolled study of nurses.[56] This finding must be interpreted cautiously, however, as many of the relevant studies had low causal inference ratings or provided only minimal information on this outcome. However, the same finding persists after restricting controlled and experimental studies (4 and 5 star ratings), with 5 of 5 studies reporting favourable changes.[57-61] Given the high relevance of absenteeism to organisation leaders (see economic evaluation section below), this represents an important outcome for additional study.

The finding on absenteeism is further strengthened by the comparative studies reporting on job stress intervention evaluations across multiple independent—which could not be included in Table 2 (summarised in Appendix Table III). In a study comparing intervention evaluation results across 217 workplaces, Lindstrom found that sickness absence was favourably associated with organisational more participatory and customer service-oriented interventions (Appendix Table III, page 44).[39] Similarly, in a comparative intervention study of 52 worksites, Nielsen et al. found that those workplaces that did the most to improve the psychosocial work environment (more primary intervention focused) achieved the highest drop in absence rates.[48 62]

Economic Evaluations: Of the six *High* systems approach studies that reported economic evaluations of some sort, all six reported favourable results.[58 60 61 63-65] Four of these were controlled studies (4 or 5 stars), but not all included statistical analysis of intervention versus controls. Economic evaluation was rare in *Moderate* and *Low*-rated studies (one in each, both reporting favourable economic outcomes [66 67]). Economic evaluation was usually centred on costs of sickness absence, with some including productivity. Notably, positive organisational-level findings are paralleled by favourable changes at the individual level. These findings, however, must be interpreted cautiously due to moderate causal inference ratings. Three are detailed below.

- In an intervention with customer services and sales representatives, Munz et al. found a greater increase in sales revenue (23% versus 17% increase) and a greater decrease

in absenteeism (24% versus 7%) in the intervention versus control groups; this was paralleled by significant improvements in perceived stress levels, depressive symptoms, and negative affectivity;[60]

- In an integrated job stress and physical activity intervention for Dutch manufacturing workers, Maes et al. found a significant drop in sickness absence in intervention (15.8% to 7.7%) versus control (14.3% to 9.5%) groups, which by the company's determination yielded a positive financial return on its investment in the project study.[58] This study also found significantly greater favourable changes in cardiovascular health risks (decrease), psychological job demands (decrease), job control (increase), and ergonomic risks (decrease) in the intervention group versus control. The known interaction between psychosocial and ergonomic exposures[68] may have played a role in the marked success of this intervention;
- In an integrated intervention study for Dutch hospital workers, Lourijsen et al. observed a significant difference in absenteeism percentage in intervention versus a control hospital after 3 years (4.0 versus 6.6).[61] There was also a greater decline over 4 years in intervention (8.9 to 4.0) than control (7.1 to 5.4) against steady rate averaged across all Dutch hospitals (6.5 to 6.6). Estimated benefits (1.6 million Guilders) exceeded costs (1.2 million Guilders) at the intervention hospital 2 years into the intervention. Once again, this finding was paralleled by favourable changes at the individual level.

Intervention mechanisms: Some studies have integrated process and effectiveness evaluation, providing insights into pathways through which observed changes in outcomes are made.[42] Some intervention evaluation evidence supports hypothesized physiological mechanisms from observational epidemiology studies, such as cardiovascular disease risk factors. Orth-Gomer et al. (*High*) found improvements in lipid profiles in association with improvements in psychosocial work environment in a randomised-controlled study (Appendix Table I, page 15).[69] Erikson et al. (*High*) made a similar finding in a controlled study (Appendix Table I, page 4).[70] Finally, Rydstedt et al. (*Moderate*) found significant improvements in blood pressure and heart rate to be correlated with changes in job hassles for inner city bus drivers (Appendix Table I, page 21).[71] Thus, job stress interventions affect cardiovascular disease risk factors, which epidemiologic study has shown to be on the causal pathway linking job stress to cardiovascular disease (see Chapter 2).

Other studies illustrate how *High* and *Moderate* systems approaches can favourably affect both individual and organisational level outcomes. Bond & Bunce 2001 (*Moderate*) found in a randomised-controlled study that favourable effects on mental health, sickness absence, and performance were mediated by increased employee job control through work re-organisation (Appendix Table I, page 18).[72] In a longitudinal comparative study of 81 Dutch workplaces, Taris et al. found that work-directed (primary prevention-focused), but not other, interventions are linked to job stress reduction (Appendix Table III, page 47).[49]

The importance of employee participation—central to *High* systems approaches—is highlighted in other studies. In a comparative longitudinal study of 40 work groups, Eklof et al. found that high employee participation and integration of occupational health with traditional core organisational concerns was consistently associated with decreases in work demands, improvements in social support, and decreases in stress levels (Appendix Table III, page 43).[38 46] In another longitudinal comparative study, Lindstrom found that a collaborative/participatory approach applied in the intervention correlated significantly with many changes in organisational climate, and most of all with an increase in continuous improvement practices (Appendix Table III, page 44).[39] 'Health Circles', as developed in

Germany, provide a systematic means of conducting participatory needs assessment and intervention development.[16 73 74]

Integrated OHS/HP Interventions: There is a growing interest in intervention strategies that integrate occupational health and workplace health promotion.[75] We identified eight studies [53 58 61 63 65 76-78] in this review that integrated job stress intervention with health promotion of some sort (e.g., physical activity,[58] smoking,[61] alcohol consumption[77]).

Most of these studies (5 of 8) had *High* systems approach ratings. Health behaviour outcomes were evaluated, however, in only two of these studies. In one, a significant increase in physical activity was reported,[58] and the other showed a decrease in smoking, but did not test this change for statistical significance. Three studies had *Low* systems approach ratings. One reported a significant decrease in alcohol and cigarette use,[77] one reported 'more health behaviour changes' in intervention versus control groups,[53] and the third reported increases in physical fitness.[78] The two latter studies included organisational-level outcomes, and findings in each echoed our conclusion above that that individual approaches can be effective at the individual level (including health behaviours as well as health outcomes) but are less likely to be so at the organisational level: Peters et al. found no impacts of the intervention on any of the several organisational level outcomes examined,[53] and Eriksen et al. found no effects on sick leave.[78] Integration with primary prevention in such interventions would both enable effectiveness at the organisational level and increase effectiveness at the individual level.

Though there are only a handful of integrated job stress and health promotion studies to date, there is great potential for improving worker health through integrated approaches, as reflected in the European Network for Workplace Health Promotion's 2002 Barcelona Declaration on Developing Good Workplace Health in Europe.[79] This Declaration links the increase in mental disorders in Europe to increasing psychosocial stressors and strain in the workplace, and declares that smoking and alcohol consumption are also work-related, and "can only be tackled through health promoting workplaces." Closer to home, the Tasmanian Workplace Safe agency has prepared excellent guidance material for employers and workers on 'hidden hazards', including specific linking of job stress with misuse of tobacco, alcohol, and other drugs.[80]

CONCLUSIONS

Conclusion 1: *Studies of interventions using High systems approaches represent a growing proportion of the job stress intervention evaluation literature, possibly reflecting growing application of such approaches in practice internationally.*

Conclusion 2: *Individually-focused, Low systems approaches are effective at the individual level, favourably affecting a range of individual-level outcomes.*

Conclusion 3: *Individually-focused, Low systems approach job stress interventions tend not to have favourable impacts at the organisational level.*

Conclusion 4: *Organisationally-focused High and Moderate systems approach job stress interventions have favourable impacts at both the individual and the organisational levels.*

The observed growth in *High* systems approach studies in the job stress intervention evaluation literature in comparison to previous reviews is hopeful sign. This suggests that *High* systems approaches are likewise growing in practice—at least internationally. But there likely remains a long way to go before *High* systems approaches represent the norm in job stress intervention. Most previous reviews and authoritative declarations indicate that individually-focused (*Low*) approaches continue to dominate.[6 13 17 25 36 81 82]

Our main conclusion can be summarised (from Conclusions 2-4 above) as follows: the available evidence indicates that *High* systems approaches are the most effective in addressing the organisational and individual impacts of job stress. This is consistent with several other reviews that have applied similar lenses to the job stress intervention literature (described in Introduction above), all of which acknowledge the need to address both the causes and consequences of job stress.[3 4 6 8-10 12-14 25 33] In addition, addressing job stress using systems approaches is supported by leading authoritative statements and declarations.[32 79 82 83]

Our conclusions must also be qualified by the following limitations.

- The conclusions are necessarily generalisations;
- The inclusion of non-peer reviewed studies and those with low causal inference ratings (some 3-star studies) limits the confidence with which observed effects can be attributed to interventions alone. However, this inclusiveness affords a more representative picture of prevalent practice, as internally-initiated interventions (i.e., not researcher or evaluator-driven) tend to have less-developed evaluations and lower causal inference ratings, and are more often published in the grey literature;
- Our systems approach rating scheme was fairly crude, and was based only on information provided in publications. The published literature tends to focus more on evaluation and often provides only limited description of the intervention. For example, there is likely to be a wide range of degrees of participation among those interventions noted in the Tables as including participation;
- Our review was limited to interventions including employees or contractors independent of pre-existing susceptibilities, complaints, or illnesses (i.e., excluded patient populations, only employees reporting stress-related symptoms). Other reviews have taken complementary approaches and reached different conclusions. For example, a meta-analysis conducted by Van der Klink et al.[11] only included participants recruited from working populations because of imminent or already-manifested stress-related psychologic problems. From this meta-analysis, it was

concluded that stress management interventions are effective for such a target population, with cognitive-behavioural interventions being more effective than other types;

- We identified very few[63] intervention studies that integrated tertiary-level intervention with primary and/or secondary (see Figure 1). This suggests (but does not necessarily show) that this is also the case in prevalent practice. This represents a disconnect between tertiary level and other intervention research and practice at the organisational level (though Workers Compensation agencies often target primary or secondary prevention efforts on sectors with high job stress claims rates). Most literature in this area focuses on (early) return-to-work programs for employees who have filed job stress claims.[84] There are opportunities for building constructive links between tertiary and other intervention levels,[11 44 84 85] but also numerous pitfalls that are largely attributable to the challenges of integrating public health and insurance concerns.[84 86]

RELEVANT LITERATURE NOT COMPREHENSIVELY REVIEWED

The scope of the comprehensive job stress intervention literature review was restricted to interventions expressly aiming to alter the sources of, responses to, or effects of job stress.[1] We also recognise, however, the relevance of other studies of planned or observed changes in job stress and associated outcomes, including developmental studies, natural experiments, and policy analyses. Summary discussions of each of these are provided below along with explanation of insights provided for job stress intervention.

Developmental Studies: Developmental intervention research provides an important complement to evaluation studies.[42] The following examples illustrate their utility. Cottrell outlines an in-depth survey-based needs assessment to develop focussed job stress interventions for community mental health nurses in a semi-rural area of North Wales.[87] Applying a systems approach, a range of specific and tailored interventions are developed for the individual, group ('team perspective'), and organisational levels ('systems perspective'). Such developmental research optimises the chances of success, and provides compelling justification for investment in intervention effectiveness evaluation studies.

In an Australian study of a medium-sized public sector agency, Noblet strategically assessed two barriers to adopting a 'settings' or public health approach to job stress: the lack of information on how job stress can influence health, and the lack of understanding of organisational-level aspects of this problem.[35] The goal was to stimulate a broader approach to job stress than prevalent lifestyle-oriented strategies. Using a comprehensive job stress audit, Noblet was able to show that job control and workplace social support accounted for large proportions of the variance in job satisfaction and psychological health, and that several job-specific stressors were predictive of the strain experienced by employees. These findings were used to advocate for a systems approach to job stress within the organisation under study. Such study is often necessary to prepare organisations for change, and to convince managements to adopt a systems approach over a narrower individual focus.

To optimally develop systems approaches to job stress, it is important to involve all aspects of the system. We noted above the particular disconnect between tertiary level players (e.g., return-to work coordinators, claims managers) and those engaged at the primary and secondary levels. Because job stress is a contentious issue, however, it is important to frame discussions as forward-looking in order to avoid defensiveness, issues of blame and fault, etc. A method for achieving this efficiently and effectively has been developed and tested by A Shaw and V Blewett and was used in a current project being undertaken for NSW WorkCover on job stress in the health and community services sector (MF Dollard, AD LaMontagne, A Shaw, and V Blewett). This method, called *Future Inquiry,* has the added benefit that it embodies the principles of participation and respect that underpin systems approaches. The method adapts existing participative planning techniques, building on appreciative inquiry[88] and future search [89] methodologies. This method aims to examine new directions for action by looking for fresh ideas and acknowledging what works well at present. A focus on positive stories and ideas generates respect for what has been done well, identifies the parts that individuals play in their organisations, articulates accepted values, and invites an affirmation and expansion of ideas. This approach yields insights that are grounded in the experience of stakeholders, reflecting the reality of everyday working life, and identifying existing strengths as well as needs.

Future Inquiry consists of a day-long workshop involving representatives of key stakeholder groups. The NSW event involved over 60 participants, including unions;

employer representatives; health and safety representatives; workers and managers; treatment providers; OHS coordinators and consultants; rehabilitation coordinators and consultants; the OHS regulator; and the workers' compensation regulator. A particular strength of this approach is that it brings together of tertiary intervention stakeholders along with those focused more on primary and secondary strategies. The workshop alternates between small group work and plenary discussions. Activities identify stakeholder positions and needs, and progressively integrate those into intervention development. *Future Inquiry* also builds commitment to prevention strategies from the beginning. It provides a means for differences between stakeholders to be acknowledged without causing conflict. In the NSW workshop, there was remarkable congruence between normally opposed stakeholders on what the issues are and ways forward (e.g., the need to address stigma associated with stress claims in order to get people back to work). *Future Inquiry* supports the development of concrete actions and intervention strategies in a way that builds acceptance and commitment across the full range of relevant stakeholder and system levels.

Natural Experiments: 'Natural experiments' do not expressly aim to address job stress, and thus were not reviewed in detail in this report. However, they provide an important complement to the intervention evaluation literature, as demonstrated by the examples below. Dodd-McCue et al. provide an account of 'unintended consequences' of stress reduction (measured as role ambiguity, role conflict, and role overload) for critical care nurses resulting from a protocol change to improve communications during potential organ donation cases.[90] This small but valuable descriptive study illustrates how improvements in healthcare service provision and psychosocial work environment can go hand in hand.

Another study reviewed the impact of the growth in 'lean production' management methods with respect to associated effects on job stress.[91] Landsbergis et al. found little evidence that lean production "interventions" empower industrial workers or reduce their stress. To the contrary, they appear to intensify work pace and demands. Increases in decision authority and skill are very modest and/or temporary, and decision latitude remains low. Therefore, the expansion of "lean" work principles (e.g., an understaffed, flexible labour force, little job security, overtime) throughout the labour force could produce dramatic increases in the incidence of stress-related physical (e.g., hypertension, CVD) and mental health (e.g., depression) outcomes.

Finally, the Cornell Worksite Ambulatory Blood Pressure (AmBP) study is another example of a 'natural experiment' showing indirect benefits of job stress intervention.[92 93] This prospective study followed 285 healthy men aged 30-60 at eight New York city worksites. Data were collected at years 0, 3, and 6. Job strain was positively related to AmBP at each time point (cross-sectionally). Changes in job strain predicted changes in AmBP, after controlling for 10 other potential confounding factors. Most notably, decreasing job strain was associated with higher smoking quit rates.[94] These results demonstrate that decreasing job strain—from whether due to purposeful intervention or not—results in decreased AmBP as well greater success in quitting smoking, both of which decrease the risk of heart and other diseases. The quitting result is a valuable complement to the integrated intervention studies reviewed in this report (detailed above), demonstrating the potential for improvements in psychosocial work environment to result in improvements in health behaviours.

Policy Interventions

Various legal, legislative, and other approaches to job stress issues are emerging across the industrialized world.[95 96] The concept of policy level intervention includes governmental regulatory policy, voluntary best practice guidelines published by non-governmental organizations, collective bargaining agreements, company policies, and more.[42] The European Union provides an example of a recent broad-based effort to address job stress, with its dedicated European Union OHS week 2002 on *Working on Stress - Preventing Psychosocial Risks at Work* (http://osha.eu.int/ew2002/).

There is little evaluation information to date on job stress policy interventions, but the limited studies to date in this area demonstrate the potential of policy interventions to stimulate systems approaches to job stress.[96 97] For example, the Swedish Working Life Fund was set up by government to promote and fund programs to improve work environments and work organization, to enhance productivity, and to improve rehabilitation.[98] Evaluation using a random sample of 7,500 of the 25,000 major programs funded showed increases in productivity, decision latitude, and job satisfaction, and decreases in physical job strain.[98] Notably, ratings by management and labour union representatives were almost equal.

There is also a number of policy precedents emerging, most notably from Europe and the UK.[96 99] The Management Standards approach exemplifies of how a national authority may introduce and implement organisational strategies for job stress prevention through a three stage process: entailing the development of (1) management standards, (2) risk assessment, and (3) risk indicator tools.[99] In the UK, this approach is embedded in a Health and Safety Executive (HSE) Stress Priority Programme, giving priority to collective over individual protective measures and emphasizing employee, employer, and researcher participation (approximating a systems approach). Problematic points of this approach relate to the clarity of the standards and their relation to the risk indicator tool, the validity of the risk indicator tool, and the scientific basis for standard threshold points. [99]

Another example of Management Standards, the Covenants on Health and Safety at Work in the Netherlands, were initiated as sectoral agreements with respect to stress management among representatives of the Dutch Ministry of Social Affairs and Employment, trade unions and employers organizations.[99] The Dutch Work Environment Act (WEA) applies to both the physical and psychosocial work environment with concern for safety, health and well-being at work being the clear responsibility of the employer.[97] The WEA states that employees should have the possibility of organizing their own work in accordance with their own professional qualifications, sufficient opportunity to determine their own work pace and keep in contact with their colleagues, and that monotonous and repetitive jobs should be avoided. The Dutch working conditions policy is linked to social security policy regulation in an attempt to reduce absenteeism; however, there is great bureaucratic segregation between social and industrial policies. The Ministry of Social Affairs and Employment introduced a national monitoring instrument, "Work stress and physical work load,' in 1994.

In most OECD countries (e.g., those above), the responsibility for managing the relationship between work and mental health is divided between Ministries of Health and of Labour, rather than clearly residing with the former.[100] In these countries, overall responsibility for public health resides with the Ministries of Health while responsibility for occupational health is placed within the Ministry of Labour or an independent agency (e.g., Victorian WorkCover Authority). This structural arrangement can be seen as an organizational form of 'role ambiguity' and is a barrier to effective action. Yet job stress is both an occupational health and a public health problem—requiring primary, secondary, and

tertiary intervention efforts from all relevant stakeholders. There is an urgent need in the Victorian example of this situation for leadership in raising awareness of the seriousness of the problem among the various government (e.g., Victorian WorkCover Authority, DHS) and non-government stakeholder groups (e.g., unions, *beyondblue*, healthcare providers), advocating for systems approaches, and coordinating action among stakeholders.

IMPLICATIONS FOR RESEARCH, POLICY, & PRACTICE

Further study is needed to develop the job stress intervention evidence base to guide policy and practice. Studies that include organisational outcomes, such as absenteeism and economic measures, will be particularly valuable for encouraging organisations to adapt systems approaches. The growing evidence base for systems approaches to job stress provides a timely opportunity for advocacy and information dissemination. Europe and the UK are providing international leadership on taking a systems approach to job stress. Translation of their policy and practice insights to Victoria—where systems approaches are not the norm in prevalent practice and policy (as outlined in subsequent chapters of this report)—would be valuable.

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Chapter 3

Job Stress in Victoria, Part I:

Stakeholder Interview Study

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INTRODUCTION

As previous chapters of this report demonstrate, there have been many studies of job stress interventions, including a growing body of effectiveness studies. Noticeably, however, there has been at best only limited analysis examining the context for these interventions. The literature provides little evidence with which to answer critical contextual questions about job stress intervention, such as: How do key stakeholders conceptualise job stress? How serious do stakeholders believe the problem to be? Where do stakeholders in industry go for advice, guidance and information?

To characterise this context for job stress intervention, we conducted an in-depth interview study of prevalent views and activities in the area of job stress. A wide range of relevant Victorian stakeholder groups were interviewed including employers and employer groups, trade unions and other worker advocates, researchers and the Victorian WorkCover Authority. These stakeholders operate within a context shaped by occupational heath and safety (OHS) law, which imposes specific obligations on employers to control risk (including risks to psychological health). The OHS regulator, the Victorian WorkCover Authority (VWA), is responsible for monitoring and enforcing compliance with this duty. Unions and employer organisations have critical roles both in contributing to the development of regulation through a tripartite process, as well as supporting and advocating for stakeholders in workplaces to achieve regulatory requirements. As the regulator, the VWA (sometimes referred to as WorkSafe, the OHS division's operational name) has a critical role in determining how legal compliance might be achieved for the risks presented by job stress. Through interviews across industry and with key stakeholders, this chapter provides a thorough and empirically grounded description of current Victorian practice, a critical support for developing a systems approach to workplace stress. The interviews sought to examine the views of Victorian stakeholders in the area of job stress to investigate understanding of and receptivity to systems approaches. We also sought to review experiences in workplaces to examine how the concept of job stress is understood by those who deal with it directly at the workplace and the ways in which they deal with it.

METHODS

Approach

Because job stress is a contentious issue, interviews were framed as forward-looking in order to avoid defensiveness and issues of blame and fault. The approach drew upon 'appreciative inquiry' techniques, which aims to examine new directions for action by looking for fresh ideas and what works well at present. A focus on positive stories and ideas generates respect for what has been done well, identifies the parts that individuals play in their organisations, reinforces accepted values, and invites an affirmation and expansion of ideas. This approach yielded insights that were grounded in the experience of stakeholders, reflected the reality of everyday working life, and identified existing strengths as well as needs. For the goal of melding state-of-the-art research knowledge with the local Victorian context, this approach provided an optimal complement to the review of the theoretical and empirical literature. The interview study protocol was reviewed and approved by the University of Melbourne Human Research Ethics Committee.

Sample

Interview participants who represented stakeholder groups (e.g., employer associations, trade unions) were identified through the researchers' professional networks. Specific workplaces were nominated and approached through the stakeholder participants. Potential interviewees were sent a project description, so that their decision about whether to participate could be made on the basis of information about the project.

A total of 41 individuals were interviewed in 29 interviews. Interviews were conducted with representatives of the following stakeholders:

- the Victorian WorkCover Authority (VWA, the regulator) (two representatives)
- Victorian Employers Chamber of Commerce and Industry (VECCI)
- Australian Chamber of Commerce and Industry (ACCI)
- Australian Council of Trade Unions (ACTU)
- Victorian Trades Hall Council (VTHC)
- Textiles Clothing and Footwear Union of Australia (TCFUA)
- Electrical Trades Union (ETU) (two representatives)
- OHS Officers at VTHC (eight representatives of different affiliate unions)
- Dr. Andrew Noblet, Faculty of Business and Law, Deakin University
- Working Women's Health (a non-governmental community organsiation) (one representative)Interviews were conducted with the following employees at the following public and private sector workplaces:

- ***Public Sector***

- Local government – a regional council. Chief Executive Officer, Health and Safety Representative (HSR), two OHS coordinators

- State government – emergency services agency. Senior manager, HSR, OHS manager

- Federal government – service provision agency. Local manager, OHS officer, 2 HSRs

- ***Private Sector***

  - Textiles industry manufacturer. General manager, Human Resources (HR) manager, HSR

  - Hospitality – catering and events company. HR manager and HSR.

  - Media company – two OHS coordinators, local manager and HSR

  - Electrical contracting company – General manager (who takes responsibility for OHS) and HSR

Interview protocol

The interviewer reviewed the project description with interviewees at the beginning of interviews and verbal consent was then obtained using a standard phrase.

Each interview covered the following issues in open ended questions:

- How the interviewee's organisation deals with workplace stress
- How they define it
- The extent to which they see it as a problem
- If it is a problem, whose problem it is
- How they think their organisation should deal with workplace stress
- Where they look for guidance, authoritative advice or information on workplace stress
- The advantages and disadvantages of dealing with workplace stress, including affects on business outcomes.

Interview length ranged from 20 minutes to over one hour.

Analysis

Interviews were transcribed and the transcripts analysed to determine common and divergent themes relating to six issues that were specified in consultation with the project funder (VicHealth) *a priori*:

1. Conceptualisation of job stress
2. Perception of the extent of the problem

3. Identification of responsibility for job stress

4. Action being taken on stress

5. Current sources of advice and information

6. Identification of further needs (eg for action, for information)

In particular, we analysed the extent to which the interviewees demonstrated understanding of a systems approach, which we defined as:

- Addressing the whole work system and context of the organisation
- Integrating primary, secondary and tertiary interventions, with intervention as far upstream as possible
- Participation in the design and implementation of interventions by those targeted by the intervention
- Ongoing monitoring or surveillance of job stress issues and interventions, and integration into the way the organisation is run.

This was done by carefully scrutinising the transcripts and identifying key words, phrases and "concepts that fit the data", as described by Strauss (1987:28)[1], in order to ground the findings in the data. As a result, regular features of the data were identified and grouped, patterns and themes were noted and the data were clustered by conceptual groups. Contrasts and comparisons between the groups were made and relationships noted in order to finally assemble the data coherently[2].

FINDINGS

Conceptualisation of job stress

Stress was primarily understood as an individual's reaction to their working environment, with most interviewees defining stress in terms of the health outcomes in individuals, citing conditions such as sleeplessness, irritability, inability to concentrate, feelings of anxiety and exhaustion as showing stress. When questioned further, all interviewees acknowledged that job stress is an OHS issue and that it can result from the circumstances of work.

Defining work-related stress was surprisingly challenging for most interviewees, who were more comfortable discussing the factors that lead to job stress than providing a specific definition. Some stakeholders provided a formal definition after the interview, while others read out a formal definition agreed by their organisation. As this suggests, there was some sensitivity about defining stress. The VWA interviewees, for example, reported that that they would be undertaking *more consultation before we did any sort of official position on the definition of stress.*

A health and safety representative reported sensitivities in their workplace over defining stress: *I'm not allowed to say I'm under workplace stress. I'm actually allowed to say I'm just overworked at the moment* (HSR). The OHS manager in the emergency services agency argued that trying to define stress too closely can be counter-productive and that it was more useful to talk about the factors in question such as workload or workplace conflict: *If you don't do a more detailed analysis and be more specific that you end up providing them with the wrong strategies* (OHS Manager, emergency services agency)

Often, though, stress was still seen as related to individual factors rather than underlying organisational factors. For example, the Manager in the federal government agency reported that:

> *People that work here tend to … you know they come in and they hang, and they hang for a long time. So may be there's a personality mismatch or something with this fast paced environment and the stationary kind of worker* (Manager, federal agency).

The general manager of the textiles enterprise identified stress as related to an individual's capacity to fulfill the functions of jobs:

> *People who, effectively, are capable of doing their job, but they're not applying themselves to the job and as we took them through the disciplinary procedures you do go through their performance and it became stressful for them and they have effectively left* (Manager, textiles company).

This manager also identified that there were often more effective strategies for achieving better performance in a machine paced environment: *If, for example, a machine is not functioning, the operator cannot do anything. So there is no point putting pressure on the operator* (Manager, textiles company).

Stakeholders had widely divergent views about the most important issues associated with the causes of job stress. Employer stakeholders were most concerned about identifying the extent to which individual cases of stress were work related, seeing the majority of stress issues related to the individual: *[people who make stress claims] seem to be idealistic and*

unreal and have a very undeveloped sense of realism so tend to be more prone (Employer Organisation). Rather than being context dependent, individual differences were seen as the key factor: *Different people respond differently to different situations in terms of their work and their home environment.* (Employer Organisation)

One blue-collar union OHS officer also took a more individualistic line:

> *Some people thrive very well on stress. They need the intensity. They perform much, much better where with other people it becomes very, very much overbearing and they tend to get depressed.* (Union Official).

An interviewee from an employer organisation argued that, while stress resulting from traumatic events such as workplace violence was clearly work-related, the evidence for work-relatedness, more generally, is poor:

> *You're probably aware that there has been something like 10,000 studies world wide relating to workplace stress and none of those actually comes up with any firm indications of the link between stress and work.* (Employer Organisation)

One employer organisation interviewee reported concern from their members that successful workers' compensation claims for stress implied blame on the employer.

In contrast, most union interviewees saw stress as the consequence of poor work organisation and were committed to primary prevention and a systems approach. A number of union officials clearly identified the causes of job stress as rooted in changing industrial structures and processes: *One of the large fundamental causes of stress amongst our membership is job insecurity* (Union Official). Similarly, another official also identified that: *Casualisation of work is a great producer of stress* (Union Official). Another official recognised the health issues, but as a consequence of the industrial processes:

> *We see it as something that is both a sort of industrial and a health issue, we think. It's an industrial issue in the sense that it is often to do with the organization of work and the way that people in our industry, members in our industry, are required to work and the pressures that they are under that are extremely stressful but then it's also the case that it's a specific sort of side effect if you like of many of the jobs that they do and the industry they're working in.* (Union Official)

As well as growth in job insecurity and casualisation, union interviewees identified longer working hours, multi-skilling, work targets, communication problems, rostering, and clashes between work and family responsibilities as key factors underlying job stress in workplaces. Workload was an important issue raised across union interviews, with work intensification and greater surveillance of workers identified as consequences of this.

Other interviewees not directly involved in OHS were also able to articulate a systems understanding of job stress. The interviewee from Working Women's Health described the way their clients talk about stress:

> *because of the conditions of their work, because the people who they work for weren't paying them at the right time or the right scale or because there was sexual harassment and they didn't know who to go*

and see … they were worried about losing their jobs (Working Women's Health)

Some interviewees demonstrated a familiarity with the scientific and professional literature, being able to refer to definitions from international publications, eg:

> *We have been very much guided by the definition from the European Union about what stress is*. (Union Official)

This definition was preferred because it focuses on the workplace, not individual workers and their capacity to cope. Some OHS staff in the case studies also cited international literature, such as standards produced by the UK Health and Safety Executive and WHO publications.

Bullying was seen as part of stress and more likely to resonate with blue collar workers. Union officials and enterprise interviewees reported that blue collar workers identified issues with bullying but did not usually identify the issue of stress as relevant to them:

> *…bullying is having a bell with people, but if you talk about stress, it just doesn't click …. It's not saying that … people don't [or] are not undergoing psychological abuse … and ending up with psychological problems as a result of their work but its not how people identify.* (Union Official)

The extent of workplace bullying was reported to have increased for much the same reasons as for increased stress:

> *there is a change in managerial styles … there's less staff to take up the slack, there's more pressure in terms of output and also there's less industrial strength so things become more individualised* (Union Official)

As previously described, one blue collar union official articulated an individualistic concept of job stress. In contrast, another official of the same union reported, in relation to the link between stress and depression: *maybe much more of it is kind of existentially rooted in the way we're constructing the relationship between work and play and work and family*. This represents a tendency revealed in the interviews for OHS/HR professionals across different categories of interviewees to proffer an individualistic explanation when probed about the causes and management of stress, while those without an OHS background offered explanations more grounded in work and social organisation.

Greater depth and sophistication of the conceptualization of stress as a work organisation issue appeared to be somewhat more evident in those who have a more day-to-day direct experience of production. For example, the manager of the electrical contractor clearly recognised that the amount and time pressure of work required was the key stressor on individuals in the electrical contracting company:

> *When I look at the people in the office and I look at, for arguments sake, my project managers and my managers that, yes, it's obvious that they do suffer from stress because, again, there are periods in the normal cycle of a project where they are subjected to long hours, very tight deadlines and I suppose the more I think about it the longer those durations of extended periods of tight deadlines that obviously, as I'm*

> *talking to you, are starting to visualise. When I look at the individual you can see that they are suffering from stress.* (Manager, Electrical Contracting Company)

The manager's strategy was to reduce the work, not to teach people to do a better job of managing the workload:

> *I do take it into consideration in terms of I do keep an eye on the guys and I do that unconsciously. But I do consciously determine when I'm allocating work out what the workloads are so that I don't put individuals under too much stress.* (Manager, Electrical Contracting Company)

Similarly, the senior manager of one of the enterprises articulated the links as:

> *Stress and culture are quite interrelated, so if I've got high levels of stress, I would make the assumption that I've probably got a less than satisfactory organisational culture. If I've got low levels of stress then I would think that I would be moving more towards a healthy culture of people wanting to come to work* (Senior Manager, local government).

This wider sphere of action may be because the starting point of analysis for some OHS practitioners was individual health, possibly leading them to an individualistic explanation. Even where organisational responses were being implemented, individual factors were identified as significant:

> *If we can improve the physical fitness, physical health of individuals, it means that they are by virtue of that able to cope with stressors in their life* (OHS Manager, emergency services agency)

Other interviewees started from an understanding of the industrial and organisational context of work, some even identifying the link between an individualistic approach to job stress with individualistic approaches to employment arrangements being pursued by the federal government:

> *How do you build a culture of understanding in a situation where it's all about individual contracts in the workplace and you separate the workers so that there's not even a collective spirit?* (Union Official)

One union official argued that, in part, stress has become such a problem because *things [have] become more individualised, when you're more collectivised you actually handle those things [workload, pressure, bullying]* (Union Official).

The VWA's concept of stress was primarily claims driven, for example their strategy on job stress was limited to the public sector because that was where the majority of claims occur. Claims data was their only response to a question about the extent of the problem of job stress. Union officials reported concern that the VWA's concept of stress has difficulties dealing with circumstances where injury has not yet occurred.

The seven enterprise case studies demonstrated a thorough recognition of job stress as an OHS issue and growing understanding of systems concepts. Indeed, while individual factors were prominent in the explanations of job stress, most of the case study enterprises were able

to clearly articulate organisational causes of stress and many had taken steps towards a systems approach, even if these were not very programmatic (eg not formal).

Both the manager and the health and safety representative from a private sector company identified working hours and deadlines as the key causes of stress in their work. While formal control strategies did not exist, they both argued that the teamwork ethos of their company was critical to managing and reducing the potential for negative outcomes:

> *There is a very, very strong emphasis on the company being a family and teamwork is at the core of the ethic of the company …. It means that you never actually feel like you're doing it on your own …. And that's probably the major thing that stops people from feeling really stressed* (HSR)

Interviewees from another private sector company also identified rosters and workload issues as key causes of job stress and cited positive workplace relationships as key control measures:

> *the people I actually work with here I actually love and respect ….I don't feel like I am on my own at all…. I am always getting solutions and support. One of the stress things for me is that nothing I do here is unrewarded* (HSR)

The OHS manager of the emergency services agency articulated a sophisticated understanding of a systems approach to work related stress, linking it clearly to a systematic approach to risk management across the range of OHS risks: *a systems approach to work related stress is the same as the systems approach to any occupational health and safety hazard, that is … hazard id, assess, control* (OHS Manager, emergency services agency).

The HSRs in a public sector agency identified job pressure as a key issue:

> *We have individual stats so we are competing with each other, so it becomes stressful in itself …. We are being pushed all to one target, to one level which we're all different people and that's what the stress I think comes down to* (HSR).

These data show that Victorian stakeholders understand the causes of job stress as rooted in work organisation and work systems. However, while this shows some receptivity to systems approaches, interventions in enterprises are currently dominated by individually focused strategies to address the problem.

Perception of the extent of the problem

All interviewees asserted that stress was a big problem. Unions see job stress as a very significant problem for their members, even where it was not identified directly. Union interviewees reported that *changed social and work patterns have made it a huge problem*.

This was reported to have resulted from microeconomic changes:

> *We've seen over the past 20 years labour market change where productivity is going up and the pressures placed on workers by employers to meet those productivity requirements has increased and there is downsizing … if you just look at casualisation you look at the*

labour market with that. We have seen increased pressure and stress on workers and I think more than ever before stress has become a massive issue. (Union Official).

However, a number of union officials reported that the extent of the problem was not recognized by employers or even by their members:

Employers in the industry would if you asked them say it is not an issue, they would see stress in a more narrow way … they would think there was some correlation between low skilled work in their terms and lack of stress (Union Official)

Partly as a result of these perceptions, formal workers' compensation claims for stress-related ill-health in blue-collar industries are rare. Instead, workers experiencing job stress were reportedly more likely to submit claims for musculo-skeletal disorders. For example, one union interviewee reported that musculoskeletal disorders in the manufacturing industry can be manifestations of poor work organisation features such as bullying. This was reinforced by an employer organisation interviewee who accepted that *there's a whole lot of stress associated with things they might claim for a crook back*.

One employer organisation interviewee argued that stress was a significant issue for his members, because stress claims are very expensive and have long-term effects on workers' compensation premiums. This was a particular issue because employers feel unable to control the risk, believing that:

There's nothing I could have done to stop this and there's nothing I could do to resolve it because I had to make a decision to promote someone over someone else or to reduce expenditure in one area in favour of something else. It was a decision that I can't reverse. So they're seeing it as an interference in their ability to manage. (Employer Organisation)

If employers believe that they cannot control it, then the only actions they can identify to reduce the cost and frequency of claims are through aggressive claims management. According to this interviewee, this problem has meant that workers compensation claims for stress may have stopped increasing:

Because people have started to realise that if you claim stress you won't work again if your claim is accepted. Because no one will give you a job because no one knows how to prevent or control it. And if this person's gone down before they may go down again and what am I going to do and what caused them to go down? (Employer Organisation)

Employer organisations also reported that, as an OHS issue, stress was 'over-emphasised'. They argued that treating stress as a workers' compensation issue does not help employers to deal with it:

It's got to be removed from the compensation thing …. Stress can't be treated like back injuries or shoulder injuries. That shouldn't distract from the fact that it's becoming a problem …. I think it needs to be recognized that without the compensation problems which I think are more legal problems than medical, there's also some real issues that

need to be addressed but no one is quite sure how yet. (Employer Organisation)

The VWA identified the extent of the problem in terms of workers' compensation data, providing a formal response to this question after the interview by providing workers' compensation statistics of incidence and severity rates in the public and private sectors.

In contrast, many interviewees identified that job stress can have adverse organisational outcomes apart from workers compensation. For example, the academic identified the links between job stress and poor organisational performance in other ways, reporting that the organisational factors that lead to stress *are the very same things that are contributing to error rate, contributing to absenteeism, it's contributing to the ability of the organisation to met the requirements of their customers, shareholders, etc*.

This was well recognised in the case study enterprises, with the time taken in managing these issues identified as a significant issue:

> *If you're managing interpersonal conflict, stress related problems, workload, work pressure problems in your work group, it's actually very debilitating to the individuals and to their work group as a whole.* (OHS Manager, emergency services agency).

Consequences for organisational outcomes were also identified:

> *It decreases money raised in revenue and profits and that sort of stuff and that's all the on-costs and the hidden costs* (OHS Manager).

Most enterprise interviewees identified stress as a problem for their organisation, although for some cases this was not as a result of significant history of stress-related workers' compensation claims. These private sector enterprises instead referred to the human cost of ill-health and negative performance outcomes as being important issues.

The nature of the problem also shifts, responding to changing circumstances. For example, the emergency services agency reported that the attributed causes of claims for stress changed as interventions such as the Bullying Guidance were rolled out, with people now more likely to attribute their stress reaction to bullying when they may have attributed it to critical incidents in the past. This was reported to be helpful, because:

> *If you have a greater clarity about what the real drivers are then your strategies in terms of resolution of those issues and your strategies in terms of prevention of future cases are much clearer.* (OHS Manager, emergency services agency).

As this suggests, how people characterise the problem and the seriousness with which they view it has signficant consequences for their ability to act on it, described in subsequent sections of this chapter.

Identification of responsibility for job stress

This was a highly charged area, with strong disagreement about the allocation of responsibility between stakeholders. Employer organisations were focused on differentiating between work and non-work related causation, arguing that because of this interplay, job stress was perhaps primarily a community, rather than an OHS, problem. On the other hand,

private sector employers were more sophisticated in their understanding of the web of responsibility, readily acknowledging the employers' responsibility for a safe workplace and that control of stress fitted within that. For example, the HR manager of the catering company reported that, *if they have someone in a management position who doesn't deal with his staff appropriately and you've got bullying issues then it's definitely an employer's responsibility* (HR Manager, catering company).

Unions saw job stress as an OHS issue and therefore the responsibility of employers:

> *The employer has that duty of care and … until they start taking this seriously and not just saying that people just … can't cope … you need to see employers introduce structures and … workplace change that will reduce the effects of stress. Basically, stress is a hazard in the workplace and they need to prevent that hazard.* (Union Official).

Most interviewees reported that employers' responsibility for job stress as an OHS issue was generally accepted: *It's roundly accepted as a problem and a health issue in the workplace.* (Union Official). However, this same interviewee identified that in workplaces themselves, stress was seen as an individual responsibility:

> *There is a movement amongst employers to blame workers for not being able to cope rather than looking at their own workplaces and what is causing that stress in the first place* (Union Official).

Some interviewees argued that *it's very much a large social issue that I think we need to come to grips with, need to be able to grapple with as a society before we can actually move forward.* (Union OHS officer). This theme was reinforced by other interviewees, who saw job stress as *serious government policy issue* (Union Official). Indeed, public sector union officials identified that *it's actually government decisions that often cause the stress*.

The ability of the regulator to deal with the work organisation factors that create job stress was identified as a problem by union interviewees: *we've had a lot of reluctance from Worksafe to pick up on that issue of workload.* This difficulty is because of the contentious nature of the issue, with stakeholders in conflict over the nature of the problem. As one union official put it:

> *It seems to be a lot of this argument about defining or not defining or who it is or what it isn't means that employers don't actually take it on as something they can actually control* (Union Official)

Reinforcing this, employer organisations reported that, sometimes, employers seek to "cop out" of dealing with stress in workplaces: *The employer says I've referred them [to counseling]; I've got no further role in this.* (Employer organisation). This reaction was related to a sense of powerlessness identified by this interviewee. As described earlier, he reported that many employers do not feel that they can control the risk and therefore that they cannot be held responsible for stress. Similarly, some case study enterprises reported that their supervisors were reluctant to deal with behaviour issues in the workplace because they believed they risked being accused of bullying.

On the whole, however, the employers interviewed for this study were able to articulate their responsibilities to manage stress-related issues, although they often articulated this as being primarily having to deal with difficult individuals. The OHS manager of the emergency services agency argued that, even in this case:

> *Whichever way you cut it, once someone is in your workplace and has some of these – has a stress related condition or a mental health condition – it is everyone's problem, but it is the manager's problem to resolve* (OHS Manager, emergency services agency).

The manager from the media organisation identified that stress is:

> *Everyone's problem. We all have some sort of ownership over it. I wouldn't say that it is totally the organisation's. I think it is also the responsibility of the individual to take it upon themselves to either alert the organisation or management or do something themselves whether it be a simple walk around the building. I think everyone should have ownership over it.* (Manager, media organisation).

The textiles company manager asserted that managers have to manage within the resources of the organisation and the capabilities of the employees to control stress-related problems:

> *Most people … want to go home at night thinking well I kept my end up and they cannot do that if you ask them to do something that you don't train them for, that's unrealistic in terms of the equipment and machines that they've to, the volume that you want.* (Manager, textiles company).

As this section suggests, the recognition of employer responsibility for job stress does not necessarily lead to systems-based approaches to controlling the risks of job stress, described in the next section.

Action being taken on stress

Even though interviewees were able to articulate aspects of the systems approach in their conceptualisation of stress, strategies to address stress remain concentrated on secondary and tertiary approaches, demonstrating that direct experience of implementing systems approaches was limited at best. Primary interventions were not common in case study enterprises. The most commonly implemented strategy in workplaces was providing Employee Assistance Programs, a tertiary intervention which was available in all three public sector enterprises and the media organisation.

The approach that came closest to a full systems approach was evident in the emergency services agency that has been dealing with job stress for many years, primarily through secondary and tertiary strategies to respond to critical incidents associated with their work. In more recent years, this agency has sought to implement primary interventions to control the factors that give rise to critical incidents as well as more chronic stressors, in particular workplace conflict and workload. Strategies to integrate primary, secondary and tertiary strategies have been identified and were seen as valuable, although the organisation's structure and professional confidentiality make integration difficult. This agency sees the need to be able to address the range of issues impacting on stress as critical to prevention:

> *It will be some workload, workflow, work pressure issues but they will be almost insurmountable because of the interpersonal issues that are part of that work environment as well. So you need to be able to address the two of them at the same time* (OHS Manager, emergency services agency).

They have directly sought to involve their workforce in developing and implementing interventions through relevant unions. Their strategy over job stress was explicitly part of a broader organisational strategy about management and leadership. One of their key strategies to achieve this was to develop the skills of their line managers to support a culture change in the organisation so that they deal with their staff fairly and with respect. This was also underway in the other two public sector workplaces, with programs focusing on leadership skills and the federal agency also seeking greater customer focus.

The local government agency provided examples of control measures that related to work organisation factors (e.g., providing enough time to complete jobs within rosters and redesigning physical arrangements to provide more contact between team members to allow support). The federal government agency described strategies to identify and deal with local issue, such as customer aggression.

Managers in private sector enterprises address primary factors in many cases, even though this was generally not as a result of a formal risk management approach. The particular division of a private sector organisation where interviews were conducted has used explicit strategies to build social support within the area to deal with stress:

> *An environment where your manager is constantly doing social activities, we are constantly celebrating any occasion that comes up …. Personal performance is rewarded.* (HSR).

The VWA reported that they were engaged in developing an intervention strategy through pilots in two state government agencies. They reported that the pilots were taking a risk management approach to stress, but were concerned not to pre-empt the findings of the

evaluation currently being finalised by providing any detail about the actual process being undertaken. Unions involved in the project were positive about the pilot strategy, which they reported was *starting to actually hopefully try to open up the issue a bit more so that management are aware that it is an issue that they've got to attack and address*.

Alongside the prevention pilot, the VWA was also working in the public sector to improve return to work outcomes for stress claimants in three government departments. This tertiary strategy has been undertaken independently of the prevention pilot, with no apparent information exchange between the projects. Because these strategies have not been integrated, the VWA could not be described as taking a systems approach.

Other union interviewees were less positive about the extent of the VWA's interventions in the area because they feel that the VWA was not doing enough or with enough speed: *WorkSafe … does little work in this area from my knowledge. I've never come across anything coming out of that authority that has dealt with blue collar stress.* This interviewee identified the issue here as the VWA's focus on claims, which were unlikely to be made by large segments of the workforce. As a result, the interviewee argued that the VWA would not be able to address the issue because: *There is just not a capacity to really understand what is going on in huge sections of the workforce unless they're appearing in injury rates*. Another union official identified this as leading to an approach that does not deal with the causes of stress related ill-health: *We tackle the symptoms rather than the causes … I think they're probably a bit frightened by it.* (Union Official)

Unions reported that they try to address the workplace factors that create ill health but were most likely to be drawn into tertiary issues to service members. Actions by unions directly address stress mostly through scoping activities, rather than prevention campaigns. For example, the National Tertiary Education Union has conducted a previous survey of stress amongst their members and was currently making arrangements to conduct a second. The ACTU has undertaken campaigns at different times, including a campaign dealing specifically with stress some years ago. Public sector unions include stress and related issues such as bullying in their standard training for health and safety representatives as well as offering stand alone courses for representatives and to members in workplaces.

Where union officials identified industrial issues as part of their concept of job stress, they also explained their actions around stress as including the work being done on industrial issues: *We try and combat by trying to create a secure future for our members and to try to be active in trying to secure the fact that they will have jobs into the future* (Union Official). Other industrial matters such as including issues about workload and working hours in EBAs and action on work and family life were also cited as part of a union response to job stress.

The individualistic theme found in the responses of OHS practitioners was also clear when explaining job stress interventions being undertaken. In particular, dealing with the reluctance of stress-affected individuals to seek help was reported as a significant issue. One union OHS officer asserted that:

> *We could have as much information out there about stress, … about how to potentially deal with stress, about services that are available but quite often people don't either think that there's an issue, want to realise that there's an issue or even take on board that stress could be an issue. It becomes a hard barrier to go past…. You could have a whole room full of stuff and do nothing until the person says I have an issue.*

Many enterprise interviewees also cited the failure of individuals to acknowledge that they were experiencing an adverse reaction to job stress as a key constraint in taking action to control stress: *People actually admitting it, when you can quite clearly see that the person is totally stressed, but they're not willing to get help – that's a huge hindrance* (HSR). Similarly, a number of interviewees referred to the difficulties managers have when dealing with stress-related ill health in workplaces:

> *We've got someone who has obviously got problems, we'll refer them to [the employee assistance program] and then we don't have to do it. I don't think Australians are good with dealing with personal issues, particularly male managers are probably worse at it.* (Employer Organisation)

A union interviewee argued that these individualistic approaches do not address the underlying causes:

> *... if we thought stress was a serious problem we could try to resolve it in an individualistic way via counseling and better services. Or we could approach it in a more collectivist way or holistic way which sort of looks at the fundamentals and what the real causal factors are*

Employer organisations were focused very much on tertiary issues – undertaking research to quantify the extent to which stress-related claims were actually due to non-work issues and servicing members in fighting stress claims. Employer organisations reported that they were disappointed with the VWA's activities in the area, because they felt that the VWA was not helping to differentiate between cases of stress-related ill health that were and were not work related. This suggests that the VWA faces competing pressures from its stakeholders, with unions arguing for greater focus on primary strategies at the same time that employers are pressuring for greater attention to workers' compensation issues.

Employer organisations also cited secondary strategies, such as providing good social and supervisory support with effective human resource management systems as a way of dealing with stressful working conditions. They report that organisations successfully dealing with stress have clear HR systems for dealing with workplace behaviour:

> *It's good management and good management of its human resources. Which includes probably being a bit harsher when it's necessary. But at least the ground rules are laid, there are parameters and things that are outside the norm get noticed and get attention.* (Employer Organisation)

Such strategies were certainly the most common approaches evident in the case study enterprises, although the evidence suggests that a number of workplaces were achieving aspects of a systems approach at least some of the time.

Current sources of advice and information

Different groups of interviewees found advice and information in different sources and expressed different levels of satisfaction with it. Employer organisations did not believe they had access to good guidance in the area and argued that employers need more practical guidance on how to control the risks of stress. They were also dissatisfied with workers

compensation data because they do not allow identification of individual factors that may have caused or exacerbated stress claims. A degree of dissatisfaction with academic research in the area was also evident:

> *Basically it's a whole lot of mumbo jumbo, it's inconclusive and they draw conclusions when you can think of another 100 conclusions could be drawn from the same evidence* (Employer Organisation).

In contrast, unions were reasonably well-aware of and satisfied with the academic literature and access local expertise for advice, although they did not see the VWA as a source of information or advice in this area. Many union OHS officers use European, UK and Canadian sources as the most authoritative. Perhaps as a result of this, some reported that current sources were too disjointed, with little synthesis of the issues. A particular advantage of the European sources was cited to be their basis in a strategic vision for occupational health, which interviewees claimed was missing from current Victorian regulatory strategies in this area. Many union interviewees identified that members and their knowledge of what happens in workplaces were critical to further action in the area:

> *[the union's] got generations of knowledge developed about these things… They're talking about these things because they're actually getting anecdotal and empirical evidence back from the workplace that it's a problem*.

At enterprise level, most interviewees were confident that they would be able to get their questions answered within their own organisation or via the internet, albeit with some effort on their part. Public sector enterprises engaged their own professional advice and cited the ComCare materials as useful sources that they referred to often. Again, the VWA was not identified as a source of authoritative advice although some interviewees named specific WorkSafe inspectors as possible sources.

Identification of further needs

Almost all interviewees identified a need for further information and education about the issues for themselves and others in their organisations, eg supervisors in local government, health and safety officers in unions. In particular, many union interviewees identified the need to educate employers about the underlying causes of job stress in work organisation factors. Blue collar union officials identified the need for greater understanding and awareness about stress in blue collar workplaces. General awareness and education campaigns were also seen as valuable: *Let people know that work can be very good or very bad for people's mental health …. The attitude that 'we can't control it, can't do anything about it' has to change* (Union Official). And: *What we need is the message 'stress-related illness has a cause in the culture and systems of work'* (Union Official). Information and training needs were identified for medical practitioners in particular, so that treating practitioners can understand the links between stress-related ill-health and workplace factors.

Most interviewees argued for integrating this issue within the broader OHS framework:

> *Until they put practices into place of seriously looking at what are the factors that cause stress out there, carrying out risk assessment and putting in place control mechanisms, we're never going to get anywhere.* (Union Official)

In the same vein, many union officials argued that regulatory tools were needed, eg a code of practice or guidance note to clearly position the issue in the OHS domain: *It is of such significance that you need to regulate for it* (Union Official).

The need for further research was identified by many interviewees, particularly to identify how job stress can be addressed in workplaces. The academic advocated the use of case studies as a useful way to emphasise that it is possible to address these issues. In contrast, one union official who identified sources of stress clearly in features of work organisation argued that it was time to act, rather than investigate:

> *How much more research do we need about what's wrong in the workplace? Why western society is experiencing layers and layers of stress? It's all there, so do we need more research? Well, you know, if VicHealth wants to go and confirm what we already know that's fine…. Let's understand there's a point where research is compelling; let's act on it* (Union Official).

Clear and practical guidance was seen as a critical tool to address the sense of powerlessness that a number of interviewees ascribed to workplaces. The need for *tools to be able to actually do something with that information* was identified by union officials and employer organisations. Some reported that, while further Australian research may be useful, *we know that stress is a problem in the workplace for workers, what we want is some action to stop it, to prevent it, so that's where we would like more work done*. This point was also made by HSRs in workplaces: *To me, it's a simple thing. You need to recognize the reason why the stress is happening and deal with it in some way. Employ more staff.* (HSR).

The OHS manager from the emergency services agency identified the need for more effective approaches to dealing with workplace conflict as critical:

> *Good, sound debate is the way we learn and grow and that organisations can move forward in terms of their structures and strategies. If we damp that down because we're scared of creating conflict, then we're not going to be able to keep moving forward So I think we need to develop new strategies, new approaches to be able to debate issues in the organisation in a way that is safe and not seen as conflictual* (OHS Manager, emergency services agency).

The issue of how to deal with mental health issues in workplaces was also identified as a need by many. The OHS Manager of the emergency services agency identified mental health issues as a major concern for the agency, with people with a mental health condition being a significant component of their stress-related claims:

> *people resist having a mental health tag put on their condition. They'd much prefer that it is in the stress bag, but it makes it very difficult for us to do anything in terms of providing appropriate return to work or anything else, if we can't actually look at what the medical condition is and make sure that it's being treated appropriately* (OHS Manager, emergency services agency).

Employer organisations argued that employers needed more resources and tools for dealing with mental health, particularly when dealing with people who are unwell:

> *They simply don't know what to do about it. It's not something that they're commonly asked to deal with. If there is an unguarded machine they can go out and put a guard on it.* (Employer Organisation)

The analogy of an unguarded machine was also used by the VWA to illustrate the need for more information about intervention:

> *The reason we're doing the pilot is because there is not a shelf solution to stress like there might be a shelf solution to an unguarded machine … we're running these projects to work out what's an effective approach*. (VWA).

This information needs to be targeted in such a way to meet the needs of the particular audiences, as the interviewee from Working Women's Health emphasised.

The need for greater information sharing and cooperation in developing interventions was also identified:

> *Let's all get together and talk about what we're doing and see if we can pull the eye teeth out of it and reflect on the learnings and all of that. I think that sort of collegiate approach is a much better approach than some of the others at this point in time*. (OHS Manager, emergency services agency).

DISCUSSION

The picture that emerges from the interview data is contrasting, but with common features across groups. Most parties undersstood stress as an individual health issue, even though the links to the wider workplace environment were recognised by many. The views of some interviewees imply moral judgements about acceptable stress, experienced by "good" people who deal with trauma and conflict in their work, and unacceptable stress, experienced by "bad" people who can't cope with the ups and downs of working life. Even so, the need to deal with job stress is recognised by all.

The individual focus evident from those in OHS and HR roles is concerning, especially given the greater understanding of the underlying systems causes evident in responses from managers. There is a risk that managers who have a good understanding of systems approaches may be lead to tertiary and secondary strategies by OHS professionals whose understanding is not as sophisticated.

Job stress is a politically charged area, as evidenced by the reluctance of a number of stakeholders to provide a definition of stress, even though this issue had been addressed by their organisation. This results from the interplay between workers compensation (reactive) and OHS regulation (preventive), with associated concerns about costs and blame. When the fundamental issue is job control, workplace power issues become central. In this light, the report of employer organisations that some employers feel powerless to deal with the issues warrants further investigation.

While there was limited evidence of this in the case study enterprises, interviews suggest that systems approaches were beginning in these enterprises and that good foundations for further development were being established. The seven enterprises involved in this study were receptive to such approaches and would benefit from leadership and guidance on how to implement systems strategies. This would doubtless also support those employers who currently feel powerless to control job stress in workplaces under their control. The data presented here suggest that any guidance must provide practical advice on how to implement a systems approach. In particular, it should address clear gaps in current practice, such as blue collar workers and the marginalised workforce, eg labour hire, outworkers. It must also address the exacerbation of job stress by non-work related issues such as family responsibilities. Currently, employers' concern for workers' compensation liability makes this issue hard to address directly, particularly by the VWA

The OHS regulator faces competing pressures from the workplace parties, which makes the need for a clear systems-based definition and recognition of the diversity of the manifestations of job stress even more important. As previous chapters of this report have set out, there is considerable evidence of the range of manifestations; job stress is not isolated to the public sector and is manifest in many ways, not just as "stress claims". The next chapter sets out how it is possible to measure the patterns of job stress in the working population, providing evidence and justification for targetting of interventions to groups and contexts that are most affected.

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Chapter 4

Job Stress in Victoria, Part II.

Job strain Exposures Versus Stress-Related Workers' Compensation Claims in Victoria: Developing a Public Health Response to Job Stress

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ABSTRACT

Study Objective: To compare patterns of job strain exposure with patterns of stress-related Workers' Compensation (WC) claims on a jurisdictional level.
Design & Setting: Comparison between a cross-sectional population-based sample of Victorian workers and government compiled WC statistics from the same jurisdiction and calendar year.
Setting: The state of Victoria in south-eastern Australia
Participants: Job strain exposures were determined by telephone survey of a random sample of White Pages listings. Quota sampling was conducted to reflect population proportions of upper white collar, lower white collar and blue collar workers (n=1,101 with a 66% response rate). Stress-related WC claims consisted of all accepted claims from Victorian workers in 2003, where the mechanism of injury or disease was classified as 'mental stress' (n=1725).
Main Results: Job strain prevalence was higher among females than males, and was elevated 2-3 fold amongst lower occupational skill levels versus higher for both genders. Amongst females, job strain was also positively associated with being aged 30-40 versus older, being a union member and for service versus manufacturing sector workers. Compared to the overall claims incidence rate for job stress, there were elevated job stress claims in upper occupational skill levels and workers aged 45-54. Both job strain exposure and claims rates were elevated for women and the health and community services sector.
Conclusions: Those most likely to be exposed to and thus adversely affected by job stress are the least likely to receive stress-related WC benefits. WC statistics do not provide an adequate evidence base to guide public health responses to job stress problems.

INTRODUCTION

Occupational stress has been linked to a range of adverse physical and mental health outcomes, including cardio-vascular disease,[1-4] musculoskeletal disorders,[5] depression and anxiety.[3 6-13] Although occupational stress is a significant public health problem, population-level information is lacking regarding the patterns of occupational stress exposures and associated health outcomes in most jurisdictions. Job stress policy and practice responses are primarily driven by stress-related workers' compensation (WC) statistics.

In Australia, according to the National Occupational Health and Safety Commission (NOHSC) the incidence rate for workers' compensation cases where the mechanism of injury or disease was 'mental stress' was 0.9 per 1,000 (7,480 cases) in 2003.[14] However the true number of individuals affected by job stress in Australia is likely to be far higher because many workers are not covered by WC, some groups of workers tend not to file claims for work-related illness (e.g., those who are precariously employed), [15] and because of under-recognition and under-reporting of occupational disease, particularly for multi-factorial disease outcomes such as those associated with job stress. This likely leads to the appearance in WC statistics of only the most severe and persistent cases of job stress-related illness.

WC claims are the result of workers seeking compensation for conditions which have been identified by a medical practitioner as having an occupational causation. When a worker presents to a medical practitioner for a job stress-related condition (whether the worker suspects stress-relatedness or not), the general practitioner or other provider may or may not identify an underlying occupational causation or contribution. Even if job stress is medically recognized as a contributory factor, there is a documented reluctance amongst Australian general practitioners to initiate WC claims for patients presenting with job stress-related conditions.[16 17]

There is also a scarcity of studies looking at patterns of job stress on a population level in the international literature.[13] Similarly, there has been little research on patterns of stress-related WC claims. Leigh and Robbins looked at WC claims for occupational diseases in the USA for the year 1999.[18] They reported a total of 2,272 claims for 'mental stress' (denominator details were not provided), and concluded that in general WC statistics substantially underestimate occupational disease.

To facilitate the development of public health responses to job stress in Victoria (Australia) and to identify aspects of the problem not previously recognised by WC statistics, this study compared patterns of population-based job stress exposures to stress-related WC claims in the same jurisdiction, thus providing a public health evidence base to complement WC statistics as the basis for policy and practice in this area.

METHODS

Data Sources

The Victorian Job Stress Survey (VJSS): The VJSS is a cross sectional study of 1,101 workers (526 men and 575 women) quota-sampled to reflect Australian Bureau of Statistics census proportions of upper white-collar (29%), lower white-collar (30%), and blue-collar workers (41%). Telephone interviews were conducted in November 2003, from a random sample of White Pages listings for the state of Victoria, Australia. In comparison to census data on working Victorians, the VJSS over-represents women (52.2% in sample versus 45.2% in census) but has the same mode and median age and income categories as the census.[19] The protocol for this study was reviewed and approved by the University of Melbourne Human Research Ethics Committee (HREC #030398).

Job stress measures: Karasek's model of demand and control was used to assess job strain.[20] Job strain—the combination of high job demands and low job control—is the most widely studied measure of job stress,[20] and also has strong evidence linking it predictively to adverse effects on mental and physical health. [3] The model focuses on task-level job characteristics, postulating that psychological strain results from the interaction of job demands and job control, with the combination of low control and high demands producing "job strain."[20 21] Standard methods for computation of measures were used as described previously, with job control and psychological demand dimensions meeting international norms of reliability (Cronbach's alphas of 0.80 and 0.66, respectively). [22]

Covariates: Covariate data were collected for a range of socio-demographics. Workers were asked if they were a member of a union, and if they worked for a government, private sector or not-for profit, religious or community organization and their average weekly working hours. Occupations were collapsed into five Australian Bureau of Statistics (ABS) skill levels (level one lowest to level five highest). Industrial sector information was collected according to 17 ABS categories and then collapsed into manufacturing or service. Hostility was assessed using the sum of three Likert-scaled items[23] with higher scores indicating greater hostility.

Victorian Workers' Compensation Data: The Australian National Occupational Health and Safety Commission (NOHSC) compiles a publicly accessible national WC statistics database [www.nohsc.gov.au/OHSInformation/NOSI/default.asp (Accessed and data downloaded 17/05/2005)].[14] Numbers of cases are derived from compensation claims received from insurance companies, self-insurers and government departments at commonwealth, state and territory level. The denominators which are used by NOHSC were calculated by the ABS using Labour Force Survey and the Survey of Employee Earnings and Hours.[14] The WC database was queried for incidence rates of Victorian job stress claims for the same as year as the VJSS (2003), as identified by mechanism of injury or disease classification of 'mental stress.' Claims incidence rates were filtered by age, gender, ABS classifications for occupational levels and ABS categories for industry.

Statistical Analyses

Job strain exposure data from the VJSS was stratified by industry, age and occupation with proportions calculated by group. Analyses were conducted separately for males and females. Bivariate analyses were performed comparing categorical variables using a χ^2 test, or a Fisher's exact test when appropriate. Four sets of multivariate logistic regression

analyses were performed to identify determinants of job strain, with risk expressed by Odds Ratios (OR) and 95 % confidence intervals. Model fit was assessed using Hosmer-Lemeshow tests; all models presented had acceptable test statistics (> 0.20).

For the Victorian WC data, incidence rates and numbers of cases for "mental stress' claims were stratified by industry, age and occupation. For both the VJSS dataset and the WC claims dataset, we noted where proportions or rates were higher or lower than the overall WC incidence rates (number of occupational disease cases/number of employees x 1,000).[14] Data analysis was performed using STATA 8 (Stata Corporation, College Station, TX).

RESULTS

Socio-demographic and employment characteristics for the VJSS are summarized in Table 1. There were slightly more women than men. Males were older and had a lower educational level than women. Blue collar jobs were most common amongst the males, and there were more middle white-collar workers amongst the females. More males were self-employed, and more females were employed in their main job for <=35 hours/week. Most respondents were employed by private companies or not for profit agencies.

Table 1. Victorian Job Stress Survey Socio-Demographic and Employment Characteristics

	Males **n (%)**	**Females** **n (%)**	**Total** **N (%)**
Whole Sample	n=526	n=575	N=1101
Age			
• ≥ 51 years	122 (23.2)	117 (20.3)	239 (21.7)
• 41-50 years	122 (23.2)	162 (28.2)	284 (25.8)
• 30-40 years	161 (30.6)	159 (27.7)	320 (29.1)
• < 30 years	121 (23.0)	137 (23.8)	258 (23.4)
Educational level			
• Post-graduate	47 (8.9)	56 (9.7)	103 (9.4)
• Undergraduate	132 (25.1)	217 (37.7)	349 (31.7)
• Vocational	128 (24.3)	76 (13.2)	204 (18.5)
• Completed high school	90 (17.1)	111 (19.3)	201 (18.2)
• Completed primary or some high school	124 (23.5)	112 (19.5)	236 (21.4)
Occupation			
• level five (highest skill level)	115 (21.9)	164 (28.5)	279 (25.3)
• level four	41 (7.8)	47 (8.2)	88 (8.0)
• level three	130 (24.7)	80 (13.9)	210 (19.1)
• level two	119 (22.6)	142 (24.7)	261 (23.7)
• level one (lowest skill level)	121 (23.0)	142 (24.7)	263 (23.9)
Union membership	148 (28.1)	165 (28.7)	313 (28.4)
Industrial sector			
• Manufacturing	339 (64.5)	235 (40.9)	574 (52.1)
• Service	187 (35.5)	339 (59.0)	526 (47.8)
Location			
• Urban	377 (71.7)	417 (72.5)	794 (72.1)
• Rural/regional	149 (28.3)	158 (27.5)	307 (27.9)
Employed by			
• Government	61 (11.6)	175 (30.4)	236 (21.4)
• Private / not for profit agency	462 (87.8)	392 (68.2)	854 (77.6)
Self-employed	121 (23.0)	66 (11.5)	187 (17.0)
Size of workplace			
• >=20	273 (49.2)	306 (53.2)	579 (52.6)
• <20	253 (46.0)	269 (46.8)	522 (47.4)
Average weekly hrs (ABS)			
• <=35 hrs	106 (20.1)	296 (51.5)	402 (36.5)
• 36-49 hrs	250 (47.5)	198 (34.4)	448 (40.7)
• >= 50 hrs	160 (30.4)	65 (11.3)	225 (20.4)

Job Strain

The prevalence of job strain was higher in females than in males (25.4 % versus 18.6% $p<0.05$). Younger males had the highest prevalence of job strain as well as passive jobs (Table 2A). Older males had the lowest prevalence of job strain. There were significant differences according to occupational skill level, with the prevalence of job strain and passive jobs increasing stepwise with decreasing skill level. Being self-employed was highly protective against job strain. Male unionized workers had a similar demand-control profile to non-union members.

For females (Table 2B), job strain prevalence was highest amongst middle-aged women versus those aged >=51. Similar to the pattern for males, the prevalence of job strain and passive jobs was highest in the lowest skill group, but with less of a clear gradient. Self-employed females were also highly protected against job strain. Amongst female union members versus non-members, however, there was a higher prevalence of job strain in combination with a markedly higher prevalence of active jobs and a lower prevalence of passive jobs. As observed in males, females with higher skill level jobs generally had lower levels of job strain and those with lower skill level jobs had higher levels of passive jobs.

Table 2. Victorian Job Stress Survey: Four-way Demand Control Measures

A) MALES (n=501)	low job strain n (row %)	active jobs n (row %)	passive jobs n (row %)	high job strain n (row %)	p-value
Occupation:					
• level five (highest skill level)	41 (37.3)	41 (37.3)	15 (13.6)	13 (11.8)	
• level four	13 (34.2)	11 (28.9)	9 (23.7)	5 (13.2)	
• level three	45 (35.7)	31 (24.6)	28 (22.2)	22 (17.5)	
• level two	19 (17.4)	17 (15.6)	49 (44.9)	24 (22.0)	
• level one (lowest skill level)	22 (18.6)	12 (10.2)	55 (46.6)	29 (25.6)	0.000
Age:					
• <30	22 (18.5)	22 (18.5)	47 (39.5)	28 (23.5)	
• 30-40	52 (33.6)	36 (23.2)	40 (25.8)	27 (17.4)	
• 41-50	30 (26.6)	29 (25.7)	30 (26.6)	24 (21.2)	
• >=51	36 (31.6)	25 (21.9)	39 (34.2)	14 (12.2)	0.044
self employed or employee:					
• self-employed	49 (44.6)	29 (26.4)	21 (19.1)	11 (10.0)	
• employee	91 (23.3)	83 (21.2)	135 (34.5)	82 (21.0)	0.000
Union membership:					
• non union member	103 (28.6)	83 (23.1)	109 (30.3)	65 (18.1)	
• unionized	37 (26.4)	29 (20.7)	46 (32.9)	28(20.0)	0.840
Industrial Sector:					
• manufacturing	101 (31.0)	74 (22.6)	91 (27.8)	61 (18.7)	
• service	39 (22.4)	38 (21.8)	65 (37.4)	32 (18.4)	0.099
Employed by:					
• government	12 (20.0)	18 (30.0)	19 (31.7)	11 (18.3)	
• private/ not for profit	126 (28.8)	94 (21.5)	136 (31.1)	82 (18.7)	0.364
Average weekly hrs (ABS):					
• <=35hrs	26 (25.2)	10 (9.7)	52 (50.5)	15 (14.6)	
• 36-49hrs	67 (27.9)	39 (16.2)	78 (32.5)	56 (23.3)	
• >=50hrs	44 (29.7)	61 (41.2)	22 (14.9)	21 (14.2)	0.000
B) FEMALES (n=550)	**low job strain n (row %)**	**active jobs n (row %)**	**passive jobs n (row %)**	**high job strain n (row %)**	**p-value**
Occupation:					
• level five (highest skill level)	36 (22.6)	75 (47.2)	19 (11.9)	29 (18.2)	
• level four	9 (20.0)	6 (13.3)	16 (35.6)	14 (31.1)	
• level three	15 (20.0)	15 (20.0)	25 (33.3)	20 (26.7)	
• level two	33 (24.4)	19 (14.1)	52 (38.5)	31 (23.0)	
• level one (lowest skill level)	10 (7.4)	8 (5.9)	72 (52.9)	46 (33.8)	0.000
Age:					
• <30	22 (16.5)	18 (13.5)	57 (42.9)	36 (27.1)	
• 30-40	29 (18.7)	35 (22.6)	46 (29.7)	45 (29.0)	
• 41-50	27 (17.8)	38 (25.0)	46 (30.3)	41 (27.0)	
• >=51	25 (22.7)	32 (29.1)	35 (31.8)	18 (16.4)	0.035
Self employed or employee:					
• self-employed	21 (35.6)	15 (25.4)	18 (30.5)	5 (8.5)	
• employee	82 (16.7)	108 (22.0)	166 (33.8)	135 (27.5)	0.000
Union membership:					
• non union member	83 (21.3)	69 (17.7)	154 (39.5)	84 (21.5)	
• unionized	20 (12.5)	54 (33.8)	30 (18.8)	56 (35.0)	0.000
Industrial Sector:					
• manufacturing	52 (22.8)	59 (25.9)	72 (31.6)	45 (19.7)	
• service	51 (16.0)	64 (19.9)	111 (34.6)	95 (29.6)	0.012
Employed by:					
• government	35 (20.6)	52 (30.6)	39 (22.9)	44 (25.9)	
• private/ not for profit	67 (17.9)	68 (18.2)	143 (38.2)	96 (25.7)	0.001
Average weekly hrs (ABS):					
• <=35hrs	56 (19.6)	47 (16.4)	109 (38.1)	74 (25.9)	
• 36-49hrs	33 (17.7)	42 (22.6)	63(33.9)	48(25.8)	
• >=50hrs	10 (16.1)	29 (46.8)	9 (14.5)	14 (22.6)	0.000

Logistic Regression Modeling of Job Strain

In bivariate analyses for males (first column, Table 3A) before adjustment for educational level, young age, being an employee (versus self-employed), and working longer hours were associated with higher odds of experiencing job strain. Multivariate modelling was then conducted to assess the relative contributions of the examined set o potential job strain determinants. Several covariates were not significant and dropped from Models 1 & 2 (Table 3A). Although negative personality (hostility) may represent both a predisposition to and a consequence of job strain, we present models with and without adjustment for hostility (Models 1 & 2) to be conservative. Hostility is significantly associated with job strain, but with a very small magnitude in comparison to other identified determinants. The final models (3 & 4) show that the risk of job strain is elevated among young males, males in lower skill-level jobs, and males working longer hours. Effect size estimates (adjusted ORs) for these job strain determinants remained fairly stable with varying combinations of covariates modelled, and were little affected by adjustment for hostility. Workplace size, public versus private organisation, urban versus regional location, and being an employee versus self-employed were not associated with job strain in men.

Bivariate analyses for females (first column, Table 3B) showed a wider range of job strain determinants than for males: lowest occupational skill, working in the service compared to the manufacturing sector, being an employee versus self-employed, all age groups compared to the oldest, and for union members compared to non-members. Based on the results of Models 1 & 2 (Table 3B), a similar set of non-significant covariates as for men was dropped. Hostility was not associated with job strain in women. The final models (3 & 4) show that the risk of job strain is elevated among middle-aged women, among women in low and middle skill-level jobs, and—in contrast to males—among employees versus self-employeds, among union members versus non, and among women working in the service versus manufacturing sector. The association between job strain and female union members may be related to highly unionized industries such as health and community services also having a high percentage of female workers (n=35 females and n=6 males in VJSS as well as an increased risk of job strain. Effect size estimates (adjusted ORs) for these job strain determinants remained stable with varying combinations of covariates modelled.

Table 3. Logistic Regression Modelling of Job Strain in the Victorian Job Stress Survey: Adjusted Odds Ratios (aOR) and 95 % Confidence Intervals (95 % CI)

A) Males (n=501)	Bivariate OR (95%CI)	Model 1* aOR (95%CI)	Model 2* aOR (95%CI)	Model 3* aOR (95%CI)	Model 4* aOR (95%CI)
Occupation:					
• Reference: level five					
• level four	1.5 (0.6-3.9)	1.0 (0.3-3.1)	1.0 (0.3-3.2)	1.0 (0.3-3.3)	1.1 (0.3-3.4)
• level three	1.3 (0.5-3.3)	1.7 (0.7-4.1)	1.8 (0.8-4.4)	1.6 (0.7-3.8)	1.8 (0.7-4.1)
• level two	1.6 (0.6-4.4)	2.1 (0.9-5.0)	2.3 (1.0-5.4)	2.1 (0.9-4.8)	2.3 (1.0-5.3)
• level one	1.9 (0.7-4.9)	2.5 (1.0-6.0)	2.5 (1.0-6.2)	2.4 (1.0-5.6)	2.5 (1.0-6.0)
Age:					
• Reference: >=51					
• 41-50	1.9 (0.9-3.4)	1.7 (0.8-3.7)	1.6 (0.8-3.5)	1.7 (0.8-3.7)	1.7 (0.8-3.5)
• 30-40	1.5 (0.8-3.0)	1.4 (0.7-2.9)	1.3 (0.6-2.8)	1.4 (0.7-3.0)	1.4 (0.7-2.9)
• <30	2.2 (1.1-4.4)	1.9 (0.9-4.2)	1.8 (0.8-4.0)	2.1 (1.0-4.4)	1.9 (0.9-4.1)
Employee versus self employed	2.4 (1.2-4.7)	1.4 (0.6-3.1)	1.4 (0.6-3.1)	--	--
Union membership	1.1 (0.7-1.8)	0.9 (0.5-1.6)	1.0 (0.5-1.7)	--	--
Sector: (service v manufact)	1.0 (0.6-1.6)	0.8 (0.5-1.4)	0.8 (0.5-1.4)	--	--
Workplace size: (>=20 v <20)	0.7 (0.4-1.1)	0.8 (0.4-1.3)	0.8 (0.5-1.4)	--	--
Location: (urban versus rural/regional)	0.8 (0.5-1.3)	0.8 (0.5-1.4)	0.8 (0.5-1.4)	--	--
Private versus government	1.0 (0.5-2.0)	1.0 (0.4-2.1)	0.9 (0.4-2.1)	--	--
Average weekly hrs (ABS)					
• Reference <=35hrs					
• 36-49hrs	1.8 (1.0-3.3)	1.9 (1.0-3.8)	1.9 (0.9-3.8)	2.1 (1.1-4.1)	2.1 (1.1-4.1)
• >=50hrs	1.0 (0.5-2.0)	1.3 (0.6-3.0)	1.4 (0.6-3.1)	1.3 (0.6-2.3)	1.4 (0.6-3.1)
Hostility	1.1 (1.0-1.2)	-- n=482	1.1 (1.0-1.2) n=482	-- n=483	1.1 (1.0-1.2) n=483

B) Females (n=550)	Bivariate OR (95%CI)	Model 1* aOR (95%CI)	Model 2* aOR (95%CI)	Model 3* aOR (95%CI)	Model 4* aOR (95%CI)
Occupation:					
• Reference: level five					
• level four	2.0 (0.9-4.2)	2.9 (1.2-7.0)	2.9 (1.2-7.0)	2.6 (1.2-6.0)	2.6 (1.2-6.0)
• level three	1.6 (0.9-3.1)	2.7 (1.2-5.8)	2.7 (1.2-5.8)	2.4 (1.1-5.1)	2.4 (1.1-5.2)
• level two	1.3 (0.7-2.3)	1.7 (0.9-3.3)	1.7 (0.9-3.4)	1.6 (0.9-3.1)	1.7 (0.9-3.2)
• level one	2.3 (1.3-3.9)	3.2 (1.6-6.6)	3.2 (1.6-6.6)	3.1 (1.6-6.0)	3.1 (1.9-6.1)
Age:					
• Reference: >=51					
• 41-50	1.9 (1.0-3.5)	1.8 (0.9-3.6)	1.8 (0.9-3.5)	1.6 (0.8-3.1)	1.6 (0.8-3.1)
• 30-40	2.1 (1.1-3.9)	2.1 (1.1-4.2)	2.1 (1.1-4.1)	1.9 (1.0-3.7)	1.9 (1.0-3.6)
• <30	1.9 (1.0-3.6)	1.4 (0.7-2.9)	1.4 (0.7-2.8)	1.4 (0.7-2.7)	1.3 (0.7-2.7)
Employee versus self employed	4.1 (1.6-10.4)	3.5 (1.3-9.8)	3.5 (1.3-9.7)	3.5 (1.3-9.1)	3.5 (1.3-9.1)
Union membership	2.0 (1.3-2.9)	2.6 (1.6-4.4)	2.7 (1.6-4.4)	2.5 (1.9-4.0)	2.5 (1.6-4.0)
Sector:(service v manufac)	1.7 (1.1-2.6)	1.7 (1.0-2.6)	1.7 (1.0-2.6)	1.7 (1.1-2.6)	1.7 (1.1-2.6)
Workplace size:(>=20 v <20)	0.8 (0.6-1.2)	1.1 (0.7-1.7)		--	--
Location:(urban versus rural/regional)	1.1 (0.7-1.7)	1.2 (0.7-1.9)	1.1 (0.7-1.8)	--	--
Private versus government	1.0 (0.6-1.5)	1.2 (0.7-2.0)	1.2 (0.7-2.0)	--	--
Average weekly hrs (ABS)					
• Reference <=35hrs					
• 36-49hrs	1.0 (0.6-1.5)	1.1 (0.7-1.8)	1.1 (0.7-1.8)	--	--
• >=50hrs	0.8 (0.4-1.6)	1.3 (0.6-2.6)	1.2 (0.6-2.6)	--	--

Hostility	1.0 (1.0-1.1)	-- n=525	1.0 (0.9-1.1) n=525	-- n=546	1.0 (0.9-1.1) n=546

*Model adjusted for educational level and all the variables included

Job Stress-Related WC Claims Versus Job Strain Exposure

Table 4 presents Victorian 'mental stress' WC claims patterns by occupation and age. Similar to the VJSS, the incidence of claims was higher amongst females than males (0.9 per 1,000 versus 0.7 per 1,000). However, there were also many differences between the patterns emerging from the two sources. Claims data show the highest rates among workers employed in higher skill level jobs, and for the 45-59 age range for both males and females. This contrasts with job strain patterns in the VJSS, where the highest prevalence of job strain was amongst lower skill levels and the youngest age group in males and 30-40 year olds in females.

Table 4. Victorian Workers' Compensation Data for 2003- Case numbers and incidence rates for mental health stress claims (per 1,000 workers)

	males cases (IR)*		**females cases (IR)***		**Total cases (IR)***	
Occupation: (9 categories)						
• Managers and administrators (skill level five)	60	(0.6)	46	(1.7)	106	(0.9)
• Professionals (skill level five)	128	(0.6)	266	(1.2)	394	(0.9)
• Associate professionals (skill level four)	208	(1.5)	133	(1.3)	341	(1.4)
• Tradespersons and related workers (skill level three)	61	(0.3)	25	(1.1)	86	(0.4)
• Advanced clerical and service workers (skill level three)	14	(1.2)	62	(0.8)	76	(0.9)
• Intermediate clerical, sales and service workers (skill level two)	74	(0.8)	236	(0.8)	310	(0.8)
• Intermediate production and transport workers (skill level two)	146	(0.8)	22	(0.8)	168	(0.8)
• Elementary clerical, sales and service workers (skill level one)	44	(0.5)	93	(0.5)	137	(0.5)
• Laborers and related workers (skill level one)	55	(0.5)	51	(0.7)	106	(0.6)
Age: (11 categories)						
• <20	np[#]	(0.1)	8	(0.1)	13	(0.1)
• 20-24	26	(0.2)	48	(0.4)	74	(0.3)
• 25-29	44	(0.3)	94	(0.7)	138	(0.5)
• 30-34	84	(0.6)	123	(1.0)	207	(0.8)
• 35-39	120	(0.9)	121	(1.1)	241	(1.0)
• 40-44	148	(1.1)	148	(1.2)	296	(1.1)
• 45-49	138	(1.1)	165	(1.4)	303	(1.3)
• 50-54	109	(1.0)	157	(1.6)	266	(1.3)
• 55-59	85	(1.1)	55	(0.9)	140	(1.0)
• 60-64	31	(0.8)	14	(0.7)	45	(0.8)
• 65+	np[#]	(0.3)	0	(0.0)	np[#]	(0.2)
TOTAL	792	(0.7)	933	(0.9)	1725	(0.8)

*IR=Incidence rate data where the mechanism of the injury of disease was 'mental stress'. Data available from NOSI excludes self-employed individuals from the denominator.

[#] np=data not published by NOHSC due to confidentiality restrictions

Table 5 presents Victorian job stress WC claims and VJSS job strain prevalence stratified by the 17 ABS industrial sector categories. The slight discrepancies between the WC claims data reported in tables 4 and 5 are a result of cells with small numbers being

masked by NOHSC to protect confidentiality. Sectors exceeding the overall rates have been noted. Sectors with higher rates have been noted. Both claims rates and job strain prevalence were elevated in the health and community services sector for males and females. For males, the education and transport and storage sectors had high claims as well as job strain prevalence, as was the case for females in personal and other services, and finance and insurance sectors. However there were a number of industries where the elevated prevalence of job strain was not reflected in claims patterns. These included manufacturing, construction, and wholesale trade for men, and retail for women. Most notably, job strain prevalence was elevated for accommodation, cafes and restaurants for both males and females, but claims were not.

Table 5: Victorian Stress-Related Workers' Compensation Claims[#] Versus Job Strain Prevalence by Industrial Sector

	Males		Females		Total	
	WCC n (IR)	**Job strain n (%)**	**WCC n (IR)**	**Job strain n (%)**	**WCC n (IR)**	**Job strain n (%)**
Industrial sector: (17 categories)						
• Agriculture, forestry & fishing	9 (0.4)	4 (11.4)	np* (0.6)	5 (25.0)	14 (0.4)	9 (16.4)
• Mining	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
• Manufacturing	105 (0.4)	21 22.6) ♣	43 (0.5)	6 (16.7)	148 (0.5)	27 (20.9)
• Electricity, gas & water supply	np* (0.2)	1 (12.5)	np* (0.2)	0 (0.0)	np (0.2)	1 (11.1)
• Construction	19 (0.2)	15 24.6) ♣	np* (0.3)	1 (12.5)	23 (0.2)	16(23.2) ♣
• Wholesale trade	35 (0.5)	4 19.1) ♣	26 (0.7)	2 (25.0)	61 (0.5)	6 (20.7)
• Retail trade	50 (0.3)	7 (16.3)	106 (0.6)	22(28.9) ♣	156 (0.5)	29(24.4) ♣
• Accommodation, cafes & restaurants	np* (0.1)	4 (20.0) ♣	17 (0.3)	13(41.9) ♣	22 (0.2)	17(33.3) ♣
• Transport & storage	113 (1.8) ♣	7 (25.0) ♣	23 (1.1) ♣	3 (23.1)	136(1.6) ♣	10 (24.2)
• Communication services	np* (0.3)	4 (21.1) ♣	6 (0.6)	2 (25.0)	11 (0.4)	6 (22.2)
• Finance & insurance	19 (0.5)	1 (9.1)	56 1.1) ♣	8 (38.1) ♣	75 (0.9) ♣	9 (28.1) ♣
• Property & Business services	59 (0.4)	5 (8.5)	88 (0.7)	10 (22.2)	147 (0.5)	15 (14.4)
• Government administration & defence	25 (0.8) ♣	1 (7.1)	21 (0.6)	5 (21.7)	46 (0.7)	6 (16.22)
• Education	82 (1.6) ♣	7 (28.0) ♣	173 1.5) ♣	15 (18.3)	255(1.5) ♣	22 (20.6)
• Health & community services	75 (1.5) ♣	6 (24.0) ♣	263 (1.5) ♣	35(28.9) ♣	338(1.5) ♣	41(28.1) ♣
• Cultural & recreational services	15 (0.6)	1 (11.1)	34 1.1) ♣	1 (9.1)	49 (0.9) ♣	2 (10.0)
• Personal & other services	169 4.6)♣	5 (8.5)	68 (1.8) ♣	12(26.7) ♣	237(3.2) ♣	17 23.9) ♣
TOTAL	788 (0.7)	93 (18.6)	935 (0.9)	140 (25.5)	1723 (0.8)	233 (22.2)

[#] Data for 2003- Case numbers and incidence rates per 1,000 workers (IR), excluding self-employed workers
*np=data not published by NOHSC due to confidentiality restrictions
♣Rate exceeds overall rate

DISCUSSION

This study showed that women were more likely to be exposed to job strain than men, and that job strain was higher in younger employees in lower status jobs. Some job strain exposure patterns are reflected in stress-related claims rates, as some groups that are more likely to be exposed to job strain do receive WC as a result of stress-related ill health, such as more claims amongst women compared to men, and health and community services workers compared to other industries. In other contexts this is not the case. The industrial sector with the highest prevalence of job strain for both males and females—accommodation, cafes, and restaurants—was not elevated in terms of stress claims. Further, relatively few younger people in lower status occupations are compensated, possibly because they have received insufficient OHS education and are unaware of the potential stress-relatedness of their illnesses, because they fear losing their jobs if they seek compensation (especially if precariously employed [24]), because a medical practitioner has been unwilling to initiate a stress-related WC claim,[16 17] because submitted claims are denied, or because of other reasons. These findings demonstrate the shortcomings of insurance-based responses to the public health problem of job stress, and how those shortcomings disproportionately affect groups that are socially or economically disadvantaged.

There are some limitations with this study. Although the VJSS was designed to be representative of the working population, the study sample was taken from publicly available telephone listings, this may disproportionately exclude those workers who are in less secure employment and in lower status groups. Shift workers and those working longer hours may also be underrepresented as participants were contacted on their home telephone numbers. These considerations suggest that the disparities observed are likely to be underestimates. There are also a number of limitations with comparing patterns of job strain exposure prevalence from the VJSS with claims patterns. WC statistics are based on accepted claims; information regarding the numbers of claims submitted is unavailable. Given the adversarial nature of the WC system, it is likely that many workers with stress-related illnesses have their claims rejected, or may be deterred from filing a claim. Another limitation is the classification of 'mental stress' for stress-related claims. This narrow definition may result in an underreporting of stress-related illness; it is possible that with a wider definition more claims might have been included, such as those for stress-related cardio-vascular disease[25] and musculoskeletal disorders. Indeed, interactions between physical and psychosocial stressors in the causation of enduring health outcomes are known,[26] particularly in regard to noise[27] and ergonomic exposures.[28] However, whilst the narrow definition used by WC data and the likely low claims acceptance rates restrict the validity of comparisons, these limitations also highlight the inadequacies of WC data as proxy public health surveillance data.

Some of the observed variance between job strain and claims patterns might be explained by disease latency. The latency period between job strain exposure and the manifestation of job stress-related disease is not fully understood. Current best estimates indicate that exposure to poor psychosocial working conditions (including demand-control model measures) can be linked to adverse mental health outcomes with a one year latency period.[29] Given that mean job tenure among VJSS respondents was 7.5 years with 90% of

respondents in their current job for 6 months or longer,[30] it is reasonable to compare claims rates and job strain prevalence from the same year. As the variation in observed age groups between job strain exposure and claims rates ranged from 10 to 20 years, disease latency could explain only part of the observed variation.

Implications for Policy & Practice

Development of an evidence-based public health response to job stress requires information regarding where the problem is at its worst, and where intervention efforts could most efficiently be directed. These findings suggest that those most likely to be adversely affected by job stress and most in need of compensation for stress-related illness are the least likely to be compensated. WC statistics are an inadequate evidence base data source for guiding public health policy and practice responses to the job stress problem. Population-based job stress exposure data is relatively easy to obtain, provides an essential complement to WC statistics, and contributes to the evidence-base needed to direct public health responses to job stress.

Intervention efforts in health and community services and other sectors with elevated job stress claims should be continued and expanded to integrate primary, secondary, and tertiary interventions in a systems approach. This effort needs to be complemented by similar comprehensive intervention efforts for younger and lower status workers, particularly for women in such groups, where stress-related effects on health could be prevented by reducing job stressors and mitigated by effective compensation for stress-related illness.

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Chapter 5

Job Stress in Victoria, Part III.

Estimating the Contribution of Job Stress to Ill Health among Working Victorians

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INTRODUCTION

Job stress is a risk factor for a broad range of adverse effects on health, including major chronic diseases that contribute substantially to the general burden of disease such as cardiovascular disease (CVD) and depression. Some international estimates have been made of the proportion of CVD attributable to job stress by combining population-based data on job stress exposures with estimates of stress-related increases in specific disease risks taken from independent epidemiologic studies (reviewed in Chapter 1). This yields what is referred to as the 'population attributable risk' (PAR), the proportion of disease cases that is attributable to the exposure in question. Put another way, PAR is the fraction of disease cases that is attributable to an exposure in the population and that would *not* have been observed if the exposure was non-existent.

Previous international PAR estimates for job stress have focused on CVD outcomes. General population-based estimates of the proportion of CVD attributable to job stress are on the order of 7–16% among men for job strain assessed at a single point, and up to 35% for long-term exposure to low job control.[1] A recent Finnish study used population-based exposure estimates for job strain of 19% for men and 23% for women, and an effect size of 2.0 for job strain in relation to ischemic heart disease (IHD).[2] This yielded a PAR of 16% in men and 19% in women for the proportions of IHD attributable to job strain. We found only one estimate of job strain-related PAR for depression – a Finnish study estimating 14.6% of depressive episodes among men and 9.8% among women were attributable to job strain.[2]

This chapter combines Victorian population-based job strain exposure data with international estimates of job stress-related increases in the risks of CVD and depression to estimate the contribution of job strain to these two prominent chronic diseases among working Victorians.

METHODS

We reviewed the job stress epidemiology literature and extracted the range of effect sizes for job strain in relation to CVD and depression, then combined that information with exposure prevalence figures from the Victorian Job Stress Survey to estimate the proportions of CVD and depression attributable to job strain among working Victorians. Data sources for each are described in turn below.

Magnitude of Increased CVD and Depression Risks from Job Strain

The size of the effect which occupational stress has on CVD and depression has been estimated in a number of large-scale studies. Cardiovascular disease has been studied to the greatest extent,[3] as summarised in Chapter 1. A recent systematic review of job stress and CVD estimated effect sizes for job strain as a risk factor for CVD as ranging from 1.2 to 4-fold increase for men and a 1.2 to 1.6-fold increase for women after adjustment for other known causes of CVD.[3] Middle estimates from these ranges are Odds Ratios of 2.6 for men and 1.4 for women (Table 1). These and the estimates for depression below account for other known risk factors and potential confounders for these outcomes, including negative personality traits, socioeconomic position, health behaviours, and more (see Chapter 1).

Job stress has also been linked to increased risks for a wide range of mental health outcomes, as summarised in Chapter 1. Because depression represents a major and growing contributor to the general burden of disease, we have focused on this particular mental health outcome for illustrative purposes. Some cross-sectional studies have found strong associations between job stress and depression, such as a US study that presented high adjusted Odds Ratios (OR) for job strain and major depressive episode (OR = 7.0), job strain and depressive episode (OR = 4.1), and job strain and dysphoria (OR = 2.9) among women.[4] Longitudinal studies, by contrast, tend to find smaller effect sizes. In a four-year longitudinal study of depression outcomes in Swedish workers that also examined the role of non-occupational factors such as coping ability and stressful life events, job strain remained significantly associated with sub-clinical depression (RR = 2.8) for women.[5] In the French longitudinal GAZEL study, Neidhammer et al found that the demand/control model measures of high psychological demands (OR = 1.77 men, 1.37 women), low job control (OR = 1.38 men, 1.41 women), and low social support (OR = 1.58 men, 1.29 women) predicted subsequent depressive symptoms at 1-year follow-up.[6] All effects were statistically significant and were unchanged after adjustment for potential confounders. Similar results were confirmed on 3-year follow-up.[7] These investigators did not combine demand and control measures to assess job strain as a predictor variable, but their findings do show significant effects of demand/control variables that are similar for men and women. These studies contrast with a recently published longitudinal Finnish study of 4815 hospital personnel. Although this study found significant associations between organisational justice and depression, it found no association between job strain and depression.[8]

The international literature includes a limited number of Australian studies. The recent Personality and Total Health (PATH) Through Life Project is a cross-sectional study

of workers aged 40–44 years. For the entire sample of 2249 workers from low, middle and high status jobs they found statistically significant independent associations between job strain and depression (OR= 2.46) for both genders.[9] Using a subset of 1,188 employed professionals they found odds ratios of 2.54 for depression, again with the same effect size for men and women.[10] These cross-sectional Australian estimates are similar to those obtained internationally from longitudinal studies. No systematic or comprehensive review of job strain in relation to depression was available to aid in setting the range of effect sizes. Taking these studies together, we believe it would be reasonable to estimate an effect size for job strain on depression of 2-3 for both men and women. To be conservative, however, we have not included the high cross-sectional estimates from the US and we will include the recent negative longitudinal study from Finland, giving an effect size range of 1.0.[8] to 2.5[9] for men, and 1.0[8] to 2.8[5] for women.

The Victorian Job Stress Survey

The VJSS was conducted by telephone from a random sample of White Pages listings in the state of Victoria in Australia. The protocol for this study was reviewed and approved by the University of Melbourne Human Research Ethics Committee (HREC #030398). In order to reflect general population occupational group proportions, quotas were set to match Australian Bureau of Statistics (ABS) census proportions of upper white-collar, lower white-collar, and blue-collar groups (29%, 30%, and 41%, respectively). The VJSS also quota sampled for urban Melbourne (72%) versus rural/regional Victoria (28%). The inclusion criteria were being aged 18 years or older, and working at the time of the survey for profit or pay (including self-employed). Interviews were completed in November 2003 with a 66 % response rate from in-frame households (i.e., had one or more residents aged 18 or over and working) to yield a representative sample of 1,101 working Victorians (526 men and 575 women).

Job stress measures: We used Karasek's model of demand and control to measure job stress.[11] The demand-control model focuses on task-level job characteristics, postulating that psychological strain results from the interaction of job demands and job control, with the combination of low control and high demands producing "job strain."[11 12] Psychologic demand was measured as the sum of 3 items (Cronbach's alpha = 0.66), job control using two equally weighted scales of 6 and 3 items measuring skill discretion and decision authority respectively (Cronbach's alpha = 0.80).[13] Each of these dimensions was dichotomised at the median. Dichotomised psychological demand and job control were combined to create four categories: low strain (low demand and high control), active jobs (high demand and high control), passive jobs (low demand and low control), and job strain (high demand and low control). In subjects with missing data, scores were recalculated using the lower and the higher theoretical score for each missing item and dimensions dichotomised according to their median. If the classification of participants was the same for any possible value of the missing item, participants were considered as having non-missing answers for the dimension of interest (38/88 participants with missing data). If the classification differed according to the replaced value, participants were considered as having a missing answer for the dimension.[14] Non-missing job strain measures were available thus calculated for 501 men and 550 women.

Covariates: Covariate data were collected for a range of demographics including occupational skill level, age, and highest level of education completed. Occupational skill levels were collapsed into five Australian Bureau of Statistics (ABS) skill levels (level one lowest to level five highest).

Statistical Analysis

Population attributable risk (PAR) was calculated according to the formula PAR = (p * [OR – 1]/1 + p * [OR – 1]) * 100, where p = prevalence of exposure and OR = associated outcome effect size. Data analysis was conducted in men and women separately and was performed using STATA 8 (Stata Corporation, College Station, TX).

RESULTS

Table 1 below presents PARs for job strain in relation to CVD and depression. These were calculated using VJSS job strain prevalence of 18.6% for men and 25.5% for women and the lower and upper estimates of the published effect sizes (magnitude of stress-related increases in risk). For CVD, minimum attributable proportions represent significant preventable disease burdens (4–5% of CVD for men and women, respectively). For men, the proportion of CVD attributable to job strain could exceed one third, whereas for women it may be up to roughly one seventh of CVD cases. For depression, the high-end estimates are reversed for men and women, with job strain accounting for as much as one-third of depression among women, versus up to one-fifth for men. Because one recent longitudinal study found no association between job strain and depression among men or women, the lower estimate is zero.

Table 1: Population Attributable Risk Estimates for Job Strain in Relation to Cardiovascular Disease and Depression among Working Victorians, by Gender

	Men		**Women**	
Effect Size Estimates (Odds Ratios)	**Range, Percent**	**Middle Estimate, Percent**	**Range, Percent**	**Middle Estimate, Percent**
Cardiovascular disease				
• **1.2–4-fold increased risk in men, middle estimate 2.6**	3.6–35.8%	22.9%		
• **1.2–1.6-fold increased risk for women, middle estimate 1.4**			4.8–13.2%	9.3%
Depression				
• **1.0–2.5-fold increased risk in men, middle estimate 1.75**	0–21.8%	12.2%		
• **1.0–2.8-fold increased risk for women, middle estimate 1.9**			0–31.4%	18.7%

Because job strain prevalence also increases with decreasing occupational skill level (as shown in Table 2 of the previous chapter), we also estimated PAR for CVD and depression by occupational skill level (Table 2). Among men, there is a steady increase in PAR for both CVD and depression going from the highest skill level to the lowest. The upper estimates for CVD suggest a range from roughly one quarter to as high as 43% of CVD as attributable to job strain among working Victorian men. The middle estimates nearly double across the gradient from top skill level to bottom, going from 16% to 29%. There is a similar doubling of PAR for depression among men, but accounting for smaller but still substantial proportions of disease outcome (from 8—16% in middle estimates).

While job strain prevalence is lowest for the highest skill and vice versa among women, there is not a clear gradient of exposure, and thus less of a clear gradient in PAR estimates. Nevertheless, the extremes of CVD middle estimates for women approach a doubling, with 7% for the highest skill level and 12% for the lowest. Depression shows a similar pattern for women, but with a higher range of attributable fractions than CVD and substantial contributions of job strain to depression risk for most working women—approximating one fifth overall for skill levels from one to four.

Table 2. Population Attributable Risk Estimates for Job Strain in Relation to Cardiovascular Disease (CVD) and Depression among Working Victorians, by Occupational Skill Level

	Job Strain Prevalence	Cardiovascular Disease PAR		Depression PAR	
Occupational Skill Level:	**Percent**	**Range, Percent**	**Middle Estimate, Percent**	**Range, Percent**	**Middle Estimate, Percent**
Men (n = 501					
• level five (highest)	11.8	2.3—26.1	15.9	0—15.0	8.1
• level four	13.2	2.6—28.4	17.4	0—16.5	9.0
• level three	17.5	3.4—34.4	21.9	0—20.2	11.6
• level two	22.0	4.2—40.0	26.0	0—24.8	14.2
• level one (lowest)	25.6	4.9—43.4	29.0	0—27.7	16.1
Women (n = 550)					
• level five (highest)	18.2	3.5—9.8	6.8	0—24.7	14.1
• level four	31.1	5.8—15.7	11.1	0—35.9	21.9
• level three	26.7	5.1—13.8	9.6	0—32.4	19.4
• level two	23.0	4.4—12.1	8.4	0—29.3	17.1
• level one (lowest)	33.8	6.3—16.7	11.9	0—37.8	23.3

DISCUSSION

Estimated proportions of CVD and depression attributable to job strain in Victoria indicate that job stress is a substantial public health problem. Our estimates are also consistent with and in the range of previous international estimates for CVD and contribute to new knowledge internationally on the contribution of job stress to depression. Findings also show that job strain and associated CVD and depression risks are inequitably distributed, with working Victorians in lower skill level jobs most likely to be adversely affected. Combining finding from the previous chapter with this one, we have also observed elevated risks of job strain and thus associated disease outcomes for women overall, and for younger men. Recent Victorian Population Health Surveys have also found that mental health problems and mental illness disproportionately affect women, people in lower status occupations, and younger people.[15 16] The findings of this Report thus suggest that job stress may be a significant contributor to mental health inequities in Victoria. Job stress intervention for these disadvantaged and underserved groups offers a promising and underutilised strategy for reducing these inequities.

The effect size estimates used were fairly conservative. Because there has been far more study of job strain in relation to CVD than depression, the PAR estimates for CVD are firmer than those for depression. Substantially higher effect sizes estimates have been published for women in particular,[4] but these were not used because they were markedly higher than others. Because the relationship between job strain, other job stress measures, and depression is an active area of international research, estimates of effect sizes and associated disease burdens will continue to evolve. The analyses presented are also conservative in other ways. To produce a comprehensive estimate of the effects of job strain on working Victorians, we would also need to examine the full range of other associated health conditions, such as anxiety and other mental health outcomes, work-related suicide, the contribution of job strain to injuries, contributions of job strain to behavioural disorders (for example, alcoholism and nicotine addiction), and more. No such comprehensive estimates are currently available. Further, job strain represents only one psychosocial work hazard. Others include job insecurity, bullying, and sexual harassment. All such hazards would need to be included to estimate the contribution of psychosocial work hazards to chronic disease and other outcomes. No such estimates are currently available.

These findings—coupled with those of the previous chapter showing that those most likely to be exposed and affected by job strain are the least likely to benefit from workers' compensation—represent compelling justification for expanded public health policy and practice to address job stress. Further, job stress and other psychosocial hazards are on upward trends in many OECD countries. In addition to concerns about to preventable occupational disease, job stress also has been linked to unfavourable organizational outcomes such as lost work days, low productivity and high turnover rates (as summarised in Chapter 1). The substantial attributable proportions observed for job strain in relation to CVD and depression demonstrate that in addition to being a concern for workers, employers, labour and the occupational health and safety and workers' compensation system, job stress should be a concern for physical and mental health promotion agencies (e.g., VicHealth, National Heart Foundation, *BeyondBlue*), public health authorities (e.g., state and federal Health

Departments), medical practitioners, and others.[17] Combining this chapter's findings with other chapters in this Report, we have shown that a substantial and inequitable disease burden could be addressed by applying a systems approach to job stress in Victoria. The optimal response to this challenge would encompass participation by the full range of workplace stakeholders as well as various public health, community, advocacy, and other organisations.

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APPENDIX

TABLE OF CONTENTS

APPENDIX I: JOB STRESS INTERVENTION STUDIES 1990—APRIL 2005

These tables summarise job stress intervention studies that met our specified inclusion criteria. They are summarised into three tables, each ordered alphabetically by first author (first column). The first column also includes brief description of the study population and/or setting, and the number of subjects included in the evaluation. Appendix Table I includes all studies rated as having a HIGH systems approach to job stress intervention (second column), as defined in the Methods section. Appendix Table II presents all studies rated as having a MODERATE systems approach (ordered alphabetically by first author, starting on page 18), followed by those studies rated as having a LOW systems approach (ordered alphabetically starting again within same table, by first author on page 24). Finally, Appendix Table III summarises studies of multiple worksites where varying systems level interventions were implemented (ordered alphabetically by first author, starting on page 43)

Additional notes in Systems Approach column are: intervention included employee participation (PAR); needs assessment or risk assessment conducted to tailor intervention to context (NA/RA); job stress/occupational health & safety intervention integrated with health promotion (OHS/HP). Levels of intervention (third column) are noted as physical work environment (E), organisational (O), at the interface of organisation and individual (O/I), or individual (I). Intervention duration is also noted in the third column, with indicated units ranging from hours to years. Level of causal inference (level of confidence in attributing observed effects to intervention and not other causes) was rated as follows: *** = evidence obtained without a control group or randomization but with evaluation; **** = evidence obtained from a properly conducted study with pre and post measures and a control group but without randomization; ***** = evidence obtained from a properly conducted study with pre and post measures and a randomized control group. Additional abbreviations used include: IG (intervention group); CG (control or comparison group); WC (Workers' Compensation); Indiv (Individual); Org (Organisational); GHQ (General Health Questionnaire); SF (Short-Form).

APPENDIX Table I: Job Stress Intervention Studies with "High" Systems Approach Ratings: 1990—April 2005

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
Adkins, 2000 [1]; US Air Force; n =16,193	HIGH PAR NA/RA OHS/HP	E, O, O/I, I 3 years (approx.)	No control group; Org-level: suicide rates, Workers' Compensation (WC) rates, WC costs, healthcare utilization rates and healthcare costs. Indiv-level: Measures of stress produced by personal health, threat of job loss, problems with supervisor, work relationships, conflicting responsibilities, deployment, workload, and being away from family; measures of absenteeism, work performance, and accidents; and measures of coping strategies.	3-*** QUAL	Org-level: After the first year, workers' compensation rates declined by 3.9% and health care utilization rates declined by 12%. Deaths resulting from behavioural problems, including suicides, declined by 41%. From 1995 to 1996 the suicide rate decreased 38% and an additional 25% from 1996 to 1997. However, no analyses were reported on the statistical significance of these improvements. Indiv-level (qualitative and quantitative data): Only baseline data reported ostensibly used to tailor intervention to specific contexts.
Aust, 1997 [2]; German bus drivers; n= 54	HIGH PAR	O, O/I 12 weeks	Non-intervention control group; Measure of need for control, evaluation of the program (participation, satisfaction, perceived benefits), and positive and negative mood.	4-****	Mean level of "need for control" (previously shown to predict heart disease) was significantly reduced in IG vs. CG at 12 weeks, and this effect persisted after 3 months. No significant impact on mood or symptoms. Suggestions for structural changes were discussed with superiors and, after end of the group-based stress management program, they were dealt with by the official occupational health and safety committee of the company. This report restricted to assessment of immediate effects of the 12 week group

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
					program.
Barrios et al, 1997 [3]; Managers, engineers and factory workers; n= 48	HIGH	O/I 6 months	No control group. Personal Opinion Survey (for happiness, contentment, burnout, nervousness, tension, anxiety and anger), measures of job stress, heart rate variability, and blood pressure.	3-***	Evaluation of an "inner quality management program" showed increases in contentment, job satisfaction, and communication, and decreases in physical symptoms and blood pressure in hypertensive individuals.
Bunce and West, 1996 [4]; Health care workers n=202	HIGH PAR	O/I, I 3 months, 1 year	No-treatment control group; Measures of job satisfaction, motivation, health (GHQ), tension and innovation.	4-****	Differential impact of interventions: improvements in GHQ and satisfaction scores, and increases in innovation were experienced by PAR group.
Cahill, 1992 [5]; Social service employees in US; n=43.	HIGH PAR	O, O/I 6 months	No control group; Measures of skill discretion / development, decision latitude / authority, job satisfaction, autonomy and stress.	3-***	Improvement in decision latitude, skill development, job satisfaction and attitude to new technology. No changes to strain levels.
Cartwright, 2000 [6]; UK government department employees; n=343	HIGH NA/RA PAR	E/O, O/I Interventions 1 year and ongoing Evaluation follow-up at 2 years	Non-intervention division; Measures of well-being, job satisfaction and attitude (OSI).	4-**** QUAL	Indiv-level: Stress levels emanating from the organizational structure and climate were significantly reduced post-intervention in the intervention group compared to the non-intervention group (no change). No significant changes in physical and psychological health. Org-level: Significant post-intervention improvements in the intervention division in job satisfaction. Focus groups indicated improved organisational climate as a result of the intervention.

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
Eriksson et al, 1992 [7]; Public administration employees (Sweden) n=129	HIGH PAR	E/O, O/I, I Duration not specified	Four intervention work units and a no-treatment control work unit; Measures of social support, blood lipid profiles, general health and wellbeing	4-****	The education, discussion group, and action plan program was deemed to be more effective in groups that had a high degree of autonomy, high decision latitude and high initiative skills. In the intervention groups there was a significant increase in "good" cholesterol HDL (high-density lipoprotein), decrease in "bad" cholesterol LDL (low-density lipoprotein), and a sharp decrease in triglyceride levels. In the intervention groups, perceptions of more stimulating work, increased feedback from supervisors, and reduced workload were reported. In the control group, few psychosocial or physiological changes could be observed.
Feuerstein et al, 2004 [8]; Office workers with work-related upper extremity symptoms; n=70	HIGH	E, O/I, I One-time work station modification and stretching exercises and two 70-minute stress management education sessions. 3-month and 12-month follow-up evaluation	Ergonomics-only comparison group (provided with job stress resources) compared to a combined ergonomic and job stress intervention group; Measures of observed ergonomic risks and self-reported ergonomic risks, job stress (life stressors and social resources inventory), pain, symptoms, functional limitation, and general physical and mental health (SF12).	5-*****	While both groups experienced significant decreases in pain, symptoms, and functional limitation from baseline to three months with improvements continuing to 12 months post baseline, no significant differences between groups were observed for any outcome measures. Findings indicate that the additional two-session job stress management component did not significantly enhance the short- or long-term improvements brought about by

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
					the ergonomic intervention alone.
Griffin, 2000 [9]: Hospital employees n=540	HIGH PAR NA/RA	O, O/I, I Duration unclear. Pre-intervention survey and 2-year follow-up	No control group; Measures of organisational climate, employee morale and distress, turnover intention and noncertified sick leave.	3-***	A series of paired sample t-tests showed significant improvements, across the two years of the survey, to employee ratings of leadership, professional interaction/development, goal congruence, recognition, participation, workplace/individual morale, workload and workplace stress.
Griffiths et al, 2003 [10] UK Senior hospital nurses (H grade most senior, G grade middle seniority, F grade least senior) N = 80	HIGH PAR NA/RA	E, O, O/I 6 months	No comparison group; Baseline and follow-up survey: measures of general well-being ('worn-out' scores), overall job satisfaction, intention to leave, absence, musculo-skeletal pain, reported working conditions in terms of reported problems (e.g., lack of management support, lack of time for leave). Follow-up survey also included items on: awareness and involvement in intervention, perceived impact of the intervention, and whether the intervention had made things better for them.	3-*** QUAL	Overall, nurses reported being slightly less worn-out. There was a slight decrease in percent of G and H grade nurses intending to leave, but a slight increase in F grade nurses intending to leave. Nonetheless, both groups remained satisfied with their jobs and absence days per year remained low. Musculo-skeletal pain increased in both groups, but the reasons for this were not clear. Success rating explored amongst those involved in each intervention whether working conditions or well-being had improved in comparison with those not aware of or involved in the intervention. The increase in time allowed for administrative aspects of nurses' work, installation of computers, and appointment of housekeeping staff varied in success. The increase in administration time was successful if staffing was not an issue; however, where it was an issue its success was

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
					limited. The installation of computers if complete was viewed positively however if it was not fully completed or training had not been provided it was not recognised as a success. Study leave and training were evaluated as effective. The intervention designed to increase communication was viewed positively.
Innstrand et al, 2004 [11]; Staff working with persons with intellectual disabilities; n=112	HIGH PAR	E, O/I 10 months	Non-intervention control group; Maslach Burnout Inventory (MBI), measures of job satisfaction, and work stress	4-****	The intervention group showed a significant reduction in stress and exhaustion, and a strong significant rise in job satisfaction after intervention.
Israel et al, 1989 [12] & 1992 [13], and Heaney et al, 1993 [14]; US manufacturing plant employees (86% hourly, 14% salaried) n=1100; n=176 (Heaney et al) [14]	HIGH PAR NA/RA	E, O, O/I 7 years (Israel et al) 5 years (Heaney et al)	No control groups —one participatory action research intervention in two independent branches of one company: one with cooperative labour-management relations, the other with adversarial; Israel et al: On-going qualitative evaluation and periodic employee surveys measuring support and well-being. Heaney et al: Measures of participation, participative climate, labour /management relations, social support and depressive symptoms (CES-D).	3-*** QUAL (Heaney et al: questionnaire survey, semi-structured interviews and field observations)	Israel et al: Although there were increases in co-worker support and trust between hourly and salaried staff, job security decreased due to a down-sizing and company split during the intervention. Consistent with this down-sizing event, there was also an increase negative feelings and sleeping problems, supervisor support, and some symptoms. Heaney et al: Employee participation in decision-making increased in both intervention conditions. Also found enhanced employee perceptions of the effectiveness of the process in both contexts, but employee well-being did not improve in either group. Labour management relations context

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
					influenced the impact of the stress project. The intervention enhanced employees' perceptions of the climate for participation only in the organization with more cooperative industrial relations. However, counter to hypothesized changes, increases in coworker support and decreases in depressive symptoms were associated with the intervention only in the organization with more adversarial industrial relations. This likely explained by adversarial setting having no previous opportunities for exchanging support with co-workers. Interpretations complicated by organization restructuring during study.
Kalimo, 1999 [15]: Forest Industry employees: n=c. 11,000	HIGH PAR NA/RA	E, O, O/I Ongoing intervention with consultation over 15 years (1984-1999) including, support, training, and feedback on changes in work conditions and work behavior. 2, 4 and 10 year devaluation data collections	No control or comparison group; Measured work-related and health-related factors: group support, commitment, and strain.	3-***	Work changes viewed positively but time pressures had increased. Overall level of stress remained low with the majority of staff assessing their psychological working capacity as good.
Kawakami 1997 [16]: Japanese blue – collar manufacturing	HIGH PAR (supervisors only) RA/NA	E, O, O/I 1 year	Intervention group = 2 worksites (n=79) vs comparison group from 3 worksites (n=108) with complete data at 2 years follow-up	4-****	Statistically significant decreases in depression symptoms and days of sick leave in intervention vs control group (adjusted for gender age and baseline

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
employees: n=187.			Measures: depression symptom score, sickness absence, systolic and diastolic blood pressure, and work characteristics.		levels). No changes to blood pressure levels. Percent reporting work overload increased in intervention group versus control, due to an unanticipated intervention-independent workload increase at intervention sites that did not occur at comparison sites in same company.
Kvarnstrom, 1996 [17]: Swedish electrical manufacturing employees; n=c50.	HIGH NA/RA PAR	O, O/I 6 years and ongoing at time of publication; 1-year follow-up compared to data 2 years prior to intervention	No control groups: Measures of production, turnover, sickness absence and workplace injuries.	3-***	Significant reductions in turnover, absenteeism and injuries, and a major improvement in production.
Lavoie-Tremblay et al, 2005 [18] ; Health care workers in a long-term care unit; n=60	HIGH PAR	E, O/I 6 months intensive, 1 year follow-up	No control group; Job Content Questionnaire, Effort Reward Imbalance Questionnaire, Psychiatric Symptom Index, and an indicator for recorded absenteeism.	3-***	There was a significant increase in reward and a significant decrease in Effort Reward Imbalance following the intervention. Absenteeism rates decreased from 8.26% to 1.86% over the study period, but in the rest of the institution remained the same. However, there was a significant decrease in social support from supervisors at post-test.
Logan et al 2005 [19]; Unit managers of a trucking company n=64	HIGH PAR	E, O/I 10-hour training session	Non-intervention control group; Measures of overall control, supervisory support, somatic complaints, depression (CES-D), anxiety, and job satisfaction (JDS).	5-***** QUAL	This was intended as a control-enhancing intervention for unit managers. The intervention increased perceptions of control after 4 months, but only for those managers with supportive

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
					supervisors. In conjunction with supervisory support, the intervention produced improvements in job satisfaction, but not general well-being outcomes. Process evaluation interviews indicated that the intervention was implemented as intended.
Lourijsen, et al, 1999 [20]; Employees of one Dutch hospital (n = 612) versus a control hospital (n = 382)	HIGH PAR NA/RA OHS/HP	E, O, O/I, I 3 years	Non-intervention control hospital; Org-level measures: absenteeism rates, intervention costs, and intervention benefits Indiv-level measures: Interviews with supervisors and measures of work organisation, employee health, health behaviours and absenteeism.	4-****	Org-level: Significant difference in absenteeism percentage in intervention versus control hospital after 3 years (4.0 versus 6.6). Greater decline over 4 years in intervention (8.9 to 4.0) than control (7.1 to 5.4) against steady rate averaged across all Dutch hospitals (6.5 to 6.6). Estimated benefits (1.6 million Guilders) exceeded costs (1.2 million Guilders) at the intervention hospital 2 years into the intervention. Indiv-level: Improved employee opinions of how sick co-workers dealt with by management, quality of patient care, working conditions, and psychosocial work climate also reported. Little self-reported impact on health behaviours, however, these programs not yet implemented.
Maes et al, 1998 [21]; The Brabantia Project—Dutch manufacturing company employees; n = 264	HIGH PAR NA/RA OHS/HP	E, O, I 3 years	Non-intervention control group (n = 130) versus intervention (n = 134); Org-level measures: absenteeism rates Indiv-level measures: cardiovascular health risks, psychological job demands, job control, ergonomic risk factors.	4-****	Org-level: significant drop in sickness absence in intervention (15.8% to 7.7%) versus control (14.3% to 9.5%) groups, which by the company's determination yielded a positive financial return on its investment in the project. Indiv-level: Manufacturing employees in intervention group versus control had

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
					significantly greater favourable changes in cardiovascular health risks (decrease), psychological job demands (decrease), job control (increase), and ergonomic risks (decrease).
Matrajt, 1992 [22]; Mexican manufacturing plant employees; n=130 managers and 3600 employees.	HIGH PAR NA/RA	O, O/I 17 weeks situation diagnosis and corrective phase, 12 months follow-up	No control groups; Measures of productivity, psychosomatic symptoms and internal relations.	3-***	Indiv-level: Progressive reduction in psychosomatic illness (17% for managers and 15% for assembly-line workers). Org-level: General work environment improved, with an increase in productivity and reduced absenteeism. Cost-benefit evaluation justified investment in the study through increased productivity, savings in lost work hours and the costs of training replacement managers, and medical care and sickness benefits for assembly-line workers.
Melchior (1996) [23]; nurses; n=161	HIGH	E/O, O/I 1 year	No-treatment control group; Measures of Maslach burnout inventory, employee turnover	5-*****	There was no observed change in burnout inventory scores for the treatment or control group, but job turnover decreased significantly versus controls as a result of innovation in care delivery with emphasis on primary nursing, feedback/support, and communication skills training in order to reduce burnout.
Michie, 2004 [24]; Hospital cleaning (intervention) and catering (control)	HIGH PAR NA/RA	E, O, O/I Changes and new reporting systems introduced in one	Cleaning staff intervention group (n=221) and catering staff control group (n=91); Org-level measure of monthly	4-****	Significant, albeit small, reduction (2.3%) in the difference in sickness absence between intervention and control groups in the six months after

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
staff; n=221		month Evaluation follow-up at 6 and 12 months	sickness absence rates		intervention. The difference in sickness absence rates, however, was not maintained at 12 months.
Mikkelsen, 2000 [25]; Healthcare employees; n=135	HIGH PAR	O, O/I, I 1 week, 1 year	No treatment control group; Measures of work stress, health, demands/ control, skill discretion, decision authority, social support, role harmony, learning climate and leadership.	5-***** QUAL	Limited positive effect on work stress, job characteristics, learning climate and management style. Written reports from management, consultants and union representatives favourable regarding usefulness of intervention.
Mikkelsen et al, 1999 [26] Postal workers N = 153	HIGH PAR	E, O 12 weeks intervention, 1 year evaluation follow-up	Compared two intervention groups (n = 91) to two control groups (n = 62); Cooper's Job Stress questionnaire Spielberger State-Trait Anxiety Inventory (STAI), Organizational Commitment Questionnaire (OCQ), Job satisfaction was measured by the Quinn and Shepard method, Job Content Questionnaire, Subjective health was measured by the Health Inventory; Social support, Learning climate and leadership were also measured.	5-*****	The goal of the intervention was to improve work environment and health, however this study was also affected by organizational restructuring and turbulence. Work conditions deteriorated during the observation period in the control groups. In one of the intervention groups, this negative trend was reduced by the intervention. Lack of positive results in the other intervention group may have been due to organizational restructuring and turbulence.
Munz, 2001 [27]; Customer service/sales representatives (USA) n=79	HIGH PAR	E, I 3 months 'comprehensive stress management program'	Four comparable work units in 4 different cities: two intervention (combined self-management training and stressor reduction process) versus two non-intervention control units. Org level measures: Productivity and absenteeism. Individual measures: Pre and post intervention questionnaires, measures	4-****	Org level: 24% decrease in absenteeism compared to 7% decrease in the control groups and 23% increase in productivity (measured by sales revenue) compared to 17% increase in the control group. Statistical significance of difference between intervention and controls not reported); Indiv level: Significant improvements in perceived stress levels, depression and

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
			of perceived stress, depression, positive/negative affect.		positive/negative affectivity.
Nijhuis et al, 1996 [28] Dutch construction employees; n=425	HIGH NA/RA OHS/HP	O, O/I, I Apparently ~1 year: Interventions (organisational structuring and training) started in autumn 1992, effects expected during 1993, Post intervention (2-year follow up) survey in 1994.	Two no-treatment control groups; Measures of absenteeism, health complaints, and employee attitudes to work	4-****	Baseline surveys were completed by all groups, however, authors do not specify how and if comparison groups were used in statistical analysis of pre and post data. Nevertheless, they report that: • Significantly fewer employee complaints with respect to aspects of job content and labour relations, ($p<.05$). • No significant reduction in employee complaints with respect to decision latitude, physical working conditions, stress-related fatigue, or health complaints; • Considerable reduction in absenteeism rates of managerial staff; • Sickness absence rates declined from 10% to 8% in the total population. Multiple regression analysis showed that 34% of this decline could be attributed to experienced differences in stressors (social relations, task information, and participation); • Economic evaluation found cost effectiveness through reduced absenteeism of managers, greater capacity for spotting and solving problems, and improved efforts by

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)§	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)# Note if includes qualitative (QUAL)	Principal Findings
					workers.
Orth-Gomer et al, 1994 [29] Government office workers (Sweden) n=129	HIGH PAR	O, I 8 months	Non-intervention control group (n =35) versus intervention (n = 94); Physiological measures: apolipoprotein B/apolipoprotein AI ratio Psychosocial measures: job strain and social support.	5-*****	Intervention included education program, relaxation training, and worker committees which developed and carried out action plans to reduce work-related sources of stress. Found: • Significant decrease in apolipoprotein B/apolipoprotein AI ratio occurred in the intervention group, but not in the control group. • Stimulation from and autonomy over work significantly increased in the intervention group but remained the same in the control group
Poelmans, 1999 [30] Pharmaceutical company employees; n=3,261.	HIGH	E/O, O/I, I 1 year.	No control groups; Measures of stress experiences, psychosomatic complaints and work conditions.	3-*** QUAL	Significant reduction in sickness absenteeism. Intervention forced stress onto the company agenda with members being made aware of issues.
Sastry, 1992 [31]; Mining company in India: Managers (n = 204) Opeators and loaders (n = 404)	HIGH PAR NA/RA OHS/HP	O/I, I 3 day training program	No control group; Indiv-level: measures of qualitative job content (e.g., participation in decision-making, role ambiguity, interpersonal relations), stress-related health complaints, and health behaviours	3-***	Reported percentages of respondents indicating improvements at first feedback period (6 months), but no numbers (response rates) nor statistical analyses reported. Examples of findings: • 39% of the senior managers and 28% of the middle-level managers indicated improvements in qualitative content of the job • 47% of senior managers and 39% of middle-level managers

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
					indicated a reduction in their stress-related health complaints; • Shift schedules rearranged in response to need identified by operators and loaders; • 53 % of senior managers, 29% of middle-managers, 34% of operators, and 54% of loaders reported a "reduction in tobacco consumption".
Schaubroeck, 1993 [32]; Nonacademic university employees in a Midwest USA university; n=27 in intervention group n=25 in control group	HIGH PAR NA	E, O/I 2 year	Randomized controlled trial with control group waitlisted. Org level measures: Measures of absenteeism, role ambiguity / conflict and supervisor satisfaction. Individual measures: physical and mental well-being.	5-*****	Org-level: ambiguity and supervisor dissatisfaction were reduced through role clarification. Indiv-level: No significant effects The study took place during a period of organizational financial cutbacks with rumours of personnel cutbacks and job reclassification that were viewed negatively by the employees
Van Dierendock et al, 1998 [33]; Direct-care mental health professionals and staff N=149 at final	HIGH PAR	E/O, O/I, I 5 weekly group sessions of ½ day each Data collection pre-, 6 months post-, and 12 months post-intervention	External and internal control groups; Maslach burnout inventory, social support, turnover intention, absenteeism and equity	4-****	Burnout, absence, and deprived feelings (negative value in equity measure, indicating an inequitable relationship) significantly decreased relative to control groups. Turnover intention remained stable for intervention group, but increased for the internal control group.

[§]Additional Notes: intervention included employee participation (PAR); needs assessment or risk assessment conducted to tailor intervention to context (NA/RA); job stress/occupational health & safety intervention integrated with health promotion (OHS/HP).
[#]3- *** = evidence obtained without a control group or randomization but with evaluation; 4-**** = evidence obtained from a properly conducted study with pre and post measures and a control group but without randomization; 5-***** = evidence obtained from a properly conducted study with pre and post measures and a randomized control group

APPENDIX Table II: Job Stress Intervention Studies with "MODERATE" or "LOW" Systems Approach Ratings: 1990—April 2005

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
Bagnara et al, 1999 [34] Trainee nurses n=128	MODERATE	O/I, I 6 months of discussion groups (12-15 students) plus periodic meetings with supervisor	Non intervention control group Measures of psychological well-being (GHQ), anxiety, self -esteem, work expectations and work involvement.	5-*****	Psychological well-being (GHQ) improved significantly within the intervention group, but improvement in relation to control group not reported. Significantly more trainee nurses passed their exams in comparison to control group.
Blomkvist et al, 2005 [35]; Coronary critical care unit nursing staff (Sweden); n=36	MODERATE	E Sound absorbing ceilings installed and data collected at start and end of work shifts to calculate daily exposure effects during baseline "sound refecting period" of 20 weekdays, and intervention "sound absorbing" of 22 weekdays.	No control or comparison group; Measure of acoustics, pressure (stress, calmness, hastiness), strain (irritation, anger, tension), distress (anxiety, sadness, depression) and a condensed visual analogue version of the Swedish demand-control-support model.	3-***	Improved acoustics significantly reduced demands, strain, and pressure during the afternoons, while control/support and distress were not affected by the condition at all. Staff reported feeling more relaxed and less irritable during the intervention period. It was previously known that physical and psychosocial stressors can interact in producing enduring health effects. Notably, this study demonstrates that intervening on physical stressors can reduce psychosocial stress, thus exploiting the interaction in an intervention context.
Bond & Bunce, 2001 [36]; U.K. administrative employees; n=97	MODERATE PAR RA/NA (Note: strong participatory methodology, but no indication of	E/O, O/I Five 2-hour steering committee meetings over a 3 month period, plus various activities integrated into day to day work;	Matched randomized control group; Measures of mental and physical ill-health, sickness absence (based on personnel records), performance, and job satisfaction. Used the Occupational Stress Indicator, and Job Content Questionnaire.	5-*****	Employee committees developed action plans to increase employee control in various areas. Significantly improved participant's mental health, sickness absence rates, and self-rated performance at 1-year follow-up

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
	secondary/tertiary intervention)	12 month evaluation follow-up			Results also indicate that favourable effects mediated by increased employee job control through work re-organisation.
de Croon et al, 2004 [37]; Dutch lorry drivers; n=78	MODERATE	E 2 years	2 matched control groups; Measures of job demands and control, mental health (need for recovery after work) and job attitudes (organisational commitment) using the Dutch Questionnaire on the Experience and Assessment of Work (VBBA).	5-*****	Results showed that the application of on board computer (OBC)-systems negatively affected the drivers' job control and organisational commitment. However, OBC-systems did not influence the drivers' psychological job demands and need for recovery after work. Accordingly, it was concluded that the application of OBC-systems negatively affects the lorry driver's psychosocial work environment and job attitudes.
Elo, 1998 [38] Finnish carton production employees; n=118	MODERATE NA/RA PAR	E/O 3-years	No control or comparison groups; Measures of variability of work, and mental and physical strenuousness (Occupational Stress Questionnaire).	3-*** QUAL	Indiv-level: Significant overall reduction in mental and physical strenuousness levels. Org-level: Significant increases in the variability of work in one department.
Landsbergis & Vivona-Vaughan, 1995 [39]; State government agency employees (US); n=77	MODERATE PAR	O, O/I 1 year as a pilot program	2 intervention departments and 2 waitlist control departments; Measures of communication, support, supervisor relations, job characteristics, organisational climate, job satisfaction and psychological/physical strain (i.e., depression and sleeping problems).	5-***** QUAL	Mixed impact on scores of the intervention in department 2 (relative to control 2), though univariate and multivariate analyses (adjusting for demographics and job characteristics) were borderline or non-significant. Negligible or negative impact in intervention department 1 (relative to control 1), though effects were non-significant.

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
					Intervention efforts were disrupted by a major organizational restructuring and hampered by lack of formal management and labour commitment to maintaining the intervention process.
Molleman, 1995 [40]; Healthcare employees (nurses); n=435	MODERATE	O 8 hours per week support by a staff nurse for 6 months 6, 12 and 18 months after start of intervention	Matched control groups; Measures of perceived control, autonomy and performance.	4-****	The new work design brought about a shift in control from head nurses to regular staff nurses, with the following higher in intervention versus control groups: • Level of control of nurses over primary care; • The extent to which nurses can make decisions autonomously • The necessity to consult nurses before making decisions.
Parkes, 1995 [41]; Driving Test examiners; n=49.	MODERATE	O	Cross-over control; Measuring cognitive performance under variably demanding work.	5-*****	Significant decrease in both speed and accuracy while performing tasks with increasing workload.
Proctor et al, 1998 [42]; Nursing home care staff; N=84	MODERATE	O/I, I 6 month intervention	No-treatment control group; Used the occupational stress indicator and GHQ.	4 - ****	No significant differences were found between the intervention versus control group for this intervention in skill development in residential care provision.
Reynolds et al, 1997 [43]; City council employees; n=156	MODERATE NA/RA	O/I, I 1-year and 2-year evaluation follow-up	Non-intervention control group versus individual counseling group and organizational change group; Measures of job characteristics, psychological wellbeing, physical	4-****	No changes (psychological /physical well-being or absenteeism) due to organisational change intervention aimed at increasing participation and control of employees in day to day

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
			symptoms, work / life satisfaction and absenteeism.		decisions. By contrast, favourable changes at individual level were observed for individual-focused comparison group (see Reynolds [1997], LOW, in Table II below).
Rydstedt et al, 1998 [44] and Evans, 1999 [45]; Swedish bus drivers n=21 questionnaire n=41 field study (observations of workload, psychophysiological reactions at work, and self-reported stress)	MODERATE	E, O Intervention on-going over 2 years; Field study evaluation at one year; questionnaire study evaluation at 2.5 years.	Field study: 10 intervention drivers and 31 matched controls; Questionnaire for occupational stress and perceived workload; Field study for observer-rated job hassles, systolic blood pressure, heart rate at work, and perceived distress after work.	3-***	Intervention on a difficult inner city bus line in Stockholm--designed to reduce traffic congestion, reduce passenger service, and reduce workload demands imposed on the drivers. Investigators hypothesised that initially elevated indices of job stress among drivers on the difficult intervention bus route would be reduced to levels equivalent to those in comparison group: results consistent with hypothesis in field study (n = 41): • Significant decline in systolic BP (-10.7 mm Hg) in the intervention group greater than the comparison group (-4.3 mm Hg); • Significant decline in heart rate (3.7 bpm) in the intervention group greater than the comparison group (0.5 bpm); • Significant decline in job hassles per hour (-4.5) in the intervention group greater than the comparison group (+0.6); • Changes in job hassles were significantly correlated to changes in systolic blood pressure, health

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
					rate, and perceived stress, but not diastolic blood pressure change This further supported by favourable decreases in perceived workload and distress in the smaller questionnaire study (n = 21)
Smith et al, 1992 [46]; US meat processing employees; N =~ 125-150 (not specified)	MODERATE PAR NA/RA	E, O 1 year	No control group; Unstructured interviews and conversations including discussion of health status, psychosocial (e.g., job stress, job satisfaction), and other working conditions	3-*** QUAL	Overall, there seems to be some improvement in psychological indicators (nervous or irritable) for meat cutters and for meat wrappers, but not for meat processors. For psychosocial factors there appears to be an overall worsening effect for meat cutters and meat processors. Interviews showed that meat processors and meat wrappers had very positive feelings about the job enlargement program. They reported that their overall job satisfaction was greatly increased, even though this was not reflected in their responses in the survey. Meat cutters were generally happy with increased rotation away from cutting meat, but unhappy with the lower job content level of meat processing and wrapping. All groups felt that there was less job stress overall.
Terra, 1995 [47]; Dutch metal can manufacturing plant employees; n=430.	MODERATE PAR NA/RA (physical work environment) Note: Participation level very high,	E, O, O/I Initial intervention period not clearly specified- apparently 6 months, 5 years of follow up	No control group; Org level measures: Measures of productivity, sickness absence rates.	3-***	Org-level: • 50% reduction in sickness absence rate in comparison to significant increases in comparable plants (as reported by company OHS Service), saving 1 million Guilders

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
	with workers involved in job redesign.				per year; • 66% increase in productivity, from 0.26 to 0.43 million cans/worker/year. Indiv-level: not systematically assessed. Managers anecdotally reported that workers better qualified, informed, and motivated.
Theorell 2001 [48]; Insurance company employees; n=483.	MODERATE	O, O/I	No-treatment group; Measures of decision latitude, skill discretion, psychological demands, work climate, work pace, cholesterol, cortisol and gamma-GT	4-****	Results indicate the possibility of improving the work environment and decreasing employee arousal levels by providing adequate management training.
Wahlstedt & Edling, 1997 [49]; Swedish postal employees; n=100.	MODERATE	E/O, O/I, O Changes to ongoing systems and structures introduced in one month	No comparison groups; Measures of psychosocial factors' sleep disturbances, gastrointestinal complaints and sick leave.	3-***	At one-year follow up, significant increase in skill discretion and perceived authority was significantly correlated with lower levels for sleep difficulties and gastrointestinal complaints.
	Begin LOW				
Alexander, 1993 [50]; White collar employees in automotive industry; n=86	LOW OHS/HP	I	Matched controls; Measured skin conductance, general health, trait anxiety, work tension, sleep problems and job satisfaction.	4-****	Significant improvements in reducing skin conductance, trait anxiety and alcohol/cigarette use in comparison to the control group for regular attendees of MED program. Less effect for irregular attendees.
Bond et al, 2000 [51]; Media organization employees n=90	LOW	I 9 hrs (over 3 months)	Randomized control group (waitlist, n = 30), 'emotion-focused' coping skills group (n = 30), and 'problem-focused' innovation promotion program group (n = 30);	5-*****	Improvements in mental health and work-related variables were found in both intervention groups (two types of stress management intervention). As hypothesized, changes in outcome

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
			Measured GHQ, depression, motivation, job satisfaction and attitudes toward innovation and change.		variables in the coping skills group were mediated only by the acceptance of undesirable thoughts and feelings. In the 'problem-focused' Innovation Promotion Program, change was mediated only by attempts to modify stressors.
Carson et al, 1999 [52]; Mental health nurses; n=53	LOW	O/I Intervention duration unclear	Standard-care control group (provided with booklet on stress management) versus intervention group (individual feedback and support). Both groups received some form of feedback on questionnaire scores; Measures included the DeVillers Carson Leary Stress scale, GHQ, Maslach burnout inventory.	5-*****	Unexpectedly, greater stress reduction (in Stress Scale scores) was indicated in the control group (MD = -11.5) rather than the intervention group (MD = -3.0). These differences were statistically significant. In addition, this finding was supported by similar patterns in the related measures of GHQ and Maslach Burnout Inventory. Attrition of study subjects may have affected the results.
Cecil, 1990 [53]; School teachers; n=54	LOW	O/I, I	Co-worker support, stress inoculation training, or no-treatment control; Measuring teacher stress.	5-*****	Stress inoculation training was effective in reducing teachers' self-reported stress, while the co-worker support group was not
Cigrang, 2000 [54]; Military trainees; n=178	LOW	I	"Usual care" control group: Measured graduation /discharge rates.	5-*****	No significant results reported after stress inoculation training.
Cooper, 1992 [55]]; English Postal employees; N=288	LOW NA/RA	I 2 years	Control group (non randomized) Org level measures: Measures of absenteeism Individual measures: mental health, self-esteem, organizational commitment and changes in health behaviors	4-****	Org-level: Significant improvement in absence rates. Indiv-level: Decline in anxiety levels and depression. Increase in self-esteem but no marked changes to satisfaction and commitment levels.

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
Delvaux et al, 2004 [56]; Oncology nurses; n=115	LOW	O/I 3 weeks (105 hours)	Non-intervention control group; Measures of nurse attitudes, communication skills, and occupational stress levels.	5-*****	Compared to controls, nurses who participated in a psychological training program (PTP) reported positive changes on their stress levels, communication skills, and attitudes.
Doctor, 1994 [57]; Police Officers; N=61	LOW	I	No-treatment control group; Measuring GHQ, stress symptoms and absenteeism.	5-*****	Response to stress symptoms questionnaire and counseling sessions implies that internal organisational issues where the main sources of dissatisfaction. No significant effects on absenteeism and health.
Elliott, 1991 [58]; US pharmaceutical employees; n=56	LOW NA/RA	O/I, I Four 2-day workshops	No control group: Hassles Scale administered by mail one-month after workshops) and Myers Briggs Type Indicator.	3-*** QUAL	After-only: Positive subjective evaluations from participants of the relevance/usefulness of program. One month after, found lower Hassle Scale scores in intervention group (but with 42% response rate).
Eriksen et al, 2002 [59]; Postal service employees (Norway); n=860	LOW OSH/HP	O/I 12 weeks	Non-intervention control group (n =344), physical exercise only (n = 189), and integrated physical exercise and stress management training (n – 162); Subjective Health Complaint Inventory (SHC), self-reported sick leave, Cooper job stress questionnaire.	5-*****	The exercise-only group showed improved general health, physical fitness and muscle pain, and the integrated exercise and stress management group showed improved stress management, with the integrated group showing the strongest effects. Notably, however, there were no significant effects on subjective health complaints, sick leave, or job stress.

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
Ewers et al, 2002 [60]; Forensic mental health nurses; N = 33	LOW	O/I, I	Maslach Burnout inventory	5-*****	Significant improvements to the nurses' knowledge and attitudes towards clients.
Francis, 1992 [61]; University employees n=43	LOW	I	Other activity group who wrote about nontraumatic events; Measuring blood samples, absenteeism, positive/negative affect and emotional inhibition.	5-*****	Positive trends showing improvement in blood values (except cholesterol) and absenteeism in intervention group. No substantial differences in wellbeing between the intervention and control groups.
Freedy, 1994 [62]; US nurses; n=87	LOW	I 5 weekly 75 minute sessions	Lagged intervention control group; Dual Resource Intervention (DRI) (targets both social support and mastery) treatment group and Single Resource Intervention (SRI) delayed comparison group (also served as no treatment control); Measures of social support, mastery of destiny, emotional exhaustion, depression (CES-D) and conservation of resources.	4-****	DRI group reported significant improvements in social support and mastery compared to the no treatment control, which persisted through a 5-week follow-up. DRI participants with low initial levels of social support or mastery reported significant reductions in psychological distress. SRI group reported a slight improvement in mastery compared to the no treatment control group.
Gardiner et al, 2004 [63]; General Practitioners; n=105	LOW	O/I 15 hours	Non-intervention control group; Measures of work-related distress and morale, quality of work-life, and general psychological distress (GHQ).	4-****	Following this cognitive behavioural stress management training program, GPs' quality of work life and morale improved while their work-related distress and general psychological distress decreased.
Goodspeed, 1990 [64];	LOW	I Five 90-minute	Time-Life Stress Management Program group (n=113) and Myers-	3-***	Baseline strain scores for the Time-Life group were significantly higher than for

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
Various occupations; n=148		workshops for "Time-Life" and two 4-hour sessions for Myers-Briggs. Evaluation follow-up 6 to 8 months after baseline.	Briggs program (n=35); Used Stress Potential Survey and Strain Questionnaire (including physical, behavioural, and cognitive sub-scores).		Myers-Briggs group, further complicating interpretability of evaluation (in addition to imbalance in group sizes, and having no control). Significant reductions in follow-up strain measured in each of the three sub-scores as a result of both programs, although no between-group differences were identified at follow-up.
Greco, 1992 [65]; Canadian Government employees, n=229	LOW	O, O/I, I	No control groups, Measurement of job satisfaction, well-being, and quality of relationships.	3-***	Managers reported improvements to their management style, understanding of stressful situations and general well-being as a result of intervention. Employees reported improved ability to manage stress and improved team relationships.
Grossman, 1993 [66] Healthcare professionals n=41	LOW	O/I	No control groups: Measuring the effectiveness of support group.	3-***	Support groups experienced high drop out rates (perhaps individuals who needed the most help), however, participants of the program reported stress alleviation.
Heron, 1999 [67]; Pharmaceutical employees; n=508.	LOW	O/I, I 2-3 months.	No-treatment control group; Measuring GHQ, coping skills, stress management awareness and life events	4-****	No-treatment group less aware of stress management and less adequate at coping.
Hyman , 1993 [68]; Long-term care facility employees; N=51	LOW	O/I, I Three 3- hour sessions designed to address team	No control groups; Human Services Survey (Maslach and Jackson, 1981) (including emotional exhaustion, depersonalizations, and	3-*** QUAL	Using a retrospective pretest design (i.e., after-only), a statistically significant (n=42) improvement from "then" to "today" was found for:

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
		building, communication skills, self-esteem, and stress management; Evaluation at session end	personal accomplishment and measures of work atmosphere.		• Depersonalization • Emotional Exhaustion, and • Personal Accomplishment. Responses to an open-ended question about workshop effects corroborated the quantitative data. Open-ended interview question: participants reported an increase in self-esteem, improved communication, enhanced coping skills to deal with stress and an improvement in work atmosphere.
Iwi et al, 1998 [69] Local authority Housing Department employees n=193	LOW	I 3 months	Non-randomized control groups; General Health Questionnaire (GHQ) and Occupational Stress Indicator (OSI)	4-****	Workers accepting the offer of counseling were subject to greater levels of work stress, had poorer self-reported health and markedly lower levels of job satisfaction than those who did not. Questionnaire scores were not significantly different before and after counseling, giving no evidence of treatment effects on symptomatology. However, almost all subjects rated counseling as having been extremely helpful. This study suggests that adverse effects on staff facing organizational change may be ameliorated by improved management practice.
Jenkins, 1991 [70]; Female public school teachers, Georgia, USA n=124	LOW	I Three hour seminar with or without individualised stress management plan	Compared seminar with step-by-step individualized stress management plan (intervention) versus global comparison (seminar without individualized stress management	3-***	Three weeks after the training, teachers provided with individualized step-by-step training reported a significantly greater increase in time spent managing stress versus the

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
			plan); Questionnaire items on types of stress experienced, sources of stress at work and home, effects of stress and burnout, variety and type of stress relief methods used, and degree of involvement.		comparison group.
Johanning, 1996 [71]; US mass transit operators; Intervention n=98 Controls n=26	LOW OSH/HP	I One year, bi-weekly 7½-hour program sessions Evaluation after 1 year	Waitlist control group; Measures of job strain, musculoskeletal problems, CVD risk factors (Rose questionnaire), electrocardiograms, HDL cholesterol, total cholesterol, and systolic blood pressure. Psychological profile ("sense-of-life") based on in-depth interview.	4-**** QUAL	Indiv-level: Intervention group overall CVD risk reduced but not significantly compared to control group. Intervention group back problems were significantly reduced compared to controls. Org-level: No significant difference with respect to job strain.
Kushnir, 1993 [72]; Safety officers; n=40.	LOW	I Five weekly meetings	No-treatment control group: Measures of cognitive weariness, somatic complaints, irrational beliefs and assertiveness.	4-****	Assertiveness, somatic complaints, and irrationality improved in the short term, and to a lesser extent 18 months later. Cognitive stress symptoms decreased in the long term. Assertiveness was improved in the short term.
Kushnir, 1998 [73]; Israeli occupational health practitioners; Treatment n=39 and controls n=25.	LOW	I 14 weekly 3-hour meetings	No-treatment control group; Measures of low frustration tolerance (a category of so-called "irrational beliefs") and professional psychosocial efficacy (Psychological Medical Inventory).	4-****	Mean scores of "irrational beliefs" were significantly reduced and the mean level of psychosocial efficacy increased in the treatment group. These are considered anti-stress resources, based on a model in which irrational/dysfunctional thinking is a cause of stress—but this model is not well validated.

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
Le Scanff et al, 2002 [74]; Male police officers n=150	LOW	O/I 6 months: initial four-day meeting, a two-day follow-up meeting one month later, and a final one-day meeting at six months).	No control group; A stress manifestations inventory (Adaptability Questionnaire, ADQ), group interviews/discussions.	3-*** QUAL	This essentially a qualitative process evaluation. Results indicated that the psychological training was very well received and led the police management to consider contributing factors and manifestations of stress in a more extensive way. However, not able to assess impacts on stress manifestations, as most participants kept for themselves their ADQ scores. Subjective comments and feedback from the participants formed the basis of the program evaluation.
Lee et al, 1994 [75] Nurses; n=57	LOW	I Intervention duration unclear	Placebo intervention. Used the perceived stress scale.	5-*****	Findings indicated a greater decrease in stress for the treatment group as compared to the placebo group.
Lees et al, 1990 [76]; Nursing staff; n=53	LOW	O/I, I	No control groups; Measures of personality, assertiveness, coping and self-esteem.	3-***	Assertiveness positively correlated with emotional stability and self- esteem. Participative support groups nursing ensure the inclusion all staff regardless of personality.
Matthews et al, 2002 [77] Males aged 35-57 years, in various occupations: the Multiple Risk Factor Intervention Trial	LOW	I 7 years (additional 9 years of follow up)	Randomized control group n=6438 given 'usual care'; Measured work and non-work stressors, cardiovascular disease mortality.	4-****	Increasing number of different work stressors and divorce during the trial were associated with total and cardiovascular mortality during the 9-year follow-up period (P <.01 for linear trend), with a relative risk of 1.26 (95% confidence interval, 1.07-1.48) for

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
(MRFIT). n=12866					those reporting 3 or more different work stressors compared with those reporting none, and relative risk of 1.37 (95% confidence interval, 1.09-1.72) for those who divorced compared with those who remained married for total mortality. Work and marital stressors increase risk for mortality in men.
McCue et al, 1991 [78]; Physicians; n=64	LOW	O/I, I ½ day workshop Evaluation 2 weeks pre-intervention and 6 weeks post.	Non-intervention comparison group (interested volunteers who could not be freed from clinical duties); Measuring burnout, stressors, stress symptoms and support skills.	4-****	This "modest, inexpensive stress management workshop" showed positive impacts of learning and practicing interpersonal skills that may increase the availability of social support; Intervention group reported a reduction in burnout levels and stress symptoms, and reported being more aware of work stressors and of support seeking opportunities.
Meier 2000 [79]; Social workers; n=52	LOW	O/I 10 weeks	Non-intervention control group; Occupational Stress Inventory	5-***** QUAL	No statistically significant changes in levels of occupational stress or psychological strain. The small sample size and relatively weak intervention of this feasibility study made it unlikely that any effects would be detected.
Michie, 1992 [80]; Hospital staff; n=163	LOW	I 6 months 1 year evaluation follow-up.	No control group; Measures of anxiousness, depression, sickness absence rates, perceived functioning and satisfaction.	3-***	Significant improvements to anxiety, depression, work satisfaction, life satisfaction, and perceived functioning at work observed 6 months post intervention.
Michie, 1996 [81]	LOW	I	No control group;	3-***	Highly significant reductions in anxiety

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
Hospital staff; n=92		6 months	Measures of anxiousness, depression, sickness absence rates, perceived functioning and satisfaction.		and depression and highly significant improvements in satisfaction with self.
Pelletier et al, 1999 [82]; Bank employees; n=136	LOW	I 6 months	Mail, mail plus telephone, and control group; Measures of job strain (JCQ), objective wellness (Stanford SMART health-risk appraisal), perceived wellness (Brief Symptom Inventory), self-efficacy, and feelings about personal control.	5-*****	No significant differences among groups were found in changes of any scales in the JCQ. At 1-year follow-up, the telephone group showed the largest improvement in mental health status rating, followed by the mail group, with a significant difference between the phone group and the control group. The telephone group showed increases in self-efficacy, perceived wellness, and feelings of personal control, with significant differences between the phone group and the control group. At 6-month assessment, the telephone group showed significant decreases in somatization and anxiety, but these differences were no longer evident at 1-year follow-up.
Peters, 1999 [83]; Maintenance workers in Hawaii, USA n=50.	LOW OHS/HP	I Ten weeks	Control group (wait listed); Indiv measures: Physical (e.g., blood pressure, cholesterol, overweight) and behavioural measures (exercise, smoking in health risk appraisal), self efficacy, health locus of control, state-trait personality, health attitudes and behaviour. Org level: rates of injury, absenteeism, overall measure of job morale, satisfaction, and productivity.	5-*****	Indiv level: Statistically significant Improvements in IG versus CG on: • health risk appraisal (more health behaviour changes), • number of people who lost weight in IG versus CG; • in self-efficacy for stress management, exercise, and nutrition. There were no significant effects on

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
					emotional or psychological variables with the exception of "curiosity" Org level: No significant effects on rates of injury or absenteeism, or overall measure of job morale, satisfaction, and productivity.
Pruitt, 1992 [84]; Government employees; n=64.	LOW	I.	Waitlist control group; Measuring blood pressure, psychiatric symptoms, anxiety and life events.	5-*****	Significant reduction in reported stress-related physical symptoms. No major effect on anxiety and blood pressure.
Reynolds, 1997 [43]; City council employees; n=156.	LOW NA/RA	O/I, I Three 1-hour counselling appointments; 1-year and 2-year evaluation follow-up	Non-intervention control group, individual counseling group, and organizational change group; Measures of job characteristics, psychological wellbeing, physical symptoms, work / life satisfaction and absenteeism.	4-****	Individual counseling intervention improved the physical and psychological well-being of employees. There were no significant differences in absence from work after the intervention was introduced. Repeated measures MANOVA indicated that there were nonsignificant effects of comparison group and of time, but that there was a significant time X comparison group interaction [F(4,160)=2.45,p<.049], suggesting there were differential changes in the three comparison groups (see Reynolds [1997] in moderate table).
Reynolds, 1993 [85]; Female health service employees; n=92	LOW	I Six 2-hour stress management workshops at weekly intervals	No control group; Work / life satisfaction, general health questionnaire (GHQ), session evaluation and session impact.	3-***	Significant reductions in psychological distress (GHQ scores), but no changes in job or non-job satisfaction.

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
Robinson, 1993 [86] Emergency service, welfare and hospital employees; n=172	LOW	I 11 debriefings for welfare agency employees, 18 for emergency service personnel, and 2 for nurses 2 weeks post-intervention evaluation	No control group; Measuring impact of actual incident, stress symptoms and value of debriefings.	3-*** QUAL	Employees who reported symptoms of stress following critical incident also reported these to be reduced as a consequence of psychological debriefing (96% of emergency service workers, and 77% of welfare/hospital staff). Personal descriptions of how the debriefing was helpful were reported by 75% of emergency service personnel and 84%. The debriefing was valued more by staff who were more severely impacted.
Schaufeli, 1995 [87]; Community nurses; n=64.	LOW	O/I, I 1 month.	No control groups; Measuring burnout, temperament (reactivity) and performance.	3-***	Treatment decreased and stabilised mental and physical symptoms, but had no major impact on performance. Low reactive nurses, who are able to draw upon coping resources and who in the main are resistant to stress gained more benefit from the program.
Sheppard, 1997 [88]; High security US government agency employees; n=44.	LOW	I 5 hours of instruction and 12 one-hour bi-weekly group meetings	Transcendental meditation (TM) treatment group and corporate stress management (CSM) education control group; Measure of blood pressure, state/trait anxiety inventory, depression and self-perception.	5-*****	Significant reduction in trait anxiety and depression values in treatment compared to control. Significant improvement in state/trait anxiety, depression and self-perception maintained by treatment group after 3 years without further training.
Smoot & Gonzales, 1995 [89]; State hospital employees;	LOW	O/I, I 4 weekly 8-hour sessions Evaluation 6 months	Waitlist control group; Measures of turnover, sick leave, annual leave, patients' rights complaints, assaults of staff, and cost-	4-****	Org-level: Although no statistical testing performed, this "empathic skills training" intervention evaluation showed (in terms of % change over

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
Intervention n=35 Control n=37		pre- and 6 months post-intervention	benefit analysis.		time): • Reduced staff turnover in IG (increased in CG) • Larger reduction in sick leave in the IG than in the CG • Reduced annual leave in IG (increased in CG) • Reduction in patients' rights complaints filed (with increase in CG) • Smaller reduction in assaults on staff in the IG than the CG Cost-benefit analysis revealed substantial savings for the trained unit and increased expenditures for the control unit.
Taylor, 1991 [90]; Nurses; n=102	LOW	I	Had treatment control group with random allocation. Measures of perceived stress scale	4-****	Significant difference between the control and treatment groups in stress reduction.
Teasdale, 2000 [91] Pharmaceutical company employees; n=452	LOW OHS/HP	O/I, I Workshops (duration not reported) ran over a 6-year period (subjects had attended at least one)	No-treatment control groups; Measures of well-being (GHQ), coping skills, life-events and stress awareness.	3-*** (after-only)	No significant differences reported between workshops attendees and non-attendees.
Toivanen, 1993a [92]; Hospital cleaners; n=50.	LOW	I 3 months, 6 months.	No-treatment of control group; Measures of absenteeism, EMG, depression and subjective work feelings.	5-*****	Intervention group reported significant reductions in muscle tension levels, sleeping problems and nervousness. Absenteeism levels reduced in control and intervention groups could be attributed to a “Hawthorne” effect or self reporting.

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
Toivanen, 1993b [93]; Hospital cleaners and bank employees N=98	LOW	I 6 months	No-treatment control group; Measures of cardiovascular ANS function and stress. Interviews discussing the employee's work situation were also held.	5-*****	The relaxation method employed in this study normalised cardiac ANS functions when practiced regularly. Guided training proved to be more effective compared to individuals practicing on their own.
Tsai, 1993 [94]; Nurses (Taiwan); n=137.	LOW	I Intervention included 3 relaxation training sessions at weeks 1, 2, and 5 Evaluation at weeks 2 and 5.	Non-intervention control group; Measures of Nurses' Stress checklist (NSC) and Chinese General Health Questionniare (CGHQ).	5-*****	Intervention group reported a reduction in stress levels and symptoms after completing training course: • Mean scores for both NSC and CGHQ differed significantly between intervention and control groups at 5 week follow-up. • CGHQ scores also differed significantly at 2 week follow-up.
Vines, 1994 [95]; Unspecified workers from corporations; n=68.	LOW	I Intervention duration unclear. Evaluation follow-up at 9 and 20 weeks	Waitlist control group; Measures of depression, anxiety and personal lifestyle.	4-****	No significant difference between intervention and control groups for depression, anxiety, or health seeking behaviours.
Whatmore, 1999 [96]; Public sector employees (UK); n=270.	LOW	I Intervention period: 1 hour information sessions plus 2-hour workshops on 3 different topics followed by take-home assignments	Waitlist and non-volunteer control groups versus 'personal stress awareness,' 'exercise,' and 'cognitive restructuring' intervention groups; Measures of anxiety, depression, mental and physical well-being, organisational commitment, job satisfaction and self-reported sickness	5-*****	At the 3-month post intervention stage, the exercise group reported improvements in physical and mental well-being and depression. However, most of the benefits gained from training were not sustained at six months.

Study; First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
		over ?3 months (unclear). Evaluation follow-up at 3 and 6 months	absence		No "significant effects" (data not shown) on job satisfaction or organisational commitment. Sickness absence increased in all groups with the exception of the 'exercise' intervention group, which showed a decrease sickness absence rates 6-months post-intervention (no statistical analysis or comparison of difference with controls provided).
Wiholm 2000 [97]; Swedish Software developers working with computers n=106	LOW	I 1-1.5 hours of training over a three month period	Control group, one department selected for the intervention compared to another department without the intervention. Individual measures: Baseline and post-training questionnaires. Blood samples were taken at baseline, immediately post –training and 5 months post-training. Blood level testosterone, cortisol and prolactin were measured.	4-****	Indiv-level: Study assessed the effects of stress management training on skin symptoms. Stress management training was associated with a significant decrease in skin symptoms only during the actual training period. No beneficial effects measured 6 months post-training.

[§]Additional Notes: intervention included employee participation (PAR); needs assessment or risk assessment conducted to tailor intervention to context (NA/RA); job stress/occupational health & safety intervention integrated with health promotion (OHS/HP).
[#]3- *** = evidence obtained without a control group or randomization but with evaluation; 4-**** = evidence obtained from a properly conducted study with pre and post measures and a control group but without randomization; 5-***** = evidence obtained from a properly conducted study with pre and post measures and a randomized control group

APPENDIX Table III: Studies Reporting on Job Stress Intervention Evaluation Across Multiple Independent Organisations or Worksites (1990—April 2005)

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	**Intervention Level or Levels (E, O, I); Intervention Duration**	**Control or Comparison Groups; Evaluation Measures or outcomes**	**Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)**	**Principal Findings**
Eklof et al, 2004a&b [98 99]; White-collar computer users: 40 groups from 11 private and public organizations (Sweden); n=342	Varying levels of Systems Approach—internal comparisons Included NA/RA and PAR to varying degrees.	E, O, O/I to varying degrees by organisation. Evaluation: baseline and 6-month follow-up employee surveys	Internal comparisons among the work groups, with data aggregated to work group level (n = 40); Measures of characteristics of change processes by degree of: • Employee participation (and empowerment) in efforts to improve work environment; • Integration of work environment issues with traditional core organisational issues; Were related to work environment and health improvement indicators: • Job control, psychological demands, social support, emotional stress, comfort during computer work, and physical complaints.	3-***	This was essentially a process evaluation study, assessing the degree to which the characteristics of the change process was related to intervention-associated improvements in ergonomic and psychosocial work environment. The change process characteristics of employee participation and integration of OHS with core organisation business were highly correlated, and may together constitute a positive organisational "learning strategy for change". At follow-up and prospectively, high employee participation was consistently associated with: • lower demands (-) • higher social support (+), and • less stress (-) At follow-up and prospectively, high degree of integration was consistently associated with: • lower demands • higher social support (+), and • less stress (-).

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
					Neither participation nor integration was consistently associated with job control, quality of work environment modifications, comfort, or prevalence of musculoskeletal complaints. These findings support the importance of worker participation and integration of OHS into core organisational concerns to enable and facilitate work environment improvements.
Lindstrom 2000 [100]: Employees from 217 small and medium-sized enterprises in manufacturing, traffic, service, and office work sectors (Finland); n=4068 217 workplaces	Varying levels of Systems Approach—internal comparisons NA/RA: each enterprise and employee received feedback on baseline survey. PAR to varying degrees by workplace. Pooled analysis of a centrally coordinated intervention project, wherein participating worksites tailored	E, O, O/I, to varying degrees by organisation. Interventions up to 2 years in duration 1-2 years intervention and evaluation timeline	Internal comparisons between workplaces (n = 217); Surveys done on both employers and employees pre- and post-intervention. Measures of employee well-being (psychological strain), job satisfaction, sickness absence in previous 12 months. Organisational practices and climate assessed in terms of : • co-worker relations • supervisory support • continuous improvement practices • informing about changes • future insecurity of job • appreciation of one's work; Planned organizational interventions	3-***	For all worksites combined, over the intervention period there was a decrease in perceived physical work environment risk factors and workload, and an increase in job control. Time pressure, however, had increased over the intervention period. Based on employers' reporting, the statistically significant effects of interventions were most pronounced on organisational climate: • A collaborative/ participatory approach applied in the intervention correlated with many changes in organisational climate, and most of all with an increase in continuous improvement practices ($r=0.36$, $p<0.001$). • Collaboration was also related to improved co-worker relations ($p<0.05$) and positive changes in job

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
	intervention to their needs.		were also characterized by focus: • Customer service • Multi-skilling • Leadership • Collaboration between employees and managers (~employee participation) Organisational effectiveness was assessed in terms of (manager perceptions on 100-point scales): • Productivity • Profitability .		future insecurity ($p<0.05$), while leadership interventions decreased job insecurity less than other interventions($p<0.05$) • Organisations with more intensive planned interventions in customer service ($p<0.05$) and collaboration ($p<0.05$) had a smaller increase in sickness absence compared with organisations having minor or no intervention; • Job satisfaction did not decrease ($p<0.05$), if the company carried out interventions in collaboration, "as compared to the others" Based on employees' reporting: • All intervention types were all related an increase in continuous improvement ($p<0.001$), in informing workers about changes ($p<.05$), and in appreciation of one's work ($p<0.01$) • Work capacity improved somewhat along with the multi-skilling of workers ($r=0.06$, $p<.01$) • Exhaustion symptoms decreased when the interventions were focused at colloboration ($r=0.06$, $p<.0.001$) Good profitability was related statistically significantly to all types of

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
					organisational development interventions. High production was related only to interventions dealing with multi-skilling of workers and the development of managerial practices. Results overall support a healthy work organisation model wherein the well-being of employees is central to company effectivess.
Nielsen et al, 2002a and 2002b [101 102]; Pharmaceutical, technical services, and nursing home employees at various worksites (Denmark); n=2068	Varying levels of Systems Approach—internal comparisons. Includes NA/RA and PAR to varying degrees by worksite.	E, O, O/I—varying degrees. 3 years Post-intervention surveys 2 and 5 years after baseline	High-absence intervention work-sites (n = 22), high-absence control work-sites, and low-absence control work-sites (n = 30 control sites)—comparisons apparently among individual worksites (unclear). Job Content Questionnaire, SF-36, scales on meaning of work and predictability, absence from work, behavioural stress, somatic stress, emotional stress, and cognitive stress	4-****	At baseline, absence days per annum was significantly and positively associated all stress indicators, and was significantly and negatively associated with general health, vitality, and mental health. Improvements were achieved, but to very different degrees in different workplaces. Method of analysis and results not detailed, but authors claim it is "statistically supported that": • the workplaces that did the most to improve the psychosocial work environment, achieved the highest drop in absence rate; • the workplaces in which the psychosocial work environment, due to different reasons, became worse have experienced the highest increase in the absence rate; • employees with reduced workability from workplaces where the

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					psychosocial working environment was improved had a reduction in absence spells over the period; • employees with reduced workability from workplaces where the psychosocial work environment was not improved, or was poor initially, had a considerable increase in absence spells over the period.
Taris et al, 2003 [103]; Domiciliary care employees from 81 organizations (The Netherlands) N = 26,563	Varying levels of Systems Approach across organisations Includes NA/RA and PAR to varying degrees by organisation.	O, O/I, I to varying degrees by organisation. 2 and ½ year follow-up evaluation	All participating sites had intervention, but to varying degrees; unit of intervention and analysis = organisation; analysis by internal comparison relating intervention process to outcomes at individual and organisational levels. Measures of psychosocial working conditions: Emotional exhaustion (Maslach burnout inventory) as a measure of stress; job demands, job control, and social support; Type of intervention: work-directed (factual changes in work content and/or relations), person/work interface (to increase employee resistance to stressors), and person-directed (e.g., exercise, employee assistance programs, relaxation training)	3-***	Org-level: Overall means of job stress measures improved (job demands decreased, job control increased, social support increased, and emotional exhaustion decreased) over the intervention period (2 yrs). Relating intervention process to outcome at the organisational level showed: • Organisations usually implemented a wide variety of intervention activities; • The greater the number of interventions activities, the greater the improvement in job stress measures at individual level; • Work-directed, but not other, interventions were linked to job stress reduction at the individual level; • A higher number of work-directed

Study: First Author, Year Population and Sample Size	Intervention		Evaluation		
	Systems Approach Rating (Low, Moderate, High) Additional Notes (PAR, NA/RA, OHS/HP)[§]	Intervention Level or Levels (E, O, I); Intervention Duration	Control or Comparison Groups; Evaluation Measures or outcomes	Study Design/Causal Inference Rating (3 stars to 5 stars)[#] Note if includes qualitative (QUAL)	Principal Findings
					interventions was significantly linked to larger decreases in job demands at the organisational level. Similar work-directed intervention improvement patterns were observed for other job stress measures at the org level, but these did not achieve statistical significance. • Overall conclusion is that work-directed, but not other, interventions, are linked to job stress reduction, although the effect sizes were small.

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