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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