EVIDENCE BASED PUBLIC HEALTH POLICY AND PRACTICE

Work and health in a contemporary society: demands, control, and insecurity

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Objective: To examine independent associations of job strain (high demands and low control) and job insecurity with mental and physical health outcomes.
Design: Cross sectional general population study conducted in 2000 using a self completed questionnaire.
Setting: Two adjoining cities in south east Australia.
Subjects: 1188 employed professionals, aged 40–44 years, 55% (n = 655) male.
Main outcome measures: Depression, anxiety, physical, and self rated health (SRH).
Results: Adverse job conditions were relatively prevalent as 23% of the sample reported high job strain, while 7.3% and 23% reported high and moderate job insecurity respectively. Associations between job conditions and health persisted after adjustment for gender, education, marital status, employment status, major life events, and negative affectivity (personality). When adjusted for job strain, high job insecurity was independently associated with a greater than threefold increase in odds for poor SRH, depression and anxiety (OR (95% confidence intervals) poor SRH: 3.72 (1.97 to 7.04) depression: 3.49 (1.90 to 6.41), anxiety: 3.29 (1.71 to 6.33)), and a twofold increase for physical health 2.19 (1.21 to 3.95). High job strain also showed significant independent associations with depression: 2.54 (1.34 to.4.75) and anxiety: 3.15 (1.48 to 6.70).
Conclusion: In this relatively privileged socioeconomic group, insecure employment and high job strain showed independent, consistent, and strong associations with physical and mental health. These adverse job conditions are on the increase, particularly insecure employment, and the influence of these two work conditions are an important focus for future public health research and their prevalence and impact should be examined in other occupations.

For over two decades, researchers[1–3] have investigated the effects of job demands and job control on wellbeing. Job control refers to employees' ability to make decisions about how and when they perform their work as well as the extent to which their job entails using and developing their skills. Job demands encompasses the amount and pace of work.[4] The combination of high job demands and low control, termed *job strain*, has been linked to a wide range of mental and physical health outcomes.[5–7] Poor job control appears to be prevalent and associated with lower occupational status.[8]

Work conditions are changing as a result of globalisation and increasing competition. One change has been the growth of insecure or casual employment. For example, casual employees now constitute 27% of the Australian workforce, compared with 19% a decade ago.[9] In the context of downsizing and more temporary or short term contract work, many employees may consider their jobs insecure.

Unlike job demands and control, less research has examined the health impact of insecurity. However, studies indicate that job insecurity could also affect health.[7 10–12] Job insecurity involves both the threat of job loss, and uncertainty regarding future employment. Threat of job loss has also been associated with increases in self reported morbidity, serum cholesterol, depression, and anxiety.[13–15]

The aim of this study is to examine the extent to which job strain and job insecurity are associated with mental and physical health outcomes. We test whether job strain and insecurity are independently associated with employee health. Because adverse working conditions are associated with low education and income[8] we have restricted our sample to comparatively advantaged employees—that is, managers and professionals. We expect this sample to be those least vulnerable to work related stress, which along with adjustment for other key confounding factors, will supply a conservative test of the health impact of job strain and insecurity.

METHODS AND SAMPLE

The PATH 40+ (Personality and Total Health) Through Life Project is a cross sectional study of 40 to 44 year old adults conducted by the Centre for Mental Health Research, The Australian National University. Firstly, 9033 residents of two south east cities of Australia aged 40 to 49 were identified from electoral rolls.* Letters were then sent inviting participation if they were aged 40 to 44 on the 1 January 2000. Of these, 4222 were outside of the age range, 281 had moved out of the area, 612 could not be traced, and 1389 refused to participate. The remaining 2530 (64.6% of those within age range) were then interviewed using hand held computers to respond directly to the survey questions. Occupations were coded according to the Australian Standard Classification of Occupations (ASCO) (second edition) based on job title, main tasks performed, and industry of employer. While the ASCO can be coded to a very detailed 6 digit level, we coded ours to the four digit level.[16] For this study, the sample was restricted to currently employed and self employed managers and professionals (ASCO codes 1000 through to 2549) for whom we had complete data on study factors and outcomes. Eighty one unemployed people and nine with incomplete data were excluded, resulting in a total population of 1188. Approval for this study was obtained from the human research ethics committee of the Australian National University.

*Australian electoral rolls provide virtually complete lists of voting age adults, excepting those of unsound mind, serving a prison sentence of five years or more, or convicted of treason or treachery

Key points

- Adverse work conditions are associated with poor health, particularly mental health
- Both job strain (high demands and low control) and job insecurity were independently associated with poor health outcomes.
- The health impact of work is independent of personality.
- Even in a relatively advantaged sample, fear of job loss and a sense of job insecurity may have potent health impacts.

Policy implications

- The potential impact of job strain and job insecurity on employee health warrants attention by governments, management, and unions formulating industrial relations policies and agreements.

Outcome variables

Four health outcomes were analysed: depression, anxiety, physical and self rated health (SRH). *Depression* and *anxiety* were assessed using Goldberg's 9 item Scales.[17] Items were summed to give total scores on each scale ranging from 0 to 9. These scales have been extensively validated in community samples and have high internal consistency (Cronbach's $\alpha = 0.78$ for depression and 0.79 for anxiety). The short form *SF 12 Physical Health Summary Scale* is comprised of a 12 item subset of the SF-36[18] and assesses physical functioning, pain, and impairment.

Self rated health (SRH) was measured by a single question shown to predict later morbidity and mortality.[19] Participants rated their health as either excellent, very good, good, fair, or poor.

Exposure measures

Job demands and job control were measured by items used by Bosma[2] in the UK Whitehall study. Job demands (four items) assessed the intensity and pace of work while job control (15 items) assessed skill discretion and decision making. There were four response categories for these 19 items (often, sometimes, rarely, and never). Insecurity about current job was assessed by a single item with four response categories (very secure, secure, moderately secure, and not at all secure).

Sociodemographic factors and confounders

Demographic measures from the self completed questionnaire included *gender, education, marital status, employment status* (full time or part time), and *employment position* representing managerial, supervisory, or non-management roles (the latter was self assessed by respondents based on their current job responsibilities). *Major life events* controlled for in the analysis were a *major illness, death of a close family relative* and *relationship problems* and if they experienced any *financial hardship* in the past six months.

Sensitivity to negative stimuli, also termed neuroticism or *negative affectivity* is known to correlate with both perceptions of work stress and with self reported health outcomes.[20] To adjust for potential confounding, this personality trait was assessed with the seven item behavioural inhibition system (BIS) scale[21] (Cronbach's $\alpha = 0.78$ for BIS).

Statistical methods

Job demands and control were dichotomised at the median (high and low), and the two variables were combined to measure the degree of job strain. *High strain* was defined as low job control and high job demands. *Passive* jobs were defined as the combination of low job control and low job demands; *active* jobs were those with high job control with high job demands and *low strain* jobs were defined by high job control with low job demands.

Secure and very secure job categories were combined into one group indicating low job insecurity; moderately secure and not at all secure jobs were coded as moderate and high job insecurity; hence *job insecurity* was classified into three categories: *low, moderate, and high*.

Cut offs closest to the upper octile were used to dichotomise the continuous scores of depression and anxiety, the nearest cut offs identifying 10% as depressed (between 5 and 6) and 8.3% as anxious (between 7 and 8). Scores for SF12 physical health were dichotomised at the lower octile, classifying 12.5% as having physical health problems. SRH was dichotomised between what we have called *good* and *poor* health (good = responses: excellent, very good, or good; poor = fair or poor).

For each outcome variable, we compared those with low job strain with those reporting high, active or passive job strain, and those with low job insecurity with those reporting high or moderate job insecurity using the χ^2 statistic at conventional levels of significance ($p<0.05$). Three sets of multivariate logistic analyses were performed: strain only, insecurity only, and strain and insecurity together in the same model. Education, gender, marital status, employment status, major life events, and negative affectivity (BIS) treated as a continuous variable were covariates in all the analyses. All the statistical analyses were conducted using SPSS.

RESULTS

The sample (n = 1188) included a range of different professions: managers (34%), information technology specialists (16%), teachers (10.8%), nurses (4.4%), other business professionals (4.4%), lawyers (2%), social welfare officers (2%), and doctors (1%). Just over half (55%) were men, two thirds (67%) had tertiary education and more than three quarters were married (81%) (table 1). Most (84%) were employed full time and most (89%) worked in organisations with more than 25 employees. Government agencies employed 60% of respondents, and 12% were self employed. Of the salaried professionals, 50% described themselves as being in managerial positions while a third held neither managerial nor supervisory roles. The average BIS score for negative affectivity was 20.66 (SD 3.28), comparable to Australian norms.[22]

Job strain

Overall, about one quarter (n = 274, 23%) of participants[66] were classified as having ''high'' job strain. High job strain was associated with gender and personality (high negative affectivity) (fig 1A). Full time workers, those employed by government or non-government organisations, those in supervisory positions and those who worked in larger organisations were also more likely than others to experience high job strain (fig 1B).

Associations of job strain with mental, physical and SRH are shown in table 2A. Passive and high strain jobs were associated with, depression, anxiety, and SRH ($p<0.01$) (table 2). Adjustment for gender, marital status, education,

Table 1 Sociodemographic and employment characteristics of the sample

	n = 1188	%
Gender		
Men	655	55.1
Women	533	44.9
Education		
Tertiary education	796	67.0
Diploma (diploma/undergraduate or trade certificate)	262	22.1
School (some primary or secondary education)	130	10.9
Marital status		
Couple (married/defacto)	956	80.5
Separated (separated/divorced/widowed)	139	11.7
Single	93	7.8
Employment status		
Full time	955	83.8
Part time	193	16.2
Employed by		
Government agency	715	60.2
Profit making agency	213	17.9
Another organisation	113	9.5
Self employed/in business practice for oneself	147	12.4
Size of employment agency*		
1–9 members	58	5.6
10–24	60	5.8
25+	923	88.6
Position*		
Managerial	517	49.7
Supervisory	174	16.7
Non-management	350	33.6
BIS score†		
Mean score (SD)	20.66 (3.28)	
Median	21.00	
Range	(9–28)	

*147 self employed persons are not included here. †BIS score a measure of negative affectivity.

employment status, major life events, and negative affectivity reduced these gradients somewhat, particularly for physical and SRH, but strong associations were still evident for high job strain and mental health outcomes (OR depression = 2.84, 95% confidence intervals (1.53 to 5.27) and OR anxiety = 3.42 (1.62 to 7.19)).

Job insecurity

High and moderate job insecurity were reported by 7% (n = 87) and 23% (n = 273) of the sample respectively. In addition to marital status, negative affectivity showed an association with job insecurity (fig 2A). Part time workers, those self employed, in non-management positions or

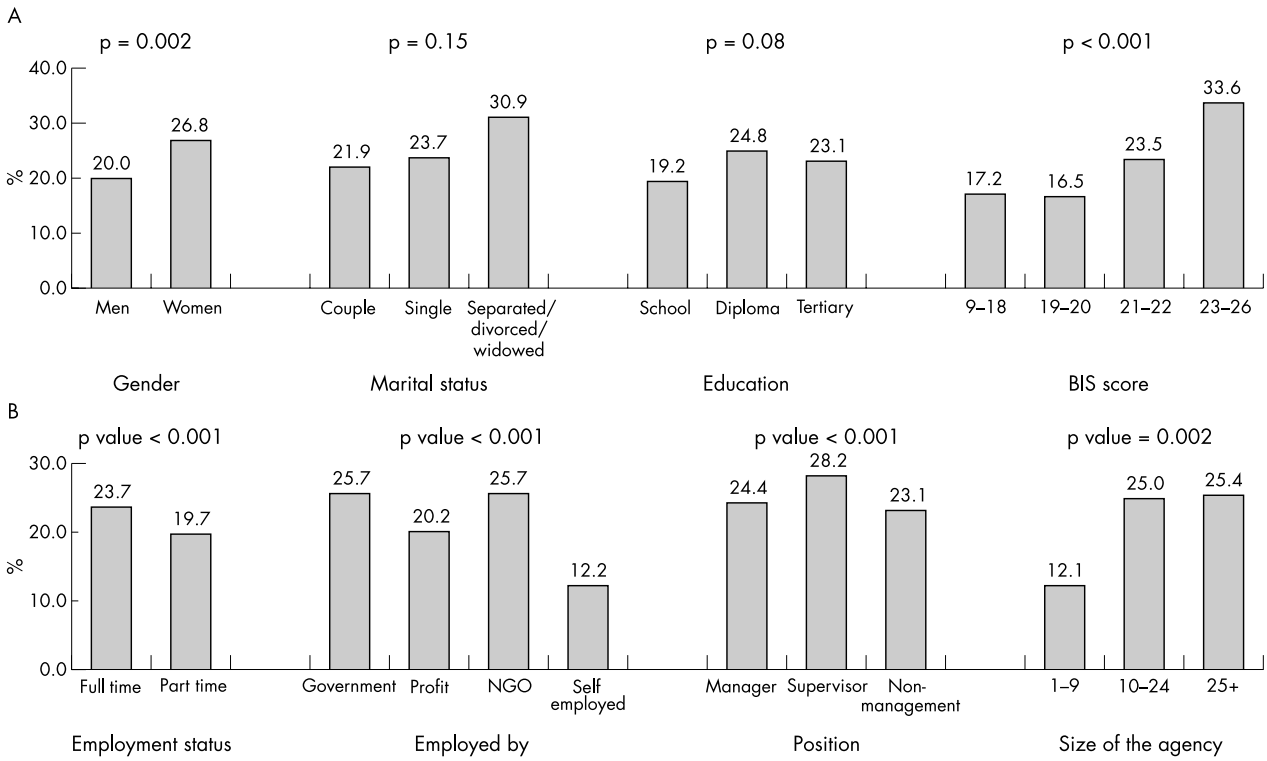

Figure 1 High job strain by (A) demographic and (B) employment characteristics.

Table 2 (A) Job strain, (B) job insecurity: unadjusted and adjusted odds ratios for depression, anxiety, poor physical and overall health

(A) Job strain	Job strain	N	%	Unadjusted OR (95% CI)	p Value	Adjusted OR* (95% CI)	p Value
Depression	Low	347	4.6	1.0		1.0	
	Active	243	8.2	1.86 (0.94 to 3.66)	0.07	1.68 (0.84 to 3.39)	0.15
	Passive	324	11.7	2.75 (1.50 to 5.03)	0.001	2.06 (1.10 to 3.84)	0.02
	High	274	16.4	4.07 (2.24 to 7.37)	<0.001	2.84 (1.53 to 5.27)	0.001
Anxiety	Low	347	2.9	1.0		1.0	
	Active	243	7.8	2.86 (1.31 to 6.26)	0.009	2.30 (1.02 to 5.23)	0.05
	Passive	324	9.6	3.57 (1.72 to 7.40)	0.001	2.57 (1.20 to 5.49)	0.02
	High	274	14.2	5.59 (2.74 to 11.42)	<0.001	3.42 (1.62 to 7.19)	0.001
Physical health	Low	347	10.4	1.0		1.0	
	Active	243	11.9	1.17 (0.70 to 1.97)	0.55	1.06 (0.62 to 1.83)	0.82
	Passive	324	10.8	1.05 (0.64 to 1.71)	0.86	0.80 (0.48 to 1.36)	0.39
	High	274	17.5	1.84 (1.15 to 2.92)	0.01	1.36 (0.83 to 2.30)	0.22
Self rated health	Low	347	4.6	1.0		1.0	
	Active	243	5.8	1.27 (0.61 to 2.64)	0.53	1.10 (0.51 to 2.35)	0.81
	Passive	324	8.6	1.96 (1.04 to 3.69)	0.04	1.46 (0.76 to 2.81)	0.26
	High	274	11.3	2.64 (1.41 to 4.93)	0.002	1.85 (0.96 to 3.54)	0.07
(B) Job insecurity							
Depression	Low	828	6.2	1.0		1.0	
	Moderate	273	16.1	2.93 (1.91 to 4.50)	<0.001	2.73 (1.74 to 4.27)	<0.001
	High	87	27.6	5.80 (3.35 to 10.04)	<0.001	3.78 (2.06 to 6.91)	<0.001
Anxiety	Low	828	5.4	1.0		1.0	
	Moderate	273	12.1	2.39 (1.49 to 3.84)	<0.001	2.07 (1.25 to 3.43)	0.004
	High	87	24.1	5.54 (3.11 to 9.85)	<0.001	3.55 (1.85 to 6.81)	0.001
Physical health	Low	828	10.5	1.0		1.0	
	Moderate	273	14.3	1.42 (0.95 to 2.13)	0.09	1.34 (0.88 to 2.05)	0.18
	High	87	25.3	2.88 (1.69 to 4.91)	<0.001	2.23 (1.24 to 4.00)	0.007
Self rated health	Low	828	5.3	1.0		1.0	
	Moderate	273	8.8	1.72 (1.02 to 2.88)	0.04	1.48 (0.87 to 2.52)	0.15
	High	87	24.1	5.67 (3.18 to 10.10)	<0.001	3.96 (2.10 to 7.46)	<0.001

*Adjusted for gender, education, marital status, negative affectivity, part time employment, serious illness, death of a close family relative, and relationship problems.

working in smaller organisations were more likely to experience high job insecurity (fig 2B).

Job insecurity was strongly associated with all four health outcomes (table 2B). These associations persisted after adjusting for gender, education, marital status, employment status, major life events, and negative affectivity. The effect was most marked for depression and SRH, with high job insecurity increasing the odds fourfold in the adjusted model (OR depression = 3.78 (2.06 to 6.91), OR poor SRH = 3.96 (2.10 to 7.46)).

Life events were unrelated to reports of job strain or insecurity, with the exception that those with insecure jobs were more likely to have experienced recent bereavement ($p<0.002$) (data not shown).

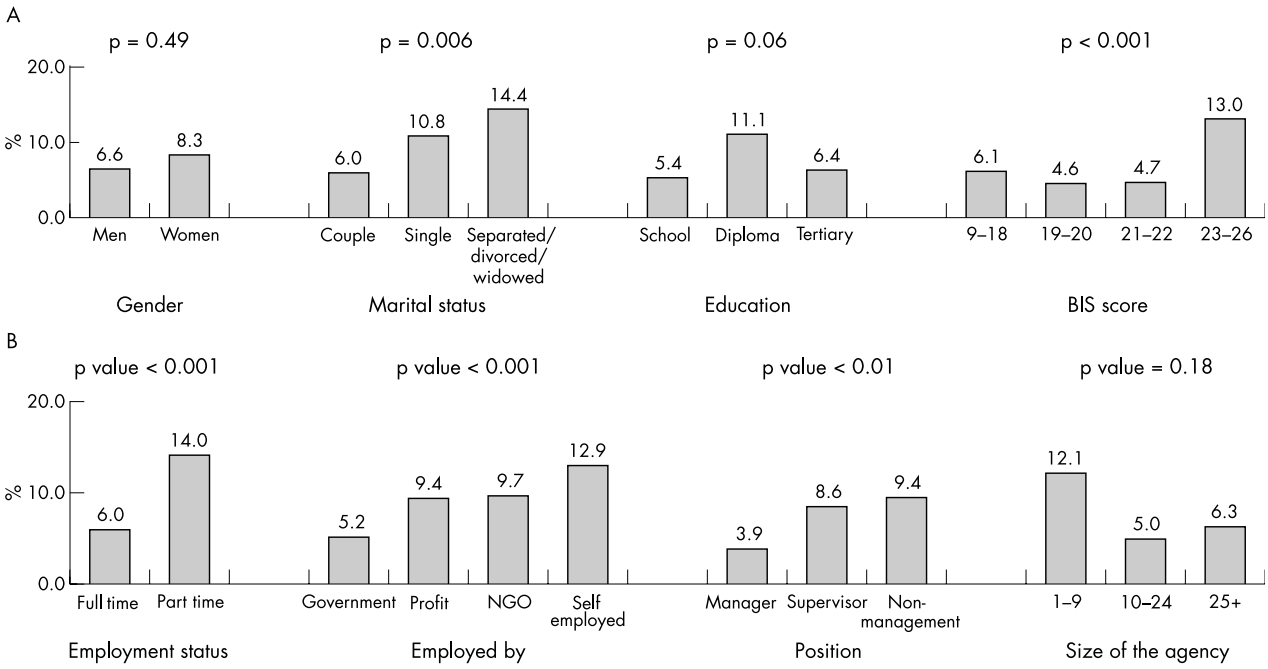

Figure 2 High job insecurity by (A) demographic and (B) employment characteristics.

Table 3 Adjusted* odds ratios and 95% CI for depression, anxiety, poor physical and overall health by job strain and job insecurity modelled together

	Depression	p Value	Anxiety	p Value	Global physical health	p Value	Self rated health	p Value
	OR (95% CI)		OR (95% CI)		OR (95% CI)		OR (95% CI)	
Job strain								
Low	1.0		1.0		1.0		1.0	
Active	1.62 (0.80 to 3.30)	0.18	2.29 (1.00 to 5.24)	0.05	1.04 (0.60 to 1.80)	0.88	1.09 (0.51 to 2.34)	0.83
Passive	1.83 (0.97 to 3.44)	0.06	2.38 (1.01 to 5.13)	0.03	0.76 (0.45 to 1.27)	0.29	1.37 (0.71 to 2.66)	0.35
High	2.54 (1.35 to 4.75)	0.004	3.15 (1.48 to 6.70)	0.003	1.28 (0.78 to 2.10)	0.34	1.66 (0.86 to 3.22)	0.13
Job insecurity								
Low	1.0		1.0		1.0		1.0	
Moderate	2.60 (1.66 to 4.08)	<0.001	1.99 (1.20 to 3.29)	0.008	1.37 (0.89 to 2.09)	0.15	1.43 (0.84 to 2.44)	0.19
High	3.49 (1.90 to 6.41)	<0.001	3.29 (1.71 to 6.33)	<0.001	2.19 (1.21 to 3.95)	0.009	3.72 (1.97 to 7.04)	<0.001

*Adjusted for gender, education, marital status, negative affectivity, part time employment, serious illness, death of a close family relative, and relationship problems.

Job insecurity after controlling for job strain

Comparing high job insecurity with high job strain we found the following proportions reporting depression (28% *v* 16%), anxiety (24% *v* 14%), poor physical health (25% *v* 18%), and poor SRH (24% *v* 11%). Although job strain and job insecurity were associated they were weakly correlated (polychoric correlation = 0.22 with standard error 0.03), indicating that the two measures refer to different aspects of job conditions.

Both work variables also show important independent associations with health (table 3). Multiplicative interactions between job strain and job insecurity were examined, however, given the large number of terms and small numbers in some categories, models became unstable. Therefore, only the main effects models are reported. Independent associations between health outcomes, job strain and job insecurity were observed even after including the major confounders in the model. Independent of the associations of job strain, people with high job insecurity had nearly four times the odds for depression (OR = 3.49 (1.90 to 6.41)) and poor SRH (OR = 3.72 (1.97 to 7.04)). A slightly smaller odds ratio was observed for anxiety (OR = 3.29 (1.71 to 6.33)) and poor physical health (OR = 2.19 (1.21 to 3.95)). Even those employees reporting moderate job insecurity were at increased risk for depression and anxiety. High job strain also showed significant independent associations with depression (OR 2.54 (1.35 to 4.75) and anxiety (OR 3.15 (1.48 to 6.70). Even when controlled for financial hardship, high job insecurity still showed significant associations with physical and mental health outcomes (data not shown).

DISCUSSION

Job strain and job insecurity are distinctive work conditions, and both are independently associated with poor health particularly mental health. These job conditions are comparatively common and, at least in the case of insecurity, will become more so if current labour market trends continue. Neither gender, education, marital status, major life events, part time or full time employment status, financial hardship, nor personality explained the associations. The associations between job strain and mental health are consistent with other studies.[1 3] Furthermore, our results extend job strain research by showing that job insecurity has strong, independent associations with health outcomes including physical and SRH as well as anxiety and depression.

These results raise several questions. It is unclear what the intensity and duration of job strain must be before a person's health is affected.[23] It is possible that workers with either mental or physical health problems may leave the workforce or move to jobs with lower strain, creating a selection bias and underestimation of the effects of job strain.[3] Furthermore, we could not estimate whether employees' perception of job insecurity was a result of illness, rather than a cause, although we did adjust for recent major illness in our analyses. Nor did we measure other work stressors such as poor workplace support, which might compound effects on health. As in all observational studies, the imperfect measurement of some covariates and the omission of others from data collection may bias the estimate of association between the main risk factors and outcomes of interest. Finally, the cross sectional design does not allow us to examine the possible interplay over time between job strain, job insecurity and health. We cannot assume a direct causal influence of these adverse work conditions on health.

The changing nature of work has implications for societies and for workplaces. Both job strain and insecurity are associated with sickness absence, which affects productivity.[24 25] In Australia, mental health problems account for the greatest population burden of disability,[26] and our results indicate that poor mental health is associated with adverse job conditions. The results of this study raise concerns about the adverse health effects in people who might be experiencing both high job strain and high job insecurity. As the labour market becomes more globalised and competitive, employees are more likely to encounter these two work conditions simultaneously. Therefore the influence of work on health is an important focus for future population health research, policy, and intervention.

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CONTRIBUTORS

Rennie M D'Souza contributed to the conception of the study, analysis, interpretation of the results and writing of successive drafts of the paper, final approval of the version to be published and will be the guarantor for this paper. Lyndall Strazdins contributed to the conception of the study, interpretation of the results, writing of successive drafts of the paper, and final approval of the version to be published. Lynette Lim contributed to conception of the study, interpretation of the results and editing successive drafts of the paper and final approval of the version to be published. Dorothy Broom contributed to conception of the study, interpretation of the results, editing successive drafts of the paper and final approval of the version to be published. Bryan Rodgers contributed to conception of the study, interpretation of the results, editing successive drafts of the paper and final approval of the version to be published. Patricia

Jacomb was responsible for the data collection. Karen Maxwell was responsible for the implementation of the study and data collection.

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