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Area-Level Unemployment and Perceived Job Insecurity: Evidence from a Longitudinal Survey Conducted in the Australian Working-Age Population

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ABSTRACT

Research significance: Job insecurity, the subjective individual anticipation of involuntary job loss, negatively affects employees' health and their engagement. Although the relationship between job insecurity and health has been extensively studied, job insecurity as an 'exposure' has received far less attention, with little known about the upstream determinants of job insecurity in particular. This research sought to identify the relationship between self-rated job insecurity and area-level unemployment using a longitudinal, nationally representative study of Australian households.

Methods: Mixed-effect multi-level regression models were used to assess the relationship between area-based unemployment rates and self-reported job insecurity using data from a longitudinal, nationally representative survey running since 2001. Interaction terms were included to test the hypotheses that the relationship between area-level unemployment and job insecurity differed between occupational skill-level groups and by employment arrangement. Marginal effects were computed to visually depict differences in job insecurity across areas with different levels of unemployment.

Results: Results indicated that areas with the lowest unemployment rates had significantly lower job insecurity (predicted value 2.74; 95% confidence interval (CI) 2.71–2.78, $P < 0.001$) than areas with higher unemployment (predicted value 2.81; 95% CI 2.79–2.84, $P < 0.001$). There was a stronger relationship between area-level unemployment and job insecurity among precariously and fixed-term employed workers than permanent workers.

Conclusion: These findings demonstrate the independent influences of prevailing economic conditions, individual- and job-level factors on job insecurity. Persons working on a casual basis or on a fixed-term contract in areas with higher levels of unemployment are more susceptible to feelings of job insecurity than those working permanently.

KEYWORDS: area-based factors; job insecurity; multi-level model; unemployment; working conditions

INTRODUCTION

Job insecurity refers to a subjective individual anticipation of involuntary job loss (Sverke and Hellgren, 2002). A substantial and growing amount of research has demonstrated links between exposure to job insecurity and a range of negative outcomes, including poor mental and physical health, low job tenure, and negative attitudes towards both jobs and employers (Ferrie *et al.*, 2002; De Witte, 2005; Cheng and Chan, 2008; Stansfeld and Candy, 2006; Sverke and Hellgren, 2002; Kim *et al.*, 2012).

There is less research on the determinants of job insecurity. Of the existing research in this area, most studies suggest that job insecurity is higher in lower educated groups (de Bustillo and de Pedraza, 2010; Näswall *et al.*, 2012), lower skilled professions, and those persons working on fixed-term contracts or on a casual basis (Landsbergis *et al.*, 2012; Mau *et al.*, 2012). The evidence for differences in job insecurity by gender and age is mixed (de Bustillo and de Pedraza, 2010; Näswall *et al.*, 2012). Comparisons between countries have shown that macro-level factors, such as expenditure on social welfare, unemployment rates, and gross domestic product influence job insecurity (Erlinghagen, 2008; de Bustillo and de Pedraza, 2010; Chung and van Oorschot, 2011; Kim *et al.*, 2012; Mau *et al.*, 2012), independently of individual factors such as age, sex, and occupational status (de Bustillo and de Pedraza, 2010).

Thus far, past multi-level research analyses on the determinants of job insecurity have been conducted in Europe and investigated differences between (rather than within) countries. This level of geographical aggregation may obscure intra-country variation in the determinants of job insecurity. For example, there may be important differences between rural and metropolitan regions in the predictors of job insecurity within countries. Further, the individual-based and area-based determinants of job insecurity have been found to vary across cultural contexts (Cheng and Chan, 2008; Erlinghagen, 2008; Mau *et al.*, 2012), which suggest that findings in Europe may not be generalizable to other countries.

Two Australian studies have focused on the psychological health consequences of job insecurity (Strazdins *et al.*, 2004; Adam and Flatau, 2005); however, job insecurity as an 'exposure' has received far less attention, with little known about the upstream determinants of job insecurity in particular. Considering its relationship to a range of negative outcomes, understanding more about the determinants of job insecurity is important and can inform policy and practice intervention strategies to reduce this work stressor.

In this study, we examine the association between area-level unemployment and job insecurity using a nationally representative panel survey of adult Australians. This research sought to investigate the relationship between area-level unemployment and individually reported job insecurity within different geographical localities. As mentioned above, most past research on macro-level predictors of job insecurity has focused on differences between, rather than within, countries. We chose to focus on area-level unemployment within Australia because recent research has identified general labour market conditions as a significant predictor of job insecurity (Chung and van Oorschot, 2011). We hypothesized that those persons living in areas with higher unemployment would have higher self-rated job insecurity than those in areas with lower unemployment. We also tested two interactions between (i) employment arrangement and area-level unemployment; and (ii) occupational skill-level and area-level unemployment. Investigating these interactions was of particular interest from a health equity perspective as persons employed in precarious or low-status employment situations have been found to be more likely to experience job insecurity (not to mention a range of other psychosocial job stressors) than those in more favourable employment situations (LaMontagne *et al.*, 2012; Landsbergis *et al.*, 2012). We hypothesized that individuals residing in areas with high levels of unemployment and who were working in lower skilled or precarious jobs would perceive greater job insecurity than those in permanent work or those who were employed in higher skilled jobs.

METHOD

Data source and sample

The Household Income and Labour Dynamics of Australia (HILDA) survey is a longitudinal, nationally representative study of Australian households running since 2001. The survey is conducted annually and covers a broad range of dimensions, including

social, demographic, health, and economic measures. Information is gathered through face-to-face interviews with trained interviewers and a self-completed questionnaire. The initial household response rate at Wave 1 was 66%. Retention of responding individuals at subsequent waves was 87% at Wave 2 and >90% thereafter. The total number of respondents in each wave is greater than the number of Wave 1 respondents because (i) some non-respondents in Wave 1 are successfully interviewed in later waves; (ii) interviews are sought in later waves with all persons in sample households, who turn 15 years of age; and (iii) additional persons are added to the panel as a result of changes in household composition (Wilkins and Warren, 2012). The sample was restricted to the 8574 persons who had been employed at some point during the 10 annual waves of the HILDA survey and who had information available on geographical residence. Cases could not be included if data were missing on job insecurity, unemployment, or other possible covariates. There were 32 053 data points analysed in this research, representing an average of four observations per person during the period 2001–2010. As individual data reports were de-identified, ethical approval was not required for this data.

Main variables of interest

The outcome variable was self-rated job security and represented the summed combination of two variables: 'I have a secure future in my job' (rated from 1 to 7) and 'I worry about the future of my job' (rated from 1 to 7 reverse coded) and has been used in previous studies on job insecurity (LaMontagne *et al.*, 2013). These variables were averaged into a 14-point (1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7) single measure and rescaled so that 1 represented the lowest level of job insecurity and 7 represented the highest level of job insecurity. The main exposure variable is yearly unemployment (rates) in major statistical regions, of which there are 13 in Australia. Each of the five larger states of New South Wales, Victoria, Queensland, South Australia, and Western Australia consists of two major statistical regions. One equates with the capital city and surrounds and the other with the balance of the state. The other smaller states and territories (Australian Capital Territory, Tasmania, and Northern Territory) have one major statistical region (ABS, 2005).

Selection of other covariates

The selection of potential covariates was guided by the development of a directed acyclic graph and informed by relevant literature. To be included in analysis, there had to be possibility that the variable was a 'common cause' related to both job insecurity and residing in an area with a particular level of unemployment (Fleischer and Diez Roux, 2008). Covariates considered were age (as a categorical variable), occupational skill level (based on the Australian Standard Classification of Occupations; ABS, 2009), educational history (high school not completed, high school completed, certificate/diploma, bachelor degree, or above), equivalized household income, household structure (couple or lone adult residing with dependents, couple without dependents, lone person without dependents, and a group or multiple person household), long-term health condition (yes or no), and history of unemployment occurring at any point from 2001 onwards (yes or no). We also controlled for employment arrangements (permanent, casual or 'precarious', fixed-term contract/labour hire, and self-employed). Casual and fixed-term contract/labour hire were grouped together as there was a relatively small number of persons in fixed-term contract/labour hire jobs. Remoteness was measured through the Accessibility/Remoteness Index of Australia (ARIA). This was collapsed into two categories: metropolitan and all other areas (regional/remote) (ABS, 2005). Year was included as a continuous variable to control for possible unmeasured effects due to time (non-linear and linear effects were modelled).

Modelling strategy

Mixed-effect multi-level regression models were used to assess the relationship between area-based unemployment rates and self-reported job insecurity. Mixed models include both fixed effects and random effects to allow for circumstances when observations are clustered, such as in the present analysis where there are multiple time points for individuals (Level 1) and grouping by geographical regions (Level 2). We implemented robust standard errors in all models. The model specified the equal variances for random effects (all covariances zero) for the variance–covariance structure.

In the first and most parsimonious model, unemployment was regressed onto job insecurity. A random

intercept for persons was included to adjust for individual effects (which controlled for stable personal characteristics such as sex and country of birth) and for each major statistical division to control for heterogeneity in results across geographical areas. The 13 geographical locations represented metropolitan (major city) and regional–remote areas and were chosen to control different economic and employment experiences across Australia. For example, preliminary analysis from HILDA showed that compared with urban areas, unemployment was higher, and job insecurity was lower in regional–remote areas (as discussed below).

Following bivariate analysis between unemployment and job insecurity, the model was expanded to include the covariates specified above. As in the unadjusted model, persons and major statistical regions were allowed a random intercept to account for heterogeneity between persons and geographical regions.

Margins were calculated from the adjusted model to assess the predicted probability of job insecurity at fixed values of area-level unemployment (categorized into 10% percentiles from the lowest to the highest unemployment rates) and averaged over the remaining covariates. A margin is a statistic based on a fitted model in which some of or all the covariates are specified. Marginal effects are changes in the response for change in a covariate after accounting for other variables in the model, which can be reported as a derivative, elasticity, or semi-elasticity (StataCorp, 2011a).

Interaction terms were included in two separate (unadjusted) models to test the hypotheses that the relationship between area-level unemployment and job insecurity differed between occupational skill-level groups and by employment arrangement. Residuals were checked to assess whether they were independently distributed. Inspection of a plot of residuals versus fitted (predicted) values indicated homogeneity of variance of the residuals.

A likelihood ratio test was used to test the fit of models with the interaction terms and contrasts were calculated to evaluate differences between levels of the interaction variables. Marginal effects were computed across low to high levels of unemployment and used to assess whether precariously employed persons would be particularly at risk of job insecurity in areas with higher levels of unemployment. All statistical analyses were completed using the STATA statistical software, version 11 (StataCorp, 2011b).

RESULTS

Descriptive results

Descriptive information for the 8574 persons included in analysis can be seen in Table 1. Most people in the sample had education beyond high school (either a certificate or diploma, or university degree). The sample was working age and included more people from higher skilled occupations than lower. This distribution of occupations is similar to the general population in Australia, which shows the largest proportion of workers in the second most skilled-level group (professionals) and the fewest number of workers in lower skill-level groups (ABS, 2012). The majority of the sample was born in Australia.

Supplementary Table 1 (available at *Annals of Occupational Hygiene* online) describes the means and 95% confidence intervals (95% CIs) of job insecurity by categories of covariates. This shows that job insecurity increases with age until 54 years, when it begins to decline. Fixed-term contract and casual workers have higher reported job security than permanent workers, and those with a history of unemployment have higher levels of job insecurity than those without any prior history of unemployment. Regional and remote areas have lower levels of job insecurity than metropolitan areas. There was a negative correlation between income and job insecurity (coefficient 0.06, $P < 0.001$).

Preliminary descriptive analysis also showed that unemployment was lower in all metropolitan areas (mean rate of 4.64, standard deviation of 0.93) than in regional or remote areas (mean rate of 5.28, standard deviation of 1.17).

Regression results

Table 2 shows all models, including unadjusted and adjusted, and models with and without interaction terms. The models accounted for variation due to personal or stable characteristics and for differences between geographical areas. The year of the survey was included in analysis to account for unobserved effects due to time.

In the unadjusted mixed-effect multi-level models, results indicated that higher unemployment was related to an increased level of job insecurity

Table 1. Sample specific characteristics (number of observations = 32 053, number of persons 8574)

		Male		Female	
		No. of persons	%	No. of persons	%
Education	No high school	1038	23.6	1126	27.0
	Year 12	711	16.1	740	17.8
	Certificate/ diploma	1542	35.0	1001	24.0
	University	1115	25.3	1301	31.2
Age group	14–24 years	1024	23.2	1073	25.7
	25–34 years	1041	23.6	965	23.2
	35–44 years	960	21.8	914	21.9
	45–54 years	884	20.1	870	20.9
	55–64 years	428	9.7	312	7.5
	65 and over	69	1.6	34	0.8
Occupational skill level	Lowest skilled	872	19.8	267	6.4
	Second lowest skilled	643	14.6	1618	38.8
	Second highest skilled	1208	27.4	720	17.3
	Highest skilled	1683	38.2	1563	37.5
Country of birth	Australia	3540	80.3	3407	81.7
	English speaking	463	10.5	373	8.9
	Non-English speaking	401	9.1	387	9.3

(coefficient 0.06; 95% CI 0.04–0.07; $P < 0.001$). For every one-unit increase in area-level unemployment, there was a 0.06 increase in perceived job insecurity.

After adjusting for individual and job-related covariates, area-level unemployment was still found to be significantly associated with job insecurity (coefficient 0.05; 95% CI 0.03–0.06; $P < 0.001$). Among the job-related factors, it appears that the lowest skilled occupational groups report significantly higher levels of job insecurity than all other skill levels. Those working in precarious, fixed term, and those who were self-employed reported higher insecurity than those who were permanently employed. Among the individual-level covariates, it appears there is non-linear relationship between age and insecurity (i.e. insecurity increases and then decreases over the time a person is employed). Persons with previous history of unemployment or with long-term health conditions reported high insecurity than those who with no history of unemployment or health issues. Those who had obtained a graduate certificate had higher insecurity than those who had not finished high school. Couples living together without dependents reported lower insecurity than those with dependents, whereas those living alone reported higher insecurity. Those residing in regional or remote areas had lower reported insecurity than those residing in metropolitan areas.

Figure 1 demonstrates the predicted level of job insecurity by unemployment rates (categorized into

Table 2. Bivariate and multivariate multi-level models on the relationship between area-level unemployment rates and self-reported job insecurity (number of observations = 32 053, number of persons = 8574)

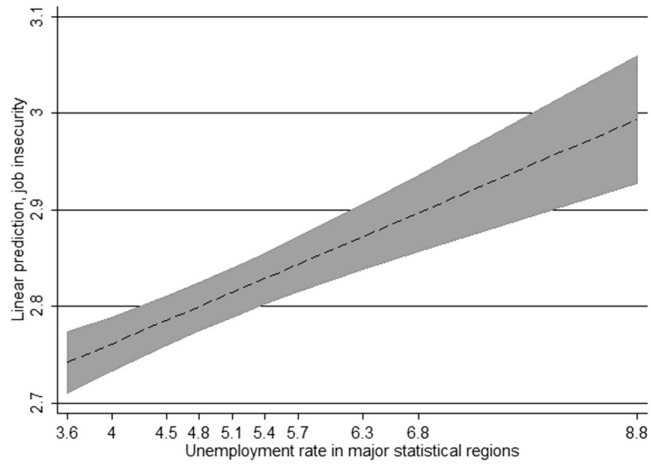
		Bivariate				Multivariate[a]			
		Estimated coefficient	Lower CI	Upper CI	*P* value	Estimated coefficient	Lower CI	Upper CI	*P* value
Area-level unemployment		0.06	0.04	0.07	<0.001	0.05	0.03	0.06	<0.001
Occupational skill level	Lowest	1 = reference				1 = reference			
	Second lowest	−0.21	−0.28	−0.14	<0.001	−0.19	−0.26	−0.12	<0.001
	Second highest	−0.19	−0.26	−0.11	<0.001	−0.18	−0.25	−0.11	<0.001
	Highest	−0.25	−0.32	−0.18	<0.001	−0.22	−0.28	−0.15	<0.001
Income		−0.03	−0.05	−0.02	<0.001	−0.02	−0.03	−0.01	0.003
Household structure	With dependents	1 = reference				1 = reference			
	No dependents	−0.12	−0.16	−0.08	<0.001	−0.06	−0.10	−0.02	0.007
	Lone	0.02	−0.04	0.08	0.549	0.07	0.01	0.12	0.024
	Group	0.00	−0.10	0.10	0.956	0.04	−0.05	0.13	0.374
Age group	14–24 years	−0.03	−0.09	0.03	0.319	0.07	0.01	0.13	0.018
	25–34 years	0.03	−0.03	0.09	0.371	0.13	0.06	0.19	<0.001
	35–44 years	0.06	0.00	0.13	0.060	0.19	0.12	0.25	<0.001
	45–54 years	−0.06	−0.14	0.01	0.099	0.08	0.00	0.16	0.047
	55–64 years	−0.32	−0.47	−0.17	<0.001	−0.24	−0.38	−0.09	0.002
	65 and over	−0.03	−0.09	0.03	0.319	0.07	0.01	0.13	0.018
Employment arrangement	Permanent	1 = reference				1 = reference			
	Casual	0.42	0.36	0.48	<0.001	0.42	0.37	0.48	<0.001
	Fixed term	0.49	0.42	0.55	<0.001	0.49	0.44	0.54	<0.001
	Self-employ	0.21	0.14	0.27	<0.001	0.22	0.16	0.28	<0.001

Table 2. ***Continued***

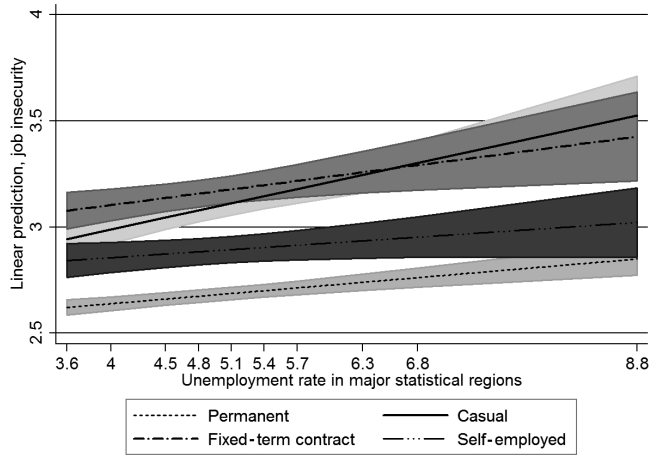
		Bivariate				Multivariate[a]			
		Estimated coefficient	**Lower CI**	**Upper CI**	***P* value**	**Estimated coefficient**	**Lower CI**	**Upper CI**	***P* value**
Education	<Year 12	1 = reference				1 = reference			
	Year 12	0.01	−0.06	0.09	0.733	0.06	−0.01	0.14	0.073
	Certificate/ diploma	0.05	−0.02	0.12	0.138	0.14	0.07	0.20	0.002
	University	−0.04	−0.11	0.03	0.246	0.09	0.02	0.16	0.012
Past unemployment	No	1 = reference				1 = reference			
	Yes	0.39	0.25	0.52	<0.001	0.31	0.20	0.43	<0.001
Long-term health condition	No	1 = reference				1 = reference			
	Yes	0.12	0.07	0.16	<0.001	0.12	0.07	0.16	<0.001
Area of residence	Metro	1 = reference				1 = reference			
	Regional	−0.08	−0.13	−0.03	0.002	−0.14	−0.19	−0.10	<0.001
Year		−0.02	−0.03	−0.01	<0.001	−0.01	−0.02	0.00	<0.001
Constant (unemployment)		2.54	2.46	2.61	<0.001	23.38	12.6	34.2	23.38

P = significant value.

[a]Model parameters: sigma_u for persons = 0.86 (95% CI 0.81–0.93); intraclass correlation (ICC) for persons = 0.38 (95% CI 0.34–0.42); sigma_u for area = 0.37 (95% CI 0.26–0.53); ICC for area = 0.45 (95% CI 0.44–0.47), sigma_e (residual) = 1.03 (95% CI 1.02–1.04).



1 Predicted job insecurity at specified levels of area unemployment, with 95% confidence intervals.



2 Predicted job insecurity for precarious and permanent workers at specified levels of area unemployment, with 95% confidence intervals.

10% percentiles). Areas with the lowest unemployment rates (3.6% of the labour force being unemployed) had significantly lower average value of job insecurity (predicted value 2.74; 95% CI 2.71–2.78, $P < 0.001$) than the average values of job insecurity in areas with unemployment rates above 5.1 (predicted value 2.81; 95% CI 2.79–2.84, $P < 0.001$).

The interaction analyses indicate that there was no significant relationship between occupational skill-level and area-level unemployment [$x^2(3) = 1.61$, $P = 0.6561$]. However, results indicated a significant interaction between employment arrangement and area-level unemployment [$x^2(3) = 11.47$, $P = 0.0094$] and post-estimation tests reveal a significant difference in job insecurity and unemployment within those employed precariously or on a fixed-term contract compared with those employed permanently. There was a steeper increase in job insecurity for precarious workers per unit increase in unemployment compared with those permanently employed (Fig. 2). Figure 2 shows that there was a more notable effect of unemployment on insecurity for those who were employed precariously rather than

those on fixed-term contracts. This suggests that persons working on a casual basis in areas with higher levels of unemployment are more susceptible to feelings of job insecurity than those working permanently.

DISCUSSION

Our results suggest that there is a linear relationship between rising unemployment rates and perceived job insecurity. This association was stronger for casual and fixed-term contract workers than permanent employees.

This study has a number of important strengths. First and foremost, it was based on an extensive survey of a large population representative sample of working Australians. The sample size and design of the survey meant that we were able to control for a number of potential confounders and adjust for clustering. The study also has a number of limitations, such as not being able to assess the impact of unemployment at smaller geographic areas because the reliability of estimates was poor at smaller sizes (ABS, 2013). Another issue that may impact the strength of findings is the limited range of variation in unemployment between areas (rates ranged from 1.9 to 8.8) and the generally low and stable levels of unemployment in Australia during the period 2001–2010. The limited variation in unemployment rates also means that results may only be generalizable to contexts that have relatively low and stable unemployment rates. Further, we acknowledge the debate in literature regarding the need to adjust multi-level mixed models using sample weights (Zaccarin and Donati, 2008). The models used in this research were not adjusted because the structure of the derived cohort was similar to that of the underlying survey. Further, the multi-level model incorporated certain characteristics of the sampling design as covariates. A limitation with the job insecurity measure was that the item included in HILDA referred to 'general cognitive uncertainty' about the future of job prospects, which provides little or no information on how individuals felt about their perceived future job prospects (e.g. emotional aspects). Another potentially important dimension of job insecurity not included in this study (or captured in this measure) relates to the continuity of certain aspects of a job including opportunities for promotion and uncertainty about the type of work undertaken in a job (Mauno *et al.*, 2001).

These limitations aside, our study suggests that there is an objective ecological influence on perceived job insecurity, even after controlling for possible individual factors. The self-rated job insecurity of the employed persons residing in areas with the highest levels of unemployment is significantly higher than those residing in areas with lower levels of unemployment. Corroborating past research in Europe (Mau *et al.*, 2012), our findings suggest that those persons working in precarious jobs are more likely to be sensitive to area-based accounts of unemployment and experience greater insecurity than those in permanent jobs. This suggests that individuals become concerned about their own employment situation when they see those around them losing their jobs or being unable to find work. This may be because these workers are more exposed than others to the correlates of perceived job insecurity, which include a lack of continuity of employment, fewer employment benefits, less social protection, and lower earnings (Benach *et al.*, 2007; Kim *et al.*, 2012). There were no significant differences in the relationship between area-level unemployment and job insecurity by occupational skill level.

There were a number of other predictors of job insecurity at the individual, household, and job level. Those with a history of unemployment reported higher job insecurity than those who had not experienced job loss in the past. These persons may be particularly sensitive to job insecurity because of previous negative experiences associated with unemployment (Booker and Sacker, 2012). Thus, it was important to adjust for this in analysis. Similarly, those with history of health issues may have also found it difficult to obtain employment and consequently may be more concerned about the future stability of their jobs. As suggested in past research (Landsbergis *et al.*, 2012), our study found employees in vulnerable positions, such as those in precarious employment and in the lowest skill jobs, were particularly sensitive to job insecurity. Those with dependents at home also had higher job insecurity than those without dependents. In these people, the threat of job loss is likely to be tied to the loss of income, and the flow on consequences this would have on the caring responsibilities (i.e. for children) and the well-being of dependents (Erlinghagen, 2008). The non-linear effects of job insecurity on age has also been reported in previous research (Mau *et al.*, 2012) and suggests that older workers experienced significantly lower job insecurity than those in middle of their working lives. This might be due to

higher level of financial commitment (e.g. mortgage, children) during midlife. Unlike previous research (Erlinghagen, 2008), our study suggests that those residing in urban areas perceived greater job insecurity than those in regional and remotes areas. Although more research is needed to understand this finding, we speculate that this is related to greater public attention to labour market conditions, or the different characteristics and skill level of jobs undertaken in regional/remote versus urban areas.

Previous research in Australia has mainly focused on the outcomes of job insecurity rather than its determinants (Strazdins *et al.*, 2004; Adam and Flatau, 2005). This research goes some way towards answering questions about the determinants of job insecurity in Australia. Aside from this, our findings also indicate the wide and negative influences of high unemployment on employed persons. There is already evidence that area-level unemployment is associated with a range of health effects at a population level (Naimi *et al.* 2009; Kendzor *et al.*, 2012). Notably, these adverse effects have been noted to negatively impact the health of both the employed and unemployed population (Clark *et al.*, 2010). Based on the present research, we speculate that job insecurity may be one of the pathways through which unemployment at the population level flows through to influence the health of the employed population. Our research also suggests that those working in casual jobs in areas with the highest level of unemployment will be more affected by job insecurity than the permanently employed. Although effects were small, area-level unemployment still had a significant influence on job insecurity after controlling for more proximal individual determinants. Further, the increase would have been enough to affect the population distribution of job insecurity given that a large proportion of the sample were employed in casual or contract work. Considering this, future research needs to assess whether the stronger relationship between unemployment and insecurity among casual workers flows through to affect health outcomes and other social and economic effects of being employed precariously and residing in areas with high levels of unemployment. This future research could help guide health and social policies on the adverse effects of job insecurity.

SUPPLEMENTARY DATA

Supplementary data can be found at http://annhyg.oxfordjournals.org/.

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