

## Do psychosocial job stressors influence mental health service use? Evidence from an Australian cohort

Allison Milner (PhD)<sup>1</sup>, Dennis Petrie (PhD)<sup>1,2</sup>, Anthony D LaMontagne (ScD)<sup>1,3</sup>, Peter Butterworth (PhD)<sup>4,5</sup>.

1. Centre for Health Equity, Melbourne School of Population and Global Health, University of Melbourne, Victoria, 3010
2. Centre for Health Economics, Monash Business School, Monash University, Clayton, Victoria, 3800
3. Centre for Population Health Research, Deakin University, Geelong, Victoria, 3125
4. Centre for Mental Health, Melbourne School of Population and Global Health, University of Melbourne, Victoria, 3010
5. Melbourne Institute of Applied Economic and Social Research, University of Melbourne, Victoria, 3010

Corresponding author:

Dr Allison Milner

Centre for Health Equity

Melbourne School Population and Global Health

The University of Melbourne, Victoria 3010 Australia

T: (+61) 03 9035 9875

E: [allison.milner@unimelb.edu.au](mailto:allison.milner@unimelb.edu.au)

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**What is already known on this subject?**

There is good evidence that job stressors are associated with common mental disorders in the employed population. There is a lack of understanding of whether the experience of these stressors also prompts greater mental health service use.

**What are the new findings?**

Results suggest job stressors did influence service use, but this association attenuated once person specific factors were considered.

**How might this impact on policy or clinical practice in the foreseeable future?**

More work is needed to understand how individual factors interact with those in working environment to influence mental health service use.

## **ABSTRACT**

**Objectives:** There is strong evidence of a relationship between psychosocial job stressors and mental health at the population level. There has been no longitudinal research on whether the experience of job stressors is also associated with greater mental health service use. We seek to fill this gap.

**Methods:** The Household Income Labour Dynamics in Australia survey cohort was used to assess the relationship between exposure to self-reported psychosocial job quality and reporting attendance at a mental health professional during the past 12 months. We adjusted for time-varying and time-invariant confounders. The study was conducted in 2009 and 2013.

**Results:** In the random effects logistic regression model, increasing exposure to psychosocial job stressors was associated with an increased odds of mental health service use after adjustment (1 stressor: OR 1.26, 95% CI 1.01 to 1.56; 2 stressors: OR 1.33, 95% CI 1.02 to 1.73; 3 stressors: OR 1.82, 95% CI 1.28 to 2.57). However, once the between person effects were controlled in a fixed effects model, the within person association between change in job stressors and change in mental health service use was estimated to be close to zero and not significant.

**Conclusions:** More work is needed to understand the relationship between job stressors and service use. However, when taken with past findings on job stressors and mental health, these findings highlight the importance of considering policy and clinical practice responses to adverse working contexts.

**Key words:** job stressors, treatment seeking, help seeking, mental health, mental health professionals, employment, working conditions.

For many people with mental health problems, seeing a mental health professional is an important step in improving their symptomology.<sup>1 2</sup> Yet, at a population level, there is an acknowledged gap between the experience of mental health problems and use of services.<sup>3</sup> Research suggests that barriers and enablers of service use reflect demographic (e.g., education, gender, age, ethnicity), economic (e.g., income and wealth) and individual (e.g., individual beliefs about health care services, presence of illness) factors.<sup>4-6</sup> In high income contexts, research has suggested that factors such as being female, having high education and income, reporting a long-term health condition, and being unemployed are characteristics associated with greater likelihood of attending a health professional for a mental health problem.<sup>3 7 8</sup>

Structural factors such as employment and income have also been shown to have an influence on mental health.<sup>9-12</sup> Of particular relevance to the current article is the influence of the working environment, including psychosocial job stressors such as low job control, high job demands, and high levels of job insecurity. There is a substantial body of research showing that job stressors are prospectively associated with a range of common mental disorders.<sup>13 14</sup> A past review across nine cohort studies demonstrated an elevated relative odds of depressive disorder in relation to high demands (OR 1.31, 95% CI 1.08 to 1.59), low control (OR 1.20, 95% CI 1.08 to 1.39) and low social support (OR 1.44, 95% CI 1.24 to 1.68).<sup>13</sup> More recent reviews have continued to support the association between psychosocial job stressors and poor mental health.<sup>15 16</sup>

While there has been some research on psychosocial job stressors and general health services,<sup>17</sup> there has been less research on mental health service use. This is important considering the most effective evidence-based approach to reducing mental health symptomology is treatment from mental health professionals providing pharmacological and/or psychosocial treatments.<sup>18 19</sup> We would note that there have been several studies demonstrating the effects of job stressors on

psychotropic drug use.<sup>20-23</sup> Acknowledging that the use of medications is a different construct than mental health service use, this body of research still implies a relationship between job stressor exposures and attendance at health care professionals, given people taking psychotropic medications have these prescribed by a (general or specialist) physician.

In this paper, we assess the influence of the psychosocial job stressors on mental health service use. Based on the literature reviewed above, a likely conceptual pathway supposes that psychosocial job stressors lead to increased distress, which in turn increases the likelihood of seeking treatment from a mental health professional. Recognising the likely influence of stable person-related (e.g., personality, parental history of illness, gender, ethnicity) and time varying influences on mental health service use, we aim to control for these in the current research using longitudinal regression approaches. Our key question is: Controlling for both time varying and time invariant confounders, what is the influence of psychosocial job quality on mental health service use?

## **METHODS**

### **Data source**

The Household, Income and Labour Dynamics in Australia (HILDA) survey is a longitudinal, nationally representative study of Australian households, established in 2001. It collects detailed information annually from over 13,000 individuals within over 7,000 households.<sup>24</sup> The initial wave of the survey began with a large national probability sample of Australian households occupying private dwellings.<sup>24</sup> The survey covers a range of dimensions including social, demographic, health and economic conditions using a combination of face-to-face interviews with trained interviewers and a self-completion questionnaire. The participation rate at wave 1 was 66%<sup>24</sup> and interviews sought in each wave with all persons in sample households aged 15 years or older. Additional persons have

been added to the sample as a result of changes in household composition. Inclusion of these new households is the main way the HILDA survey maintains sample representativeness. Further, a top-up sample of 2,000 people was added to the cohort in 2011 to allow better representation of the Australian population using the same methodology as the original sample.<sup>25</sup> The response rates for the HILDA survey are above 90% for respondents who have continued in the survey.<sup>24</sup> As described below, our variables of interest were collected in only a limited number of these waves. Because of this, the study years were confined to 2009 and 2013. The flow into the sample can be seen in Figure 1.

---- Please insert Figure 1 ----

### **Outcome variable**

The main outcome measure was a binary variable representing service use from a mental health provider in the past 12 months (mental health service use). This was ascertained using the stem question: “During the last 12 months, have you seen any of these types of health care providers about your health?” The participant was then presented with a large print show card displaying a number of health professionals including “a mental health professional such as a psychiatrist or psychologist”. This data was collected in 2009 and 2013.

### **Exposure variable**

A multidimensional measure of psychosocial job quality was constructed from four distinct perceived job stressors: control, demands and complexity, job insecurity, and unfair pay.<sup>26-28</sup> Full details of the construction and validation of the job quality measure are presented elsewhere.<sup>26-28</sup> In brief, factor analysis and structural equation modelling identified three separate factors, which

were labelled: job demands and complexity (three items); job control (three items); and perceived job security (three items). An additional single item assessing whether respondents considered that they were paid fairly for their efforts at work was included as a fourth factor measuring an important aspect of the effort-reward imbalance model.<sup>29</sup> The individual scales were associated with more widely used measures of job demands and control, and other employment conditions such as casual status, hours worked and shift work.<sup>29</sup> Each factor was dichotomized at the 75<sup>th</sup> quartile to identify those experiencing the greatest adversity and the composite measure constructed by summing the number of adverse psychosocial job conditions (high job demands and complexity, low job control, high job insecurity and unfair pay). Because of the small number of respondents reporting all four job adversities in a single year/wave, this composite scale was top-coded at three and, thus, produced four categories ranging from optimal jobs to three or more psychosocial adversities (poorest quality jobs). In this study, we treat the overall index as a four-level categorical variable, scored from no psychosocial job stressors (0) to three or more stressors (3).

### **Confounders**

We considered variables that could plausibly be considered as confounders for both reporting psychosocial job stressors and mental health service use. Confounders included gender (male or female), age (16 to 24, 25 to 29, 30 to 34, 35 to 44, 45 to 54 and 55 to 64 years), education (less than Year 12 [high school], High school, diploma or certificate, bachelors degree, postgraduate), household structure (couple without children, couple with children, lone parent with children, lone person, and other), country of birth (Australia, English speaking, other country), and weekly household income (equalivised) in quintiles. Previous research we have conducted suggests that occupational gender ratio (e.g., the proportion of males to females employed in an occupation) is a predictor of treatment for a mental health problem.<sup>30</sup> Other research also suggests differences in psychosocial working conditions by occupational gender ratio.<sup>31</sup> Hence, occupational gender ratio

was also considered as a possible confounder. We constructed a measure of whether an occupation was male dominated, female dominated or gender-neutral based on the 2006 census population level statistics from the Australian Bureau of Statistics (ABS).<sup>32</sup> We made the decision not to adjust for baseline mental health because of the concern that this might in fact be on the causal pathway between the experience of psychosocial job stressors and treatment seeking for a mental health problem. However, we did conduct a sensitivity analysis controlling for long term mental health problems (yes/no) and long term health conditions (yes/no) (discussed below).

## **Analysis**

As we had two periods of exposure (2009 and 2013), most participants were included in the analytic sample twice. To account for this, we conducted a random effects longitudinal logistic regression model with persons-specific clustering. We conducted both unadjusted (only the exposure and the outcome) and adjusted models (which also adjusted for all listed confounders). The coefficients produced from random effects (RE) models represent a weighted average of the estimates due to the within and between person effects. In our case, the RE coefficients for the effects of the psychosocial job quality index on treatment represent a combination of the relationship observed when we look at psychosocial job quality index and treatment across (or between) different people and the relationship occurring within persons (e.g., changes in both psychosocial job quality index and treatment within the same person over time). When all unobserved effects (e.g., persons specific effects not already controlled for) are independent from all explanatory variables in all time periods<sup>33</sup> both the between and within effects from the random effects models will be approximately equal and the combined random effects estimates provide causally-robust estimates. However, if this does not hold then the between person relationship observed will be bias by these unobserved person specific effects which will in turn bias the random effects estimates. In this case the within person relationship by itself is likely to provide a more causally-



robust estimate of the relationship. The within person relationship can be estimated through a linear fixed effects regression, and we additionally examined a logistic fixed effects approach as a sensitivity analysis to the random effects model. However, estimating a fixed effects regression in a logistic framework creates additional problems which we discuss below.

Following the estimation of the logistic random-effects models, we calculated average marginal effects of psychosocial job stressors on the predicted probability of service use. Coefficients were converted to percentage point increases associated with the different number of psychosocial job stressors. Again, we conducted both unadjusted (exposure and outcome only) and adjusted models (also incorporating confounders). This allows the average absolute magnitude of the effect on service use to be calculated and enables us to compare the results of the logistic analysis to the results found in models discussed below. Incorporating fixed effects within a logistic framework when the number of observations for each individual is small can be problematic due to the incidental parameter problem<sup>34</sup> and the issue of perfect predictions.<sup>35</sup> The incidental parameter problem is due to the fixed effect for each individual being estimated based on very few observations which introduces a small sample bias which then transfers over to bias the estimated impact due to the exposure. And while a conditional logistic model<sup>36</sup> overcomes the incidental parameter issue by first eliminating (conditioning out) the fixed effects, individuals with no change in their outcome are excluded due to the perfect prediction issue (bringing into question the representativeness of those included) and it is impossible to estimate average marginal effects from such a model. So instead we revert to using a linear probability model with fixed effects (with robust standard errors) which bypasses these issues but still provides a good approximation of the average marginal effect of job stressors on health service use. This allows us to examine the within person changes in service use in relation to changes in job stressors, while also controlling for stable (unmeasured) person related factors that may influence reporting of both the exposure and the outcome. We also estimated a

random effects linear probability model to compare to the average marginal effects generated from the random effects logistic model to confirm that these produce similar results. Coefficients were converted to percentage point increases at different levels of the psychosocial job stressors (treated as categorical and referenced at 0). We then conducted a sensitivity analysis assessing the effect of a reported long-term mental illness where a person also reported they needed help or support. All models were adjusted for confounders. We also conducted an analysis examining the possible effect of long term health problems (either physical or mental) on job stressors and mental health service use. No survey weights were used in the analysis.

## RESULTS

Table 1 shows the mental health service use by levels of the psychosocial job quality index across both included waves. As can be seen, a greater proportion of people report seeing a mental health professional as the number of reported psychosocial job stressors increase. A description of the sample can be seen in Table 2.

--- Please insert Table 1 and 2 ---

In the random effects logistic model, increasing exposure to psychosocial job stressors was associated with an increased odds of mental health service use (relative to no stressors: 1 stressor: OR 1.26, 95% CI 1.01 to 1.56; 2 stressors: OR 1.33, 95% CI 1.02 to 1.73; 3 stressors: OR 1.82, 95% CI 1.28 to 2.57) after adjustment (Table 3). From these, we estimated the implied average marginal effects of psychosocial job stressors on the predicted probability of service use. Compared to those reporting no stressors, respondents who reporting one job stressor showed a 0.91 absolute percent increase in service use (95% CI 0.07 to 1.75). Those reporting two stressors had 1.15% greater rate

of service use (95% CI 0.08 to 2.24) while those reporting three job stressors showed 2.66% greater use of mental health services compared to those reporting no job stressors (95% CI 0.06 to 4.36).

Results for the other variables in the model (Table 3) indicate that females had greater odds of seeing a mental health professional than males, while those employed in male dominated occupations were less likely to seek treatment than those in gender neutral occupations. Older persons were less likely to see mental health professionals compared to younger persons. Compared to couples without children, those persons living alone (either with or without children) or in “multi person” households were more likely to attend mental health professionals. Couples with children were less likely to report seeing mental health professionals. There was a noticeable gradient in education, with lower levels of education associated with lower odds of service use than those with the highest levels of educational attainment. Compared to those respondents born in Australia, migrants had lower odds of attending a mental health professional.

--- Please insert Table 3 ---

The second panel of Table 4 show that a random effects model using OLS linear probability approach produced consistent results to the average marginal effects from the random-effects logistic model. Results of the (adjusted) linear probability fixed effects model, however, indicate that once we remove the between person association there was no estimated effect of psychosocial job stressors on mental health service use, with all the coefficients being small and insignificant (Table 4). The unadjusted coefficients of the linear probability fixed effects were not markedly different from the adjusted results (available on request). We also estimated this model using a logistic regression fixed effects approach (while also acknowledging the likely problems with this, discussed above).

Results were similar to those shown in Table 4 but the sample size was markedly reduced (406 people, 812 observations).

Our analyses regarding the relationship between psychosocial job quality and service use while also controlling for a reported long-term mental illness and long-term health conditions can be seen in Supplementary Table 1. As can be seen, a long-term mental illness and long-term health conditions were associated with greater service use in random effects models. Results for the main exposure and confounders are of similar magnitude but reduce.

## **DISCUSSION**

The findings of this paper provide evidence of an association between psychosocial job quality and mental health service use. Those in poorer quality jobs are more likely to report mental health service use. However, the modelling approach adopted shows that this relationship between psychosocial job stressors and mental health service use is likely to be influenced by between-person differences on characteristics such as gender, personality, and stable levels of mental health. There is both methodological and conceptual explanations for these results, as explained below.

Models of health care access (including Andersen's Behavioural Model of Health Service Use<sup>4-6</sup>) suggest that an individual's decision to seek help from health providers involves a complex set of predisposing (e.g., demographic, social structural, and individual beliefs about health care services) and enabling factors (e.g., income and wealth, access and availability).<sup>4-6</sup> The current paper adds to this literature by demonstrating the role of psychosocial job stressors on mental health service use, which appears to be largely driven by between person differences, at least in the Australian context. It is possible that certain groups of people are selected into jobs characterized by a poor psychosocial working environment and that these persons are also those least likely to seek

treatment from a mental health professional. Our results also control for a number of other important demographic predictors of service use, including occupational gender ratio, gender, age, household structure, education and migrant status.

Fixed effects approaches suggested no relationship between psychosocial job stressors and service use. Low power may explain the lack of evidence to reject the null in the fixed effects linear probability results with mental health service use as the outcome. However, it is important to note that the direction of coefficients in these models go in the opposite direction from the random effects models. Another explanation is that there is a different temporal relationship between job stressors and mental health service use than between job stressors and mental health. For example, it is possible that the decision to seek and attend treatment in response to job stressors may take a longer time than effects of job stressors on mental health (where past evidence suggests that there is a strong contemporaneous relationship). A further explanation is that job stressors may act as a barrier to service use, in that those in poor quality jobs may not have the time or flexibility to seek treatment. We would recommend more research on these possibilities.

The limitations of this paper include the fact that we were not able to assess help-seeking from other non-designated mental health providers, such as general practitioners. General practitioners are the most commonly sought providers for mental health problems in Australia.<sup>37</sup> This is likely due to the fact that they are often the first professional contacted to provide referrals to more specialist mental health, such as psychologists or psychiatrists. Thus, our outcome represented a relatively specific aspect of the mental health system and this selectivity may have acted to reduce our associations towards the null. However, we note that the prevalence of help-seeking from mental health professionals in our sample was similar to that reported in the general population.<sup>37</sup> Another limitation is that our outcome was self-reported service use. Hence, it was possible that there was

some misclassification because people may not have recalled their service use accurately and hence it is difficult to assess whether this would have increased or decreased our observed effects size. It is also worth note that our outcome was relatively blunt in terms of the fact that we were not able to examine the number of times a person may have received treatment. Other limitations include the lack of power in the fixed effects analyses (evident in the large confidence intervals), which represented a more restrictive test of the within person relationship between psychosocial job stressors and service use. This resulted in a less statistical power to detect an actual effect. Another limitation is that those who were excluded from the analytic sample were more likely come from countries other than Australia, have a lower education, and were less likely to seek treatment for a mental health problem. The exclusion of these people reduces the generalisability of the study. It is also important to acknowledge the modest participation rate in the first wave of the study.

In conclusion, our study suggests that use of mental health services does not temporally reflect variability in exposure to psychosocial job stressors. Thus, in this paper, the relationship between psychosocial job stressors and mental health service use is likely to be largely driven by differences between people. This suggests the need for attention to wider inequalities in working conditions and on demographic and structural factors that may promote help seeking behaviours and timely access to services. At the same time, we would recommend the need for greater policy and program attention to reducing job stressors, which are increasingly recognised as a significant determinant of mental health in the working population.

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### **Contributions**

The article was conceived by AM, who also conducted analysis. DP and PB contributed to analytic design, analyses and to the interpretation of results. ADL contributed to analytic design and the interpretation of results. AM drafted the manuscript with feedback from all authors. All authors contributed to the final draft of the manuscript.

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### **Conflict of interest**

We declare no conflicts of interest.

### **Author access to data**

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Institute. The data used in this paper was extracted using the Add-On Package PanelWhiz for Stata. PanelWhiz (<http://www.PanelWhiz.eu>) was written by Dr. John P. Haisken-DeNew ([john@PanelWhiz.eu](mailto:john@PanelWhiz.eu)).



## References

1. Hofmann SG, Smits JAJ. COGNITIVE-BEHAVIORAL THERAPY FOR ADULT ANXIETY DISORDERS: A META-ANALYSIS OF RANDOMIZED PLACEBO-CONTROLLED TRIALS. *The Journal of clinical psychiatry* 2008;69(4):621-32.
2. Linde K, Sigterman K, Kriston L, et al. Effectiveness of Psychological Treatments for Depressive Disorders in Primary Care: Systematic Review and Meta-Analysis. *The Annals of Family Medicine* 2015;13(1):56-68. doi: 10.1370/afm.1719
3. Wang PS, Lane M, Olfson M, et al. Twelve-month use of mental health services in the United States: results from the National Comorbidity Survey Replication. *Arch Gen Psychiatry* 2005;62(6):629-40. doi: 10.1001/archpsyc.62.6.629 [published Online First: 2005/06/09]
4. Andersen R, Newman JF. Societal and Individual Determinants of Medical Care Utilization in the United States. *The Milbank Quarterly* 2005;83(4):10.1111/j.468-0009.2005.00428.x. doi: 10.1111/j.1468-0009.2005.00428.x
5. Babitsch B, Gohl D, von Lengerke T. Re-revisiting Andersen's Behavioral Model of Health Services Use: a systematic review of studies from 1998–2011. *GMS Psycho-Social-Medicine* 2012;9:Doc11. doi: 10.3205/psm000089
6. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *Journal of health and social behavior* 1995:1-10.
7. Bijl RV, Ravelli A. Psychiatric morbidity, service use, and need for care in the general population: results of The Netherlands Mental Health Survey and Incidence Study. *American Journal of Public Health* 2000;90(4):602-07.
8. Wang PS, Berglund P, Olfson M, et al. Failure and delay in initial treatment contact after first onset of mental disorders in the national comorbidity survey replication. *Archives of General Psychiatry* 2005;62(6):603-13. doi: 10.1001/archpsyc.62.6.603
9. Wood N, Bann D, Hardy R, et al. Childhood socioeconomic position and adult mental wellbeing: Evidence from four British birth cohort studies. *PLOS ONE* 2017;12(10):e0185798. doi: 10.1371/journal.pone.0185798
10. Gilman SE. Review: there is marked socioeconomic inequality in persistent depression. *Evidence Based Mental Health* 2003;6(3):75-75. doi: 10.1136/ebmh.6.3.75
11. Eaton WW, Muntaner C, Bovasso G, et al. Socioeconomic Status and Depressive Syndrome: The Role of Inter- and Intra-generational Mobility, Government Assistance, and Work Environment. *Journal of health and social behavior* 2001;42(3):277-94.
12. Lorant V, Deliege D, Eaton W, et al. Socioeconomic inequalities in depression: a meta-analysis. *American journal of epidemiology* 2003;157(2):98-112. [published Online First: 2003/01/11]
13. Bonde JP. Psychosocial factors at work and risk of depression: a systematic review of the epidemiological evidence. *Occupational and environmental medicine* 2008;65(7):438-45. doi: 10.1136/oem.2007.038430 [published Online First: 2008/04/18]
14. Niedhammer I, Malard L, Chastang JF. Occupational factors and subsequent major depressive and generalized anxiety disorders in the prospective French national SIP study. *BMC public health* 2015;15:200. doi: 10.1186/s12889-015-1559-y [published Online First: 2015/04/18]
15. Theorell T, Hammarstrom A, Aronsson G, et al. A systematic review including meta-analysis of work environment and depressive symptoms. *BMC public health* 2015;15:738. doi: 10.1186/s12889-015-1954-4 [published Online First: 2015/08/02]
16. Rugulies R, Aust B, Madsen IE. Effort-reward imbalance at work and risk of depressive disorders. A systematic review and meta-analysis of prospective cohort studies.

- Scandinavian journal of work, environment & health* 2017;43(4):294-306. doi: 10.5271/sjweh.3632 [published Online First: 2017/03/18]
17. Azagba S, Sharaf MF. Psychosocial working conditions and the utilization of health care services. *BMC public health* 2011;11:642. doi: 10.1186/1471-2458-11-642 [published Online First: 2011/08/13]
  18. Pampallona S, Bollini P, Tibaldi G, et al. Combined pharmacotherapy and psychological treatment for depression: A systematic review. *Archives of General Psychiatry* 2004;61(7):714-19. doi: 10.1001/archpsyc.61.7.714
  19. Cuijpers P, Dekker J, Hollon SD, et al. Adding psychotherapy to pharmacotherapy in the treatment of depressive disorders in adults: a meta-analysis. *The Journal of clinical psychiatry* 2009;70(9):1219-29. doi: 10.4088/JCP.09r05021 [published Online First: 2009/10/13]
  20. Kouvonen A, Manty M, Lallukka T, et al. Changes in psychosocial and physical working conditions and psychotropic medication in ageing public sector employees: a record-linkage follow-up study. *BMJ open* 2017;7(7):e015573. doi: 10.1136/bmjopen-2016-015573 [published Online First: 2017/07/15]
  21. Laaksonen M, Lallukka T, Lahelma E, et al. Working conditions and psychotropic medication: a prospective cohort study. *Social psychiatry and psychiatric epidemiology* 2012;47(4):663-70. doi: 10.1007/s00127-011-0372-x [published Online First: 2011/03/30]
  22. Thielen K, Nygaard E, Rugulies R, et al. Job stress and the use of antidepressant medicine: a 3.5-year follow-up study among Danish employees. *Occupational and environmental medicine* 2011;68(3):205-10. doi: 10.1136/oem.2010.057943
  23. Virtanen M, Honkonen T, Kivimaki M, et al. Work stress, mental health and antidepressant medication findings from the Health 2000 Study. *Journal of affective disorders* 2007;98(3):189-97. doi: 10.1016/j.jad.2006.05.034 [published Online First: 2006/12/22]
  24. Wilkins R. Families, Incomes and Jobs, Volume 8: A Statistical Report on Waves 1 to 10 of the Household, Income and Labour Dynamics in Australia Survey. . Melbourne: Melbourne Institute of Applied Economic and Social Research Faculty of Business and Economics 2013.
  25. Watson N. Methodology for the HILDA top-up sample. Hilda Project Technical Paper Series No 1/11. . Melbourne: Melbourne Institute 2011.
  26. Butterworth P, Leach LS, Rodgers B. Psychosocial job adversity and health in Australia: analysis of data from the HILDA Survey. *Aust N Z J Public Health* 2011;35(6):564-71.
  27. Butterworth P, Leach LS, Strazdins L, et al. The psychosocial quality of work determines whether employment has benefits for mental health: results from a longitudinal national household panel survey. *Occupational and environmental medicine* 2011 doi: 10.1136/oem.2010.059030
  28. Leach L, Rodgers B, Butterworth P, et al. Deriving an evidence-based measure of job quality from the HILDA survey. *Australian Social Policy* 2010;9:67-86.
  29. Siegrist J, Starke D, Chandola T, et al. The measurement of effort–reward imbalance at work: European comparisons. *Social Science & Medicine* 2004;58(8):1483-99. doi: [http://dx.doi.org/10.1016/S0277-9536\(03\)00351-4](http://dx.doi.org/10.1016/S0277-9536(03)00351-4)
  30. Milner A, Scovelle AJ, King T. Treatment seeking differences for mental health problems in male and non-male dominated occupations: prospective evidence from the HILDA survey. . *Epidemiology and Psychiatric Sciences* In press
  31. Milner A, King T, LaMontagne AD, et al. Men’s work, Women’s work, and mental health: A longitudinal investigation of the relationship between the gender composition of occupations and mental health. *Social Science & Medicine* 2018;204:16-22. doi: <https://doi.org/10.1016/j.socscimed.2018.03.020>

32. ABS. 2006 Census - Labour Force. Occupation 06 (ANZSCO) (OCC06P) - 2 Digit by Sex Male/Female (SEXP) Counting: Persons, Place of Usual Residence. *viewed 1 April 2017, 2006*
33. Wooldridge J. 14.2 Random effects models. In: Wooldridge J, ed. *Introductory Econometrics: A Modern Approach, Fourth Edition*. Mason, OH, USA: South-Western Cengage Learning 2009:489-92.
34. Neyman J, and Elizabeth L. Scott. "." (1948): 1-32. Consistent estimates based on partially consistent observations. *Econometrica: Journal of the Econometric Society* 1948;16(1):1-32.
35. Maddala GS. *Limited-dependent and qualitative variables in econometrics*: Cambridge [Cambridgeshire] ; New York : Cambridge University Press, 1983. 1983.
36. Chamberlain G. Analysis of Covariance with Qualitative Data. *The Review of Economic Studies* 1980;47(1):225-38. doi: 10.2307/2297110
37. AIHW. Mental health services in Australia: Medicare-subsidised mental health-related services. Canberra: AIHW. <https://mhsa.aihw.gov.au/services/medicare/> 2016.

Figure 1. Sample selection

Table 1. Description of the proportion of people attending mental health professionals within each category of psychosocial job quality

	<b>Psychosocial job quality</b>				
	<b>No stressors (%)</b>	<b>One stressor (%)</b>	<b>Two stressors (%)</b>	<b>Three stressors (%)</b>	<b>Total (%)</b>
Total sample					
No	95.4	94.3	93.7	91.8	94.30
Yes	4.6	5.7	6.3	8.2	5.70
Total (observations)	4199	7871	2903	1031	16,004

Table 2. Sample description at baseline

	Analytic sample % (n=16,004)
<b>Psychosocial job quality</b>	
No stressors	26.24
1 stressor	49.18
2 stressors	18.14
3 stressors	6.44
<b>Occupational gender ratio</b>	
Gender equal	22.32
Female dominated	35.61
Male dominated	42.07
<b>Gender</b>	
Male	52.24
Female	47.76
<b>Age group</b>	
16-24	15.84
25-34	21.36
35-44	23.13
45-54	24.92
55-64	14.75
<b>Household structure</b>	
Couple without children	25.72
Couple with children	48.76
Lone parent with child	7.39
Lone persons	13.82
Multiple persons	4.31
<b>Education</b>	
Postgraduate	12.28
Bachelor	17.22
Diploma or certificate	34.12
High school	17.13
Below high school	19.25
<b>Country of birth</b>	
Australia	80.97
English speaking	8.74
Other country	10.29
<b>Weekly income</b>	
Lowest	3.22
2	9.21
3	20.04
4	30.29
Highest	37.23

Table 3. Unadjusted and adjusted random logistic models, psychosocial job quality on mental health service use, HILDA 2009 and 2013, people=11,039, observations=16,004

	Unadjusted			Adjusted		
	OR	95% U and L CI	p value	OR	95% U and L CI	p value
<b>Psychosocial job quality</b>						
No stressors	1			1		
1 stressor	1.28	1.03 - 1.59	0.026	1.26	1.01 - 1.56	0.037
2 stressors	1.43	1.10 - 1.86	0.008	1.33	1.02 - 1.73	0.034
3 stressors	2.00	1.42 - 2.83	<0.001	1.82	1.28 - 2.57	0.001
<b>Occupational gender ratio</b>						
Gender equal	1			1		
Female dominated	0.99	0.79 - 1.23	0.92	0.83	0.66 - 1.05	0.124
Male dominated	0.54	0.43 - 0.69	<0.001	0.68	0.53 - 0.86	0.002
<b>Gender</b>						
Male	1			1		
Female	2.21	1.83 - 2.67	<0.001	1.88	1.52 - 2.34	<0.001
<b>Age group</b>						
16-24	1			1		
25-34	0.95	0.73 - 1.25	0.717	0.89	0.67 - 1.18	0.43
35-44	0.99	0.76 - 1.31	1.000	1.10	0.82 - 1.47	0.527
45-54	0.77	0.59 - 1.01	0.063	0.80	0.60 - 1.06	0.118
55-64	0.39	0.27 - 0.55	<0.001	0.36	0.25 - 0.53	<0.001
<b>Household structure</b>						
Couple without children	1			1		
Couple with children	0.79	0.64 - 0.99	0.039	0.72	0.57 - 0.92	0.007
Lone parent with child	1.8	1.29 - 2.51	<0.001	1.42	1.01 - 2.00	0.044
Lone persons	1.78	1.37 - 2.33	<0.001	1.68	1.28 - 2.21	<0.001
Multiple persons	1.32	0.86 - 2.02	0.202	1.23	0.80 - 1.88	0.353
<b>Education</b>						
Postgraduate	1			1		
Bachelor	0.82	0.60 - 1.11	0.206	0.76	0.56 - 1.02	0.07
Diploma or certificate	0.64	0.48 - 0.84	0.001	0.66	0.50 - 0.88	0.004
High school	0.70	0.51 - 0.95	0.023	0.60	0.43 - 0.83	0.002
Below high school	0.41	0.29 - 0.57	<0.001	0.42	0.30 - 0.59	<0.001
<b>Country of birth</b>						
Australia	1			1		
English speaking	0.89	0.65 - 1.23	0.497	0.99	0.72 - 1.36	0.96
Other country	0.6	0.43 - 0.83	0.002	0.57	0.41 - 0.79	0.001
<b>Weekly income</b>						
Lowest	1			1		
2	0.74	0.45 - 1.24	0.251	0.79	0.47 - 1.31	0.352
3	0.65	0.40 - 1.04	0.070	0.68	0.42 - 1.09	0.105
4	0.63	0.40 - 1.01	0.053	0.68	0.43 - 1.08	0.1
Highest	0.70	0.44 - 1.10	0.121	0.68	0.43 - 1.09	0.109

Notes: OR= Odds Ratio; 95% U and L CI = Upper and lower confidence intervals at 95% significance; p value= statistical significance at 95%. Adjusted models also control for year.

Table 4. Adjusted fixed and random effects OLS models, % increase in service use in response to psychosocial job quality, HILDA 2009 and 2013, people=11,039, observations=16,004

	Fixed effects OLS			Random effects OLS		
	% increase	95% U and L CI	p value	% increase	95% U and L CI	p value
<b>Psychosocial job quality</b>						
No stressors	0			0		
1 stressor	-0.56	-2.04 - 0.92	0.457	0.83	0.00 - 1.66	0.050
2 stressors	-1.31	-3.29 - 0.68	0.197	1.08	-0.02 - 2.18	0.054
3 stressors	-0.44	-3.79 - 2.92	0.798	2.63	0.84 - 4.42	0.004
<b>Occupational gender ratio</b>						
Gender equal	0			0		
Female dominated	-1.06	-3.87 - 1.74	0.457	-0.90	-2.05 - 0.25	0.125
Male dominated	1.76	-0.92 - 4.43	0.198	-1.49	-2.53 - -0.45	0.005
<b>Gender</b>						
Male				0		
Female				2.81	1.89 - 3.7	<0.001
<b>Age group</b>						
16-24	0			0		
25-34	0.4	-2.91 - 3.7	0.815	-0.51	-1.82 - 0.81	0.450
35-44	-0.65	-5.32 - 4.02	0.786	0.36	-1.01 - 1.73	0.607
45-54	-0.58	-6.35 - 5.19	0.844	-0.98	-2.26 - 0.29	0.131
55-64	-2.05	-8.79 - 4.68	0.550	-3.54	-4.86 - -2.22	<0.001
<b>Household structure</b>						
Couple without children	0			0		
Couple with children	-0.97	-2.94 - 1.00	0.334	-1.41	-2.35 - -0.46	0.004
Lone parent with child	1.15	-3.5 - 5.81	0.627	1.8	-0.01 - 3.61	0.052
Lone persons	1.88	-1.37 - 5.13	0.258	2.53	1.14 - 3.93	0.000
Multiple persons	2.61	-1.65 - 6.86	0.229	0.82	-1.21 - 2.85	0.429
<b>Education</b>						
Postgraduate	0			0		
Bachelor	2.24	-5.33 - 9.82	0.562	-1.33	-2.88 - 0.21	0.091
Diploma or certificate	-1.2	-9.86 - 7.46	0.786	-1.98	-3.38 - -0.58	0.005
High school	-2.64	-11.64 - 6.35	0.565	-2.38	-3.96 - -0.8	0.003
Below high school	-4.78	-14.56 - 5.01	0.338	-3.76	-5.24 - -2.27	<0.001
<b>Country of birth</b>						
Australia				0		
English speaking				-0.11	-1.42 - 1.21	0.873
Other country				-2.29	-3.39 - -1.19	<0.001
<b>Weekly income</b>						
Lowest	0			0		
2	2.08	-3.43 - 7.59	0.459	-1.16	-3.85 - 1.53	0.399
3	3.35	-1.94 - 8.64	0.214	-1.83	-4.35 - 0.69	0.155
4	3.15	-2.22 - 8.51	0.251	-1.89	-4.38 - 0.6	0.136
Highest	3.63	-1.86 - 9.12	0.195	-1.91	-4.41 - 0.6	0.136

Notes: % increase = % increase in service use in response to one point increase in job stressors; 95% U and L CI = Upper and lower confidence intervals at 95% significance; p value= statistical significance at 95%. Adjusted models also control for year.



Supplementary Table 1. Adjusted random logistic, psychosocial job quality and service use, adjusting for long term mental illness and long term health conditions, HILDA 2009 and 2013

	Adjusted random logistic models			Fixed effects OLS		
	OR	95% U and L CI	p value	% increase	95% U and L CI	p value
<b>Adjusting for long term mental illness</b>						
<b>Psychosocial job quality</b>						
No adversities	1			0		
1 adversity	1.28	1.04 - 1.58	0.018	-0.56	-2.04 - 0.92	0.459
2 adversities	1.26	0.98 - 1.62	0.070	-1.41	-3.39 - 0.57	0.164
3 adversities	1.60	1.13 - 2.26	0.007	-0.62	-3.99 - 2.76	0.721
Long term mental illness	83.11	42.84 - 161.25	<0.001	14.04	-3.16 - 31.25	0.110
<b>Adjusting for long term health conditions</b>						
No adversities	1			0		
1 adversity	1.21	0.98 - 1.49	0.077	-0.59	-2.06 - 0.89	0.435
2 adversities	1.21	0.94 - 1.57	0.136	-1.32	-3.30 - 0.67	0.193
3 adversities	1.56	1.11 - 2.18	0.011	-0.50	-3.85 - 2.86	0.772
Long term health conditions	4.02	3.29 - 4.90	<0.001	1.47	-1.02 - 3.96	0.248

Notes: OR= Odds Ratio; % increase = % increase in service use in response to one point increase in job stressors; 95% U and L CI = Upper and lower confidence intervals at 95% significance; p value= statistical significance at 95%. Adjusted models control for gender, education, country of birth, household structure, weekly household income, occupational gender ratio, and year.