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ABSTRACT

A Family Affair: Job Loss and the Mental Health of Spouses and Adolescents*

This study examines the impact of involuntary job loss on the mental health of family members. Estimates from fixed-effects panel data models, using panel data for Australia, provide little evidence of any negative spillover effect on the mental health of husbands as a result of their wives' job loss. The mental well-being of wives, however, declines following their husbands' job loss, but only if that job loss results in a sustained period of non-employment or if the couple experienced financial hardship or relationship strain prior to the husband's job loss. A negative effect of parental job loss on the mental health of co-resident adolescent children is also found, but appears to be restricted to girls.

JEL Classification: I31, J10, J65

Keywords: unemployment, involuntary job loss, mental health, families, spouses, adolescents, HILDA Survey

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I. Introduction

Mental illness is an enormous public health problem with substantial economic costs. The World Health Organization, for example, estimates the economic cost of mental health problems in developed countries to be between three and four percent of Gross National Product (WHO 2003). Much of this cost stems from reduced employment levels, increased absenteeism, and lost productivity among those with poor mental health (Fletcher 2013; Layard 2013). At the same time, labor markets play a major role in driving mental health outcomes. Mental health deteriorates, for example, when labor market conditions worsen (Gili et al. 2012; Melnychuk 2012), and cross-national differences in labor market institutions explain part of the cross-country disparity in the incidence of psychological distress among workers (Cottini and Lucifora 2013). Most importantly, there is a vast research literature linking job loss – in particular involuntary job loss – to diminished mental health for workers.

Despite the importance of the issue, and the voluminous literature, the Organisation for Economic Co-operation and Development (OECD) concluded in its recent review that the “available evidence on mental illness and its connection with work is partial or incomplete, and many important elements are still unknown or not fully understood” (OECD 2012, p. 200). In particular, the OECD drew attention to deficiencies in the data systems used to link health and employment outcomes. Others have pointed to the complexity in the causal connection between mental health, income, and labor market outcomes (Frank and McGuire 2000). Together these hurdles imply that many of our stylized “facts” about mental health and employment rest on statistical associations rather than causal estimates. Moreover, although it is widely accepted that there are likely to be spillover effects of job loss on the mental health of others, in particular on the family members of job losers (Ström 2003), empirical evidence on these effects remains scarce (Marcus 2013). A deeper understanding of

the pathways through which labor markets and mental health are linked is required to form sensible policies that can reduce the economic and social burden of mental illness.

The objective of this paper is to fill a void in the literature by assessing the way in which involuntary job loss affects the mental health of family members. We make an important contribution in focusing specifically on the disparity in mental health outcomes following job loss in those families experiencing: i) continued non-employment; ii) financial stress; and iii) relationship dissatisfaction. This focus on the heterogeneity in mental health impacts sheds light on the potential pathways through which job loss affects family members. Further, while there is a small literature on the link between partners' job loss and their spouses' mental health, ours is the first study to analyze the broader impact of men's and women's job loss on the mental health of their adolescent and young-adult children as well as their partners. Finally, we employ fixed-effects models rich in controls in order to account for any selection on observable or time-invariant unobservable individual or family characteristics. In addition, we deal with any remaining endogeneity of job loss by utilizing a measure of involuntary job loss and then testing the robustness of our results using an alternative measure of job loss that is both unexpected and involuntary. Together, these innovations allow us to add causal estimates to what is largely a correlational literature.

We find little evidence of any negative spillover effect on the mental health of husbands as a result of their wives' job loss. The mental well-being of wives, however, declines following their husbands' job loss, but only if that job loss results in a sustained period of non-employment or if the couple experienced financial hardship or relationship strain prior to the husband's job loss. A significant negative effect on the mental health of co-resident adolescent children is also found, but this appears to be restricted to girls, who are also more sensitive to the job loss of their mothers than their fathers. Importantly, these results are highly robust to a number of sampling restrictions and model specifications.

The relevant literature is reviewed in Section II, while our conceptual framework and estimation strategy are outlined in Section III. The details of the data, our estimation sample, and the parameterization of our key variables of interest are presented in Section IV. Results can be found in Section V, while conclusions and suggestions for future research are in Section VI.

II. Previous Research

It is well established that the onset of unemployment is inversely correlated with indicators of psychological well-being and mental health (for reviews see: Warr 1987; Feather 1990), with one meta-analysis supporting the hypothesis that the relationship between job loss and mental health is causal (Paul and Moser 2009).¹ At the same time, it has long been recognized that unemployment is not just a significant event for those directly experiencing it, but also for their family members (e.g., Komarovsky 1940). Job loss, especially when accompanied by a reduction in family income, can strain marriages (Atkinson, Liem, and Liem 1986; Broman, Hamilton, and Hoffman 1990), adversely affect the well-being of all family members, and potentially lead to marital separation and divorce (Hansen 2005; Doiron and Mendolia 2012; Eliason 2012). Furthermore, there may be spillovers between the mental health states of family members (Fletcher 2009; Mervin and Frijters 2014). As a result, we might expect the onset of unemployment to be associated with deterioration in the psychological well-being of not only the job loser, but of other family members as well.

Most research on this issue has focused on spousal well-being, and generally finds evidence that job loss experienced by one spouse (typically the husband) is negatively associated with the psychological well-being of the other (typically the wife). Much of this evidence, however, is unconvincing. The review by Ström (2003), for example, identifies 22

¹ Nevertheless, the question of causality is still far from settled, with recent studies reporting findings that are more mixed (cf., Eliason and Storrie 2009; Salm 2009; Schmitz 2011; Gathergood 2013).

studies of the effect of unemployment on spousal well-being. Of these, 16 employ cross-sectional data, and thus only provide evidence of correlation, while the six remaining longitudinal studies all involve very small samples (ranging from just 80 to 361 families).

At least four studies, however, investigate this issue using longitudinal data drawn from much larger population-representative samples. Clarke (2003) uses data from the first seven waves of the British Household Panel Survey (BHPS) and finds that the mental health (measured using a simple dichotomous variable derived from the General Health Questionnaire [GHQ]) of women (but not men) is sensitive to changes in the employment status of their partners. This research, however, is distinct in that it does not identify the mechanism through which unemployment occurs; it thus reveals little about the effects of involuntary job loss.

Siegel et al. (2003), on the other hand, specifically focus on involuntary job loss. Using data from the first three waves of the US Health and Retirement Study (HRS), they find no evidence that husbands' involuntary job loss has a statistically significant effect on wives' mental health (as measured by the CES-Depression scale). The HRS sample, however, is restricted to households in which, at baseline, at least one household member is aged between 50 and 61. These findings might therefore not generalize to younger populations, especially given job loss for many older workers may be a trigger for early retirement.

More relevant is the work of Marcus (2013), who uses data (drawn from nine waves of the German Socio-Economic Panel [GSOEP]) covering a much broader population – the German population aged between 18 and 62 – to consider the effect of entry into unemployment as a result of plant closure. This, he argues, accounts for the potential endogeneity that could arise if job loss is a response to mental health problems within the family. Using a combination of matching and difference-in-differences, he finds that unemployment as a result of plant closure decreases the mental health (as measured by the

mental component summary scale from the SF-12) of spouses almost by as much as it did their job-losing partner. It is important to note, however, that his outcome of interest is not simply job loss, but remaining in unemployment until at least the next survey wave. Thus, the mental health penalty he finds may be a function not only of initial job loss, but also of the difficulty regaining employment.

Finally, Mendolia (2014) analyzes data on working-age couples from 14 waves of the BHPS. Utilizing fixed-effects estimation methods, she finds that both partners' mental health (as measured by the GHQ) declined following the husband being made redundant from his job. In contrast to the findings of Marcus (2013), the decline was still noticeably larger for husbands' own health.

It is also reasonable to expect that unemployment will have adverse effects on the children of unemployed parents. This can arise if the negative income effect associated with unemployment outweighs the positive effect from an increase in the time parents have available to spend with their children, or if there are negative spillover effects from a decline in parental well-being.

Empirical research on the effect of parental unemployment on children has tended to focus either on educational outcomes or on the physical health of children (see Ström 2003). Further, many of the studies often cited in support of the claim that parental unemployment adversely affects child well-being focus not on parental unemployment but on some general measure of economic hardship or stressful event while growing up. There is, in fact, a surprisingly small body of evidence directly linking parental unemployment to indicators of the psychological well-being of children, with findings mostly suggesting relationships are either weak, often disappearing once other life events are controlled for, or statistically insignificant (Kienhorst et al. 1990; McMunn et al. 2001; Sund, Larsson, and Wichstrøm 2003; Östberg, Alfvén, and Hjern 2006; Piko and Fitzpatrick 2007; Fröjd et al. 2009). All of

this evidence, however, is based on cross-sectional data, and in no case is involuntary job loss identified. As such, this literature can tell us very little about causality.

More recently, two related studies avoid many of the weaknesses of previous research, largely by using longitudinal data from large population-representative household panel surveys. In both cases, the outcome of interest is a global measure of subjective well-being rather than child mental health. Powdthavee and Vernoit (2013) use BHPS data and find that parental job loss actually has a positive effect on the happiness of younger children (aged 11), but has either an insignificant or a strongly negative effect as children age. Kind and Haisken-DeNew (2012), on the other hand, use GSOEP data to analyze much older children (co-resident children aged between 17 and 25). They find a significant decline in the life satisfaction of co-resident male children following their fathers' job loss due to business closure. Fathers' job loss is unrelated to the life satisfaction of girls.

In summary, high quality longitudinal evidence that links job loss to changes in the mental health of other family members and adequately accounts for the potential endogeneity of job loss remains scarce. We are aware of only a handful of longitudinal studies utilizing nationally representative data that focus on spousal job loss, and to the best of our knowledge, there has been no previous longitudinal study examining how parental job loss affects the mental health of adolescent children. Further, previous researchers have not explicitly considered the heterogeneity in the impact of job loss on family members' mental health.

III. Estimation Strategy

We begin with a conceptual framework in which individuals' mental health is driven by their own characteristics (e.g., personality or gender), the life outcomes they experience (e.g., own employment outcomes), and the family circumstances (e.g., family job loss) in which they

find themselves. With this framework in mind, our goal is to understand the pathways through which involuntary job loss affects the mental health of family members, and in particular spouses and adolescent/young-adult children.²

Our estimation strategy can be illustrated by referencing a two-way error components model that includes both individual and family heterogeneity. This model is frequently used in the education production literature (see Chatterji, Kim and Lahiri 2014). Specifically, we will assume that mental health outcomes are given by:

$$y_{ijt} = x_{ijt}\beta + c_{jt}\gamma + w_{ij}\delta + z_j\theta + u_{ijt} \quad (1)$$

where y_{ijt} is the mental health of individual i in family j at time t , x_{ijt} and c_{jt} denote vectors of time-varying individual and family characteristics (including family job loss) respectively, while w_{ij} and z_j are vectors of time-invariant individual and family characteristics.

The specification of the error term (u_{ijt}) is fundamental to understanding the identification assumptions necessary to achieve causal identification of γ (the coefficient of interest) and the other parameters in the model. Despite the rich set of individual and family-level characteristics included in the estimation (see Section IV), there remains the possibility that unobserved factors correlated with both involuntary job loss and a family member's mental health may lead our estimates to be biased. We therefore allow for the following error structure in our estimation:

$$u_{ijt} = m_{ij} + f_j + \varepsilon_{ijt} \quad (2)$$

where m_{ij} denotes the time-invariant heterogeneity among individuals who are nested in families, f_j captures the time-invariant heterogeneity among families, and ε_{ijt} is the global error term.

We estimate two separate models. The first assesses the effect of one partner's involuntary job loss on his or her spouse's mental health, while the second captures the effect

² The young people in our sample range in age from 15 to 20 so for simplicity we refer to them as adolescents.

of parental job loss on adolescent children. Our spousal analysis takes couples as the “family” unit. The structure of our estimation sample (see below) implies that each individual is observed to be part of only one unique couple and hence individual (m_{ij}) and family (f_j) heterogeneity will be indistinguishable once we estimate the model separately by gender. Accounting for individual heterogeneity using a one-way error components model will therefore be robust to any time-invariant, individual- or family-level heterogeneity that is correlated with spouses’ mental health (see Chatterji et al. 2014; Kim and Frees 2006). Consequently, we analyze the effect of one partner’s job loss on the other partner’s mental health by estimating equation (1) using individual fixed-effects.

Our analysis of adolescents’ mental health defines the family unit to be one parent – either the father or the mother – and all adolescent children in the household. The model is then estimated separately for mothers’ and fathers’ job loss. Each adolescent is, therefore, matched to a single family unit (i.e., parent), though in some cases there may be multiple children observed in each family. The presence of siblings within a “family” permits the estimation of family-fixed effects models, allowing us to test for family-specific, as well as individual-specific heterogeneity using a standard Hausman (1978) test (see Kim and Frees 2006). We find evidence for both. Thus, as before, we estimate equation (1) accounting for individual-specific fixed-effects in order to eliminate the bias associated with any time-invariant, individual- or family-specific heterogeneity.

Our estimation strategy, therefore, relies on detailed controls along with fixed-effects regression to do much of the work in eliminating any threats to causality. The focus on the effects of pre-determined (lagged) job loss events is also useful in minimizing any reverse causality. Still, our estimates of the effect of involuntary job loss may be biased to the extent that there is time-varying correlation in the unobserved factors that simultaneously influence individuals’ current mental health and their family members’ previous job loss. The risk of

this occurring is obviously much less than when we are interested in the impact of job loss on one's own mental health (see Mendolia 2014); nevertheless it is not impossible. For example, coping with and managing the mental health problems of the partner (child) following some negative life event may be associated with a decline in productivity at work and thereby contributing to dismissal from that job. This would lead our estimates of the mental health effect of job loss to be overstated. We deal with this issue by testing the robustness of our results to alternative job loss measures.

The above estimation strategy allows us to generate (arguably) causal estimates of the effect of job loss overall on family members' mental health. At the same time, we are also interested in shedding light on the potential channels through which family job loss filters through the family. To this end, we create a series of indicators that allow us to estimate the disparity in mental health outcomes following job loss in families experiencing: i) continued non-employment; ii) financial stress; and iii) relationship dissatisfaction. Previous researchers have suggested that unemployment affects family well-being by increasing financial stress (Broman, Hamilton, and Hoffman 1990) and increased marital conflict (Doiron and Mendola 2012). We also investigate whether or not sons and daughters are differentially affected by the unemployment experienced by their fathers as opposed to their mothers. While gender can be considered to be exogenous, unemployment length, financial stress, and relationship quality cannot. We minimize the potential for endogeneity to confound our results by differentiating couples on the basis of pre-determined financial stress and relationship dissatisfaction experienced prior to job loss. This, however, is clearly not possible when considering the heterogeneity in impacts associated with ongoing unemployment.³ Nonetheless, these descriptive results are useful in highlighting the potential pathways through which involuntary job loss affects family members' mental health.

³ The interaction effects become larger when we consider contemporaneous financial stress and relationship dissatisfaction.

IV. Data

A. Estimation Sample

The data used in this analysis are drawn from release 12 of the Household, Income and Labour Dynamics in Australia (HILDA) Survey, a household panel survey that has been following members of a national probability sample of around 7,700 Australian households on an annual basis since 2001 (see Watson and Wooden 2012).⁴ We use data covering survey waves 1 to 12 (or roughly the period 2001 to 2012). The estimation sample is restricted to waves 2 to 11, with data from wave 12 used only in the construction of a control for panel attrition and wave 1 data used only in sample selection due to a lack of information in wave 1 on reasons for job loss during the preceding year.⁵

To identify the impact of job loss on different family members, two separate samples are generated. The first consists of people living in couple relationships, while the second consists of adolescent-parent pairs. Specifically, we construct a sample of individuals living with partners and then select only the person-year observations relating to that individual's first partner, thus dropping 2,685 (2.6 percent) person-year observations relating to any subsequent partners. We then select individuals with married or de facto partners of the opposite sex and impose an age restriction such that, on the 30th June prior to interview, both partners were between the ages of 20 and 64. While most HILDA Survey data are collected via personal interview, the measure of mental health comes from a separate self-completion questionnaire (SCQ), so we restrict ourselves to persons who completed an SCQ, dropping an additional 4,165 (7.3 percent) person-year observations.⁶ Finally, in order to minimize the potential for relationship breakdown following job loss to bias our results, we retain as many couples as possible in the sample for one period (i.e., one survey wave) following

⁴ A large population refreshment sample was introduced in wave 11 that added a further 2,153 responding households. These cases, however, are not used in this analysis given that, with data from only two interviews, we only have one observation per respondent on between-wave job loss.

⁵ All data were extracted using PanelWhiz (see Hahn and Haisken-DeNew 2013).

⁶ On average, 90 percent of all HILDA Survey interview respondents return a completed SCQ each wave.

separation.⁷ This provides an initial sample comprising 4,934 couples and 52,842 person-year observations.

We follow a similar procedure in constructing our sample of adolescent-parent pairs. Specifically, we select all adolescents (aged 15 to 20 years) living with at least one parent, where “parent” means the parental figure of the household in which the adolescent resides, and may refer to a natural, adopted, step or foster parent or a parent’s de facto partner. We then select person-year observations relating only to the adolescent’s first father and/or first mother identified in the data, which results in the dropping of a trivial number of observations. We restrict the sample to adolescents who completed the SCQ, dropping 1,446 person-year observations (11.8 percent). Finally, we retain as many parent-adolescent pairs as possible for one wave following an adolescent moving out of home.⁸ The initial adolescent-parent sample consists of 3,553 adolescents and 10,792 person-year observations.

B. Mental Health

The outcome variable used in this analysis is the Mental Health Inventory (MHI-5), a sub-scale of the Short Form (SF-36) Health Survey (see Ware et al. 2000). It consists of five items (scored on a 6-point scale) that assess the frequency of anxiety and mood disturbance symptoms over the 4-week period preceding the interview. Like all SF-36 sub-scales, raw scores on each item are summed and then standardized so that the scale values range from 0 to 100, with relatively low scores indicative of worse mental health.

The MHI-5 has been shown to be an effective screening instrument in large populations for persons with mental health problems, in particular mood and anxiety disorders (e.g.,

⁷ Of the 1832 couples that separate during the sample period, 62 do so following job loss. Given the following rules used in the HILDA Survey, we are able to retain 671 couples – 39 of which experienced job loss – in the year following separation.

⁸ We observe 934 cases of adolescents leaving home during the panel, 29 of whom do so in the year following their parents’ job loss. We are able to retain 662 of these home leavers in the sample, 23 of whom first began to live separately in the year following parental job loss.

Rumpf et al. 2001; Yamazaki, Fukuhara and Green 2005; Cuijpers et al. 2009). The MHI-5 performs as well as, if not superior to, other self-assessed survey-based scales, such as the General Health Questionnaire (McCabe et al. 1996; Hoeymans et al. 2004) and the Hopkins Symptom Checklist (Strand et al. 2003).

C. Measuring Job Loss

The measure of job loss is a dichotomous variable derived from responses to interview questions asking all survey respondents who changed employers or ceased working since the last interview to nominate the main reason why they left that job. Using this information, we create an indicator for employment terminations due to lay-off, retrenchment, redundancy, dismissal, an employer going out of business, or loss of job because no work was available. In addition, any self-employed persons who reported that their business closed down for economic reasons (went broke, liquidated, no work, not enough business) are classified as experiencing job loss. The resulting indicator closely aligns with our interest in involuntary job loss. However, it also captures dismissals for cause, which in some instances will be the result of poor performance on the part of the job loser. Unfortunately we have no way of separately identifying dismissals in these data; but we do consider the robustness of our results to alternative measures of job loss. The reference period is the time between successive interviews, which given the annual interview cycle will typically be around one year. Partner and parental job loss information is then merged to relevant partner and adolescent observations.

We observe a total of 1,269 involuntary job loss events within the couples sample (810 males and 459 females) and 467 events within the adolescent sample. The size of the “treatment group” is thus larger than available in earlier studies, increasing estimation precision.

Estimates of annual retrenchment and dismissal rates among all employed persons are provided in Table 1. The first two columns report rates based on HILDA Survey data using the job loss measure defined above. The rate of job loss has mostly averaged around 3.5 percent per annum, except in the aftermath of the 2008-09 global recession, when it rose to over 5 percent. Population-weighted estimates are very similar to the unweighted estimates, suggesting non-random response and attrition is of little importance for this variable.

For comparative purposes, we also provide estimates from a survey conducted by the Australian Bureau Statistics (ABS) as a supplement to the February round of its Labour Force Survey (see column 4). To obtain broadly comparable estimates across the HILDA Survey and ABS data, we use a different population in the denominator – all persons employed at any time during the previous year. The HILDA Survey estimates are mostly higher than the ABS survey estimates, possibly reflecting differences in population coverage, survey administration, and questionnaire design. The trends over time in both series, however, are very similar.

D. Covariates

The selection of time-varying covariates is based on previous longitudinal research analyzing the determinants of mental health (e.g., Clarke 2003; Scutella and Wooden 2008; Mendolia 2014; Wooden and Li 2014). Specifically, our estimation models control for: age; household composition (the number of children and adults); the presence of a long-term health condition and disability other than mental illness (differentiated by the extent to which the condition limits work);⁹ physical health; labor force status; working hours preferences (if employed); current education status (in the case of the adolescent sample); both home ownership and real

⁹ Persons who report having both mental illness and other forms of disabilities or long-term health conditions have not been excluded from the sample, suggesting possible collinearity in these variables. Redefining this indicator to exclude all persons reporting the presence of any mental illness that restricts everyday activity, however, has no substantive effect on any results.

home equity (a crude measure of household wealth); the regional unemployment rate; location (a set of dummies identifying how distant the household is from a major Australian city); a measure of the socio-economic status advantage or disadvantage of the region (one of four Socio-Economic Indexes for Areas [SEIFA] developed by the ABS); the presence of another adult during the survey interview, which Wooden and Li (2014) argue will tend to cause measures of subjective well-being to be overstated due to social desirability; and a dummy variable identifying whether the sample member is a non-respondent at the next survey wave. The inclusion of the latter has been proposed by Verbeek and Nijman (1992) as a simple means of both testing, and controlling, for the selectivity bias that might arise from the sample attrition that occurs during the course of a panel. Finally, in the analyses of adolescent mental health, we include an indicator variable to differentiate adolescents living in single-parent households.

We also wish to allow for heterogeneity in the effect of job loss associated with ongoing non-employment, financial stress, relationship quality and adolescents' gender. Ongoing non-employment is captured through an indicator for being not employed at the interview following the job loss (and hence measured contemporaneously with partners' mental health). We capture financial stress by using data collected in the SCQ about the occurrence of seven types of stressful financial events during the past year. Following Bray (2001) we use the seven possible responses to this question to generate two summary measures of financial stress. The first refers to cash flow problems stemming from at least one of the following occurring at least once during the past year because of a shortage of money: inability to pay the rent or the mortgage; inability to pay utilities bills; and having to ask for financial help from friends or family. The second refers to financial hardship and involves experiencing at least one of the following because of a shortage of money: pawning or selling something; missing meals; inability to heat the home; and seeking help from welfare or community

organizations.¹⁰ Our measures of financial stress are lagged one period and so capture financial stress at the interview prior to any job loss.

The SCQ also collects subjective information about relationship satisfaction. Specifically, individuals are asked how satisfied they are with a range of relationships, including their partner. We have reversed the response scale so that 0 indicates “completely satisfied” and 10 corresponds to “completely dissatisfied”. Like our financial stress measure, we also lag relationship satisfaction one period in order to capture relationship satisfaction at the interview prior to job loss.

The full list of covariates, together with definitions and summary statistics, is provided in a Data Appendix.

E. Descriptive Statistics

Using our samples, we construct Table 2, which summarizes mean unweighted MHI-5 scores by partner’s employment status for couples and by parental employment status for adolescents. A comparison of the mental health scores reveals that, on average, husbands’ mental health is lower if their wives involuntarily lost their jobs (mean = 75.3) than if their wives did not change jobs (mean = 77.4), but is lowest when their wife was not employed at the previous interview (i.e., at $t-1$) (mean = 74.1). A similar pattern is observed for wives’ mental health given their husbands’ employment status. The difference in MHI-5 scores between wives of husbands who lose their jobs and wives of husbands who do not (71.5 vs 75.2), however, is much larger than the comparable differential in the MHI-5 scores of husbands.

In the second panel of Table 2 we report similar descriptive statistics for our adolescent sample. The MHI-5 scores of female adolescents are lower following a parent losing their job

¹⁰ Data from this financial stress question are not available for wave 10, resulting in the additional loss of observations in models that include these variables.

compared to the more usual situation in which the parent remained employed. The size of this differential is particularly large in the case of maternal job loss. In contrast, male adolescents, on average, report higher MHI-5 scores following a father or mother involuntarily losing their job compared than do their peers whose parents remain employed.

V. Regression Results

A. Couples

Linear regression estimates of the effect of husbands' and wives' involuntary job loss on their partners' MHI-5 score are presented in Table 3. We report summary results from four specifications. The unconditional effect of job loss on partners' MHI-5 score is presented in Column (1). The results in Column (2) come from a model that includes individual fixed effects, but does not account for heterogeneity in observed time-varying characteristics. In Column (3) we control for all observed individual and family characteristics, but exclude fixed effects. Finally, Column (4) is our preferred specification, which controls for observable individual and family characteristics as well as individual fixed effects. Note that while the only coefficient estimates reported in Table 3 are those for the main variable of interest – partner's job loss – a complete set of coefficient estimates for specifications 3 and 4 is provided in Appendix Table A.

The results indicate there is no discernible decline in husbands' mental health following their wives' involuntary job loss. The estimated mental health impact of wives' job loss is small in magnitude and statistically insignificant. This result is striking in its consistency across all specifications. In contrast, the mental health of wives whose husbands lose their jobs is, in the absence of individual fixed effects, 2 (or 0.12 of a standard deviation [SD]) to 2.7 (0.17 SD) points lower on the MHI-5 scale than is true for wives with continuously employed partners (see Columns 1 and 3). Further, this difference is statistically significant at

the one percent level. However, once we account for time-invariant individual-specific heterogeneity through the inclusion of individual fixed effects, the estimated impact of husbands' job loss on wives' mental health is substantially reduced and becomes statistically insignificant (see Columns 2 and 4). Thus, in models that account for both observed and unobserved heterogeneity we find no significant effect of men's or women's involuntary job loss on their partners' mental health. This is particularly striking given that we would expect any endogeneity bias to lead us to overstate our results.

These results are broadly consistent with other results which use panel data techniques to account for unobserved heterogeneity in mental health. Specifically, Marcus (2013) finds that German plant closures are linked to a decline in the mental health of partners. However, the estimated effects are modest – between 0.15 (men) and 0.20 (women) standard deviations in his main specification – and only weakly significant for men. The mental health effects of dismissals are even smaller. Similarly, Mendolia (2014) concludes that in the U.K., women's mental health declines slightly (0.12 SD) as a result of their husbands being made redundant, though not as a result of being dismissed or being in a temporary job that ends.

Although workers' involuntary job loss appears to have few effects on their partners' mental health overall, there are likely to be groups for whom a partner's job loss is particularly stressful. As noted earlier, previous researchers have suggested that job loss affects the mental health of family members through a variety of channels including financial stress and marital tension. We investigate this issue by examining whether or not the mental health effect of involuntary job loss varies across families experiencing: (i) continued non-employment; (ii) financial stress; and (iii) relationship dissatisfaction. Results are presented for husbands' and wives' mental health in Tables 4 and 5, respectively.

We begin by interacting workers' involuntary job loss between $t-1$ and t with an indicator for continued non-employment at time t to assess whether job loss that results in a longer

period of non-employment has a greater impact on partners' mental health. Estimates of the key parameters are presented in Panel A of each table. Men experience a slightly larger decline in mental health (0.11 SD) if their wives' involuntary job loss results in continued non-employment than if it does not, but this effect is only marginally statistically significant (see Panel A, Table 4). The mental health penalty for women, on the other hand, is approximately 0.15 of a SD larger if, by the time of the next survey interview, their partners have still failed to secure alternative employment following involuntary job loss, and this effect is statistically significant (Panel A, Table 5). Thus, it seems clear that the extent to which workers' involuntary job loss diminishes their partners' mental health depends on how quickly those workers return to employment.

We next consider whether or not the impact of job loss on mental health varies with a household's financial situation. We consider two indicators of financial stress. The first captures any cash flow problems leading to an inability to pay the bills on time (Panel B), while the second identifies financial hardships that required the household to pawn something, ask for help from a welfare agency or go without food or heat (Panel C). Somewhat surprisingly, while financial stress that results in either cash flow problems or financial hardship is related to poorer mental health, once we account for individual-specific fixed effects, the effect of financial stress on mental health is either statistically insignificant (financial hardship) or small in magnitude (0.03 to 0.04 SD) (cash flow problems). More importantly, there is evidence that women in financially-stressed households experience a large deterioration in mental health if their partners lose their jobs involuntarily. This effect is particularly large if the family was experiencing financial hardship (0.29 SD), but is also evident if the family experienced cash flow problems (0.17 SD). In contrast, men's mental health response to their partners' job loss does not differ significantly by whether or not the family was financially stressed prior to the job loss.

Finally, we consider whether or not the relationship between respondents' mental health and their partners' job loss depends on the level of their relationship dissatisfaction prior to the job loss (see Panel D). Both men and women report poorer current mental health the more dissatisfied they were with their partners at the previous interview. Men's mental health response to their partners' involuntary job loss, however, does not depend on their satisfaction with their partners. On the other hand, women who were highly dissatisfied with their partners experience a larger drop in mental health as a result of their partners' job loss than do women who were completely satisfied with their partners. Relationship dissatisfaction compounds the mental health effects of husbands' job loss.

We can only speculate about the explanation for men and women's differential responses to their partners' involuntary job loss. Becker's (1981) marriage model, for example, postulates that men have a comparative advantage in market production, while women's comparative advantage lies in home production. The gendered nature of individuals' comparative advantage results in specialization within families, with women focused largely on home production and men focused largely on market work. Given this, couples may find it easier to maintain total household surplus if the wife, rather than the husband, loses her job, because she can exploit her comparative advantage and dramatically increase home production in the form of child care, domestic chores and the like. Time-use studies, for example, suggest that wives' unemployment is associated with an increase in hours spent in housework that is double the increase for unemployed husbands (Gough and Killewald 2011). In addition, household surplus may decline more when husbands lose their jobs because men are less able to compensate for the loss of their market income by increasing home production. These tendencies will be further reinforced by gender differences in labor market outcomes, in particular earnings (Blau, Winkler, and Ferber 2014).

B. Adolescents

The key results from the separate estimations of the effect of father's and mother's involuntary job loss on adolescent mental health are presented in Table 6. As before, we present results from four different specifications. Results for paternal job loss are presented in Panel A, while results for maternal job loss are reported in Panel B.

Our results provide no support for the hypothesis that a father's job loss has any impact on the mental health of their adolescent children. Similarly, the effect of maternal job loss, reported in Panel B, is negative but, statistically insignificant once individual fixed effects are taken into account. Thus, there is no evidence that parental job loss affects the mental health of adolescents overall.

We next assess whether there is heterogeneity in the effects of parental job loss. Specifically, we consider whether the effect of parental job loss on adolescents' psychological well-being depends on whether the parent is able to find alternative employment before the next survey interview or on the adolescent's gender. These results are presented in Tables 7 and 8 respectively.

Adolescents whose fathers experience job loss have slightly better mental health if their fathers are not employed at the next interview than if they have returned to work, though this disparity is not statistically significant (see Panel A). Both groups of adolescents report mental health scores that are statistically equivalent to their peers whose fathers did not experience job loss. In contrast, adolescents report substantially worse mental health when their mothers fail to return to work following job loss (see Panel B). In particular, the MHI-5 scores of adolescents are 6.8 points lower if their mothers remain out of work after a job loss than if they have returned to work by the next interview (see Column 4, Panel B). This effect is larger than the estimated impact of all other control variables, and is equivalent to around .41 of one SD in the MHI-5 score.

In summary, paternal job loss appears to exert no effect on the mental health of their adolescent and young-adult children. In contrast, maternal job loss is associated with worse mental health, but only if that job loss is followed by a sustained period of non-employment. Why the mental well-being of adolescent children would be responsive to mothers' job loss but not that of their fathers is not immediately obvious. Indeed, it could be argued that this result is counter-intuitive given that, in the large majority of couple households, men continue to be the primary breadwinner (Drago, Black, and Wooden 2005). Given that we do not control for income in our preferred specification, any drop in income associated with job loss is captured in the estimated effect of job loss itself. Thus, it appears that parental job loss affects adolescents' mental health through channels other than income levels. Interestingly, Kalil and Ziol-Guest (2005) reach a similar conclusion when assessing the impact of (single) mothers' unemployment on adolescents' non-cognitive skills and educational attainment.

One potential explanation lies in the different influence mothers and fathers have over the adolescent's consumption. There is substantial evidence, especially from developing countries (World Bank 2012), but also from developed nations (e.g., Lundberg, Pollak, and Wales 1997), that households members do not always pool their incomes perfectly, and that children do better when mothers control a relatively large fraction of family resources. The loss of job by the mother results in a loss of her labor income and potentially a loss of bargaining power over how remaining household resources are consumed. Consequently, the adolescent's consumption may fall. Lower consumption together with the realization that their family is experiencing economic hardship may then contribute to a decline in the adolescent's psychological well-being. On the other hand, when fathers lose their job, mothers may be more inclined to shield adolescents by maintaining their consumption levels and finding savings elsewhere.

We also examine the possibility that the effects of parental job loss may differ depending on the adolescent's gender (see Table 8). Adolescent girls have MHI-5 scores following their fathers' job loss which are substantially lower (approximately 2.2 points or 0.13 SD) than do adolescent boys whose fathers also lost their jobs. As usual, we lose precision when controlling for individual-specific fixed effects, implying that we cannot reject the hypothesis that this difference is zero. In the case of maternal job loss, however, the gender gap in adolescents' mental health is both larger (-5 points or 0.31 SD) and statistically significant, even after we control for unobserved, time-invariant heterogeneity. In short, these results indicate that the mental health of daughters is much more affected by parental job loss than is that of sons, and that this is especially so in the case of maternal job loss. Interestingly, these findings are inconsistent with Kind and Haisken-DeNew (2012) who find that the life satisfaction of young German men suffers more as a result of their parents' job loss than does that of their female peers. They are, however, consistent with a very different line of research that has found that young females are more responsive than young males to stressful life events (e.g., Ge et al. 1994; Bouma et al. 2008).

C. Robustness

As previously noted, the biggest challenge to our identification strategy is that – as is typically the case when relying on observational data – we are unable to account for any time-varying correlation in the unobserved factors that simultaneously influence the outcome of interest (i.e., individuals' current mental health) and key determinants (i.e., their family members' previous job loss). The biggest concern is that our measure of job loss includes events which may not be truly exogenous. That is, there may be unobserved events (for example, health shocks) that contribute both to a family member's poor mental health and the worker's job loss. Controlling for such selection events is widely accepted as being crucial in

studies of the effects of job loss on own mental health (e.g., Eliason and Storrie 2009; Kuhn, Lalive, and Zweitmuller 2009; Schmitz 2011), but it is far less obvious that these will be important when studying consequences for the mental health of others. Nevertheless, Siegel et al. (2003) and Mendolia (2014) both restrict their set of job losers to persons made redundant, arguing that redundancies are not the consequence of worker behaviors. Marcus (2013) goes further and restricts his treatment group to persons who lose their job because of a plant closure, arguing that partial closures and downsizing will be associated with selective retrenchments (the least productive workers will be laid off first). However, even plant closures are rarely exogenous shocks; they are usually planned and announced well ahead of time, and thus persons with better options will be more likely to quit ahead of the actual closure date.

Unfortunately, the HILDA Survey data do not enable job loss due to business closures to be separately identified. Employees, however, are asked about the probability of losing their job through being retrenched, being fired, or not having their contract renewed during the year ahead (see McGuinness, Wooden, and Hahn 2014). This information allows us to identify workers for whom job loss was largely unanticipated, providing an arguably more exogenous measure of job loss. At the same time, the question on expected probability of job loss is not asked of the self-employed forcing us to drop them from the sample. The decline in the sample size, and more importantly, in the number of job loss events, reduces the precision of our estimates, making it difficult to draw strong inferences about the impact of unexpected job loss on the mental health of family members. Nonetheless, we replicate our analysis using an alternative job loss indicator which equals one only for individuals who both reported involuntarily losing their job since the previous survey, and who also reported

at the previous interview that there was a zero percent chance that they would lose their job in the year ahead.¹¹

We find that the effects of unexpected involuntary job loss largely mirror those of involuntary job loss overall. Specifically, we find no evidence that a husband's mental health is adversely affected by his wife's unexpected job loss. This is true irrespective of whether or not the wife remains not employed, whether or not the couple is financially stressed, and the degree of relationship dissatisfaction.¹² Similarly, husbands' unexpected involuntary job loss has no significant effect on their wives' reported mental health overall. As before, wives do have significantly poorer mental health if their husbands lose their jobs and remain out of work rather than finding new employment. Importantly, this differential is substantially larger when the job loss was unexpected. The disparity in wives' mental health outcomes associated with experiencing financial stress and relationship dissatisfaction in combination with their husbands' unexpected involuntary job loss is similar in magnitude to that associated with involuntary job loss overall, but becomes statistically insignificant. Finally, consistent with our previous results, we find little evidence that adolescents' mental health is negatively affected by their parents' involuntary job loss even when it is unexpected. The exception is that the additional mental health penalty associated with mothers remaining not employed after involuntary job loss is somewhat larger if that job loss was unexpected than is the case for involuntary job loss overall, but is imprecisely estimated and statistically insignificant.

Overall, the robustness of our results across our two alternative measures of involuntary job loss provides us with some confidence that our qualitative conclusions are unlikely to be substantially overstated by any endogeneity bias resulting from time-varying unobservable factors.

¹¹ Detailed results provided upon request.

¹² In fact, counterintuitively, we find that husbands whose wives unexpectedly and involuntarily lose their jobs have somewhat higher mental health if the family experienced financial hardship prior to that job loss than if it did not. This differential is significant at the 10 percent level.

We also conducted a number of tests to check the robustness of our results against alternative sampling restrictions and model specification. First, we made an additional age restriction, retaining only couples in which both partners are aged between 20 and 55, in order to see if our results were influenced by the lead-up to retirement. We find only slight differences in results and our substantive conclusions remain unchanged. Second, we also re-estimated our models including a control for real equivalized household disposable income;¹³ in order to estimate a job-loss effect independent of any income loss. Again our results are qualitatively unchanged suggesting that the impact of job loss operates through channels other than income. Finally, we also test for significant differences in the effect of parental job loss in: i) single- versus couple-headed households; and ii) families in which adolescents do and do not report financial stress. Neither disparity was statistically significant.

VI. Conclusions

Mental illness is a pressing labor market issue. Much of the economic and social cost of mental illness stems from reduced economic participation and diminished productivity. Moreover, mental illness may have indirect effects on family members, communities, and society more generally, which will magnify the mental health costs associated with poor labor market outcomes.

Our paper makes an important contribution in quantifying these effects by analyzing the impact of involuntary job loss on the mental health of family members. We find no evidence that husbands' mental health is affected by their wives' job loss. Wives' mental health deteriorates, however, following their husbands' job loss, but only if their husbands experience a sustained period of non-employment or if the couple experienced financial hardship or relationship strain prior to the husband losing his job. We also find that co-

¹³ As is conventional, household income is specified as a logarithmic function. This required setting all non-positive values to \$1 and then including an indicator variable identifying households with non-positive income.

resident adolescent children's mental health is unaffected by their fathers' job loss. Adolescents' mental health declines, however, after their mothers' job loss, but only if they experience a period of sustained non-employment. Finally, it is adolescent girls rather than boys who are sensitive to their mothers' job loss.

Our analysis leads us to several important conclusions. First, generating sensible estimates of the indirect effects of job loss on family members' mental health requires that we carefully account for both observed and unobserved heterogeneity. In particular, the apparent deterioration in wives' mental health following their husbands' job loss disappears once we use a fixed-effects specification to control for time-invariant unobserved heterogeneity. The same holds true when we consider the impact of mothers' involuntary job loss on their adolescent children's mental health. Thus, previous studies which fail to account for the unobserved factors leading to unemployment are likely to be overstating the spillover effects of job loss on mental health.

Second, the fact that we find no evidence for spillover effects in the aggregate does not imply that they are unimportant. On the contrary, involuntary job loss does impose substantial indirect mental health costs on vulnerable families; i.e., those in which job losers do not regain employment quickly or in which financial or relationship stress were already present. Importantly, the mental health burden in these situations – which is substantial – falls much more heavily on women and adolescent girls. Estimates of the overall mental health costs associated with job loss need to account for these indirect effects. Moreover, policies designed to support mental health following job loss need to be family-oriented and targeted towards vulnerable families as well as women and adolescent girls.

Finally, like Mendolia (2014), we also find that a reduction in income is not the link between involuntary job loss and family members' mental health. This implies that policies

(for example, unemployment benefits) which merely replace the job loser's income are unlikely to be effective in maintaining family members' mental health.

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Table 1: Estimates of the Rate of Retrenchment and Dismissal – HILDA Survey and ABS Labour Mobility Survey Compared

<i>HILDA Survey year</i>	<i>As a % of persons employed at previous interview</i>		<i>As a % of persons employed at some during previous 12 months</i>	
	<i>HILDA, unweighted</i>	<i>HILDA, weighted</i>	<i>HILDA, weighted</i>	<i>ABS</i>
2001	–	–	–	3.9 (Year ended Feb 2002)
2002	4.3	4.3	4.7	–
2003	3.6	3.8	3.7	2.7 (Year ended Feb 2004)
2004	3.3	3.5	3.8	–
2005	3.5	3.5	3.2	2.2 (Year ended Feb 2006)
2006	3.2	3.0	3.4	–
2007	3.2	3.2	3.1	1.8 (Year ended Feb 2008)
2008	3.1	3.3	3.2	–
2009	5.1	5.2	5.3	3.7 (Year ended Feb 2010)
2010	3.8	3.8	3.9	–
2011	3.4	3.4	3.2	3.1 (Year ended Feb 2012)
2012	3.8	3.4	3.6	2.8 (Year ended Feb 2013)

Note: ABS data come from *Labour Mobility, Australia* (ABS cat. no. 6209.0), various issues, and available at: www.abs.gov.au.

Table 2: Mean MHI-5 Scores (and Standard Deviations) by Partner's Employment Status

A. Partner's employment status	Husbands		Wives	
	Mean	SD	Mean	SD
Employed at <i>t-1</i>				
Lost job involuntarily	75.3	16.1	71.5	17.8
Ceased a job for other reason	76.6	15.2	73.2	16.7
Did not change jobs	77.4	14.7	75.2	15.7
Not employed at <i>t-1</i>	74.1	17.7	69.4	19.7
B. Parent's employment status	Male children		Female children	
	Mean	SD	Mean	SD
<i>Father</i>				
Employed at <i>t-1</i>				
Lost job involuntarily	76.5	15.9	70.8	16.5
Ceased a job for other reason	74.7	17.6	70.3	18.0
Did not change jobs	76.5	15.3	72.9	16.7
Not employed at <i>t-1</i>	72.9	16.5	70.0	18.1
<i>Mother</i>				
Employed at <i>t-1</i>				
Lost job involuntarily	77.6	15.1	67.3	19.6
Ceased a job for other reason	75.0	16.3	71.2	17.7
Did not change jobs	77.1	15.1	72.7	16.5
Not employed at <i>t-1</i>	75.0	16.4	71.0	17.9

Table 3: Effect of Partner’s Job Loss on Mental Health – Selected OLS and Fixed Effects Estimates

<i>A: Husband’s mental health</i>				
	(1)	(2)	(3)	(4)
Wife’s job loss	-1.024 (0.748)	-0.832 (0.519)	-0.577 (0.694)	-0.413 (0.527)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.000	0.000	0.165	0.032
Rho		0.684		0.661
F statistic	1.873	2.568	188.104	26.063
Observations	26065	26065	24849	24849
<i>B: Wife’s mental health</i>				
	(1)	(2)	(3)	(4)
Husband’s job loss	-2.749** (0.590)	-0.658 (0.435)	-2.051** (0.553)	-0.706 (0.441)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.001	0.000	0.150	0.023
Rho		0.661		0.638
F statistic	21.710	2.290	170.944	18.581
Observations	26541	26541	25292	25292

Notes: Standard errors, reported in parentheses. **, *, + indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 4: Heterogeneity in the Effect of Wives' Job Loss on Husbands' Mental Health – Selected OLS and Fixed-Effects Estimates

<i>A: Re-employment of wife</i>	(1)	(2)	(3)	(4)
Wife's job loss	-0.851 (0.930)	-0.080 (0.656)	-0.725 (0.862)	0.266 (0.656)
Wife's job loss x Wife not employed	-0.618 (1.544)	-1.886+ (1.049)	0.413 (1.426)	-1.813+ (1.046)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.000	0.000	0.165	0.032
Rho		0.681		0.661
F statistic	1.110	2.783	181.133	25.211
Observations	25240	25240	24849	24849
<i>B: Cash flow stress</i>	(1)	(2)	(3)	(4)
Wife's job loss	-0.312 (0.917)	-0.766 (0.648)	0.007 (0.861)	-0.480 (0.655)
Wife's job loss x Cash flow stress (t-1)	-2.576 (1.957)	-0.232 (1.382)	-2.591 (1.834)	-0.466 (1.384)
Cash flow stress (t-1)	-7.864** (0.276)	-0.664* (0.263)	-4.529** (0.281)	-0.686* (0.268)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.038	0.001	0.178	0.034
Rho		0.689		0.671
F statistic	280.282	2.877	160.039	20.692
Observations	21509	21509	20683	20683
<i>C: Financial hardship</i>	(1)	(2)	(3)	(4)
Wife's job loss	-0.793 (0.855)	-0.846 (0.601)	-0.381 (0.804)	-0.568 (0.608)
Wife's job loss x Financial hardship (t-1)	-0.692 (2.716)	-0.031 (1.967)	-2.335 (2.551)	-0.790 (1.979)
Financial hardship (t-1)	-11.412** (0.417)	-0.137 (0.372)	-5.947** (0.420)	-0.195 (0.378)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.035	0.000	0.175	0.033
Rho		0.691		0.672
F statistic	257.693	0.781	156.187	20.252
Observations	21453	21453	20628	20628
<i>D: Dissatisfaction with partner</i>	(1)	(2)	(3)	(4)
Wife's job loss	-0.728 (1.007)	-0.472 (0.708)	-0.521 (0.934)	-0.173 (0.714)
Wife's job loss x Wife's dissatisfaction (t-1)	0.134 (0.376)	-0.153 (0.260)	0.178 (0.350)	-0.096 (0.263)
Dissatisfied with partner (t-1)	-1.933** (0.057)	-0.255** (0.057)	-1.775** (0.055)	-0.167** (0.059)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.048	0.001	0.201	0.033
Rho		0.687		0.667
F statistic	395.095	7.607	206.295	22.879
Observations	23709	23709	22970	22970

Notes: Standard errors, reported in parentheses. **, *, + indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 5: Heterogeneity in the Effect of Husbands' Job Loss on Wives' Mental Health – Selected OLS and Fixed-Effects Estimates

<i>A: Re-employment of husband</i>	(1)	(2)	(3)	(4)
Husband's job loss	-2.083** (0.672)	-0.141 (0.498)	-1.511* (0.629)	-0.122 (0.499)
Husband's job loss x Husband not employed	-3.117* (1.372)	-2.146* (0.997)	-2.284+ (1.271)	-2.483* (0.993)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.001	0.000	0.150	0.023
Rho		0.661		0.638
F statistic	13.923	3.436	164.747	18.129
Observations	25614	25614	25292	25292
<i>B: Cash flow stress</i>	(1)	(2)	(3)	(4)
Husband's job loss	-1.806* (0.764)	0.024 (0.564)	-1.183+ (0.719)	0.107 (0.568)
Husband's job loss x Cash flow stress (t-1)	-0.939 (1.388)	-2.660* (1.043)	-1.933 (1.306)	-2.856** (1.041)
Cash flow stress (t-1)	-7.141** (0.276)	-0.573* (0.275)	-4.050** (0.286)	-0.549+ (0.284)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.032	0.001	0.159	0.022
Rho		0.658		0.639
F statistic	242.095	4.989	143.813	13.508
Observations	22124	22124	21262	21262
<i>C: Financial hardship</i>	(1)	(2)	(3)	(4)
Husband's job loss	-2.343** (0.671)	-0.457 (0.497)	-1.632* (0.634)	-0.393 (0.503)
Husband's job loss x Financial hardship (t-1)	-1.543 (2.136)	-4.229* (1.692)	-3.161 (2.005)	-4.738** (1.704)
Financial hardship (t-1)	-11.937** (0.442)	-0.543 (0.414)	-6.485** (0.452)	-0.643 (0.429)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.035	0.001	0.160	0.022
Rho		0.658		0.639
F statistic	264.018	3.989	143.501	13.383
Observations	22058	22058	21196	21196
<i>D: Dissatisfaction with partner</i>	(1)	(2)	(3)	(4)
Husband's job loss	-0.966 (0.828)	0.190 (0.630)	-0.297 (0.775)	0.122 (0.633)
Husband's job loss x Dissatisfied with partner (t-1)	-0.733* (0.289)	-0.432+ (0.222)	-0.686* (0.269)	-0.406+ (0.221)
Dissatisfied with partner (t-1)	-2.035** (0.054)	-0.323** (0.059)	-1.834** (0.053)	-0.280** (0.061)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.060	0.002	0.194	0.025
Rho		0.653		0.632
F statistic	517.148	13.224	202.282	17.766
Observations	24357	24357	23572	23572

Notes: Standard errors, reported in parentheses. **, *, + indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 6: Effect of Parental Job Loss on Adolescent Mental Health – Selected OLS and Fixed Effects Estimates

<i>A: Effect of father's job loss</i>				
	(1)	(2)	(3)	(4)
Father's job loss	-0.422 (1.064)	0.182 (0.952)	-0.776 (1.042)	-0.112 (0.969)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.000	0.000	0.061	0.015
Rho		0.598		0.594
F statistic	0.157	0.037	19.395	3.093
Observations	8098	8098	7805	7805
<i>B: Effect of mother's job loss</i>				
	(1)	(2)	(3)	(4)
Mother's job loss	-1.927+ (1.120)	-0.295 (1.002)	-2.370* (1.101)	-0.636 (1.034)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.000	0.000	0.058	0.014
Rho		0.592		0.589
F statistic	2.961	0.087	23.052	3.438
Observations	10056	10056	9722	9722

Notes: Standard errors, reported in parentheses. **, *, + indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 7: The Effect of Parental Job Loss on Adolescents' Mental Health by Parental Reemployment – Selected OLS and Fixed Effects Estimates

<i>A: Re-employment of father</i>				
	(1)	(2)	(3)	(4)
Father's job loss	-0.297 (1.213)	0.206 (1.078)	-0.658 (1.189)	0.046 (1.091)
Father's job loss x Father not employed	-0.543 (2.463)	-0.550 (2.168)	-0.488 (2.390)	-0.694 (2.189)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.000	0.000	0.061	0.015
Rho		0.599		0.594
F statistic	0.104	0.036	18.676	2.982
Observations	7954	7954	7805	7805
<i>B: Re-employment of mother</i>				
	(1)	(2)	(3)	(4)
Mother's job loss	-0.263 (1.406)	2.491+ (1.281)	-0.635 (1.381)	1.970 (1.294)
Mother's job loss x Mother not employed	-4.527* (2.292)	-7.164** (2.015)	-4.648* (2.230)	-6.838** (2.047)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.001	0.002	0.059	0.015
Rho		0.594		0.589
F statistic	3.456	6.376	22.367	3.729
Observations	9912	9912	9722	9722

Notes: Standard errors, reported in parentheses. **, *, + indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 8: The Effect of Parental Job Loss on Adolescent Mental Health by Adolescent Gender – Selected OLS and Fixed Effects Estimates

<i>A: Father's job loss</i>	(1)	(2)	(3)	(4)
Father's job loss	2.296 (1.460)	1.157 (1.286)	1.585 (1.429)	0.888 (1.298)
Father's job loss x Female	-5.691** (2.096)	-2.158 (1.913)	-4.924* (2.041)	-2.218 (1.914)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.001	0.000	0.062	0.016
Rho		0.598		0.594
F statistic	3.764	0.655	18.904	3.029
Observations	8098	8098	7805	7805
<i>B: Mother's job loss</i>	(1)	(2)	(3)	(4)
Mother's job loss	3.298* (1.584)	1.922 (1.413)	2.575+ (1.553)	1.871 (1.442)
Mother's job loss x Female	-10.310** (2.213)	-4.458* (2.004)	-9.721** (2.153)	-5.040* (2.021)
Controls	No	No	Yes	Yes
Fixed effects	No	Yes	No	Yes
R-squared	0.002	0.001	0.060	0.015
Rho		0.592		0.589
F statistic	12.338	2.517	22.997	3.544
Observations	10056	10056	9722	9722

Notes: Standard errors, reported in parentheses. **, *, + indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Data Appendix: Variable Definitions and Summary Statistics

Variable name	Definition	Means (Standard deviations)			
		Couples sample		Adolescents sample	
		Husband	Wife	Male	Female
<i>Outcome</i>					
MHI-5 (Mental Health Inventory)	Sub-scale of the SF-36 Health Survey that measures mental health. Scores are standardized to range from 0 to 100.	76.298 (15.815)	74.149 (16.512)	76.149 (15.653)	71.865 (17.119)
<i>Family employment status variables</i>					
Wife's (husband's) job loss	Equals 1 if partner reported involuntary job loss (got laid off / no work available / retrenched / made redundant / employer or business went out of business / dismissed) since last interview.	0.017 (0.131)	0.030 (0.172)	-	-
Father's job loss	Equals 1 if father reported involuntary job loss since last interview.	-	-	0.031 (0.174)	0.029 (0.168)
Mother's job loss	Equals 1 if mother reported involuntary job loss since last interview.	-	-	0.021 (0.145)	0.022 (0.148)
Partner employed	Equals 1 if partner was employed at the last interview.	0.721 (0.448)	0.885 (0.319)		
Partner ceased job (other reason)	Equals 1 if partner was employed at the last interview but ceased employment in that job for any reason other than involuntary job loss.	0.121 (0.326)	0.110 (0.313)		
Father employed	Equals 1 if father was employed at the last interview.			0.897 (0.305)	0.916 (0.278)
Father ceased job (other reason)	Equals 1 if father was employed at the last interview but ceased employment in that job for any reason other than involuntary job loss.			0.077 (0.266)	0.069 (0.253)
Mother employed	Equals 1 if mother was employed at the last interview.			0.744 (0.436)	0.761 (0.427)
Mother ceased job (other reason)	Equals 1 if mother was employed at the last interview but ceased employment in that job for any reason other than involuntary job loss.			0.085 (0.280)	0.083 (0.277)

Data Appendix (cont'd)

Variable name	Definition	Means (Standard deviations)			
		Couples sample		Adolescents sample	
		Husband	Wife	Male	Female
<i>Control variables</i>					
Cash flow problems (t-1)	Equals 1 if reported experiencing at least one of the following financial stresses at least once in since the start of the year because of a shortage of money: could not pay rent or mortgage on time; could not pay electricity, gas or telephone bills on time; or asked for financial help from friends or family. Values are lagged one period.	0.182 (0.386)	0.203 (0.402)	-	-
Financial hardship (t-1)	Equals 1 if reported experiencing at least one of the following financial stresses at least once since the start of the year because of a shortage of money: pawned or sold something; went without meals; unable to heat home; or asked for help from welfare / community organizations. Values are lagged one period.	0.071 (0.257)	0.068 (0.251)	-	-
Dissatisfaction with partner (t-1)	Score on a 0 to 10 scale, where 0 represents completely satisfied and 10 completely dissatisfied, lagged one period.	1.555 (1.777)	1.757 (1.926)	-	-
Age	Age (in years) at 30th June in year prior to interview.	43.891 (11.199)	41.478 (10.958)	17.178 (1.646)	17.121 (1.632)
Any children	Equals 1 if there are any children aged less than 15 years in the household.	0.474 (0.499)	0.483 (0.500)	0.439 (0.496)	0.434 (0.496)
# children	Number of own children aged less than 15 years living with respondent.	1.179 (1.216)	1.276 (1.249)	-	-
# adults	Number of persons aged 15 years or more living in the household.	2.425 (0.799)	2.425 (0.800)	3.466 (1.038)	3.481 (1.075)
Lone parent household	Equals 1 if it is a lone parent household.	-	-	0.232 (0.422)	0.224 (0.417)
Mild disability	Equals 1 if respondent has a restrictive long-term health condition or disability that does not limit work. (Persons who only reported having a mental illness are excluded.)	0.081 (0.273)	0.062 (0.241)	0.062 (0.241)	0.056 (0.229)

Data Appendix (cont'd)

Variable name	Definition	Means (Standard deviations)			
		Couples sample		Adolescents sample	
		Husband	Wife	Male	Female
Moderate disability	Equals 1 if respondent has a restrictive long-term health condition that limits work, but not totally. (Persons who only reported having a mental illness are excluded.)	0.133 (0.339)	0.125 (0.331)	0.047 (0.212)	0.061 (0.240)
Severe disability	Equals 1 if respondent has a restrictive long-term health condition that prevents any work being undertaken. (Persons who only reported having a mental illness are excluded.)	0.004 (0.063)	0.003 (0.050)	0.0004 (0.019)	0.001 (0.031)
Physical health	Physical functioning sub-scale of the SF-36 Health Survey. Scores are standardized to range from 0 to 100.	87.911 (19.342)	86.903 (18.944)	91.963 (20.134)	92.110 (18.017)
NLF	Equals 1 if respondent is not in the labor force (i.e., not employed and not actively seeking work) in the reference week of interview.	0.103 (0.304)	0.266 (0.442)	0.333 (0.471)	0.312 (0.463)
Unemployed	Equals 1 if respondent is not employed in the reference week of interview but is actively seeking work.	0.019 (0.135)	0.022 (0.146)	0.111 (0.314)	0.085 (0.279)
Prefer fewer hours	Equals 1 if respondent is employed in the reference week of interview but would prefer to work fewer hours.	0.302 (0.459)	0.202 (0.402)	0.029 (0.169)	0.039 (0.193)
Prefer more hours	Equals 1 if respondent is employed in the reference week of interview but would prefer to work more hours.	0.077 (0.267)	0.089 (0.285)	0.196 (0.397)	0.194 (0.396)
Full-time student	Equals 1 if respondent is a full-time student, either at school or studying full time, at the time of interview.	-	-	0.666 (0.472)	0.722 (0.448)
Homeowner	Equals 1 if respondent lives in a household where a member owns, or is paying the mortgage on, the place of residence.	0.782 (0.413)	0.779 (0.415)	0.757 (0.429)	0.768 (0.422)
Home equity	Estimated resale value of residence less value of outstanding home loans (\$m at 2011-12 prices), with missing values imputed.	0.403 (0.409)	0.402 (0.413)	0.418 (0.463)	0.439 (0.510)

Data Appendix (cont'd)

Variable name	Definition	Means (Standard deviations)			
		Couples sample		Adolescents sample	
		Husband	Wife	Male	Female
Regional unemployment	The official unemployment rate in the major statistical region for October of the interview year, and sourced from ABS, <i>Labour Force, Australia, Detailed - Electronic Delivery</i> (ABS cat. no. 6291.0.55.001), Table 02: Labour force status by State, Capital city / Balance of state and Sex.	4.954 (1.048)	4.953 (1.048)	4.959 (1.024)	4.910 (1.029)
Inner regional	Equals 1 if respondent lives in inner regional Australia (as defined in the Australian Standard Geographical Classification [ASGC]).	0.257 (0.437)	0.257 (0.437)	0.254 (0.435)	0.257 (0.437)
Outer regional	Equals 1 if respondent lives in outer regional Australia (as defined in the ASGC).	0.115 (0.319)	0.115 (0.319)	0.103 (0.304)	0.097 (0.296)
Remote	Equals 1 if respondent lives in remote or very remote location in Australia (as defined in the ASGC).	0.017 (0.128)	0.017 (0.130)	0.012 (0.110)	0.012 (0.108)
SEIFA index	Decile of index of relative socio-economic advantage/disadvantage for regions, where 1 represents highest relative disadvantage and 10 highest relative advantage (ABS 2001). It takes into account variables such as the proportion of families with high incomes, people with a tertiary education, and people employed in a skilled occupation.	5.725 (2.814)	5.723 (2.811)	5.652 (2.864)	5.731 (2.844)
Others present	Equals 1 if other adults were present during the respondent's interview.	0.468 (0.499)	0.408 (0.492)	0.411 (0.492)	0.423 (0.494)
NR at t+1	Equals 1 if the respondent did not respond at the next survey wave.	0.055 (0.229)	0.051 (0.219)	0.085 (0.279)	0.086 (0.280)
Separate from spouse	Equals 1 if respondent separated from partner sometime in the past year.	0.024 (0.153)	0.025 (0.157)	-	-
Left home	Equals 1 if the respondent left home sometime in the past year.	-	-	0.062 (0.242)	0.069 (0.253)

Note: These statistics are presented for the initial samples that completed an SCQ.

Appendix Table A: Effect of Partners' Job Loss on Mental Health – Complete OLS and Fixed-Effects Estimates

	<i>Husband's mental health</i>		<i>Wife's mental health</i>	
	(1)	(2)	(3)	(4)
Partner's job loss	-0.577 (0.694)	-0.413 (0.527)	-2.051** (0.553)	-0.706 (0.441)
Partner employed at last interview	0.686** (0.227)	-0.676** (0.249)	2.604** (0.331)	0.309 (0.372)
Partner ceased job (other reason)	-0.110 (0.294)	0.294 (0.231)	-0.884** (0.314)	-0.358 (0.254)
Age	-0.737** (0.075)	-0.777** (0.137)	-0.512** (0.077)	0.060 (0.144)
Age squared (/100)	1.028** (0.086)	0.820** (0.148)	0.804** (0.093)	-0.011 (0.165)
Any children (<15)	-0.802** (0.298)	-0.023 (0.314)	-0.003 (0.332)	0.587+ (0.350)
# children	0.167 (0.129)	-0.304+ (0.181)	-0.095 (0.141)	-0.689** (0.201)
# adults	-0.158 (0.149)	-0.032 (0.158)	-0.504** (0.163)	0.060 (0.176)
Mild disability	-3.010** (0.340)	-0.778** (0.283)	-3.474** (0.405)	-0.934** (0.347)
Moderate disability	-6.148** (0.330)	-2.417** (0.324)	-6.269** (0.343)	-2.791** (0.335)
Severe disability	-10.976** (1.505)	-2.497* (1.218)	-6.378** (1.887)	-2.485 (1.513)
Physical health	0.201** (0.006)	0.092** (0.006)	0.205** (0.006)	0.089** (0.006)
NLF	-5.128** (0.377)	-1.768** (0.392)	-2.410** (0.256)	-0.851** (0.273)
Unemployed	-5.345** (0.699)	-2.301** (0.584)	-5.340** (0.687)	-2.222** (0.585)
Prefer fewer hours	-2.380** (0.212)	-1.390** (0.189)	-1.974** (0.261)	-1.040** (0.230)
Prefer more hours	-1.828** (0.362)	-0.091 (0.310)	-2.978** (0.356)	-0.490 (0.303)
Homeowner	0.825** (0.277)	0.460 (0.348)	1.774** (0.290)	0.057 (0.377)
Home equity	1.965** (0.281)	0.355 (0.345)	0.326 (0.292)	0.055 (0.377)
Regional unemployment	-0.096 (0.092)	-0.088 (0.082)	-0.164+ (0.097)	-0.012 (0.089)
Inner regional	1.084** (0.237)	-0.070 (0.495)	2.489** (0.248)	1.804** (0.533)
Outer regional	1.454** (0.313)	0.471 (0.731)	2.322** (0.328)	1.002 (0.776)
Remote	1.590* (0.724)	-0.869 (1.203)	4.117** (0.746)	3.583** (1.276)
SEIFA index	0.061 (0.039)	0.057 (0.071)	0.270** (0.041)	0.050 (0.077)
Others present	0.740** (0.187)	0.568** (0.156)	0.751** (0.198)	0.212 (0.168)
NR at t+1	-0.851* (0.418)	-0.676+ (0.382)	-1.825** (0.457)	-0.513 (0.437)
Separation from spouse	-9.038** (0.618)	-6.105** (0.549)	-9.192** (0.632)	-4.860** (0.585)

Constant	70.778** (1.685)	87.057** (3.101)	61.211** (1.709)	64.493** (3.118)
Fixed effects	No	Yes	No	Yes
R-squared	0.165	0.032	0.150	0.023
Rho		0.661		0.638
F statistic	188.104	26.063	170.944	18.581
Observations	24849	24849	25292	25292

Note: Standard errors, reported in parentheses. **, *, + indicate statistical significance at the 1%, 5% and 10% levels.

Appendix Table B: Effect of Parental Job Loss on Adolescents' Mental Health – Complete OLS and Fixed-Effects Estimates

	<i>Father's job loss</i>		<i>Mother's job loss</i>	
	(1)	(2)	(3)	(4)
Parental job loss	-0.776 (1.042)	-0.112 (0.969)	-2.370* (1.101)	-0.636 (1.034)
Parent employed at last interview	2.273** (0.639)	0.083 (0.966)	0.628 (0.407)	-0.349 (0.674)
Parent ceased job (other reason)	-2.096** (0.701)	-0.725 (0.674)	-1.273* (0.598)	-0.207 (0.586)
Age	-0.435** (0.134)	-0.528** (0.138)	-0.394** (0.121)	-0.504** (0.125)
Any children	-0.540 (0.382)	-0.369 (0.627)	0.107 (0.346)	-0.232 (0.560)
# adults	0.694** (0.216)	0.531 (0.323)	0.680** (0.193)	0.300 (0.284)
Lone parent household	-2.323** (0.898)	-0.242 (1.906)	0.273 (0.473)	0.249 (1.146)
Mild disability	-4.349** (0.760)	-2.616** (0.796)	-4.440** (0.701)	-1.815* (0.723)
Moderate disability	-9.335** (0.837)	-3.534** (0.970)	-9.209** (0.728)	-3.269** (0.835)
Severe disability	-14.873* (7.107)	3.390 (6.530)	-20.359** (6.051)	-0.357 (5.552)
Physical health	0.115** (0.010)	0.043** (0.010)	0.104** (0.009)	0.051** (0.009)
NLF	-1.149* (0.465)	0.479 (0.503)	-1.799** (0.422)	-0.192 (0.454)
Unemployed	-3.533** (0.688)	-0.223 (0.672)	-3.337** (0.604)	-0.397 (0.594)
Prefer fewer hours	-4.862** (1.015)	-1.086 (0.936)	-4.620** (0.935)	-0.881 (0.861)
Prefer more hours	-1.184* (0.503)	0.201 (0.475)	-1.186** (0.458)	-0.021 (0.434)
Full-time student	0.373 (0.459)	-0.071 (0.453)	0.414 (0.411)	-0.290 (0.410)
Ln household disposable income	-0.365 (0.575)	1.063 (1.041)	-0.709 (0.495)	0.694 (0.881)
Non-positive income	0.010 (0.423)	-0.534 (0.800)	0.877* (0.422)	-0.538 (0.752)
Homeowner	0.421* (0.184)	-0.177 (0.221)	0.445** (0.167)	-0.107 (0.198)
Home equity	0.903+ (0.464)	0.451 (1.412)	0.850* (0.423)	-0.522 (1.218)
Regional unemployment	0.811 (0.644)	0.524 (1.828)	0.415 (0.590)	-1.863 (1.588)
Inner regional	0.677 (1.779)	2.292 (4.030)	3.707* (1.520)	3.527 (3.245)
Outer regional	-0.071 (0.080)	-0.001 (0.212)	0.088 (0.071)	0.018 (0.185)
Remote	0.683+ (0.379)	0.492 (0.391)	0.968** (0.341)	0.518 (0.351)
SEIFA index	-0.368 (0.702)	0.356 (0.798)	-0.431 (0.614)	0.387 (0.702)
Others present	-1.663+ (0.973)	0.153 (1.162)	-2.096* (0.824)	-0.734 (0.938)
NR at t+1	-0.776 (1.042)	-0.112 (0.969)	-2.370* (1.101)	-0.636 (1.034)

Left home	2.273** (0.639)	0.083 (0.966)	0.628 (0.407)	-0.349 (0.674)
Constant	66.728** (2.981)	77.659** (3.685)	67.328** (2.631)	78.279** (3.213)
Fixed effects	No	Yes	No	Yes
R-squared	0.061	0.015	0.058	0.014
Rho		0.594		0.589
F statistic	19.395	3.093	23.052	3.438
Observations	7805	7805	9722	9722

Note: Standard errors, reported in parentheses. **, *, + indicate statistical significance at the 1%, 5% and 10% levels.