



# Job displacement and the mental health of households: Burden sharing counteracts spillover<sup>☆</sup>

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## ABSTRACT

In this paper, I investigate the mental health effects of job displacement in 1-adult and 2-adult households. In a 1-adult household, if a worker loses a job unexpectedly, significant mental health deterioration can become manifest. In a 2-adult household, the deterioration may be less severe for the displaced worker due to burden and risk sharing with the partner. However, in this 2-adult household, there exists the additional risk of the partner's unemployment, which could be detrimental to the worker's mental health. I compare the overall burden in 1- and 2-adult households and find no statistically significant difference. This follows because the distress associated with the partner's displacement is offset by the lower distress upon own displacement. Regarding gender differences, I show that job displacement upsets male and female workers for different reasons and to different extents depending on partnership status. These results offer fresh insights into unemployment shocks, the crucial role of partner support, and how the gender gap in mental health can be linked to household structure.

## 1. Introduction

When job displacement occurs, the distress levels of displaced workers and their partners elevate as a result.<sup>2</sup> Considerable research has linked job displacement—that is, workers being fired or made redundant unexpectedly, despite their willingness to work at the prevailing wage (e.g., Shapiro and Stiglitz, 1984)—to the psychological well-being of the displaced (e.g., Kuhn et al., 2009; McInerney et al., 2013; Schaller and Stevens, 2015; Schiele and Schmitz, 2016). Recent studies also reveal that the well-being of the partner is similarly affected by unemployment or job stress (Bubonya et al., 2017a; Clark, 2003; Everding and Marcus, 2020; Fletcher, 2009; Marcus, 2013; Mendolia, 2014; Nikolova and Ayhan, 2019; Siegel et al., 2003). Hence, in a 2-adult household

(that is, a household with two adult partners), workers are subject to a potential mental health spillover, because their partners may encounter job displacement, and displacement blues are contagious.

At the same time, having a partner also confers mental health benefits when workers lose their jobs involuntarily. From a burden-sharing perspective, displaced workers can seek emotional support from their partners.<sup>3</sup> From a risk- and income-sharing perspective, pooling wages with partners ensure household income will not plunge to zero when workers encounter unemployment shocks (Mazzocco, 2004). Working partners can increase work hours to maintain household financial secu-

<sup>3</sup> See, for instance, the framework proposed by Feeney and Collins (2015).

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<sup>2</sup> In this paper, the term “worker” refers to the partner who potentially experiences job displacement, and “partner” is the remaining member in a couple who might also be employed.

rity (Kohara, 2010); non-working partners may choose to (or be compelled to) find employment to compensate for the income loss (e.g., Lundberg, 1985). In a 1-adult household (that is, a household with one adult member), whilst a worker lacks the means of sharing the mental health burden or insuring against an income shock within the household, the worker is spared the additional risk of a partner's displacement.

The phenomenon begs the first research question: Is there a mental health difference in having a partner when job displacement takes place? To motivate the question, consider a hypothetical individual who can either form a 1-adult household or be part of a 2-adult household. In a 1-adult household, the individual loses their job involuntarily and incurs a mental health cost  $MH_1$ . In a 2-adult household, when job displacement unfolds, the mental health repercussions are likely less severe because of the tangible (e.g., financial) and intangible (e.g., psychological) support from partners. Meanwhile, the individual's partner may experience involuntary job loss, which is shown to be detrimental to the individual's mental health. The expected mental health effect for the individual in this 2-adult household, is  $MH_2$ . The research question asks, given the tradeoff between own mental health gain and the partner's mental health spillover, whether  $MH_2$  is different from  $MH_1$ .

The second research question concerns gender: Do males and females undergo similar mental health challenges when displaced? The question is fueled by a few observations. Regardless of household type, the gender pay gap (e.g., Blau and Kahn, 1996; Watson, 2010) predicts a greater loss of income for males than for females. Under this view, male workers may confront higher financial strains and more mental health issues. In terms of gender division of labor (Baker and Jacobsen, 2007), men have long been viewed and treated as the breadwinners of the family. The provider stress and gender perception of job loss are therefore different for men and women in 2-adult households. In 1-adult households, women are more likely than men to be single parents supporting dependent children.<sup>4</sup> As such, women may face greater provider stress and find the unemployment experience more overwhelming.<sup>5</sup> Following from the above, potential gender differences can become less clear-cut when examined in different types of households.

To seek answers to these two questions—how the mental health toll of job displacement differs by household composition and gender—I make use of the Health, Income and Labor Dynamics in Australia (HILDA) survey from 2007 to 2019. I estimate the impact of job displacement separately for 1-adult and 2-adult households, men and women, and workers and partners. To facilitate the comparison with displaced workers, I reweigh non-displaced workers based on their observable characteristics. For each individual, I construct the difference in mental health across survey waves; the resulting measure tracks the changes in the individual's well-being during the treatment period. In short, the empirical approach addresses selection issues through reweighting, and it accounts for time-invariant unobservable characteristics through differencing. It does not, however, deal with selection on unobservable time-varying traits, nor does it address similarities across types of households and gender. These remain the limitations of the current empirical strategy.

The results reveal that job displacement influences the mental health of 1-adult and 2-adult households alike ( $p$ -value = 0.27 for males and 0.28 for females), notwithstanding the statistically significant spillover effects. This emerges from the fact that by having partners, displaced workers enjoy a discount on the emotional burden, and the discount is of similar size to any mental health spillover from the partners' potential unemployment. In fact, if one factors in the differences in the prevalence of job loss, a worker likely benefits from being in a 2-adult household.

Furthermore, being unemployed (becoming reemployed) after job displacement gives rise to significant gender differences in 2-adult (1-adult) households ( $p$ -values = 0.03). I conjecture that the interplay of (relative) financial contribution to the household and gendered perception of job loss is accountable for such heterogeneity. For men, job displacement appears to be linked to high distress independent of earnings or their relative contributions to household income.

The remainder of the paper is organized as follows. Section 2 surveys related literature. Section 3 introduces the data and variables and describes the methodology. Section 4 presents the summary statistics and conveys the key results. Section 5 discusses further results. Section 6 concludes the paper.

## 2. Related literature

Much of this work's focus is devoted to the distinction, or lack thereof, between 1-adult and 2-adult households: Does household composition affect an individual's expected mental health after an unemployment shock? Regarding household composition and well-being, prior research offers two prominent views that appear contradictory. Studies such as Clark (2003) and Bünnings et al. (2017) advance understanding of the spillover burdens within households. In the meantime, the literature on risk-sharing directs attention towards how household members provide insurance against health shocks (Dercon and Krishnan, 2000) and wage shocks (Blundell et al., 2016). The current work reconciles the two views and examines whether the burdens of mental health spillover are counteracted by the benefits of partnership at the household level.

In the study of unemployment and mental health, one common specification involves the use of marital status as a conditioning variable (e.g., Clark et al., 2010; McInerney et al., 2013; Salm, 2009; Theodosiou, 1998; Wang et al., 2018). Helpful as this formulation can be, it does not account for the additional risk of partners' unemployment and the spillover distress that follows. Another set of specifications deals primarily with the spillover among partners, and for that reason, offers comparisons within households but not between types of households. An example is Marcus (2013), a close cousin of the current study. The author concentrates on cohabiting spouses in the German Socio-Economic Panel Study and finds that unemployment is almost as detrimental to spouses as it is to workers. The current work draws inspirations from the conditioning of marital status in previous work, builds on Marcus' specification, and expands the analysis in a methodologically important direction, by allowing a counterfactual analysis of 1-adult versus 2-adult household structures that takes into account both displacement-related distress and distress spillover.

Because of this unique counterfactual setup that bridges different types of households, no study in the literature appears to be directly comparable. Nevertheless, there are recent studies in labor economics appealing to 1-adult or 2-adult households separately. For 1-adult households with children, research typically concerns work search (Avram et al., 2018) and time investment (Mencarini et al., 2019) of the working adult. For 2-adult households, Winkelmann (2005) elaborates on the role of unemployment on parents' and children's subjective well-being, modeled as a joint distribution;<sup>6</sup> Booth and Van Ours (2009) map partners' employment type to family well-being; Mariotti et al. (2016) explore how households function as a risk-sharing tool for coping with job insecurity.

With respect to general health, economists have also provided separate evidence for 1-adult and 2-adult households. To begin with, spousal bereavement is a stimulus of cognitive impairment (e.g., Zhao et al.,

<sup>4</sup> In 2022, over 80% of 1-adult households with dependent children are female-headed in Australia (Australian Bureau of Statistics, 2022).

<sup>5</sup> For a review of the literature on single motherhood, economic hardship, and self-assessed (mental) health, see Rousou et al. (2013).

<sup>6</sup> Winkelmann (2005) specifies a hierarchical ordered probit model with random effects for both individuals and households. Using the German Socio-Economic Panel data spanning 1984 and 1997, the author discovers that unemployment strongly predicts low household well-being.

2021). Likewise, divorce underlies adverse changes in physical and mental health (Zulkarnain and Korenman, 2019). Meanwhile, Davillas and Pudney (2017) observe that there exists a concordance between partners' health states. In addition, chronic illness (Holmes and Deb, 2003), disability (Braakmann, 2014), and drug dependency (Noori et al., 2015) can induce spillover effects on the mental health of partners.

Taken together, these separate findings enrich the discussion of household heterogeneity. Another dimension examined in this paper, gender heterogeneity in unemployment distress, has been extensively observed in the literature (e.g., Clark, 2003; Cygan-Rehm et al., 2017; Llana-Nozal et al., 2004; Theodossiou, 1998). How this heterogeneity varies by household composition is the novel question that the current research aims to answer.

### 3. Data and methods

#### 3.1. Data

The analysis is based on data from the Household, Income, and Labor Dynamics in Australia (HILDA, v19) survey from 2007 to 2019. Respondents of the survey are chosen to form a representative sample of households living in private dwellings in Australia (Wilkins et al., 2021). To date, over 43,700 individuals have participated in the survey at least once.

The HILDA survey offers several advantages. First, partners of the respondents also form part of the survey sample; they respond to survey modules and are linked to respondents from the same household. Second, the longitudinal nature of the survey allows users to monitor the changes in workers' and partners' mental health across survey waves. Third, over and above labor dynamics and mental health, the survey encompasses a diverse range of topics in demographics, socio-economic conditions, physical health, and household characteristics.

What necessitates the use of observational data is the fact that for obvious ethical reasons, one cannot randomly assign job displacement to study the mental health impacts. In HILDA, researchers have ready access to data on experiences of job displacement. The labor dynamics module also provides information on employment history, labor earnings, and job characteristics. These variables, along with other individual and household characteristics, ensure the proper accounting of various observable reasons for entry into unemployment (e.g., Clark et al., 2001).

#### 3.2. Outcome measure

In the analysis, changes in the standardized Kessler Psychological Distress Scale or SK10 constitute the outcome variable. In the HILDA survey, the mental health module is centered on the (non-standardized) Kessler Psychological Distress Scale. The scale was designed as a short screening tool to monitor the prevalence and trends in psychological distress in surveys (Kessler et al., 2002).<sup>7</sup> It has well-established internal consistency, reliability, and validity (e.g., Hides et al., 2007; Searle et al., 2015). The scale has been widely adopted by health economists in related studies (e.g., Chatterji et al., 2007; Johnston et al., 2013; Nguyen and Connelly, 2018).

Since 2007, the scale has been incorporated as a biennial measure into the HILDA survey. The emphasis is on current mental status, since respondents are asked to report psychological symptoms in the four weeks immediately preceding the interview. The scale, on its own, serves as a non-specific measure of mental well-being. The 10 items under the scale cast light on the different domains of well-being (e.g., depressed mood or anxiety). Appendix A presents the item inventory and Section 5.2 explores these domains.

<sup>7</sup> In the sample, the correlation between the standardized scale (SK10) and life satisfaction is 0.42, and the correlation between SK10 and health satisfaction is 0.39.

For the regression analysis, I create SK10 by standardizing the scores to have a mean of 50 and a standard deviation (SD) of 10. I then construct the changes in SK10 scores between survey waves as the outcome of interest. Workers and partners are modeled on changes in their respective SK10 scores.

#### 3.3. Treatment and control groups

The treatment period is defined over two years—the interval at which the SK10 is surveyed in HILDA. I focus on households that provide valid SK10 scores both before ( $t - 2$ ) and after ( $t$ ) the treatment. Overall, the analysis pools six treatment periods from 2007 to 2019. The main specification estimates the average mental health effects of being displaced, with displacement onset at any possible point (0 to 24 months) over the pooled treatment period. Figure 1 presents a detailed breakdown of the sample.

Workers report their treatment status in answer to the question “Did any of these happen to you in the past 12 months? Fired or made redundant by an employer.” Respondents who experienced at least one such employment transition in the treatment period are considered treated. Due to low incidence, I do not analyze multiple displacement episodes as separate treatment categories. Before the treatment, workers are required to be in the labor force, employed, and aged between 18 and 65. For 1-adult households, I additionally require that the workers have no partners. In 2-adult households, only partners who have been interviewed are included in the sample. After the treatment, workers who have undergone job displacement should remain unemployed but have not exited the labor force. Meanwhile, the control group comprises workers who have not changed jobs between  $t - 2$  and  $t$ . I exclude partners who missed interviews, changed partners, or experienced job displacement themselves during the treatment period.

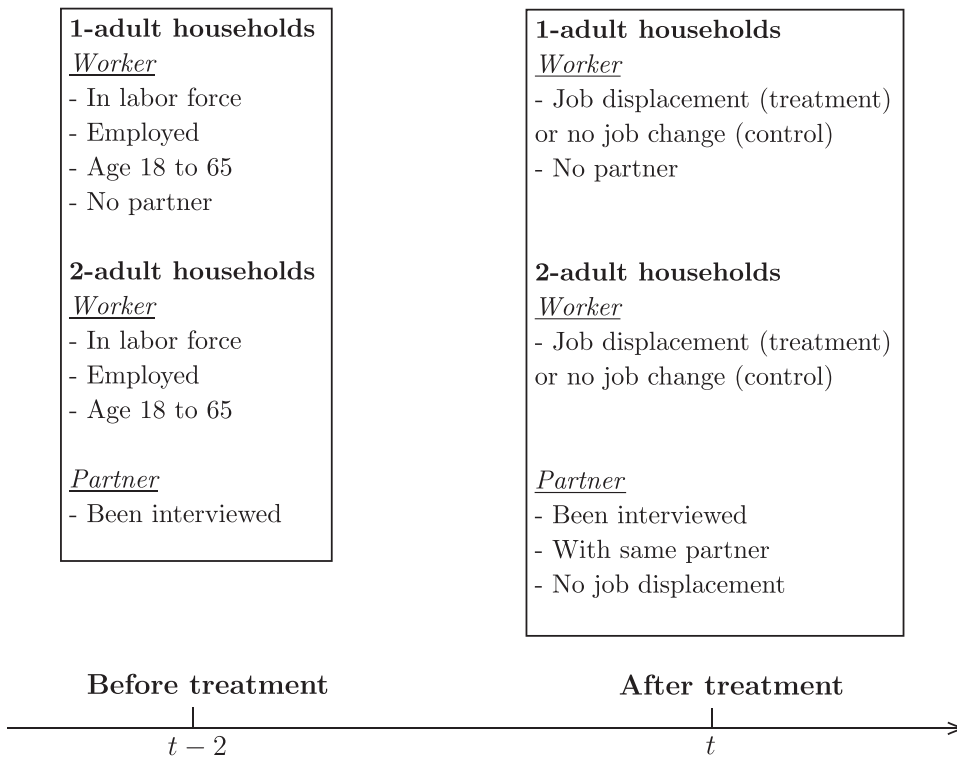
The final sample for analysis comprises 8191 households with one adult and 20,058 households with two adults. The treatment group consists of 434 (530) households with one adult (two adults), in 222 (326) of which the displaced worker is male. I have not been able to examine same-sex couples as there are only five pairs in the treatment group for the main specification, and only one pair for one of the alternative specifications. In other words, the small sample size prevents me from studying these couples as a separate treatment group.<sup>8</sup> That said, I do include individuals with same-sex identity for 1-adult households, and bisexual or other identity for both types of households.

The definition of treatment and control groups inevitably points towards a highly selective sample. As we shall see, other employment events can also alter an individual's mental state. The restrictions on job change and employment status thus ensure that the effects of job displacement are largely unconfounded. To this end, the definition also excludes those with a change in relationship status, namely, becoming single, becoming part of a couple, or changing partners in the current context. I relax some of these requirements and discuss the implications of the rest in Section 4. Lastly, despite the fact that I pool job displacement across different types of employment, occupations, and industries to make it less sensitive to the definition, the risk of bias due to non-random assignment persists and remains a limitation of the paper, in common with virtually any study of a life event (such as labor market or health shocks) that cannot be the subject of a controlled experiment.

#### 3.4. Covariates

The analysis includes a list of pre-treatment covariates categorized as individual or household characteristics. The list parallels Marcus (2013) with additions and modifications due to differences in survey and study designs.

<sup>8</sup> Regarding sexual orientation, labor market conditions, and health outcomes, examples of recent investigations include Charlton et al. (2018) and Owens et al. (2022).



**Fig. 1.** Inclusion criteria for the treatment and control groups. Different criteria apply to 1-adult and 2-adult households. The criteria also differ between time  $t - 2$  (before treatment) and time  $t$  (after treatment). Unless specified, the treatment and control groups share the same criteria.

The individual category contains demographics (age, gender, non-English speaker status, and sexual identities), health (physical health and general health), education (secondary schooling, university degree, and vocational training), and labor market (earnings, never unemployed, years in paid work, company size, job security, occupation, industry, employment type, casual worker, and income share in household).

The household category consists of dependent children, regional profile and locality (unemployment rate, neighborhood coherence, remoteness area, state, or territory), well-being (ranks on socio-economic status, economic resource, and education and career), life events, and cohabitation status. Table B.1 in Appendix B defines the covariates and specifies the subsets designated for different household compositions (one adult or two adults).

### 3.5. Empirical approach

To estimate the effects of job displacement on the mental health of households, I execute a two-step procedure that involves first constructing weights that measure the similarities between the treated and the controls, and then running weighted least squares regressions. I estimate average treatment effect on the treated (ATT), where the mental health effects pertain to those who, or whose partner, actually experienced job displacement (Marcus, 2013).

In the first step, I reweigh non-displaced households using pre-treatment circumstances; see the covariates listed in Section 3.4. This ensures that the treatment and reweighted control groups are comparable in terms of observable characteristics. More specifically, I divide the sample by household type and gender, creating four strata: 1-adult male households, 1-adult female households, 2-adult households where the displaced worker is male, and 2-adult households where the displaced worker is female. Weights are constructed separately for each stratum to reduce the variability within groups. To implement this step, I use entropy balancing developed by Hainmueller (2012), a reweight-

ing scheme that balances multiple sample moments and is doubly robust (Zhao and Percival, 2017).<sup>9</sup>

In the second step, I regress changes in SK10 on the treatment indicator and pre-treatment characteristics, applying the weights obtained from the reweighting step. The specification is given by

$$\widehat{\mathbf{W}}^{1/2} \Delta \mathbf{y} = \alpha \widehat{\mathbf{W}}^{1/2} \mathbf{1} + \gamma \widehat{\mathbf{W}}^{1/2} \mathbf{d} + \widehat{\mathbf{W}}^{1/2} \mathbf{X} \beta + \widehat{\mathbf{W}}^{1/2} \varepsilon, \quad (1)$$

where  $\widehat{\mathbf{W}}^{1/2}$  is the square root of the weight matrix from entropy balancing,  $\Delta \mathbf{y} = \mathbf{y}_t - \mathbf{y}_{t-2}$  is the change in SK10 score,  $\mathbf{1}$  is a vector of 1s,  $\mathbf{d}$  is the treatment indicator with  $d_i = 1$  if worker  $i$  is displaced and 0 otherwise,  $\mathbf{X}$  is the matrix of covariates that is used both for reweighting and conditioning, and  $\mathbf{W}^{1/2} \varepsilon$  is the weighted error term. I estimate Eq. (1) using (weighted) least squares and obtain  $\hat{\theta} = (\tilde{\mathbf{X}}' \tilde{\mathbf{W}} \tilde{\mathbf{X}})^{-1} \tilde{\mathbf{X}}' \tilde{\mathbf{W}} \Delta \mathbf{y}$ , where  $\theta = (\alpha, \gamma, \beta')'$  and  $\tilde{\mathbf{X}} = [\mathbf{1} \ \mathbf{d} \ \mathbf{X}]$ . The ATT parameter is given by  $\gamma$ , and all standard errors are clustered on household IDs.<sup>10</sup>

The specification has two merits. First, the reweighting process reduces the bias in ATT that arises from covariate imbalance between the displaced and non-displaced. Second, by constructing the differences in SK10 before and after the treatment, I control for unobservable, time-invariant heterogeneity (imperfect examples being partner preferences and risk profile) in a manner similar to first differencing in the panel data literature.

The specification also has drawbacks. First, it is not on a par with panel data analysis on within-individual variations in mental health. Such analysis is not undertaken due to sample size constraints. Second, even though reweighting addresses selection on observables and differencing addresses selection on unobservables, selection issues likely

<sup>9</sup> Entropy balancing weights are generated using the `ebalance` program (Hainmueller and Xu, 2013) in Stata 17.0.

<sup>10</sup> In the same household cluster, I gather individuals belonging to the same household (because workers' mental health can be correlated with the partners' mental health), as well as those who repeatedly appear in the sample (because one's own mental health can be correlated over time). This way, I do not over-count observations. For the main specification, there are 28,249 individuals and 10,839 clusters.



**Table 1**  
Descriptive statistics for selected pre-treatment covariates.

Pre-treatment variable	Male displacement				Female displacement			
	Treated	Unweighted controls	Reweighted controls	Difference	Treated	Unweighted controls	Reweighted controls	Difference
<b>1-adult households, workers</b>								
Age (in years)	40.1	38.8	40.1	1.3	42.4	42.0	42.4	0.4
Non-English <sup>†</sup>	7.2	7.0	7.2	0.2	8.0	8.6	8.0	-0.6
University degree <sup>†</sup>	15.8	17.8	15.8	-2.0	21.2	30.6	21.2	-9.4***
Labor earnings (in 10,000 AUD)	4.3	4.5	4.3	-0.2	3.1	3.9	3.1	-0.8***
Job security (0–20)	13.3	15.0	13.3	-1.7***	12.9	15.3	12.9	-2.4***
Casual worker <sup>†</sup>	36.9	20.3	36.9	16.6***	38.7	21.9	38.7	16.8***
Number of dependent children <sup>a</sup>	0.1	0.1	0.1	-0.0	0.3	0.3	0.3	-0.0
N	222	3673	3673	—	212	4084	4084	—
<b>2-adult households, workers</b>								
Age (in years)	46.1	43.9	46.1	2.2***	45.3	43.3	45.3	2.0***
Non-English <sup>†</sup>	12.9	9.7	12.9	3.2*	9.8	10.4	9.8	-0.6
University degree <sup>†</sup>	25.8	31.6	25.8	-5.8**	31.4	40.3	31.4	-8.9***
Labor earnings (in 10,000 AUD)	7.4	6.4	7.4	1.0***	3.8	4.0	3.8	-0.2
Job security (0–20)	13.1	15.5	13.1	-2.4***	12.1	15.6	12.1	-3.5***
Casual worker <sup>†</sup>	20.9	7.5	20.9	13.4***	24.0	16.7	24.0	7.3***
Number of dependent children <sup>a</sup>	0.7	0.9	0.7	-0.2***	0.5	0.8	0.5	-0.3***
Household income share	0.6	0.6	0.6	0.0	0.4	0.4	0.4	-0.0
<b>2-adult households, partners</b>								
Age (in years)	44.1	42.3	44.1	1.8***	47.1	45.4	47.1	1.7**
Non-English <sup>†</sup>	15.0	11.1	15.0	3.9**	8.8	8.9	8.8	-0.1
Labor earnings (in 10,000 AUD)	2.7	3.1	2.7	-0.4*	6.3	5.7	6.3	0.6
Unemployed <sup>†</sup>	34.4	22.6	34.4	11.8***	10.8	8.1	10.8	2.7
Employed full-time <sup>†</sup>	31.9	35.0	31.9	-3.1	71.6	76.2	71.6	-4.6
N	326	10,535	10,535	—	204	8993	8993	—

Notes: Descriptive statistics conditional on treatment and reweighting status for selected covariates. <sup>a</sup> Number of dependent children is included in the specification as dummy variables: no dependent child, one dependent child, two dependent children, three dependent children, and more than three dependent children. I perform separate reweighting for 1-adult households and 2-adult households, and males and females. “Treated,” “unweighted controls,” and “reweighted controls” present the means of covariates for the displaced, non-displaced, and non-displaced after reweighting, respectively. “Difference” tests the difference in means between the treatment and unweighted control groups for each covariate. A <sup>†</sup> indicates percentage mean. \* $p < 0.10$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ . Most tables in the present work are produced with the help of Stata’s `estout` command (Jann, 2005; 2007).

persist because job displacement is a non-random assignment. For one thing, reweighting does not provide a perfect solution to selection on observables, especially between different types of households.<sup>11</sup> For another, unobservable time-varying traits such as ability, employability, and perception have not been accounted for. Workers may become less employable or perceive themselves to be less employable after job displacement, and in turn, suffer from poorer mental health.

## 4. Results

### 4.1. Descriptive statistics

Table 1 reports the descriptive statistics of selected covariates conditional on treatment and reweighting status. Sample means for covariates in the treatment group, unweighted control group, and reweighted control group are presented. I further quantify and test the difference between the treated and unweighted controls. Significant differences necessitate the reweighting step, as they reflect marked contrast between the treated and controls in terms of mean characteristics. Statistics are presented separately by household type (1-adult or 2-adult households), gender (male or female), and household role (worker or partner).

In 1-adult households, compared to the control group, male workers from the treatment group report lower average job security (by 1.7

points on a 20-point scale) and work more often on a casual basis (by 16.6 percentage points). Female workers in the treatment group are less likely to have a university degree (21.2% versus 30.6%) and earn, on average, 8000 AUD less per year than their non-displaced counterparts before the treatment.

For workers from 2-adult households, these differences are also observed to different extents. In addition, workers with partners in the treatment group are generally more advanced in age (by 2 to 2.2 years) and have, on average, 0.2 to 0.3 fewer dependent children (included as dummy variables) than their counterparts in the control group. Partners of displaced male workers are more likely to be unemployed before the treatment than partners of non-displaced male workers (34.4% versus 22.6%). Even though males and females are not directly compared in the table, one observes that regardless of treatment status, no more than 35% of female partners are employed, while over 70% of male partners are employed prior to the treatment.

The “treated” column, together with the “reweighted controls” column, demonstrates that for all covariates displayed here, exact matching of the first sample moment has been achieved through entropy balancing. The same has been achieved for the remaining covariates that are not displayed. Put differently, after reweighting, the means of all covariates are identical between the treatment and control groups. Note that for these covariates, the reweighting algorithm also balances the second sample moment, which is not reported here.

### 4.2. Main results on mental distress

Table 2 presents the key findings of the displacement effects on the mental health of workers and partners. I pool respondents from all treatment periods and perform separate regression analysis based on household type (1-adult and 2-adult households). I further slice the sample

<sup>11</sup> One example kindly given by the editor is that 1-adult households without children may, in a few years, become 2-adult households with children. While the separate reweighting strategy enhances comparability within the two individual groups, it does not deal with the similarities between the two groups over time. One solution is again panel data, wherein one observes enough individuals who are treated both in 1-adult households without children and in 2-adult households with children.

**Table 2**  
The effect of job displacement on mental health.

	(1) Main specification (unemployed)			(2) Reemployed			<i>p</i> -val. of diff. b/t	(3) Unemployed and reemployed			<i>p</i> -val. of diff. b/t
	<i>b</i>	<i>se</i>	<i>N</i> <sub>Treated</sub>	<i>b</i>	<i>se</i>	<i>N</i> <sub>Treated</sub>	(1) & (2)	<i>b</i>	<i>se</i>	<i>N</i> <sub>Treated</sub>	(1) & (3)
<b>All households</b>											
All displacement for workers ( $\hat{\gamma}_1$ )	2.31***	(0.35)	964	0.04	(0.24)	1373	0.00	0.98***	(0.21)	2337	0.00
Male displacement for workers ( $\hat{\gamma}_2$ )	2.63***	(0.47)	548	-0.16	(0.34)	881	0.00	0.90***	(0.30)	1429	0.00
Female displacement for workers ( $\hat{\gamma}_3$ )	1.89***	(0.47)	416	0.40	(0.31)	492	0.01	1.11***	(0.29)	908	0.12
<b>1-adult households</b>											
All displacement for workers ( $\hat{\gamma}_4$ )	3.40***	(0.91)	434	0.35	(0.54)	430	0.00	1.87***	(0.53)	864	0.10
Male displacement for workers ( $\hat{\gamma}_5$ )	3.76***	(1.28)	222	-0.68	(0.69)	220	0.00	1.54**	(0.76)	442	0.09
Female displacement for workers ( $\hat{\gamma}_6$ )	3.02***	(1.09)	212	1.42**	(0.69)	210	0.19	2.22***	(0.68)	422	0.49
<b>2-adult households</b>											
All displacement for workers ( $\hat{\gamma}_7$ )	1.44***	(0.29)	530	-0.09	(0.24)	943	0.00	0.46**	(0.20)	1473	0.00
Male displacement for workers ( $\hat{\gamma}_8$ )	1.88***	(0.38)	326	0.02	(0.36)	661	0.00	0.62**	(0.29)	987	0.01
Female displacement for workers ( $\hat{\gamma}_9$ )	0.74**	(0.36)	204	-0.37	(0.27)	282	0.01	0.15	(0.25)	486	0.15
All displacement for partners ( $\hat{\gamma}_{10}$ )	0.86***	(0.27)	530	-0.47*	(0.26)	943	0.00	0.04	(0.19)	1473	0.01
Male displacement for partners ( $\hat{\gamma}_{11}$ )	1.00***	(0.37)	326	-0.34	(0.39)	661	0.01	0.18	(0.30)	987	0.08
Female displacement for partners ( $\hat{\gamma}_{12}$ )	0.64**	(0.32)	204	-0.75***	(0.27)	282	0.00	-0.24	(0.21)	486	0.02
<i>p</i> -value of joint difference across specifications							0.00				0.00
<b><i>p</i>-value of difference within specification</b>											
<b>Direct difference</b>											
All, $H_0 : \gamma_4 = \gamma_7$	0.04			0.46				0.01			
Males, $H_0 : \gamma_5 = \gamma_8$	0.16			0.37				0.26			
Females, $H_0 : \gamma_6 = \gamma_9$	0.05			0.02				0.00			
<b>Household difference</b>											
All, $H_0 : \rho_1\gamma_4 = \rho_1\gamma_7 + \rho_{10}\gamma_{10}$	0.19			0.18				0.02			
Males, $H_0 : \rho_2\gamma_5 = \rho_2\gamma_8 + \rho_{12}\gamma_{12}$	0.27			0.69				0.20			
Females, $H_0 : \rho_3\gamma_6 = \rho_3\gamma_9 + \rho_{11}\gamma_{11}$	0.28			0.02				0.03			
<b>Gender difference</b>											
All, $H_0 : \gamma_2 = \gamma_3$	0.27			0.23				0.62			
1-adult households, $H_0 : \gamma_5 = \gamma_6$	0.66			0.03				0.50			
2-adult households, $H_0 : \gamma_8 = \gamma_9$	0.03			0.39				0.21			
<b>Role difference</b>											
All, $H_0 : \gamma_7 = \gamma_{10}$	0.12			0.24				0.09			
Males, $H_0 : \gamma_8 = \gamma_{12}$	0.01			0.09				0.02			
Females, $H_0 : \gamma_9 = \gamma_{11}$	0.61			0.96				0.93			

**Notes:** The effect of job displacement on mental health. Pooled estimates as well as separate estimates for 1-adult and 2-adult households, males and females, and workers and partners are reported. All specifications estimate the ATT using Eq. (1), namely, reweighted difference in changes in mental health with covariates. Covariates are detailed in Appendix B. Specification (1) is for displaced workers who remain unemployed. Specification (2) studies households wherein displaced workers become reemployed. Specification (3) combines the treatment groups in (1) and (2). For all specifications, the control group comprises 7757 (19528) households with one (two) adults, 3673 (10535) of which involve male workers who experienced no job change. *b*, *se*, and *N*<sub>Treated</sub> report the estimate, standard error (clustered on household IDs), and the number of treated units. I use  $\hat{\gamma}_j, j = 1, \dots, 12$  to denote the estimated coefficients and  $\rho_j, j = 1, \dots, 12$  to denote the corresponding sample prevalence, reported in Appendix C. Here,  $\rho_7 = \rho_{10}, \rho_8 = \rho_{11}$ , and  $\rho_9 = \rho_{12}$ . I conduct Wald tests on cross-specification differences for each coefficient separately and for all coefficients jointly, reporting *p*-values in the top panel. In the bottom panel, I present the *p*-values for Wald tests on coefficients from the same specification. “Direct difference” tests whether the mental health burden is similar for displaced workers from 1-adult and 2-adult households. “Household difference” tests whether being in a 1-adult household carries different mental health implications from being part of a 2-adult household when displacement occurs. “Gender difference” tests whether job displacement affects male and female workers in like manner. “Role difference” tests whether being a displaced worker implies the same mental health consequences as being a partner in a 2-adult household.

\**p* < 0.10. \*\**p* < 0.05. \*\*\**p* < 0.01.

by gender, obtaining estimates specific to male and female unemployment, respectively. For 2-adult households, I distinguish between workers’ well-being and partners’ well-being. In the table, I present three specifications: (1) “main specification,” which includes displaced workers who remain unemployed, (2) “reemployed,” which includes displaced workers who become reemployed (not necessarily by the same employer), and (3) “unemployed & reemployed,” where displaced workers are included regardless of their subsequent employment status (i.e., it combines the treatment groups in the first two specifications). Across specifications, I test whether the estimates are equal using seemingly unrelated regressions, reporting the *p*-values in the top panel. More specifically, for each estimate *j* under specification A, I find the corresponding estimate under specification B, and test whether  $\gamma_j^A = \gamma_j^B, j = 1, \dots, 12$ . Then, I present “*p*-value of joint difference across specifications,” which tests whether the estimates are different in general using a joint test across the 12 pairwise tests.

In addition, for selected groups of estimates within each specification, I test the differences in mental health costs and report the *p*-values in the bottom panel (“*p*-value of difference within specification”). “Di-

rect difference” tests, for a displaced worker, whether being in a 1-adult household provides similar mental health buffers as being in a 2-adult household, setting aside for a moment the additional risk of the partner’s displacement in a 2-adult household. “Household difference” contrasts the potential outcomes of hypothetical individuals who choose whether to form 1-adult households or be part of 2-adult households. First, it calculates the mental health impact on the two types of households separately. For 1-adult households, the impact is equal to the estimated effect weighted by the overall displacement prevalence, as shown in Table C.1 in Appendix C. For 2-adult households, the impact is equal to the sum of two components: the worker’s own displacement effect weighted by the overall prevalence and the partner’s potential displacement effect weighted by the partner’s displacement prevalence. Then, “household difference” tests whether the impact is the same across the two types of households.<sup>12</sup> “Gender difference” compares across individ-

<sup>12</sup> Consider the case of male displacement. Men choosing to form 1-adult households will experience, on average,  $\hat{\gamma}_5$  elevation in distress. Assuming the

uals. It tests whether job displacement affects male and female workers alike. “Role difference” tests whether being a partner is as stressful as being a worker in a 2-adult household when displacement unfolds.

Specification (1) delivers the main specification, where displaced workers remain unemployed at the time of the mental health survey. Under this specification, job displacement exacerbates mental distress for all workers by 2.31 points or 23.1% of one SD on average. The impacts for males, females, workers, and partners from either type of household are all statistically significant, although they vary in size. Compared to the control group, male workers from the treatment group are expected to experience an average of 3.76 points increase in distress if they were from 1-adult households, and half of the increase in distress (1.88 points) if they were from 2-adult households. However, the difference is not statistically significant ( $p$ -value of direct difference = 0.16). For female workers, the ratio is four (3.02/0.74), meaning the ATT is four times greater for workers without partners than for those with partners, and the difference is statistically significant at the 10% level ( $p$ -value = 0.05). At this point, if I pool male and female workers for each type of household, the mental health costs are more considerable for 1-adult households (3.40 points versus 1.44 points) with a  $p$ -value of direct difference of 0.04. These findings are consistent with the view that when displacement occurs, a worker is less vulnerable as part of a 2-adult household, likely because of burden and risk sharing.

The tradeoff for workers from 2-adult households is that they have partners who can experience unemployment. For a male worker, even though the own mental health cost is 1.88 points, there exists the potential spillover of the partner's displacement distress, which comes to 0.64 points. For a female worker, the own mental health cost is 0.74 points, while the spillover is 1 point. Hence, for workers from 2-adult households, I weigh the two sources of mental health penalties using displacement prevalence to find the average penalty. I then compare this to the average penalty for 1-adult households, assuming workers face the same likelihood of displacement regardless of household type. In this sense, the comparison depicts a hypothetical person's mental health in one of the two potential states: as part of a 1-adult household or as a member of a 2-adult household. I find that for both male workers ( $p$ -value = 0.27) and female workers ( $p$ -value = 0.28), being part of a 2-adult household does not result in any difference in mental health, even with the spillover in place.

Thus far, I have concentrated on the implications of having a partner (burden and risk sharing versus mental health spillover). However, it is not the only distinction between 1-adult and 2-adult households. The two types of households also differ in the prevalence of job displacement.<sup>13</sup> For male workers from 1-adult households, the prevalence of displacement is 0.057, while for their counterparts from 2-adult households, it is 0.03. For female workers, the prevalence of displacement is 0.049 if they are from 1-adult households, and 0.022 if they are from 2-adult households.<sup>14</sup> Hence, is there a welfare gain to having a partner, given that the two effects—the burden- and risk-sharing effect, and

the prevalence effect—are both desirable? In Appendix C, I modify the household difference test to include the prevalence effect.<sup>15</sup> I observe that the  $p$ -value of difference is 0.02 for the pooled sample, 0.05 for males, and 0.07 for females under the main specification. I then decompose the overall effect to find that for males, 29% of the difference arises from burden and risk sharing and 71% from the difference in prevalence; for females, 20% comes from burden and risk sharing and 80% from the difference in prevalence. I conclude that under the main specification, workers from 2-adult households might be better off on average, largely because their likelihood of getting displaced is approximately halved when they have partners. Appendix C provides the details of the decomposition.

The gender comparison is more straightforward. I compare the average effects between male workers and female workers. I find that the two groups are similarly affected if they were from 1-adult households ( $p$ -value = 0.66). Conversely, in 2-adult households, displaced male and female workers face different levels of distress ( $p$ -value = 0.03), with male workers reporting 2.5 times the distress of female workers. Gender differences are further highlighted by role comparisons. More specifically, in 2-adult households, whether the individual is a worker or a partner matters for males but not for females. For males, there is a distinction between being a partner and being a worker ( $p$ -value = 0.01), while for females, there is no such distinction ( $p$ -value = 0.61). These results signify that displaced male workers from 2-adult households value their role in the household as well as the wages they earn.

Specification (2) shifts focus to displaced workers who have obtained new employment by the time of the mental health survey. In general, if workers were to enter a new employment, job displacement has little impact on the mental health of households. Better yet, it benefits the mental health of male partners in 2-adult households. Meanwhile, female displacement in 1-adult households still takes its toll. As a result, the  $p$ -value of cross-specification difference between unemployed and reemployed females is 0.19 in 1-adult households, while other cross-specification differences are statistically significant. Furthermore, household difference ( $p$ -value = 0.02) and gender difference ( $p$ -value = 0.03) become significant when 1-adult female workers are concerned, and these differences were hitherto insignificant. Another observation is that the number of treated individuals is similar for specifications (1) and (2), save for displaced male workers from 2-adult households. There, twice as many workers have secured new jobs than stayed jobless. This suggests that when male workers have partners, they either maintain better mental health, which leads to greater employability, or they find new employment more easily, which leads to better mental health outcomes.

Specification (3) includes all households that experienced job displacement irrespective of subsequent employment status of the displaced. That is to say, workers who remain unemployed or become employed after the displacement are all deemed treated. While the effects are generally significant, they have shrunk by a fair amount in comparison to the main specification (specification 1) due to the absence of distress among reemployed workers in specification (2). Yet, regardless of household type, female displacement produces results similar to the main specification. As with the previous specification (i.e., reemployed workers), household difference for females is statistically significant ( $p$ -value = 0.03). What this implies is that female workers may fare worse without partners than with partners, even if they are reemployed after the displacement. For these workers, having undergone job displacement proves traumatic in its own right. The economic interpretation points to a lack of insurance from income pooling. Last but not least, household difference is statistically significant for the pooled sample ( $p$ -value = 0.02), likely due to the difference in female households. This puts forward the notion that workers, whether subsequently employed or unemployed, tend to cope better in 2-adult households than in a 1-

prevalence of displacement is the same for workers with or without partners (this assumption is relaxed in Appendix C), I use  $\rho_2$  (that is, the displacement prevalence for all male workers) to capture the likelihood of these workers becoming displaced. The weighted mental health effect is then  $\bar{MH}_1 = \rho_2 \hat{\gamma}_5$ . If these workers were to choose to be part of 2-adult households, the average distress is  $\hat{\gamma}_8$  if they were to become displaced, and  $\hat{\gamma}_{12}$  if their partners were to become displaced. The prevalence of own displacement is again  $\rho_2$  and that of partner's displacement is  $\rho_{12}$ . The weighted mental health effects for males from 2-adult households, is then  $\bar{MH}_2 = \rho_2 \hat{\gamma}_8 + \rho_{12} \hat{\gamma}_{12}$ . To examine whether having a partner carries any mental health implications, I test  $H_1 : \bar{MH}_1 \neq \bar{MH}_2$ .

<sup>13</sup> I would like to thank one referee for pointing out that the prevalence of job displacement might be different across types of households.

<sup>14</sup> The difference in prevalence is not driven by the fact that I exclude 2-adult households where both adults are displaced. If I were to include them, the prevalence would become 0.031 (versus 0.030) for male displacement and 0.024 (versus 0.022) for female displacement. I provide the full set of prevalence in Appendix C.

<sup>15</sup> This is achieved with invaluable help from Paweł Gola.

adult households after a job loss. The notion holds true even after I account for the partners' potential displacement and distress spillover in 2-adult households. One could argue that when displacement-related mental health is concerned, the benefits of partnership outweigh the costs under this specification.

As a whole, Table 2 reveals that unemployment distress affects all households if the workers remain unemployed, and 1-adult female households if the workers become reemployed. In particular, the psychological effects of involuntary job losses are more sizeable if a worker is from a 1-adult household. Then, notwithstanding the risk of a mental health spillover from the partner's unemployment, a worker experiences similar distress in a 2-adult household as in a 1-adult household in the absence of new employment. This follows because in a 2-adult household, the discount from burden and risk sharing upon own displacement is comparable in size to the spillover of partner's potential displacement, and hence the two opposing effects cancel out. In the case of a 1-adult female worker who secures a job after displacement, the discount appears to dominate the spillover, and consequently, there is a significant household difference. Moreover, in 1-adult households, distress levels vary between men and women when workers become reemployed; in 2-adult households, the gender variation comes from those who remain unemployed. Lastly, in Table 2, the distress after job displacement can be ascribed to two factors: the experience of losing a job unexpectedly, and the status of being unemployed. The latter appears to play a more vital role in most cases.

For hypothesis tests, I choose the significance threshold at 10%. The conclusions might change had I chosen a more conservative significance threshold such as 1% or 5%. Nevertheless, across specifications, I have consistent evidence showing that workers with partners bear similar (or less) burden as workers without partners in the context of displacement blues and spillover.

## 5. Further results

### 5.1. Types of employment events

Table 3 investigates several types of employment events and how they weigh on the mental health of workers and partners. The investigation is prompted by the question: Had the displacement been anticipated or voluntary, would the mental health impact have survived? I compare the estimates to the "main specification" (specification 1), where the displacement is unanticipated.

Specification (4) zooms in on anticipated displacement, where treated workers are currently unemployed, but were neither displaced unexpectedly nor out of work voluntarily. In 2-adult households, partners of displaced males do not report any elevation in distress when the displacement is anticipated, unlike the case with unanticipated displacement ( $p$ -value of cross-specification difference = 0.06). However, displaced male workers from these households find anticipated displacement to be more influential than unanticipated displacement ( $p$ -value of cross-specification difference = 0.00). This makes intuitive sense, since job insecurity (controlled for in the current study) can be burdensome to workers (Bünnings et al., 2017). Household differences become statistically significant for males ( $p$ -value = 0.02) and females ( $p$ -value = 0.01), meaning the mental health difference between the two household structures is more distinct under anticipated displacement. Together, the results show that for workers who remain unemployed after job displacement, the *shock* factor of being fired or made redundant explains individuals' mental affliction to some extent. Another part of the impact stems from the *experience* of being displaced irrespective of prior knowledge of the displacement.

Voluntary unemployment (specification 5), in contrast to other unemployment events, inflicts little damage on the mental well-being of workers and partners. Cross-specification differences between unanticipated displacement (specification 1) and voluntary unemployment are striking in general, except for females from 2-adult households. More-

over, the majority of the ATT estimates are not statistically significant from zero. This foregrounds the core feature of job displacement: its involuntary nature. If individuals enter unemployment by choice, they may experience little or no distress. This concurs with the literature on early retirement (excluded from the sample) and health benefits (Hallberg et al., 2015).

Specification (6) combines unanticipated displacement, anticipated displacement, and voluntary unemployment. With few exceptions, the inclusion of anticipated displacement and voluntary unemployment renders the effects smaller but significant nonetheless. This echoes the findings in Table 2, which shows that the state of being jobless has a significant and detrimental effect on mental health. For female workers and their partners from 2-adult households, the effects remain negligible across specifications, meaning these treated individuals are, on average, not swayed by other types of employment transitions.

A job change (specification 7) does not have a bearing on the mental well-being of female workers and their partners from 2-adult households. In fact, it is associated with enhanced mental health among all workers from 1-adult households, as well as male workers and their partners from 2-adult households. I do not reject the null hypothesis for direct, household, or gender difference tests. Almost all cross-specification differences between specifications (1) and (7) are statistically significant with  $p$ -values = 0.00, which could be attributed to one of two factors: the nature of the job change being voluntary once again, or workers remaining employed after a job change but not following a job loss.

Overall, the results in Table 3 indicate that the definition of job displacement is reasonable, since a relaxed definition (i.e., all unemployment) delivers similar results. Workers more likely self-select into other forms of unemployment than unanticipated displacement. At the same time, most of the estimates for other forms of unemployment are no larger than estimates for unanticipated displacement. All in all, these suggest that selection into job displacement would lead to underestimated rather than overestimated ATT's. Moreover, the shock of displacement along with its involuntariness lie at the heart of workers' and partners' distress. Fortunately, being prepared for unemployment and staying employed after a job change can ease the distress to varying extents.

### 5.2. Domains of well-being

Figure 2 delves into various domains of well-being—depressed mood, motor agitation (being restless, fidgety, or unable to sit still), fatigue, worthless guilt (feeling worthless), and anxiety. These domains are constituents of the generic mental health measure adopted for the main specification (i.e., SK10). Appendix A provides details on how the domains are defined. As with SK10, domain scores have mean 50 and SD 10.

"Main specification" corresponds to the results shown in Table 2, specification (1), which regresses variables on changes in SK10. "Depressed mood" attacks both workers and partners regardless of household type or gender. The  $p$ -values of direct, household, and role differences (not shown) lead us to similar conclusions as the  $p$ -values under the main specification (see Table 2). This suggests that the significant findings under the main specification, which measures the changes in generic distress, may be primarily driven by the onset of depressed mood.

"Motor agitation" is present among all workers from 1-adult households and male workers or partners from 2-adult households. For these individuals, being restless, fidgety, or unable to sit still also contribute to the general distress after job displacement. In contrast, female workers or partners from 2-adult households are spared "motor agitation" symptoms but report a significant increase in "fatigue." For female partners, this could be attributed to the added worker effect (e.g., Lundberg, 1985; Stephens et al., 2002).

"Worthless guilt" strikes male and female workers in like manner in 1-adult households ( $p$ -value of gender difference = 0.97), while in 2-adult households, male workers are more susceptible to worthless guilt



Table 3

The effect of employment events on mental health.

	(1) Main specification		(4) Anticipated displacement		<i>p</i> -val. of diff. b/t	(5) Voluntary unemployment		<i>p</i> -val. of diff. b/t	(6) All unemployment		<i>p</i> -val. of diff. b/t	(7) Job change		<i>p</i> -val. of diff. b/t
	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	(1) & (4)	<i>b</i>	<i>se</i>	(1) & (5)	<i>b</i>	<i>se</i>	(1) & (6)	<i>b</i>	<i>se</i>	(1) & (7)
<b>All households</b>														
All displacement for workers ( $\hat{\gamma}_1$ )	2.31***	(0.35)	1.49***	(0.32)	0.08	-0.05	(0.33)	0.00	1.61***	(0.22)	0.06	-0.54***	(0.14)	0.00
Male displacement for workers ( $\hat{\gamma}_2$ )	2.63***	(0.47)	2.85***	(0.30)	0.68	-0.74*	(0.41)	0.00	1.80***	(0.27)	0.07	-0.52***	(0.17)	0.00
Female displacement for workers ( $\hat{\gamma}_3$ )	1.89***	(0.47)	1.02*	(0.53)	0.23	0.49	(0.48)	0.04	1.49***	(0.35)	0.49	-0.57***	(0.21)	0.00
<b>1-adult households</b>														
All displacement for workers ( $\hat{\gamma}_4$ )	3.40***	(0.91)	2.76***	(0.70)	0.57	-0.64	(0.84)	0.00	2.40***	(0.62)	0.33	-0.81***	(0.29)	0.00
Male displacement for workers ( $\hat{\gamma}_5$ )	3.76***	(1.28)	1.90**	(0.77)	0.18	-2.01*	(1.06)	0.00	1.49*	(0.84)	0.10	-0.72**	(0.35)	0.00
Female displacement for workers ( $\hat{\gamma}_6$ )	3.02***	(1.09)	3.38***	(1.02)	0.81	0.40	(1.10)	0.10	3.16***	(0.83)	0.92	-0.86**	(0.43)	0.00
<b>2-adult households</b>														
All displacement for workers ( $\hat{\gamma}_7$ )	1.44***	(0.29)	0.83***	(0.31)	0.15	0.50*	(0.28)	0.02	1.06***	(0.19)	0.22	-0.37***	(0.14)	0.00
Male displacement for workers ( $\hat{\gamma}_8$ )	1.88***	(0.38)	4.01***	(0.20)	0.00	0.42	(0.29)	0.00	2.06***	(0.20)	0.60	-0.42**	(0.20)	0.00
Female displacement for workers ( $\hat{\gamma}_9$ )	0.74**	(0.36)	0.16	(0.55)	0.41	0.57	(0.40)	0.75	0.48	(0.33)	0.62	-0.32	(0.21)	0.00
All displacement for partners ( $\hat{\gamma}_{10}$ )	0.86***	(0.27)	0.52*	(0.27)	0.37	0.01	(0.23)	0.02	0.54***	(0.16)	0.25	-0.18	(0.14)	0.00
Male displacement for partners ( $\hat{\gamma}_{11}$ )	1.00***	(0.37)	0.27	(0.19)	0.06	0.43	(0.27)	0.24	0.83***	(0.18)	0.59	-0.50**	(0.20)	0.00
Female displacement for partners ( $\hat{\gamma}_{12}$ )	0.64**	(0.32)	0.57	(0.47)	0.91	-0.34	(0.31)	0.03	0.37	(0.28)	0.54	0.19	(0.18)	0.16
$N_{\text{Treated}}$	964		1344			777			3085			4942		
<i>p</i> -value of joint difference across specifications					0.00			0.00			0.00			0.00
<b><i>p</i>-value of difference within specification</b>														
<i>Direct difference</i>														
All, $H_0 : \gamma_4 = \gamma_7$	0.04		0.01			0.20			0.04			0.18		
Males, $H_0 : \gamma_5 = \gamma_8$	0.16		0.01			0.03			0.50			0.45		
Females, $H_0 : \gamma_6 = \gamma_9$	0.05		0.01			0.89			0.00			0.26		
<i>Household difference</i>														
All, $H_0 : \rho_1\gamma_4 = \rho_1\gamma_7 + \rho_{10}\gamma_{10}$	0.19		0.08			0.20			0.18			0.44		
Males, $H_0 : \rho_2\gamma_5 = \rho_2\gamma_8 + \rho_{12}\gamma_{12}$	0.27		0.02			0.07			0.24			0.27		
Females, $H_0 : \rho_3\gamma_6 = \rho_3\gamma_9 + \rho_{11}\gamma_{11}$	0.28		0.01			0.74			0.01			0.82		
<i>Gender difference</i>														
All, $H_0 : \gamma_2 = \gamma_3$	0.27		0.00			0.05			0.49			0.85		
1-adult households, $H_0 : \gamma_5 = \gamma_6$	0.66		0.25			0.11			0.16			0.81		
2-adult households, $H_0 : \gamma_8 = \gamma_9$	0.03		0.00			0.77			0.00			0.72		
<i>Role difference</i>														
All, $H_0 : \gamma_7 = \gamma_{10}$	0.12		0.40			0.15			0.03			0.31		
Males, $H_0 : \gamma_8 = \gamma_{12}$	0.01		0.00			0.07			0.00			0.02		
Females, $H_0 : \gamma_9 = \gamma_{11}$	0.61		0.84			0.78			0.36			0.53		

Notes: The effect of different employment events on the mental health of households. Pooled estimates as well as separate estimates for 1-adult and 2-adult households, males and females, and workers and partners are reported. All specifications estimate the ATT using Eq. (1), namely, reweighted difference in changes in mental health with covariates. Covariates are detailed in Appendix B. Specification (1) reports the main results (unanticipated displacement) as seen in Table 2. Specifications (4)–(7) display the results for anticipated displacement (the treated workers are not displaced unexpectedly or unemployed voluntarily), voluntary unemployment (voluntarily inactive, studying, traveling, or working in an unpaid voluntary job), all unemployment (unanticipated displacement, anticipated displacement, and voluntary unemployment aggregated), and voluntary job change, respectively. *b* and *se* report the estimate and standard error (clustered on household IDs). The number of treated units for each specification is displayed next to  $N_{\text{Treated}}$ . I use  $\hat{\gamma}_j, j = 1, \dots, 12$  to denote the estimated coefficients and  $\rho_j, j = 1, \dots, 12$  to denote the corresponding sample prevalence. Here,  $\rho_7 = \rho_{10}$ ,  $\rho_8 = \rho_{11}$ , and  $\rho_9 = \rho_{12}$ . I conduct Wald tests on cross-specification differences for each coefficient separately and for all coefficients jointly, reporting *p*-values in the top panel. In the bottom panel, I present the *p*-values for Wald tests on coefficients from the same specification. “Direct difference” tests whether the mental health burden is similar for displaced workers from 1-adult and 2-adult households. “Household difference” tests whether being in a 1-adult household carries different mental health implications from being part of a 2-adult household when displacement occurs. “Gender difference” tests whether job displacement affects male and female workers in like manner. “Role difference” tests whether being a displaced worker implies the same mental health consequences as being a partner in a 2-adult household. \**p* < 0.10. \*\**p* < 0.05. \*\*\**p* < 0.01.

than female workers ( $p$ -value of gender difference = 0.04). The implication is that the presence of partners alleviates female workers' sense of worthlessness after a job loss. Additionally, feeling worthless appears to be an emotion unique to workers and does not spill over to partners ( $p$ -value of role difference = 0.00).

"Anxiety" is prominent among partners of displaced male workers in 2-adult households. Female workers from these households, however, do not appear to exhibit any anxiety symptoms. In fact, the coefficient has a negative sign. In this respect, females from 2-adult households are generally more anxious about their partners' job loss than their own job loss ( $p$ -value of role difference = 0.01).

The discussions above substantiate the gender differences and show that they are nuanced and domain-specific. From the figure, household differences also stand out, with 1-adult households (top of the figure) bearing more burden than 2-adult households (bottom of the figure) in

general. This is especially true for females, as there exist substantial direct differences (comparing females with and without partners) across all domains except fatigue. Even after accounting for the spillover burden, I still identify significant household differences in depressed mood, motor agitation, and worthless guilt for these workers. When the prevalence effect—that is, workers with partners encountering displacement less often than workers without partners—is introduced, I find significant household differences across all domains for the pooled sample.

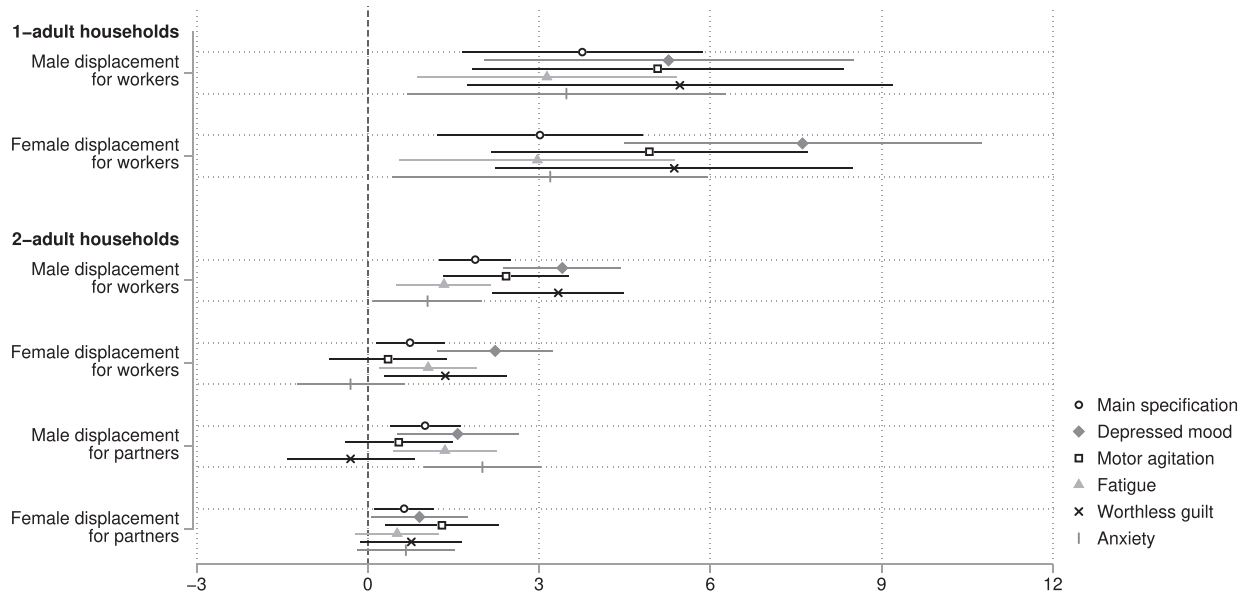
### 5.3. Heterogeneity analysis

Table 4 examines potential mental health heterogeneity by education attainment and urbanicity. Specification (8) focuses on households where the workers' highest education attainment does not exceed high school completion. Specification (9) pertains to households where the

**Table 4**  
Heterogeneity by education and urbanicity.

	(8) High school or below		(9) Diploma or above		$p$ -val. of diff. b/t (8) & (9)	(10) Major cities		(11) Regional and remote areas		$p$ -val. of diff. b/t (10) & (11)
	$b$	$se$	$b$	$se$		$b$	$se$	$b$	$se$	
<b>All households</b>										
All displacement for workers ( $\hat{\gamma}_1$ )	2.84***	(0.57)	1.98***	(0.42)	0.28	2.25***	(0.39)	2.23***	(0.66)	0.98
Male displacement for workers ( $\hat{\gamma}_2$ )	3.38***	(0.86)	2.09***	(0.50)	0.25	2.52***	(0.54)	2.49***	(0.76)	0.97
Female displacement for workers ( $\hat{\gamma}_3$ )	1.90***	(0.68)	2.25***	(0.48)	0.71	1.98***	(0.52)	1.15	(0.92)	0.40
<b>1-adult households</b>										
All displacement for workers ( $\hat{\gamma}_4$ )	3.43***	(1.20)	2.44***	(0.59)	0.53	3.24***	(0.96)	3.05*	(1.84)	0.92
Male displacement for workers ( $\hat{\gamma}_5$ )	3.53**	(1.58)	2.39***	(0.62)	0.57	3.31**	(1.33)	3.52*	(2.05)	0.93
Female displacement for workers ( $\hat{\gamma}_6$ )	2.99**	(1.42)	2.46***	(0.60)	0.76	2.94***	(1.13)	1.79	(2.56)	0.65
<b>2-adult households</b>										
All displacement for workers ( $\hat{\gamma}_7$ )	2.09***	(0.45)	1.18***	(0.37)	0.16	1.52***	(0.35)	1.13***	(0.39)	0.45
Male displacement for workers ( $\hat{\gamma}_8$ )	2.75***	(0.51)	1.30***	(0.43)	0.05	1.92***	(0.44)	2.14***	(0.42)	0.72
Female displacement for workers ( $\hat{\gamma}_9$ )	0.62	(0.50)	1.46***	(0.42)	0.24	1.02**	(0.40)	-0.31	(0.44)	0.02
All displacement for partners ( $\hat{\gamma}_{10}$ )	1.84***	(0.40)	0.34	(0.33)	0.01	0.77**	(0.31)	1.44***	(0.44)	0.19
Male displacement for partners ( $\hat{\gamma}_{11}$ )	1.58***	(0.55)	0.65	(0.41)	0.22	0.99**	(0.41)	1.22**	(0.53)	0.73
Female displacement for partners ( $\hat{\gamma}_{12}$ )	1.73***	(0.39)	0.33	(0.36)	0.01	0.50	(0.36)	2.50***	(0.33)	0.00
$N_{\text{Treated}}$	379		585			700		264		
$p$ -value of joint difference across specifications					0.07					0.00
<b><math>p</math>-value of difference within specification</b>										
<b>Direct difference</b>										
All, $H_0 : \gamma_4 = \gamma_7$	0.30		0.02			0.09		0.31		
Males, $H_0 : \gamma_5 = \gamma_8$	0.64		0.04			0.32		0.51		
Females, $H_0 : \gamma_6 = \gamma_9$	0.11		0.05			0.11		0.42		
<b>Household difference</b>										
All, $H_0 : \rho_1\gamma_4 = \rho_1\gamma_7 + \rho_{10}\gamma_{10}$	0.98		0.14			0.30		0.62		
Males, $H_0 : \rho_2\gamma_5 = \rho_2\gamma_8 + \rho_{12}\gamma_{12}$	0.85		0.20			0.44		0.99		
Females, $H_0 : \rho_3\gamma_6 = \rho_3\gamma_9 + \rho_{11}\gamma_{11}$	0.47		0.63			0.48		0.68		
<b>Gender difference</b>										
All, $H_0 : \gamma_2 = \gamma_3$	0.18		0.61			0.47		0.26		
1-adult households, $H_0 : \gamma_5 = \gamma_6$	0.80		0.82			0.83		0.60		
2-adult households, $H_0 : \gamma_8 = \gamma_9$	0.00		0.59			0.13		0.00		
<b>Role difference</b>										
All, $H_0 : \gamma_7 = \gamma_{10}$	0.64		0.07			0.09		0.59		
Males, $H_0 : \gamma_8 = \gamma_{12}$	0.11		0.07			0.01		0.49		
Females, $H_0 : \gamma_9 = \gamma_{11}$	0.19		0.16			0.96		0.03		

**Notes:** The effect of job displacement on mental health with separate estimates for education levels and urbanicity. Pooled estimates as well as separate estimates for 1-adult and 2-adult households, males and females, and workers and partners are reported. All specifications estimate the ATT using Eq. (1), namely, reweighted difference in changes in mental health with covariates. Covariates are detailed in Appendix B. Specification (8) is intended for households where the workers have a high school degree or lower, while specification (9) is aimed at households where workers have a diploma or above (a Bachelor's, graduate diploma, or postgraduate degree). Specification (10) represents households living in major cities in Australia, and specification (11) follows households living in inner regional, outer regional, remote, and very remote Australia. Remoteness is identified by Australian Bureau of Statistics (2011).  $b$  and  $se$  report the estimate and standard error (clustered on household IDs). The number of treated units for each specification is displayed next to  $N_{\text{Treated}}$ . I use  $\hat{\gamma}_j, j = 1, \dots, 12$  to denote the estimated coefficients and  $\rho_j, j = 1, \dots, 12$  to denote the corresponding sample prevalence. Here,  $\rho_7 = \rho_{10}$ ,  $\rho_8 = \rho_{11}$ , and  $\rho_9 = \rho_{12}$ . I conduct Wald tests on cross-specification differences for each coefficient separately and for all coefficients jointly, reporting  $p$ -values in the top panel. In the bottom panel, I present the  $p$ -values for Wald tests on coefficients from the same specification. "Direct difference" tests whether the mental health burden is similar for displaced workers from 1-adult and 2-adult households. "Household difference" tests whether being in a 1-adult household carries different mental health implications from being part of a 2-adult household when displacement occurs. "Gender difference" tests whether job displacement affects male and female workers in like manner. "Role difference" tests whether being a displaced worker implies the same mental health consequences as being a partner in a 2-adult household. \* $p < 0.10$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .



**Fig. 2.** The effect of job displacement on mental health and in various domains of well-being. Separate estimates are illustrated for 1-adult and 2-adult households, males and females, and workers and partners. The domains are as registered in Kessler et al. (2002). All specifications estimate the ATT using Eq. (1), namely, weighted difference in changes in mental health with covariates. Covariates are detailed in Appendix B. Robust standard errors clustered on household IDs are used to calculate the confidence intervals. The markers pinpoint the estimated coefficients and the horizontal whiskers represent the 90 percent confidence intervals. The dashed vertical gray line marks the significance cutoff of 0. The graph is created using Stata's `coefplot` command (Jann, 2014).

workers have a higher education than a high school degree. This includes certificates, diplomas, a Bachelor's degree, graduate diplomas, a Master's degree, or a PhD. Three observations can be made. First, when workers have education capped at high school, their households undergo higher levels of distress. Male workers from 2-adult households represent a case in point: The increase in distress is 2.75 points for those without a diploma, and only 1.30 points for those with a diploma or above. Green (2011) lends support to this finding, as the author argues that employability could modify unemployment-related mental ill-health. Second, female workers from 2-adult households constitute a notable exception to the high education-low distress rule. There, workers with higher degrees are more distressed (1.46 points versus 0.62 points), though the difference between the two estimates is not statistically significant ( $p$ -value of cross-specification difference = 0.24). Third, direct differences are more evident when workers have diplomas or above, whereas gender differences are more striking for 2-adult households where workers have a high school degree or below.

Specification (11) studies households residing in major cities, while specification (12) considers households residing in other parts of Australia, including inner regional, outer regional, remote, and very remote Australia. If households are located in major cities, partners of displaced females incur a less severe mental health penalty (0.5 points versus 2.5 points). Female workers from these households, on the other hand, face a greater mental health challenge if they are major-city dwellers ( $p$ -value of cross-specification difference = 0.02). Furthermore, role differences are more stark among males (females) from major cities (regional and remote areas), whereas gender differences are more noticeable among non-city dwellers from 2-adult households.

These results suggest that attaining more education generally alleviates mental distress upon job loss, and significantly so for men in 2-adult households. In the meantime, residing in major cities tend to benefit mental health after job displacement, not least in regard to partners of female workers from 2-adult households. Limiting job opportunities associated with low education levels and remote residence may explain both types of heterogeneity. Female workers from 2-adult households

do not conform to the pattern; they are more concerned if they reside in major cities or have a diploma or above. These exceptions could be due to job expectations that come with higher degrees and greater competition in major cities.

#### 5.4. Other considerations

In Appendix D, I present the results under baseline specifications: mean difference on mental health without covariates, mean difference on changes in mental health without covariates, mean difference on changes in mental health with covariates, and reweighted difference on changes in mental health without covariates. The magnitude of estimates and the test conclusions are largely preserved. I further report the estimates from a placebo regression, setting the treatment to transpire two years prior to the actual treatment. Estimates of the placebo treatment lack statistical significance and bear little resemblance to those of the actual treatment.

In Appendix E, I unpack the earnings heterogeneity: Can pre-treatment earnings explain differences in mental health outcomes, and does the partner's contribution enter the equation? The answer is yes. Pre-treatment earnings matter not only in comparison with other workers, but also relative to the partner's financial contribution to the household. Men suffer mental distress regardless of how much they contribute to household income, whereas women experience displacement blues only if they earn less than 25% or between 50 and 75% of the household income. These findings suggest that gender heterogeneity is likely driven by a combination of men earning more on average, the provider stress, and a gendered perception of job loss.<sup>16</sup>

Changes in family structure are potential channels that have not been investigated in relation to how unemployment might impact mental health. People may decide to postpone marriage, get divorced or separated, or reconsider fertility decisions after losing a job (e.g., Prifti and

<sup>16</sup> I would like to thank one referee for pointing out that gender differences may be due to gender or aspects correlated with gender such as earnings.

Vuri, 2013; Schaller, 2013). In the main specification, I include getting married and giving birth in the life event index, but exclude divorce or separation because I require workers to be with the same partners before and after the treatment. If I relax this assumption, two-sample t-tests show that displaced workers more likely separate from ( $p$ -value = 0.05) or reunited with ( $p$ -value = 0.02) their partners in the year they are displaced, but the differences disappear one year after displacement onset. Households with displaced workers are also less likely to give birth one year after displacement if these workers remain unemployed ( $p$ -value = 0.01), and have 0.17 fewer dependent children overall ( $p$ -value = 0.00).

These evidence suggests that there is ample scope to unpack the mental health effects through these channels. In the context of Australia, Ding et al. (2021) observe that recently divorced individuals more likely report high psychological distress (Odds Ratio or OR = 2.78); Lee and Gramotnev (2007) show that marriage and partnership increase optimism (OR = 1.29) and life satisfaction (OR = 3.41), while motherhood heightens stress (OR = 2.25) and reduces life satisfaction (OR = 0.12). To understand how these effects translate to existing ATT estimates, a different specification is required.

## 6. Conclusion

This paper establishes how job displacement influences the mental well-being of households in varying ways and to varying degrees. It relies on longitudinal data from the Household, Income and Labor Dynamics in Australia (HILDA) survey between 2007 and 2019. It engages entropy balancing to enhance the comparability of households experiencing displacement and those experiencing no job change. Crucially, it analyzes 1-adult and 2-adult households, males and females, and workers and partners, offering a compelling account of the differences that arise from household composition and gender.

The results uniquely highlight the benefit of burden and risk sharing in 2-adult households. First, I establish that when a worker becomes unemployed involuntarily, psychological consequences follow regardless of household composition. Then, I present evidence that in a 2-adult household, there exists a mental health spillover if the worker's partner loses a job. Finally, I take a critical step to demonstrate that even with the added risk of the partner's displacement and distress spillover, the worker's well-being would not be significantly different if they were part of a 2-adult household or a 1-adult household. This occurs because, whilst there is an additional mental health risk in a 2-adult household, it is counteracted by the discount on distress coming from burden and risk sharing with the partner when the worker gets displaced.

Beyond burden sharing and risk sharing, there are other ways through which a partner could contribute to the mental health experience of a displaced worker. First, over and above emotional support, partners can provide social support. Following this argument, the loss of collegial contact (Stauder, 2019) may affect workers without partners more than it does workers with partners.<sup>17</sup> Second, partners can offer tips on job search and help the displaced access hidden job opportunities in their networks (Topa, 2011), thereby enhancing the (perceived or actual) job prospects of the displaced. Third, displaced workers from 2-adult households can switch roles with their partners; they can devote more attention to household production (Gimenez-Nadal and Molina, 2014) and possibly benefit from the preoccupation. Lastly, as observed in the sample, job displacement is less pervasive among workers with partners. Once this is reflected in the analysis, displaced workers appear to be faring better in 2-adult households than in 1-adult households.

With respect to the gender gap in mental health, the results demonstrate that it widens for 2-adult households where workers remain unemployed, and 1-adult households where workers become reemployed.

<sup>17</sup> A whole other set of conditions could come into play, namely, the non-spousal social support that workers receive. Future work can thus bring an array of focus to the broader concept of social support.

In the former case, male workers face a greater sting; in the latter, female workers struggle more. Gender differences in pay, division of labor, and the perception of job loss could all contribute to such heterogeneity. In addition, there is evidence unpacking the unfavorable impact of female employment on male partners' mental health (e.g., Kessler and McRae, 1982). More generally, men and women have different susceptibility to mental distress (Kessler, 2004); significant life events such as an unemployment shock may trigger more distress in men than in women. For female workers without partners, having dependent children could underpin the heightened distress. In the sample, only 21 treated male workers from 1-adult households are single parents. Consequently, it is not feasible to estimate the ATT for the stratum for further comparisons. Nevertheless, with dependent children, gender differences can arise from the quality of family time (Kalenkoski and Foster, 2008) or role demands on the displaced (Roman and Cortina, 2016). Together, current results and existing literature demonstrate that the gender dimension should be examined in conjunction with the household dimension for a full understanding of psychological distress following involuntary job losses.

The findings of this paper should be regarded in light of a few limitations. First, the estimates likely suffer from downward biases owing to sample attrition from workers suffering severe unemployment distress (Barnay, 2016; Classen and Dunn, 2012), selection on unobservables, and the exclusion of 2-adult households where both partners are displaced. Second, the research design dictates that the results pertain to the short-run impact (up to two years) of job displacement on mental well-being. The complex long-run psychological implications of an unemployment shock therefore remain to be addressed. Third, even though the covariates are carefully chosen, the specification does not preclude confounding effects or omitted variable bias. Related to the point is the incomplete set of pre-treatment conditions, from which variables such as tenure status and mortgage payment are missing due to limited data availability. As a result, a worker's propensity to be displaced may not have been fully captured.

In looking closely at related work, it quickly becomes clear that current results pose unanswered questions regarding potential cross-country differences. In Marcus (2013), both male and female unemployment adversely impact the mental health of workers and cohabiting spouses in Germany. The present study foregrounds the distinction in the mental well-being of displaced men and women in Australia.<sup>18</sup> Future work on displacement spillover could also branch into unemployment spells, income protection schemes, multiple displacement events, variations in treatment timing, and their impact on other aspects of health such as body weight and substance use. It might also be instructive to examine the endogenous anticipation of unemployment and its effects on the psychological adjustment of workers, their families, or individuals in the same network.

In summary, the work offers novel perspectives on job displacement and psychological well-being. It demonstrates that the extent to which job displacement impinges on individuals' mental health depends critically on household type, gender, the role in the household, subsequent employment status, and the type of unemployment. From an empirical standpoint, the research challenges existing views on mental health spillover and identifies the phenomena of burden sharing and risk sharing within 2-adult households. It offers practical implications on the importance of partnership in mediating the unemployment experience. It

<sup>18</sup> This could be attributed to the fact that between countries, female labor force participation and family composition generally vary, and thus displacement-related mental health spillover through these predictors may also vary. In particular, Australia spends 0.60% of its GDP in public unemployment compensation, whereas in Germany, 0.86% of GDP is spent on public unemployment (Organisation for Economic Co-operation and Development OECD, 2018b). Furthermore, the average size of households is 2.56 for Australia and 2.00 for Germany (Organisation for Economic Co-operation and Development OECD, 2018a).



**Table A.1**

Kessler Psychological Distress Scale item inventory and domains of well-being.

Item no.	Item	Domain
1	Depressed	Depressed mood
2	Everything was an effort	Fatigue
3	So nervous that nothing could calm you down	Anxiety
4	So restless that you could not sit still	Motor agitation
5	Hopeless	Depressed mood
6	Nervous	Anxiety
7	Restless or fidgety	Motor agitation
8	So sad that nothing could cheer you up	Depressed mood
9	Tired out for no good reasons	Fatigue
10	Worthless	Worthless guilt

Notes: For each item, the reversed answer categories range from 1 (*none of the time*) to 5 (*all of the time*). The standardized Kessler Psychological Distress Scale or SK10 is equal to the unweighted sum of the responses to each item, standardized to have mean 50 and SD 10 for the current study. I then construct the changes in SK10 scores across survey waves as the outcome of interest. Kessler et al. (2002) register the well-being domains to which the items under the scale belong. See also Australian Bureau of Statistics (2001b) for the adoption of the scale in Australian surveys.

also broadens understanding about gender heterogeneity in psychological resilience when workers confront adverse labor market experiences.

#### Data availability

The authors do not have permission to share data.

#### Appendix A. The Kessler psychological distress scale

Developed by Kessler et al. (2002), the Kessler Psychological Distress Scale (SK10) serves as a generic measure of mental well-being in surveys. The scale consists of 10 items, listed in Table A.1. After reversal, each item invites a response to one of the five categories: 1 = “none of the time,” 2 = “a little of the time,” 3 = “some of the time,” 4 = “most of the time,” and 5 = “all of the time.” In the Household, Income, and Labor Dynamics in Australia (HILDA) survey, respondents indicate their response to each item, and I derive SK10 by summing up the responses to the items, which were given equal weights. By construction, the higher the total score, the higher the distress. In the present study, the scale is standardized to have mean 50 and standard deviation (SD) 10.

Kessler et al. (2002) further sort items under the scale into domains listed in the DSM-III-R (American Psychiatric Association, 1987).<sup>19</sup> The final item pool reflects five domains: depressed mood (3 items), motor agitation (2 items), fatigue (2 items), worthless guilt (1 item), and anxiety (2 items). For each domain, the unweighted sum of item scores is again standardized to have mean 50 and SD 10. Item to domain mapping is also presented in Table A.1.

#### Appendix B. Definition of covariates

Table B.1 describes the pre-treatment covariates used for reweighting and conditioning. Individual information involves demographics, health, education, and labor market characteristics. Household information pertains to composition, locality, rankings, well-being, and relationship type.

Physical health measures are collected from the short-form health survey (Ware, 2000). Role-emotional refers to issues with work or other daily activities due to emotional problems, and role-physical refers to

the same issues due to physical problems. The remaining health measures are self-explanatory.

To disentangle the income effect from the gender effect, I consider income share, which represents how much a worker contributes to the household income before the treatment. In light of the fact that a worker can hold a low-skill position in a high-skill industry or vice versa (e.g., Gola, 2022), I control for both occupation and industry sectors by using 27 dummy variables, 8 for various occupations and 19 for different industry sectors; these measures also partially account for the effects that job conditions have on mental health (Belloni et al., 2022; Bubonya et al., 2017b). Furthermore, I include the partner's demographic characteristics, health conditions, and educational background to partially adjust for assortative mating in the mental health dimension.

To address the potential impact of significant life events on mental well-being, I introduce a life event index. The notion is long endorsed by economists studying labor market stress and strain (e.g., Lindeboom et al., 2002; van den Berg et al., 2010). Table B.2 details the construction of the index. It summarizes the impact of various life events prior to the treatment. Each event is dichotomized, with 1 indicating the occurrence of the event and 0 otherwise. The raw index is then constructed as a weighted sum of the events. Weights are determined by impact scores in Holmes and Rahe (1967).

In the construction of the index, I exclude events that define the treatment or control group: being fired or made redundant, changing jobs, and being promoted at work. Being fired or made redundant, the treatment in this study, has an impact score of 47 out of 100. It ranks number eight out of the 43 life events listed in Holmes and Rahe (1967) in terms of severity. Job change, on the other hand, entails either changing the line of work, the responsibilities at work, or work hours and conditions. The impact scores are 36, 29, and 20, respectively. Being promoted at work also has no exact mapping to any event in Holmes and Rahe (1967) but shares the set of approximations with job change. Retirement from the workforce (impact score = 45) is excluded because retirees do not enter either the treatment or the control group. Separated from the spouse and got back together with the spouse have no occurrence in the sample owing to the partnership requirements imposed on the treatment and control groups.

Bounding the raw index between 0 and 100, I derive the standardized index, which is subsequently used in the reweighting and regression steps. The sample mean is 5.4 points with a SD of 7.8. In the sample, the most common event is serious injury or illness to a family member, followed by changing residence and the death of a close relative or family member. The least common events are being detained in jail, being a victim of physical violence, and having a close family member who is detained in jail.

#### Appendix C. Decomposing the overall household difference

In Table 2, I test for household differences in burden and risk sharing using the average likelihood of displacement across both household types. This ensures that the test results are not confounded by differences in the prevalence of displacement. In this appendix, I modify the household test to incorporate both effects—burden and risk sharing effect, and the prevalence effect. Table C.1 revisits the estimates in Table 2, presents the prevalence of displacement, and introduces the new test. The difference between the two tests, the “household difference in burden and risk sharing” test and the “overall household difference including prevalence” test, is that the former employs the average prevalence across household types whereas the latter employs prevalence specific to either household type.

Using the prevalence specific to 1-adult and 2-adult households, I find that the overall household difference has a *p*-value of 0.02 for the pooled sample, 0.05 for males, and 0.07 for females under the main specification (specification 1). For the remaining specifications, the test conclusions do not change when I introduce the prevalence effect. To distinguish the prevalence effect from the burden- and risk-sharing ef-

<sup>19</sup> This was with the exception of positive affect, which was later eliminated from the final pool. See Kessler et al. (2002).

**Table B.1**  
Covariates inventory for 1-adult and 2-adult households.

Pre-treatment variable	Definition	1-adult	2-adult	
		W	W	P
<b>Individual information</b>				
<i>Demographics</i>				
Age	In years	✓	✓	✓
Female <sup>†</sup>	= 1 if female	✓	✓	
Non-English at home <sup>†</sup>	= 1 if speaks language other than English at home	✓	✓	✓
Same-sex identity <sup>†</sup>	= 1 if identifies as lesbian or gay	✓		
Bisexual or other identity <sup>†</sup>	= 1 if identifies as bisexual, other, or unsure	✓	✓	✓
<i>Health</i>				
Bodily pain	2 items (0–100) based on SF36 (Ware, 2000)	✓	✓	✓
General health	5 items (0–100) based on SF36	✓	✓	✓
Physical functioning	10 items (0–100) based on SF36	✓	✓	✓
Role-emotional	3 items (0–100) based on SF36	✓	✓	✓
Role-physical	4 items (0–100) based on SF36	✓	✓	✓
Social functioning	2 items (0–100) based on SF36	✓	✓	✓
Vitality	4 items (0–100) based on SF36	✓	✓	✓
<i>Education</i>				
Secondary schooling <sup>†</sup>	= 1 if has diploma or certificate from technical school	✓	✓	✓
University <sup>†</sup>	= 1 if has university degree	✓	✓	✓
Vocational training <sup>†</sup>	= 1 if has vocational training	✓	✓	✓
<i>Labor market</i>				
Labor earnings	Financial year nominal earnings in 10,000 AUD, CPI-adjusted to 2012 price levels	✓	✓	✓
Never unemployed <sup>†</sup>	= 1 if never unemployed	✓	✓	✓
Years in paid work	Years worked for previous employer	✓	✓	
Company size	7 categories ( $\leq 20$ , 20–99, 100–499, 500–999, 1000–4999, 5000–19,999, $\geq 20,000$ employees)	✓	✓	
Job security	Scale from totally dissatisfied to totally satisfied (0–20)	✓	✓	
Occupation	8 categories based on Australian and New Zealand Standard Classification of Occupations (ABS, 2006a)	✓	✓	
Industry sector	19 categories based on Australian and New Zealand Standard Industrial Classification (ABS, 2006b)	✓	✓	
Employment type	4 categories (employer, employee, own account worker, contributing family worker)	✓	✓	
Casual worker <sup>†</sup>	= 1 if employed on a casual basis (i.e., no paid leave)	✓	✓	
Income share	Individual earnings divided by household income		✓	
Work status	4 categories (unemployed, casual, part time, full time)			✓
<b>Household information</b>				
Dependent children	5 categories (0, 1, 2, 3, $> 3$ dependent children)	✓	✓	✓
Regional unemployment	Unemployment rate (ABS, 2020) in statistical region	✓	✓	✓
Remoteness area	7 categories based on Australian Statistical Geography Standard remoteness area (ABS, 2011)	✓	✓	✓
State or territory	8 categories (NSW, VIC, QLD, SA, WA, TAS, NT, ACT)	✓	✓	✓
Life event index	Weighted sum of 17 life events (0–100) (See Table B.1)	✓	✓	✓
Neighborhood coherence	Sum of area satisfaction and sense of belonging (0–100)	✓	✓	✓
Socio-economic status rank	Socio-Economic Indexes for Areas (SEIFA) decile of index of relative socio-economic disadvantage (ABS, 2001a)	✓	✓	✓
Economic resource rank	SEIFA decile of index of economic resources	✓	✓	✓
Education and career rank	SEIFA decile of index of education and occupation	✓	✓	✓
Cohabitation <sup>†</sup>	= 1 if cohabiting with partner		✓	✓
Survey year	6 categories (2009, 2011, 2013, 2015, 2017, 2019)	✓	✓	✓

Notes: An overview of covariates adopted for the analysis. The covariates are first used for reweighting and then included as control variables in regressions. Different subsets of covariates are selected for 1-adult households and 2-adult households. In the latter case, both workers' ("W") and partners' ("P") characteristics are included. A <sup>†</sup> indicates a dummy variable that equals zero if the stated condition is not met. All covariates are measured before the treatment.

fect, I perform the following decomposition for males:

$$\begin{aligned}
 & \rho_5 \hat{\gamma}_5 - \rho_8 \hat{\gamma}_8 - \rho_{12} \hat{\gamma}_{12} \\
 = & \underbrace{(\rho_5 \hat{\gamma}_5 - \rho_8 \hat{\gamma}_5)}_{\text{prevalence effect}} + \underbrace{(\rho_8 \hat{\gamma}_5 - \rho_8 \hat{\gamma}_8 - \rho_{12} \hat{\gamma}_{12})}_{\text{burden- and risk-sharing effect}} \\
 = & \begin{cases} 71\% + 29\% & \text{(main specification)} \\ -10\% + 110\% & \text{(reemployed)} \\ 27\% + 73\% & \text{(unemployed and reemployed)} \end{cases}
 \end{aligned}$$

In words, I compute the prevalence effect by holding the mental health burden ( $\hat{\gamma}_5$ ) constant and updating the prevalence ( $\rho_5$  to  $\rho_8$ ). To compute the burden- and risk-sharing effect, I hold the prevalence ( $\rho_8$ ) constant for workers, update the mental health burden ( $\hat{\gamma}_5$  to  $\hat{\gamma}_8$ ), and subtract the spillover of partner's potential displacement ( $\rho_{12} \hat{\gamma}_{12}$ ). By the same token, I have, for females under the main specification,

$$\begin{aligned}
 & \rho_6 \hat{\gamma}_6 - \rho_9 \hat{\gamma}_9 - \rho_{11} \hat{\gamma}_{11} \\
 = & \underbrace{(\rho_6 \hat{\gamma}_6 - \rho_9 \hat{\gamma}_6)}_{\text{prevalence effect}} + \underbrace{(\rho_9 \hat{\gamma}_6 - \rho_9 \hat{\gamma}_9 - \rho_{11} \hat{\gamma}_{11})}_{\text{burden- and risk-sharing effect}}
 \end{aligned}$$

$$\begin{cases} 80\% + 20\% & \text{(main specification)} \\ 26\% + 74\% & \text{(reemployed)} \\ 51\% + 49\% & \text{(unemployed and reemployed)} \end{cases}$$

In Section 4.2, I establish that burden and risk sharing alone are not associated with any mental health gain or loss for workers from 2-adult households in general. According to the current exercise, individuals from 2-adult households are better off on average (if one-sided hypotheses were specified a priori). This comes partly from burden and risk sharing with partners (i.e., the burden- and risk-sharing effect) and partly from the fact the workers are less likely displaced as part of couples (i.e., the prevalence effect). More specifically, for displaced workers who remain unemployed, the prevalence effect prevails. For displaced workers who become reemployed, the burden- and risk-sharing effect is more prominent.<sup>20</sup>

<sup>20</sup> In the case of reemployed male workers, the prevalence is lower for workers without partners than for workers with partners (but not by much), thereby the prevalence effect is negative.

**Table B.2**  
Summary statistics for life events and impact scores.

Life event	Impact score	N <sub>i</sub>	Mean (%)	SD
Got married	50	509	1.9	0.14
Pregnancy	40	1746	6.4	0.24
Birth/adoption of new child	39	1248	4.6	0.21
Serious personal injury/illness	53	1985	7.3	0.26
Serious injury/illness to family member	44	3713	13.6	0.34
Death of close relative/family member	63	3088	11.3	0.32
Death of a close friend	37	2249	8.2	0.27
Victim of physical violence	53	232	0.8	0.09
Victim of a property crime	44	810	3.0	0.17
Detained in jail	63	27	0.1	0.03
Close family member detained in jail	50	333	1.2	0.11
Major improvement in finances	38	808	3.0	0.17
Major worsening in finances	58	665	2.4	0.15
Changed residence	20	3351	12.2	0.33
Standardized index	Min	Max	Mean	SD
	0	100	5.4	7.81

Notes: All life events are dichotomous with 1 indicating the occurrence of the event and 0 otherwise. Hence, the means represent percentage shares in the top panel. Life events are randomly ordered in the table. The impact scores are defined in Holmes and Rahe (1967). The impact scores for victim of physical violence, victim of a property crime, and close family member detained in jail are extrapolated based on event severity. Being fired, changed jobs, retired from the workforce, promoted at work, separated from the spouse, got back together with the spouse, and the death of a spouse or a child are excluded from the calculation of the life event index. For each event, the number of incidents is reported under N<sub>i</sub>. The total number of reweighted observations is 28,249 for the main specification. In the construction of the standardized index, missing values (approximately 3.15% of the observations) are replaced by 0, the variable's mode. For the reweighting and regression steps, the life event index is standardized to a 0–100 scale.

It is difficult to determine whether the difference in prevalence is the result of having a partner or selection. It could be that employers are more reluctant to fire employees who have partners. It could also be that workers who are less likely to be displaced are more inclined to partner up. For that reason, in the main text, I give priority to the burden- and risk-sharing effect, which yields the most conservative estimate of tradeoff a particular worker could experience from coupling up.

#### Appendix D. Baseline results

The main specification is built on reweighted differences on changes in mental health with covariates. Key features of this specification include reweighting, constructing changes in mental health, and adjusting for covariates. This appendix presents baseline specifications that are formulated using a subset of the these features, laying the groundwork for the main specification. Table D.1 reports the estimates.

Specification (12), “mean difference on  $y$ ,” estimates  $y = \alpha + \gamma d + \epsilon$ , where  $y$  is the (non-differenced) mental health score after the treatment,  $\iota$  is a vector of 1s, and  $d$  is the treatment indicator with  $d_i = 1$  if worker  $i$  is displaced and 0 otherwise. To express it in words, it is the simple difference in average mental health impacts between the treated and the controls. The results in this column show that on average, displaced workers indeed experience higher levels of distress. This is especially true among female workers from 1-adult households (6.72 points or 67.2% of one SD). Furthermore, I find significant mental health spillover in 2-adult households, with 2.36 points spillover for male displacement and 1.96 points spillover for female displacement.

Specification (13), “mean difference on  $\Delta y$ ,” estimates  $\Delta y = \alpha + \gamma d + \epsilon$ , where  $\Delta y$  is the change in SK10 score before and after the treatment. The departure from specification (12) is that I now model changes in mental health on the left-hand side of the equation. Under this specification, workers who are displaced face a less pronounced increase in mental distress than in specification (12). Nevertheless, the effects under specification (13) remain positive and significant for all work-

ers without partners, as well as male workers with partners. In 2-adult households, male displacement has a more substantial impact on mental health than female displacement; the difference between males and females becomes statistically significant at the 10% level ( $p$ -value = 0.06).

Specification (14), “adjusted difference on  $\Delta y$ ,” estimates  $\Delta y = \alpha + \gamma d + X\beta + \epsilon$ , where  $X$  is the matrix of covariates. It augments the previous specification by adding covariates as control variables. It appraises how job displacement affects changes in mental health, holding observable characteristics constant. The majority of the ATT estimates have become more sizeable compared to specification (13). In the case of female workers from 2-adult households, the effect jumped from 0.4% to 8.3% of one SD. In addition, direct differences are substantial for the pooled sample ( $p$ -value = 0.03), which speak to the benefits of having a partner, if we consider own displacement effects only.

Specification (15), “reweighted difference on  $\Delta y$ ,” estimates  $\widehat{W}^{1/2} \Delta y = \alpha \widehat{W}^{1/2} \iota + \gamma \widehat{W}^{1/2} d + \widehat{W}^{1/2} \epsilon$ , where  $\widehat{W}^{1/2}$  is the square root of the weight matrix from entropy balancing. Put another way, I estimate weighted least squares where covariates are used to generate the weights but are not yet included as control variables. Some of the estimates have again increased in size in comparison with specification (14). For female workers from 2-adult households, the ATT estimate has shrunk in magnitude (from 0.83 points to 0.74 points) but is more precisely estimated with a smaller standard error (0.44 as opposed to 0.65).

Then, in specification (1), “main specification,” I estimate Eq. (1), which, compared to specification (15), contains the additional component  $\widehat{W}^{1/2} X\beta$ . That is to say, I have included the covariates as control variables in addition to using them for reweighting. I have done so because while the ATT estimates are mean-independent of the covariates after reweighting, they are not variance-independent. Put differently, variations in the covariates can further help explain variations in the outcome variable, namely, changes in mental health. As expected, for the household- and gender-specific equations, the point estimates under specification (1) are almost identical to those under specification (15) with minor discrepancies attributable to the separate reweighting setup—if I had reweighted the four strata jointly, there would have been

**Table C.1**  
Overall household difference in mental health.

	(1) Main specification (unemployed)			(2) Reemployed			(3) Unemployed and reemployed		
	<i>b</i>	<i>se</i>	$\rho$	<i>b</i>	<i>se</i>	$\rho$	<i>b</i>	<i>se</i>	$\rho$
<b>All households</b>									
All displacement for workers ( $\hat{\gamma}_1$ )	2.31***	(0.35)	0.034	0.04	(0.24)	0.048	0.98***	(0.21)	0.079
Male displacement for workers ( $\hat{\gamma}_2$ )	2.63***	(0.47)	0.037	-0.16	(0.34)	0.058	0.90***	(0.30)	0.091
Female displacement for workers ( $\hat{\gamma}_3$ )	1.89***	(0.47)	0.031	0.40	(0.31)	0.036	1.11***	(0.29)	0.065
<b>1-adult households</b>									
All displacement for workers ( $\hat{\gamma}_4$ )	3.40***	(0.91)	0.053	0.35	(0.54)	0.053	1.87***	(0.53)	0.100
Male displacement for workers ( $\hat{\gamma}_5$ )	3.76***	(1.28)	0.057	-0.68	(0.69)	0.057	1.54**	(0.76)	0.107
Female displacement for workers ( $\hat{\gamma}_6$ )	3.02***	(1.09)	0.049	1.42**	(0.69)	0.049	2.22***	(0.68)	0.094
<b>2-adult households</b>									
All displacement for workers ( $\hat{\gamma}_7$ )	1.44***	(0.29)	0.026	-0.09	(0.24)	0.046	0.46**	(0.20)	0.070
Male displacement for workers ( $\hat{\gamma}_8$ )	1.88***	(0.38)	0.030	0.02	(0.36)	0.059	0.62**	(0.29)	0.086
Female displacement for workers ( $\hat{\gamma}_9$ )	0.74**	(0.36)	0.022	-0.37	(0.27)	0.030	0.15	(0.25)	0.051
All displacement for partners ( $\hat{\gamma}_{10}$ )	0.86***	(0.27)	0.026	-0.47*	(0.26)	0.046	0.04	(0.19)	0.070
Male displacement for partners ( $\hat{\gamma}_{11}$ )	1.00***	(0.37)	0.030	-0.34	(0.39)	0.059	0.18	(0.30)	0.086
Female displacement for partners ( $\hat{\gamma}_{12}$ )	0.64**	(0.32)	0.022	-0.75***	(0.27)	0.030	-0.24	(0.21)	0.051
<b><i>p</i>-value of difference within specification</b>									
<i>Household difference in burden and risk sharing</i>									
All, $H_0 : \rho_1\gamma_4 = \rho_1\gamma_7 + \rho_{10}\gamma_{10}$	0.19			0.18			0.02		
Males, $H_0 : \rho_2\gamma_5 = \rho_2\gamma_8 + \rho_{12}\gamma_{12}$	0.27			0.69			0.20		
Females, $H_0 : \rho_3\gamma_6 = \rho_3\gamma_9 + \rho_{11}\gamma_{11}$	0.28			0.02			0.03		
<i>Overall household difference including prevalence</i>									
All, $H_0 : \rho_4\gamma_4 = \rho_7\gamma_7 + \rho_{10}\gamma_{10}$	0.02			0.19			0.01		
Males, $H_0 : \rho_5\gamma_5 = \rho_8\gamma_8 + \rho_{12}\gamma_{12}$	0.05			0.71			0.15		
Females, $H_0 : \rho_6\gamma_6 = \rho_9\gamma_9 + \rho_{11}\gamma_{11}$	0.07			0.02			0.01		
All, burden- and risk-sharing effect	0.24			0.95			0.63		
Males, burden- and risk-sharing effect	0.29			1.10			0.73		
Females, burden- and risk-sharing effect	0.20			0.74			0.49		
All, prevalence effect	0.76			0.05			0.37		
Males, prevalence effect	0.71			-0.10			0.27		
Females, prevalence effect	0.80			0.26			0.51		

*Notes:* Household differences in mental health. Pooled estimates as well as separate estimates for 1-adult and 2-adult households, males and females, and workers and partners are reported. All specifications estimate the ATT using Eq. (1), namely, reweighted difference in changes in mental health with covariates. Covariates are detailed in Appendix B. Specification (1) is for displaced workers who remain unemployed. Specification (2) studies households wherein displaced workers become reemployed. Specification (3) combines the treatment groups in (1) and (2). For all specifications, the control group comprises 7757 (19528) households with one (two) adults, 3673 (10535) of which involve male workers who experienced no job change. *b*, *se*, and  $\rho$  report the estimate, standard error (clustered on household IDs), and the prevalence of displacement. I use  $\hat{\gamma}_j$ ,  $j = 1, \dots, 12$  to denote the estimated coefficients and  $\rho_j$ ,  $j = 1, \dots, 12$  to denote the corresponding sample prevalence. Here,  $\rho_7 = \rho_{10}$ ,  $\rho_8 = \rho_{11}$ , and  $\rho_9 = \rho_{12}$ . Furthermore, the table presents *p*-values for Wald tests. “Household difference in burden and risk sharing” tests whether being in a 1-adult household carries different *mental health* implications from being part of a 2-adult household when displacement unfolds. “Overall household difference including prevalence” tests whether being in a 1-adult household carries different *welfare* implications to being part of a 2-adult household when displacement unfolds. The overall household difference is then decomposed into burden- and risk-sharing effect and prevalence effect. \* $p < 0.10$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

no discrepancies in the pooled estimates. The standard errors of the estimates, on the other hand, are smaller, suggesting that the ATT estimates with covariates are more precise with covariates than without covariates. The main specification is thus superior to the other specifications, since it produces ATT estimates that are more precise and less sensitive to observable characteristics and unobservable time-invariant characteristics.

Lastly, in specification (16), “placebo regression,” the treatment is set to transpire two years earlier than the actual treatment. For this setup, I lag the outcomes and pre-treatment covariates by two years so that they precede the placebo job loss. I then match on the placebo treatment using lagged covariates to generate the weight matrix. The results show that the placebo displacement has no significant impact on mental well-being. This is reassuring as it suggests there is little difference in mental health trends between the treated and reweighted controls prior to the treatment.<sup>21</sup> For most pairs of estimates between the main specification and the placebo regression, I can reject the null of equality at 10% level of significance; see column “*p*-value of difference between (1) and (6).” This means that the placebo estimates are significantly differ-

ent from the main estimates. The two exceptions are with partners of all workers and male workers, where the cross-specification differences are not striking, but the placebo estimates are close to zero nonetheless. The *p*-value of joint difference across specifications comes to 0.00, strengthening the argument that the placebo treatment is different from the actual treatment.

I have also conducted robustness checks using alternative matching procedures, namely, propensity score weighting, *k*-nearest neighbors matching, kernel matching, and radius matching. These procedures produce similar results as entropy balancing, and the estimates are available from the author.

## Appendix E. Heterogeneity by earnings

Figure E.1 explores the relationship between pre-treatment earnings and psychological well-being, and how the relationship differs by gender. I divide workers into four groups according to their pre-treatment earnings: low earners (1st–25th percentile), below-median earners (26th–50th percentile), above-median earners (51st–75th percentile), and high earners (76th–100th percentile). Earnings are CPI-adjusted to 2012 price levels. I compare the mental health of households from the same earnings quartile, estimating ATT using Eq. (1), namely, weighted difference in changes in mental health with covariates.

<sup>21</sup> Yet, it is still possible that workers with poor mental health self-select into unemployment. See Schmitz (2011) for a causal examination.

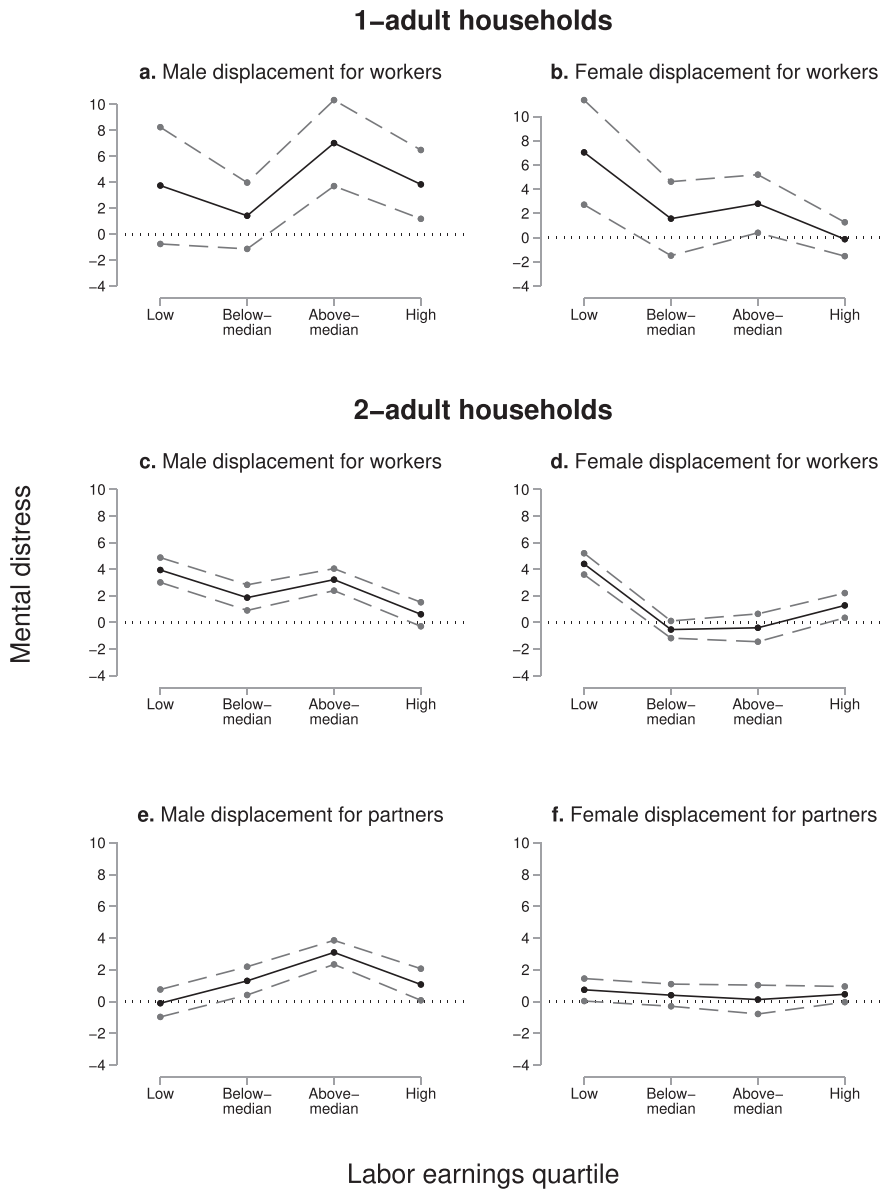


**Table D.1**

The effect of job displacement on mental health—baseline estimates.

	(1) Main		(12) Mean		(13) Mean		(14) Adjusted		(15) Reweighted		(16) Placebo		<i>p</i> -val. of
	specification		diff. on $\Delta y$		diff. on $\Delta y$		diff. on $\Delta y$		diff. on $\Delta y$		regression		diff. b/t
	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	(1) & (16)
<b>All households</b>													
All displacement for workers ( $\hat{\gamma}_1$ )	2.31***	(0.35)	5.07***	(0.40)	1.76***	(0.34)	2.21***	(0.34)	2.32***	(0.37)	-0.41	(0.42)	0.00
Male displacement for workers ( $\hat{\gamma}_2$ )	2.63***	(0.47)	4.52***	(0.50)	2.13***	(0.45)	2.47***	(0.45)	2.64***	(0.53)	-0.26	(0.59)	0.00
Female displacement for workers ( $\hat{\gamma}_3$ )	1.89***	(0.47)	5.89***	(0.63)	1.26**	(0.51)	1.91***	(0.53)	1.90***	(0.51)	-0.64	(0.56)	0.00
<b>1-adult households</b>													
All displacement for workers ( $\hat{\gamma}_4$ )	3.40***	(0.91)	5.54***	(0.64)	2.71***	(0.59)	3.05***	(0.60)	3.40***	(1.01)	-1.52	(1.14)	0.00
Male displacement for workers ( $\hat{\gamma}_5$ )	3.76***	(1.28)	4.44***	(0.83)	3.03***	(0.88)	3.45***	(0.86)	3.76**	(1.60)	-1.96	(1.75)	0.01
Female displacement for workers ( $\hat{\gamma}_6$ )	3.02***	(1.09)	6.72***	(0.96)	2.37***	(0.78)	2.71***	(0.83)	3.02**	(1.26)	-0.72	(1.36)	0.03
<b>2-adult households</b>													
All displacement for workers ( $\hat{\gamma}_7$ )	1.44***	(0.29)	3.79***	(0.47)	0.95**	(0.38)	1.45***	(0.39)	1.44***	(0.31)	0.27	(0.37)	0.01
Male displacement for workers ( $\hat{\gamma}_8$ )	1.88***	(0.38)	3.80***	(0.59)	1.50***	(0.47)	1.79***	(0.48)	1.88***	(0.43)	0.75	(0.50)	0.08
Female displacement for workers ( $\hat{\gamma}_9$ )	0.74**	(0.36)	3.93***	(0.76)	0.04	(0.62)	0.83	(0.65)	0.74*	(0.44)	-0.68	(0.48)	0.02
All displacement for partners ( $\hat{\gamma}_{10}$ )	0.86***	(0.27)	2.28***	(0.46)	0.86**	(0.37)	0.97***	(0.36)	0.86***	(0.30)	0.23	(0.36)	0.16
Male displacement for partners ( $\hat{\gamma}_{11}$ )	1.00***	(0.37)	2.36***	(0.60)	0.98**	(0.47)	1.06**	(0.46)	1.00**	(0.43)	0.61	(0.55)	0.56
Female displacement for partners ( $\hat{\gamma}_{12}$ )	0.64**	(0.32)	1.96***	(0.69)	0.68	(0.60)	0.62	(0.58)	0.64	(0.40)	-0.26	(0.30)	0.04
$N_{\text{Treated}}$	964		964		964		964		964		652		
<i>p</i> -value of joint difference across specifications													0.00
<b><i>p</i>-value of difference within specification</b>													
<i>Direct difference</i>													
All, $H_0 : \gamma_4 = \gamma_7$	0.04		0.03		0.01		0.03		0.06		0.14		
Males, $H_0 : \gamma_5 = \gamma_8$	0.16		0.52		0.13		0.09		0.26		0.13		
Females, $H_0 : \gamma_6 = \gamma_9$	0.05		0.02		0.02		0.07		0.09		0.98		
<i>Household difference</i>													
All, $H_0 : \rho_1\gamma_4 = \rho_1\gamma_7 + \rho_{10}\gamma_{10}$	0.19		0.98		0.16		0.28		0.24		0.12		
Males, $H_0 : \rho_2\gamma_5 = \rho_2\gamma_8 + \rho_{12}\gamma_{12}$	0.27		0.63		0.29		0.22		0.37		0.16		
Females, $H_0 : \rho_3\gamma_6 = \rho_3\gamma_9 + \rho_{11}\gamma_{11}$	0.28		0.72		0.21		0.46		0.35		0.68		
<i>Gender difference</i>													
All, $H_0 : \gamma_2 = \gamma_3$	0.27		0.09		0.20		0.41		0.31		0.64		
1-adult households, $H_0 : \gamma_5 = \gamma_6$	0.66		0.07		0.57		0.54		0.72		0.57		
2-adult households, $H_0 : \gamma_8 = \gamma_9$	0.03		0.89		0.06		0.23		0.06		0.04		
<i>Role difference</i>													
All, $H_0 : \gamma_7 = \gamma_{10}$	0.12		0.01		0.86		0.33		0.15		0.92		
Males, $H_0 : \gamma_8 = \gamma_{12}$	0.01		0.04		0.28		0.12		0.03		0.08		
Females, $H_0 : \gamma_9 = \gamma_{11}$	0.61		0.10		0.23		0.78		0.67		0.08		

*Notes:* The effect of different employment events on the mental health of households. Pooled estimates as well as separate estimates for 1-adult and 2-adult households, males and females, and workers and partners are reported. All specifications estimate the ATT using Eq. (1), namely, reweighted difference in changes in mental health with covariates. Covariates are detailed in Appendix B. Specification (1) reports the main results (unanticipated displacement) as seen in Table 2. Specifications (12)–(15) display the results for baseline specifications: mean difference in mental health, mean difference in changes in mental health, mean difference in changes in mental health with covariates, and reweighted difference in changes in mental health. Specification (16) assumes the displacement takes place two years earlier. *b* and *se* report the estimate and standard error (clustered on household IDs). The number of treated units for each specification is displayed next to  $N_{\text{Treated}}$ . I use  $\hat{\gamma}_j, j = 1, \dots, 12$  to denote the estimated coefficients and  $\rho_j, j = 1, \dots, 12$  to denote the corresponding sample prevalence. Here,  $\rho_7 = \rho_{10}$ ,  $\rho_8 = \rho_{11}$ , and  $\rho_9 = \rho_{12}$ . I conduct Wald tests on cross-specification differences for each coefficient separately and for all coefficients jointly, reporting *p*-values in the top panel. In the bottom panel, I present the *p*-values for Wald tests on coefficients from the same specification. “Direct difference” tests whether the mental health burden is similar for displaced workers from 1-adult and 2-adult households. “Household difference” tests whether being in a 1-adult household carries different mental health implications from being part of a 2-adult household when displacement occurs. “Gender difference” tests whether job displacement affects male and female workers in like manner. “Role difference” tests whether being a displaced worker implies the same mental health consequences as being a partner in a 2-adult household. \**p* < 0.10. \*\**p* < 0.05. \*\*\**p* < 0.01.



**Fig. E.1.** Pre-treatment earnings and mental health effects. Each panel divides the treatment group into four earnings quartiles, low (1st–25th percentile), below-median (26th–50th percentile), above-median (51st–75th percentile), and high earnings (76th–100th percentile). I estimate the ATT using Eq. (1), namely, reweighted difference in changes in mental health with covariates. Covariates are detailed in Appendix B. Robust standard errors clustered on household IDs are used to calculate the confidence intervals. The solid black line traces the estimate for each group. The dashed gray lines mark the 90 percent confidence intervals. The dotted horizontal line denotes the significance cutoff at 0. Panels are created using Stata's `coefplot` command (Jann, 2014).

In panel *a*, above-median male earners from 1-adult households are overwhelmed by job displacement. The elevation in distress is 7.02 points or 70.2% of one SD, which is four times more than the elevation among below-median earners ( $p$ -value of cross-specification difference = 0.03). The treatment is also taxing for high earners but not low earners. These results reinforce the common sense understanding that the loss of higher earnings is associated with greater distress.

In panel *b*, female workers from 1-adult households overturn the pattern. Low earners are more profoundly influenced by the unemployment shock than high earners (7.04 points versus -0.12 points,  $p$ -value of cross-specification difference = 0.01). The estimates for below- and above-median earners fall between the two extremes. If we think of earnings as pertaining to expenditures and job expectations, the results follow. It is worth noting at this point that 1-adult households report larger standard errors than 2-adult households because there are fewer treated cases.

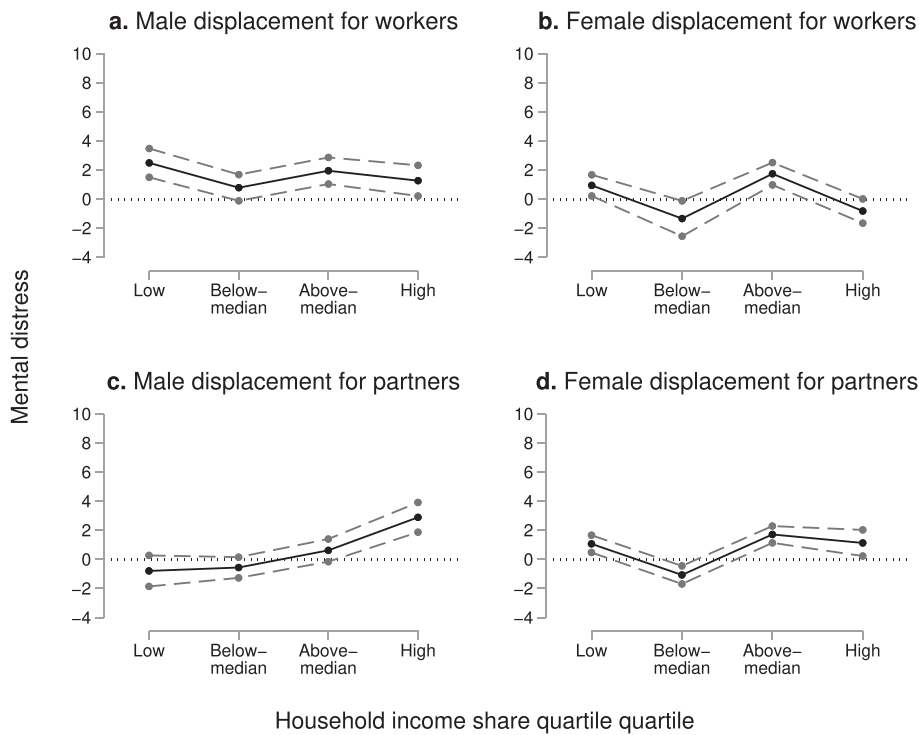
What is evident in panel *c* is that male workers from 2-adult households are subject to high distress in general. Additionally, low earnings

are significantly more damaging than below-median or high earnings ( $p$ -values of cross-specification difference < 0.01). According to the theory that was proposed earlier, this relates to expenditures and expectations. Whether or not I include the spillover effect, it remains the case that household differences are significant for above-median and high earners.

Panel *d* again casts the spotlight on low earners. Here, female workers from 2-adult households report an average increase of 4.4 points in distress, much like their counterparts from 1-adult households ( $p$ -value of direct difference = 0.38). The difference is that high earners also respond unfavorably to job displacement. For this reason, household difference in burden and risk sharing among high earners returns a  $p$ -value of 0.03, with 1-adult households bearing less burden for a change.

Panel *e* turns attention to partners of displaced male workers. It uncovers the role difference for females in 2-adult households: If distress is high upon own job loss (panel *d*), it is low upon the partner's job loss (panel *e*), and vice versa. The only lack of distinction is for

## 2-adult households



**Fig. E.2.** Pre-treatment household income share and mental health effects in 2-adult households. Each panel divides the treatment group into four contribution groups, low (1–25%), below-median (26–50%), above-median (51–75%), and high contribution (76–100%). I estimate the ATT using Eq. (1), namely, reweighted difference in changes in mental health with covariates. Covariates are detailed in Appendix B. Robust standard errors clustered on household IDs are used to calculate the confidence intervals. The solid black line traces the estimate for each group. The dashed gray lines mark the 90 percent confidence intervals. The dotted horizontal line denotes the significance cutoff at 0. Panels are created using Stata's `coefplot` command (Jann, 2014).

the high-earning group, for whom displacement presents mental health challenges regardless of household role.

In panel *f*, the lack of effect is coherently presented across different groups. It challenges us to reevaluate the significant findings for partners of displaced females under the main specification (see Table 2). It reflects that for males, significant household differences are reliant on the spillover effects being negligible. In addition, role differences emerge through comparisons between panel *c* and panel *f* for all groups save high earners.

If earnings rank among peers can be considered a form of global status, what then of earnings within households (local status) (Gola, 2022)? Figure E.2 studies the effect of relative earnings in households. I construct the percentage earned in the household (“income share”) before the treatment, and group individuals into quartiles accordingly: low contribution (1–25%), below-median contribution (26–50%), above-median contribution (51–75%), and high contribution (76–100%). In 1-adult households, individuals earn close to 100%, providing insufficient variations to rank individuals. Hence, in this exercise, I consider 2-adult households only.

In panel *a*, displaced male workers who contribute low shares of household income are the most concerned (2.49 points), followed by above-median contributors and high contributors. In Fig. E.1, we observe a comparable pattern for these workers (panel *c*). In this respect, peer ranking and household ranking are perceived similarly by male workers with partners.

Panel *b* directs attention towards above-median contributions. The distress associated with the loss of 50–75% of household income is 1.74 points. This is contrasted with below-median and high contributions, which return favorable, albeit insignificant, estimates ( $p$ -values of cross-specification difference = 0.00). Not surprisingly, gender differences (comparing panel *a* and *b*) arise due to these favorable effects.

Panel *c* depicts a clear trend for partners of male workers: The more the worker contributes to household income, the more distressed the

partner likely becomes when displacement occurs. Estimates start from -0.79 points for low shares and tend towards 3 points for high shares. Panel *c*, together with panel *b*, signal that in the case of male displacement in 2-adult households, income loss is a greater concern for the partners, whereas gender role and perception of unemployment may be more relevant for the workers.

Panel *d* shows that the partners’ distress pattern closely resembles that of the workers’. Above-median contributions again draw the focus with an estimate of 1.71 points. Comparing panel *d* in Fig. E.2 with panel *f* in Fig. E.1, it becomes apparent that partners of displaced female workers are more concerned with the loss of relative income than the loss of absolute income.

Overall, Figs. E.1 and E.2 argue that gender differences are not driven solely by earnings. If such were the case, we would have observed a strict upward trend in all panels. In the case of male workers, no matter the earnings rank or contribution proportion, there exists relatively high distress. Female workers’ experience, on the other hand, is more sensitive to pre-treatment earnings. As partners, males and females absorb the distress to different extents. Simple controlling of earnings and income share can fail to do justice to the complexities of the mental health experience of households.

Being a non-English speaker at home is another potential channel that is in need of more attention.<sup>22</sup> On the one hand, being an immigrant (as proxied by language spoken at home) could reduce employability. On the other hand, recent evidence shows that occupational foreign language skills could benefit workers in certain occupations (e.g., Stöhr, 2015).

<sup>22</sup> Analysis of this dimension has been limited by the size of the treatment group.

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