

# Do longer job hours matter for maternal mental health? A longitudinal analysis of single vs. partnered mothers

Julija Simpson<sup>1\*</sup>, John Wildman<sup>1</sup>, Clare Bambra<sup>1</sup>, Heather Brown<sup>2</sup>

<sup>1</sup>Newcastle University, UK

<sup>2</sup>Lancaster University, UK

\*Corresponding author: [julija.simpson@ncl.ac.uk](mailto:julija.simpson@ncl.ac.uk)

## Abstract

Over the past decade, single mothers have experienced increasing work requirements both in the UK and in other developed countries. Our aim was to examine if increasing job hours are associated with mental health of single mothers compared to partnered mothers.

Using 13 waves of the Understanding Society Survey (2009-2023), we estimated the relationship between changing job hours and mental health using difference-in-difference event study design, accounting for differential treatment effects across time and individuals. We also investigated the role of potential mechanisms, including role strain and additional income.

Our findings suggest that increasing job hours from part-time to full-time is associated with an instantaneous decrease in mental health of 0.19 standard deviations for single mothers [95% CI: -0.37;-0.01], with no effect for partnered mothers. Further analyses suggest increased role strain for single mothers as a mechanism helping explain these differences.

The negative effects of increasing job hours and increased role strain should be considered when developing future welfare policies for single mothers, to ensure that greater work requirements do not undermine the mental health of the already vulnerable population group.

Keywords: mental health; job hours; single mothers; inequalities; difference-in-difference

JEL classification: D13; J22; I14; I38.

Practitioner Points:

- There have been major increases in labour force participation of single mothers over the past decade;
- We have found that full-time job hours are negatively associated with their mental health; no relationship for partnered mothers.
- Found evidence for role strain as a likely explanation.

# 1 Introduction

## 1.1 Background

Over the past two decades, there has been a marked rise in employment of single parents in the UK. Rising by more than twenty percentage points, the rate of expansion in employment of single parents has been greater than that of their partnered counterparts (four percentage points), with over half of single parents currently employed in full-time work (Office for National Statistics, 2022).

Such increases in employment at least in part reflect the changing welfare policy landscape for single parents. Both internationally and in the UK, single parents have been faced with increasing pressure to either find work or to increase their job hours in order to remain eligible for benefits (Whitworth & Griggs, 2013). In the UK, one of the key such policies has been the Lone Parent Obligation (LPO). In 2008, work requirements were first introduced to single parents, previously unconditionally entitled to the Income Support benefit. In the following years, the age of the youngest child at which single parent is eligible for the benefit had been lowered from 10 to 7 in 2010, to 5 in 2012, and to 3 in 2017 (Katikireddi et al., 2018), with LPO directly contributing to increasing employment levels of single parents (Avram, Brewer, & Salvatori, 2018; Codreanu & Waters, 2023).

Introduction of the Universal Credit (UC) in 2013 (currently the main working-age benefit in the UK) has been another important policy development for employment of single parents. By having a tapered, as opposed to sharp cut-off for benefits withdrawal, UC was designed to break the disincentive to work beyond the 16-hour limit existing under the legacy benefits system (DWP, 2010). Furthermore, both LPO and UC were implemented in the broader context of austerity and welfare reform in the UK, adding further pressure for single parents to increase their labour force participation (Bell & Gardiner, 2019). Finally, recently there have been major increases in work hour and search requirements for single parents. From November 2023, single parents with children aged 3-12 are expected to work or search for work up to 30 hours per week – up from 16 and 25 hours for parents of 3-4 year olds and 5-12 year olds respectively (Department for Work and Pensions (DWP), 2023), indicating that most single parents are now expected to work full-time hours<sup>1</sup>.

## 1.2 Literature review and evidence gaps

Employment is a crucial determinant of health and wellbeing, and its positive association with mental health has been established across numerous studies and population groups (Modini et al., 2016). However, despite the significant rises in workforce participation, much less is known about the relationship between employment, and in particular job hours, and the mental health of working single mothers – a group with historically high prevalence of mental ill-health (Gingerbread, 2018; Targosz et al., 2003).

There is a small body of evidence suggesting that being employed is associated with more benefits for mental health for partnered than for single mothers (Afifi, Cox, & Enns, 2006;

---

<sup>1</sup> Although there is no standard definition of full-time hours in the UK, in this study we define full-time hours as working 30 or more hours per week. This is consistent with previous literature on working hours and health as well as with the definition used in the Understanding Society survey (see Section 2.3 for more detail).

Ali & Avison, 1997; Baker, North, & Team, 1999). However, to the best of our knowledge, to date, there has been only one study investigating the effects of longer job hours on mental health of single (and partnered) mothers. A cross-sectional study by Robinson, Magee and Caputi (2014) investigated the role of job hours in explaining the differences in physical and mental health of single and partnered mothers in Australia. The study has found that job hours is an important determinant of the differences in physical health between the two groups but there was no significant relationship with mental health.

Related longitudinal research from the UK, on the other hand, suggests that working full-time is associated with increased biomarkers of chronic stress for mothers relative to women without children, concluding that reduced job hours or flexible working arrangements could enable working mothers to lower their levels of chronic stress (Chandola et al., 2019). However, the study did not explicitly consider single and partnered mothers and was based on only two waves of data.

Recognising the lack of evidence in this area, a systematic review of quantitative studies on employed mothers by Robinson, Magee and Caputi (2018) has concluded that ‘there is remarkably little research on the work-family interface of single mothers, [providing a case for] further research on single employed mothers, in particular for more comparative studies with partnered mothers’ (p.280).

In the context of continuously increasing work requirements for single mothers, the lack of understanding about the relationship between job hours and mental health indicates an important and policy-relevant gap in the evidence base.

### 1.3 Potential Mechanisms

The theory of ‘Role Strain’ (Marks, 1977; Michel et al., 2011; Spencer-Dawe, 2005) can provide a useful framework to investigate the relationship between higher job hours and mental health of single vs. partnered mothers (Robinson et al., 2014). According to this theory, individuals have finite resources (e.g., time, money and attention) available to balance roles, such as work and family obligations. Managing multiple competing roles can lead to exhaustion of available resources, generating role strain (Hargis et al., 2011). Prolonged role strain can in turn impair health, resulting in depressive symptoms and burnout (Ahola et al., 2006).

Time is a crucial finite resource for working mothers. It has been well established in the economics literature that individuals who dedicate more time (and effort) to work, will have, accordingly, to dedicate less time to fulfil family responsibilities (Becker, 1965). This trade-off or conflict arising from combining competing multiple responsibilities is likely to increase with the number of job hours and is also likely to be more pronounced for single than partnered mothers. This is because, unlike partnered mothers, single mothers are unable to pool their resources with their partner (e.g., they are not able to split childcare responsibilities) meaning that the demands on their time are far greater than those for partnered mothers.

However, despite the greater time constraints, research suggests that single mothers allocate no less time to childcare responsibilities than partnered mothers (Craig, 2005; Pepin, Sayer,

& Casper, 2018). Thus, longer hours are likely to generate much greater role strain for single as opposed to partnered mothers, leading to worse mental health.

On the other hand, longer job hours may generate additional income, leading to an increase in other available resources (e.g., money to pay for childcare) which may help facilitate managing the demands of work and family and reduce the role strain for both single and partnered mothers. Furthermore, income per se has been shown to be positively associated with mental health, particularly when it moves individuals out of poverty (Thomson et al., 2022). Thus, given that single mothers are more likely to be in poverty than partnered mothers (Joseph Rowntree Foundation, 2023), they may be more likely to benefit from any increases in income from longer job hours. Finally, longer job hours may also lead to increased skill development and social support, which may also benefit mental health of both single and partnered mothers (Greenhaus & Powell, 2006).

It is a priori unclear which effect (role strain or income) will dominate and therefore the effect of longer working hours on mental health of single and partnered mothers should be investigated empirically.

The aim of this study is to investigate the effect of increasing working hours to full-time (30 hours per week or more) vs. remaining part-time (1-29 hours) on the mental health of working single mothers and to compare this relationship to that of partnered mothers, and to explore if working more hours is contributing to the mental health inequalities between the two groups. Additionally, we aim to explore the effects of role strain and additional income in mediating this relationship.

Improved understanding of this relationship will help inform future welfare policies for single mothers, to help ensure that the rising employment and job hours help foster, or at least does not undermine, the already poor mental health of this population group.

## 2 Materials and methods

### 2.1 Data

We use thirteen waves of data from the UK Understanding Society Survey (USS), covering the period between 2009-2023 (University of Essex, 2023). USS is a nationally representative, longitudinal panel survey based on a stratified clustered random sample of 40,000 households from the four UK countries. Sample selection for the survey is based upon postcodes which are then grouped into geographical strata to ensure a nationally representative selection of households. The survey asks respondents a range of questions related to their health, labour market experience, finances, opinions, family life, and well-being.

### 2.2 Sample

In line with previous research on job hours (Mendolia, 2016; Robinson, Magee, & Caputi, 2014), this study focuses on employed mothers, defined as female respondents (aged 16-65) in paid work (but not in self-employment<sup>2</sup>), and with parenting responsibilities of a child less

---

<sup>2</sup> Self-employed mothers (n=5,213 obs.) were not included in the analyses as they have much greater flexibility in choosing their job hours.

than 16 years old. Eligible individuals are kept in the analyses as long as they meet the above inclusion criteria.

We examine two marital status categories: single working mothers and partnered working mothers. The ‘single’ category includes those separated, divorced and widowed; ‘partnered’ includes those married or cohabiting.

Given the event-study design and the focus on the effect of increasing hours from part-time to full-time (vs. remaining part-time) we exclude mothers who decreased their hours or remained full-time. Also excluded are the mothers with more than one switch from part-time to full-time as they could be exposed to variable hours rather than increasing their hours. We explore the impact of relaxing each of these restrictions in our sensitivity analyses.

Our total sample includes 4,577 mothers resulting in 17,778 observations across the 13 waves, with single mother observations accounting for 21% and partnered mother observations accounting for the remaining 79% of total observations. Sample flow diagram is illustrated in Appendix 1.

## 2.3 Outcome

The key outcome of interest in this study is mental health, as measured with GHQ-12 (the twelve-item General Health Questionnaire). This measure has been validated to identify poor psychological health in the general population and has been widely used in longitudinal studies (Goldberg et al., 1997; Goldberg & Hillier, 1979). The total score ranges from 0 to 36, with higher scores indicating worse mental health. In this study, the GHQ-12 is reverse coded, with higher scores indicating better mental health (see, e.g., Aksoy et al. (2021); Bambra et al. (2022)). The scores are standardised (by subtracting the sample mean and dividing by standard deviation) for easier interpretation of results.

## 2.4 Key explanatory variable

Our main explanatory variable is job hours. It indicates the number of hours typically worked in a week, including hours from overtime. Given the focus of our study on the effects of full-time work, we categorise job hours into a binary variable of full-time vs. part-time. Full-time hours are defined as working 30 hours or more per week – in line with previous literature (e.g., Mendolia (2016)) as well as with the definition used in the Understanding Society Survey. This definition also reflects the recent increase of the working hour requirements for single parents receiving Income Support benefit in the UK to 30 hours per week (DWP, 2023). Accordingly, part-time hours are defined as under 30 hours (1-29 hours per week).

Given that job hours are likely to have a non-linear relationship with mental health (e.g., it is well-established that working very long hours has detrimental effects on mental health relative to working full-time (Weston et al., 2019)), in additional analyses, we add a further category of working long hours (41+ per week).

## 2.5 Empirical strategy

### 2.5.1 Difference-in-difference event study

We use a staggered design approach to estimation in order to allow for potential heterogeneous treatment effects across time (Callaway & Sant'Anna, 2021). We define treatment (event) as increasing job hours from part-time to full-time vs. remaining part-time, where treatment is an absorbing state and never treated units are the comparison group (i.e., those remaining part-time in all previous periods), with separate models for single and partnered mothers.

Our estimation model is as follows:

$$y_{its} = a_i + b_t + \sum_{p=-5}^{-2} \beta_p D_{sp} + \sum_{p=0}^6 \gamma_p D_{sp} + x_{its} + \varepsilon_{its} \quad (1)$$

where  $y$  is standardised GHQ-12. Subscripts  $i$ ,  $t$ , and  $s$  denote the individual, wave, and treatment group respectively. Parameters  $a$  and  $b$  capture individual and time (wave) fixed effects. The subscript  $p$  denotes the period relative to the year of treatment, with one year pre-treatment ( $p=-1$ ) the omitted category. We estimate 5 leads and 6 post-treatment effects (lags) around the treatment period,  $p = 0$ .<sup>3</sup>

$D$  is a dummy variable taking a value of 1 if the individual has been treated in period  $p$ , and  $x$  denotes exogenous controls for mother's age. The average treatment effect on the treated (ATT) is calculated from aggregating the and estimates according to Callaway and Sant'Anna (2021) as an event study<sup>4</sup>.

To explore if increasing working hours to full-time is associated with widening inequalities between single and partnered mothers, we also estimate a model where partnered mothers (both increasing hours and remaining part-time) are included in the comparison group for single mothers.

We also explore if the mental health effects vary by level of job hour intensity. We create a variable containing three categories: part-time (1-29 hours per week), full-time (30-40), and long hours (41+) and estimate the following two-way fixed effects model:

$$y_{it} = \beta_1 \text{Job hours} + \beta_2 x_{it} + \alpha_i + b_t + \varepsilon_{it} \quad (2)$$

Where  $\beta_1$  is the coefficient of interest indicating the effect of working 30-40 and 41+ vs. remaining part-time, with remaining parameters the same as in Equation (1).

Finally, we explore the effect of increased job hours as a continuous measure, as opposed to categorical. With this exception, our model follows the same specification as outlined in Equation 2.

---

<sup>3</sup> The number of leads and lags was determined by data availability.

<sup>4</sup> The main specification was estimated using outcome regression model using 'csdid' command in Stata (v.18).

## 2.6 Potential mechanisms

In our analysis of mechanisms, we investigate two potential mediators between higher job hours and mental health: one relating to the ‘role strain’ theory and one related to the income mechanism.

We investigate the ‘role strain’ mechanism by exploring regional variation in childcare availability in England. We use the latest Ofsted (Office for Standards in Education, Children's Services and Skills) statistics indicating the ratio of childcare places to number of children aged 7 and under in each region of England (ONS, 2024). We create a binary variable indicating whether the region was above or below the English average in terms of childcare availability (1=Above, 0=Below). The regions of North West, East of England, London and South East have above average childcare availability (i.e., above 0.25 childcare places per child), with the remaining four regions (North East, Yorkshire and the Humber, East and West Midlands, South West) having below average availability. Given that childcare availability levels have remained broadly stable over the past decade (Ofsted, 2017), the binary indicator is time invariant.

Due to the reduced number of observations (including the number of ‘switchers’), for the analysis of mechanisms, we then estimate a set of two-way fixed effects models, stratified by childcare availability for single and partnered mothers to investigate if the relationship between full-time hours and mental health is different for mothers in regions with low vs. high childcare availability. The fixed effects model takes the following form:

$$y_{it} = \beta_1 Full\ time + \beta_2 x_{it} + \alpha_i + b_t + \varepsilon_{it} \quad (3)$$

where the coefficient of interest is  $\beta_1$  indicating the effect of increasing hours to full-time (vs. remaining part-time) and the remaining parameters defined as in Equation (1).

The effect of additional income is explored by stratifying the model outlined in Equation (3) by a variable denoting if an individual was paid for working overtime or not (0=No; 1=Yes). Given the established positive association between income and mental health (Thomson et al., 2022), we would expect that working more hours through paid (especially if it is higher wage) overtime should not negatively affect health. In fact, with the income gain (and the voluntary nature of it) it should benefit mental health/wellbeing.

## 2.7 Robustness checks

We conduct several robustness checks to assess the sensitivity of our main results to different model and sample specifications.

### 2.7.1 Double robust difference-in-difference estimator

In this study, selection into full-time employment is an endogenous choice, leading to a potential selection bias. As illustrated in Appendix 2, single mothers who increase their hours to full-time have greater education levels, are more likely to work in Management & Professional occupations, are more likely to have only one child, and have older children than those remaining part-time. Similar differences apply to partnered mothers.

To mitigate possible selection bias, we use the doubly robust DiD estimator based on stabilized inverse probability weighting and ordinary least squares (Sant’Anna & Zhao,

2020). This estimator allows for matching based on observable characteristics. Our matching variables include potential confounding variables associated both with employment and mental health, including: mother's age, number of children, age of the youngest child, and occupation (Jaumotte, 2004).

### 2.7.2 Alternative sample specifications

First, we explore the results of a model specification using 'not yet treated' as controls, as opposed to 'never treated'. We then assess the impact of relaxing our sample restrictions by including in our comparison group mothers who remain full-time. Finally, we investigate the effect of adding mothers who increase their hours more than once to the treatment group (i.e., who experience more than one event).

### 2.7.3 Test for attrition

Panel data analyses are susceptible to problems of attrition bias (i.e., when individuals systematically drop out of the sample and when the drop out is associated with the outcome of interest). To test whether our results are likely to be impacted by attrition bias, we implement the Verbeek and Nijman (1992) test.

## 3 Results

### 3.1 Descriptive characteristics

Table 1 illustrates the descriptive statistics of the two comparison groups pooled across all waves. Consistent with existing literature, there are significant differences between single and partnered mothers. For example, single mothers have poorer mental health (a difference that is economically meaningful, i.e.,  $>0.2$  standard deviations<sup>5</sup>), are less likely to have higher education degree, and are more likely to be working in routine occupations. In terms of working hours, single mothers are less likely to work full time hours (15% vs 17% of single vs. partnered mothers work full-time) and are slightly less likely to work long-hours (3% vs 4% respectively). As noted earlier, descriptives further subdivided by treatment status are illustrated in Appendix 2.

---

<sup>5</sup> We define 'economically meaningful' effect by using the Cohen's D definition whereby small, medium and large effects are 0.2, 0.5, 0.8 standard deviations respectively (Cohen, 1988).



Table 1 Descriptive characteristics of the analysis sample across all available waves (1-13)

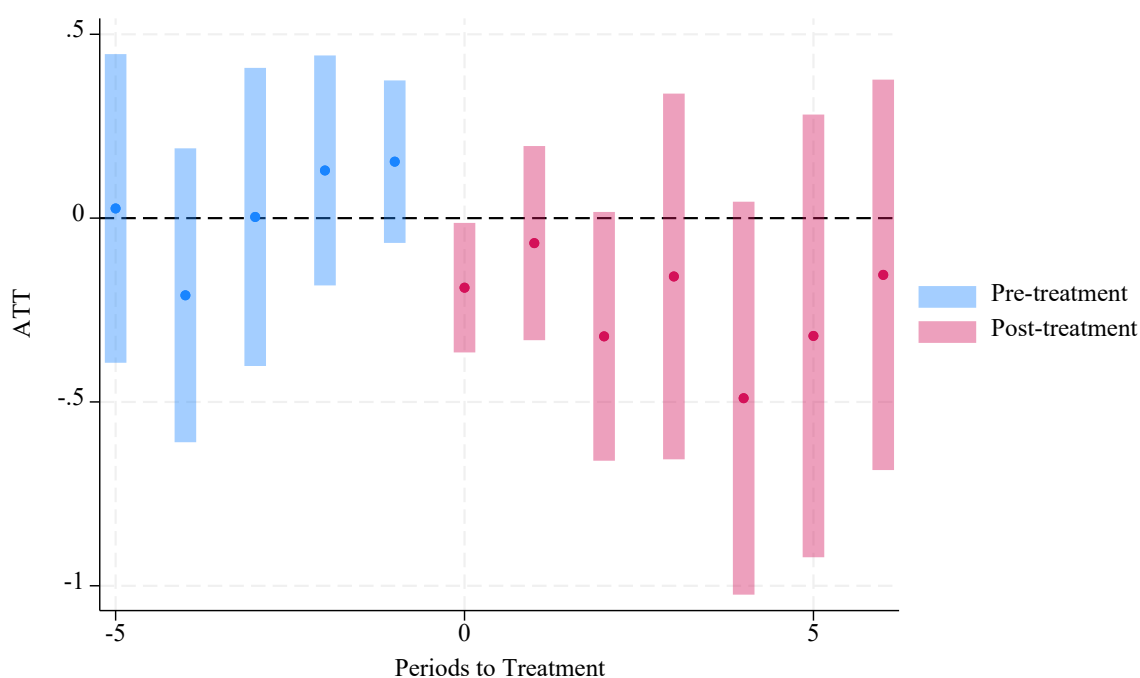
	Single	Partnered	Test
Observations	3,662 (20.6%)	14,116 (79.4%)	
GHQ-12	23.69 (5.89)	24.96 (4.98)	<0.001
Standardised GHQ-12	-0.19 (1.13)	0.05 (0.96)	<0.001
Age	38.32 (8.05)	39.30 (7.06)	<0.001
Full-time hours (30+)			
No	3,104 (84.8%)	11,671 (82.7%)	0.003
Yes	558 (15.2%)	2,445 (17.3%)	
Long hours (41+)	0.03 (0.18)	0.04 (0.20)	0.008
Education			
Degree or higher	1,044 (28.5%)	6,445 (45.7%)	<0.001
GCSE, A-levels or equivalent	2,415 (65.9%)	7,375 (52.2%)	
Below GCSE or other	203 (5.5%)	296 (2.1%)	
Occupation			
Management & professional	717 (19.6%)	4,862 (34.4%)	<0.001
Intermediate	695 (19.0%)	3,553 (25.2%)	
Routine	2,250 (61.4%)	5,701 (40.4%)	
Number of children			
One	2,125 (58.0%)	5,623 (39.8%)	<0.001
Two	1,234 (33.7%)	6,567 (46.5%)	
Three or more	303 (8.3%)	1,926 (13.6%)	
Age of youngest child			
0-2 years old	438 (12.0%)	3,073 (21.8%)	<0.001
3-11 years old	2,128 (58.1%)	8,073 (57.2%)	
12-15 years old	1,096 (29.9%)	2,970 (21.0%)	
Region			
North East	107 (2.9%)	463 (3.3%)	<0.001
North West	400 (10.9%)	1,474 (10.4%)	
Yorkshire and the Humber	327 (8.9%)	1,163 (8.2%)	
East Midlands	254 (6.9%)	1,168 (8.3%)	
West Midlands	396 (10.8%)	1,164 (8.2%)	
East of England	305 (8.3%)	1,419 (10.1%)	
London	446 (12.2%)	1,145 (8.1%)	
South East	366 (10.0%)	1,793 (12.7%)	
South West	283 (7.7%)	1,434 (10.2%)	
Wales	190 (5.2%)	820 (5.8%)	
Scotland	328 (9.0%)	1,193 (8.5%)	
Northern Ireland	260 (7.1%)	880 (6.2%)	

\*Test for equality between groups using linear regressions for continuous variables and Pearson  $\chi^2$  tests for factor variables.

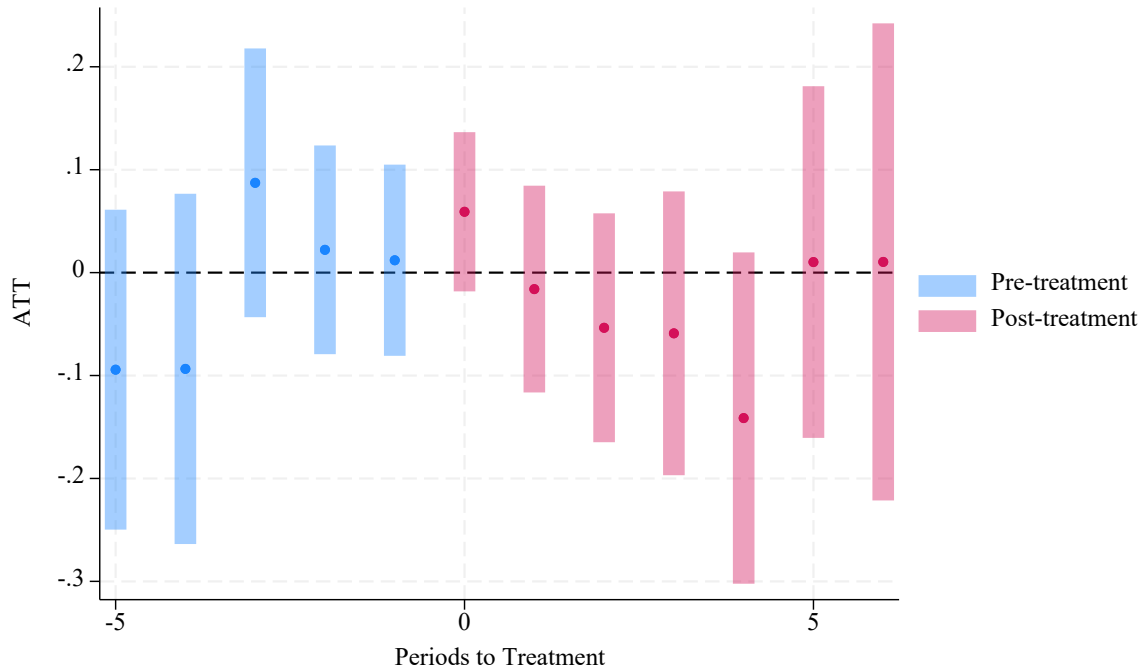
### 3.2 Econometric analysis results

Figures 1 and 2 illustrate the estimated ATT's aggregated as an event study, with standardised GHQ-12 being the outcome measure for single and partnered mothers respectively. Period 0 is the instantaneous effect of increasing hours to full-time. Pre-treatment differences are shown in blue and post-treatment differences are shown in red. The pre-treatment differences are not significantly different from zero for both single and partnered mothers suggesting that pre-trends violations are not a concern.

Following an increase in hours from part-time to full-time, there is an instantaneous statistically significant and borderline economically meaningful drop in mental health for single but not for partnered mothers, with an effect size equal to 0.19 standard deviations [95% Confidence Interval: -0.37;-0.01].

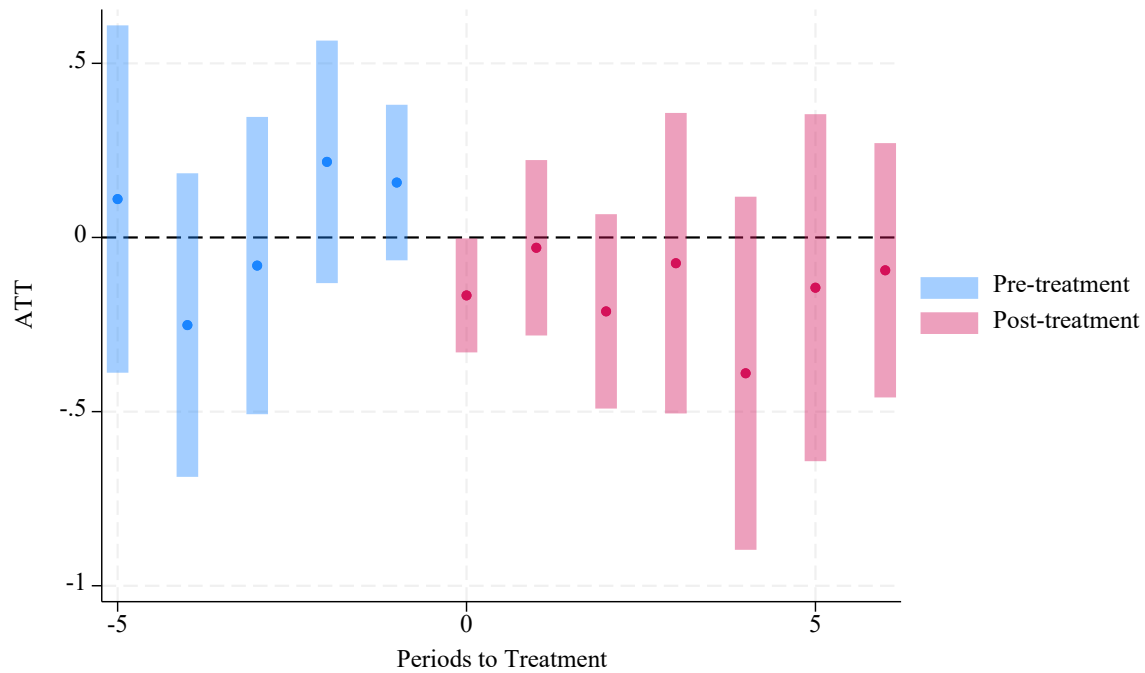


**Figure 1.** The effect of increasing working hours to full-time for single mothers presented as an event study. The estimation procedure follows Callaway and Sant'Anna (2021) outcome regression estimation model, controlling for age. ATT's are aggregated as an event study with 5 leads and 6 lags. Circles are the point estimates and the vertical bars are the 95 % confidence intervals. Blue points and bars are the lead waves and the red points and bars are the lag waves.



**Figure 2.** The effect of increasing working hours to full-time for partnered mothers presented as an event study. The estimation procedure follows Callaway and Sant'Anna (2021) outcome regression estimation model, controlling for age. ATT's are aggregated as an event study with 5 leads and 6 lags. Circles are the point estimates and the vertical bars are the 95 % confidence intervals. Blue points and bars are the lead waves and the red points and bars are the lag waves.

To investigate if increasing hours to full-time leads to widening inequalities between single and partnered mothers, we also estimate a model where partnered mothers (both increasing their hours and remaining part-time) are included in the comparison group for single mothers. The results in Figure 3 suggest that, in comparison to remaining part-time or to partnered mothers overall, there is a statistically significant drop in mental health of single mothers equal to -0.17 s.d. [-0.33,-0.001], suggesting that increasing working hours for single mothers can lead to widening inequalities in mental health.



**Figure 3.** The effect of increasing working hours to full-time for single mothers presented as an event study. The comparison group includes never treated single mothers and treated and untreated partnered mothers. The estimation procedure follows Callaway and Sant'Anna (2021) outcome regression estimation model, controlling for age. ATT's are aggregated as an event study with 5 leads and 6 lags. Circles are the point estimates and the vertical bars are the 95 % confidence intervals. Blue points and bars are the lead waves and the red points and bars are the lag waves.

We further explore if our results vary by job hour intensity. Results in Table 2 suggest that, whilst the coefficients associated with working 41+ hours are greater to those for working 30-40 hours per week, they are not statistically significant.

**Table 2.** Association between higher job hours and mental health at different job hour intensities

Ref. (1-29 hours)	Single	Partnered
30-40 hours	-0.107 [-0.254,0.040]	0.005 [-0.053,0.064]
41+ hours	-0.165 [-0.423,0.094]	-0.047 [-0.148,0.054]
Observations	3,662	14,116

95% confidence intervals in brackets.

Models estimated using two-way fixed effects regressions, controlling for mother's age.

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

The results for job hours as a continuous measure similarly show no significant effect for either single or partnered mothers (Table 3).

**Table 3.** Association between job hours and mental health with job hours as a continuous measure

	<b>Single</b>	<b>Partnered</b>
Job hours	-0.003 [-0.010,0.003]	0.000 [-0.002,0.003]
Observations	3,662	14,116

95% confidence intervals in brackets.

Models estimated using two-way fixed effects regressions, controlling for mother's age.

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

### 3.3 Mechanisms

Two potential mechanisms – role strain and additional income – could be mediating the relationship between increased job hours and mental health and the differences between single vs partnered mothers. We investigate the ‘role strain’ mechanism by examining if the relationship between working full-time (relative to part-time) is different for mothers living in regions with above and below average childcare availability in England, split by partnership status.

As shown in Table 4, single mothers who live in regions with below average childcare availability have a greater, economically meaningful and statistically significant reduction in mental health following an increase in hours when compared to those in above average regions, indicating that lower childcare availability is a potential factor explaining the negative effect of increased job hours on mental health for single mothers (although confidence intervals overlap, likely due to relatively small samples). For partnered mothers, on the other hand, both coefficients are close to zero and not statistically significant.

**Table 4.** Association between full-time job hours and standardised GHQ-12: mothers living in regions with above and below average childcare availability relative to the English average

	Single		Partnered	
	Higher Availability	Lower	Higher	Lower
FT hours	-0.057 [-0.260,0.147]	-0.240** [-0.477,-0.003]	0.007 [-0.086,0.101]	0.042 [-0.050,0.134]
Observations	1,517	1,367	5,831	5,392

95% confidence intervals in brackets. Models estimated using two-way fixed effects regressions, controlling for mother’s age.

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

In terms of the income mechanism (Table 5), there is no significant relationship between higher job hours and mental health for those with paid overtime or not for either single or partnered mothers, with all coefficients very close to zero.

**Table 5.** Association between full-time job hours and standardised GHQ-12: comparing mothers with and without paid overtime

	Single		Partnered	
	With paid overtime	Without	With	Without
FT hours	0.014 [-0.543,0.570]	0.027 [-0.573,0.626]	0.064 [-0.132,0.260]	-0.075 [-0.222,0.071]
Observations	506	308	1,838	2,146

95% confidence intervals in brackets. Models estimated using two-way fixed effects regressions, controlling for mother’s age.

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

### 3.4 Results of robustness checks

Our study includes several sensitivity checks of our results to different sample and model specifications.

The results of the doubly robust DiD estimator by Sant'Anna and Zhao (2020) are in agreement with the results of the main analysis, indicating an instantaneous negative effect of switching to full-time hours for single mothers, equal to -0.19 s.d. [-0.41;0.02] – but with a slightly weakened statistical significance level ( $p=0.09$ ), and no effect for partnered mothers (Appendix 3). Furthermore, our results remain unchanged when we use 'not yet treated' as opposed to never treated as comparison group (Appendix 4).

In terms of alternative sample specification, our conclusions remain unchanged when we include individuals who remain full-time employment in the comparison group (Appendix 5). Similarly, our results remain unchanged when those who increase their hours more than once are included in the treatment group (Appendix 6).

It should be noted that we did not include mothers with decreased hours in the control group because they were themselves exposed to a different 'treatment' (rather than remaining untreated). Indeed, as we show in Appendix 7, decreasing hours has a beneficial mental health effect for single mothers at 10% significance level (equal to 0.29 s.d. [-0.01;0.59]) and no effect for partnered mothers.

Finally, our attrition test results suggest that mental health-related attrition bias is unlikely to have affected our results (Appendix 8).

## 4 Discussion

### 4.1 Summary and contextualisation of key findings

We aimed to examine the impact of increasing job hours from part-time to full-time on maternal mental health and to investigate if this impact was different for single vs. partnered mothers. We have found that, relative to working part-time (1-29 hours per week), increasing job hours to full-time (30+ hours per week) has a significant and borderline economically meaningful negative effect on the mental health of single mothers. For partnered mothers, on the other hand, we have found no significant relationship. Further comparative analysis suggests that the negative effect for single mothers persists when partnered mothers are included in the comparison group (including both those increasing hours to full-time and those remaining part-time), suggesting that increasing hours can lead to widening inequalities in mental health.

We also explored potential competing mechanisms relating to higher job hours and mental health and have found that increased role strain (as proxied by living in regions with lower childcare availability) is a likely factor contributing to the worsening mental health of single but not partnered mothers. We found no evidence to support the role of the income mechanism.

Our findings are broadly in agreement wider literature on employment and mental health of single and partnered mothers. Previous literature has generally concluded that employment has better impacts on mental health of partnered than single mothers (Ali & Avison, 1997; Baker, North, & Team, 1999). Prior research into effects of job hours on single vs. partnered mothers is very limited, however. To the best of our knowledge, only one study to date has examined job hours as a factor explaining mental health differences between the two groups and has found no significant effect (Robinson, Magee, & Caputi, 2014). However, the study was cross-sectional and based on data from Australia from over ten years ago.

Additionally, there are several contextual differences between the UK and Australian labour market contexts that could explain why our UK-based study found a significant deterioration in mental health of single mothers whilst the Australian study by Robinson, Magee and Caputi (2014) did not. First, single mothers in Australia face less stringent conditionality requirements than those in the UK. Single parents in Australia are subject to work requirements if they have school age children (8+), thus remaining eligible for benefits with children under 8 years old (Parliament of Australia, 2024). In the UK, on the other hand, the age of the youngest child at which single parents are unconditionally eligible for benefits decreased from 10 to 3 between 2010-2017 (a period covered in our study), suggesting that working single mothers tend to have younger children in the UK than in Australia, making them more susceptible to role strain. Furthermore, although childcare costs are smaller on average in the UK, childcare subsidies are higher in Australia, making total net costs for parents lower (OECD, 2024a). Finally, up until 2016 (when wage rates began to converge), the national minimum wage was markedly higher in Australia than in the UK. For example, in 2009 the minimum wage in Australia was 54% of median wages vs. 46% in the UK (OECD, 2024b), making higher working hours more financially rewarding in Australia than in the UK for a large part of the past decade.



In terms of policy implications, there have been significant increases work requirements for single mothers during the period of our study. Both welfare benefit cuts and increasing conditionality have contributed to their rising employment rates. Our study contributes to the findings of previous research on rising work requirements which has found that it has negatively affected the mental health of single mothers (Codreanu & Waters, 2023; Katikireddi et al., 2018). In the context of continuously increasing work requirements for single parents, such findings highlight the importance of considering the potential negative effects of such policies on the mental health of the already vulnerable population group.

Additionally, our investigation of potential mechanisms provides further policy-relevant evidence on the effects of role strain in mediating the negative effects of higher job hours on mental health of single mothers. While role strain itself has been shown to have negative effects on maternal mental health (Chandola et al., 2004), it may also be limiting mothers from increasing their job hours when they desire to, thus undermining their future employment opportunities as well as their mental health (Gingerbread, 2023). Such findings highlight the importance of providing adequate childcare support and flexible working arrangements to support the employment of single mothers as well as their mental health (Brewer et al., 2022).

## 4.2 Strengths and limitations

To the best of our knowledge, this has been the first event-based study exploring the effects of longer job hours on the mental health of single and partnered mothers to date. Given the rising work hour requirements and maternal employment rates, our key finding that working longer hours may undermine the mental health of single mothers and widen inequalities represents a timely and policy-relevant contribution to the existing evidence base. The robustness of our results has been checked using several sensitivity analyses, thus strengthening the confidence in our conclusions.

However, our study has limitations. First, given that we cannot rule out endogenous selection into working hours, our results cannot be interpreted as causal effects. Nevertheless, we attempted to overcome this limitation by using heterogeneity-robust difference-in-difference event study design. By demonstrating an instantaneous drop in mental health following increased hours, our results provide plausible and robust evidence for a likely causal association. Additionally, the results of the doubly robust matching estimator (which helps account for endogenous selection based on key observable characteristics) are consistent with our main results, further supporting our conclusions.

Another limitation of our study is that our marital status variable consisted of only two categories: single mothers, including divorced, separated, never married and widowed mothers; and partnered mothers; including mothers in de-facto and marriage and those cohabiting. By grouping all these women into two categories, we thus assumed experiences and relationships were similar regardless of how or why mothers were single or partnered which is unlikely to be realistic (Afifi, Cox, & Enns, 2006). Future studies in this area should ideally take into account the different routes into single parenthood.

Thirdly, owing to data limitations, we could not further explore the clinical and economic significance of our results (e.g., whether deterioration in mental health of single mothers

translates into greater level of sickness absence or increased medication used). Investigating such outcomes remains an important avenue for future research.

Relatedly, sample size limitations (particularly for single mothers) might have meant that we were not able to detect statistically significant differences even if they were present (e.g., for the analysis of different job hour intensities).

Finally, given the focus on UK population and different labour market contexts in other countries, the external generalisability of our results may be limited. Future studies in other countries, or using multi-country data, may help further elucidate the relationship between increased job hours and mental health of single mothers.

## 5 Conclusion

Our study has shown that, increasing hours to full-time vs. remaining part-time a negative association with the mental health of single but not partnered mothers, suggesting that increasing job hours may be widening the mental health inequalities between the two groups. Given the ongoing emphasis on work activation policies both in the UK and in other developed countries, it is important to ensure that future policy evaluations consider the potential health effects of such policies, to ensure that increased job hours do not undermine the mental health of the most vulnerable groups of our society.

### **Additional Files:**

Appendix 1.docx-Appendix 8.docx

## 6 References

- Afifi, T. O., Cox, B. J., & Enns, M. W. (2006). Mental health profiles among married, never-married, and separated/divorced mothers in a nationally representative sample. *Soc Psychiatry Psychiatr Epidemiol*, *41*(2), 122-129. <https://doi.org/10.1007/s00127-005-0005-3>
- Ahola, K., Honkonen, T., Kivimäki, M., Virtanen, M., Isometsä, E., Aromaa, A., & Lönnqvist, J. (2006). Contribution of burnout to the association between job strain and depression: the health 2000 study. *J Occup Environ Med*, *48*(10), 1023-1030. <https://doi.org/10.1097/01.jom.0000237437.84513.92>
- Aksoy, O., Bann, D., Fluharty, M. E., & Nandi, A. (2021). Religiosity and Mental Wellbeing Among Members of Majority and Minority Religions: Findings From Understanding Society: the UK Household Longitudinal Study. *American Journal of Epidemiology*, *191*(1), 20-30. <https://doi.org/10.1093/aje/kwab133>
- Ali, J., & Avison, W. R. (1997). Employment transitions and psychological distress: The contrasting experiences of single and married mothers. *Journal of Health and Social Behavior*, 345-362.
- Avram, S., Brewer, M., & Salvatori, A. (2018). Can't work or won't work: Quasi-experimental evidence on work search requirements for single parents. *Labour Economics*, *51*, 63-85. <https://doi.org/https://doi.org/10.1016/j.labeco.2017.10.002>

- Baker, D., North, K., & Team, A. S. (1999). Does employment improve the health of lone mothers? *Social Science & Medicine*, 49(1), 121-131.
- Bambra, C., Munford, L., Bennett, N., Khavandi, S., Davies, H., Bernard, K., Akhter, N., Pickett, K., & Taylor-Robinson, D. (2022). The Parallel Pandemic: COVID-19 and Mental Health.
- Becker, G. S. (1965). A Theory of the Allocation of Time. *The Economic Journal*, 493-517.
- Bell, T., & Gardiner, L. (2019). *Feel Poor, Work More In*: Resolution Foundation.
- Brewer, M., Cattan, S., Crawford, C., & Rabe, B. (2022). Does more free childcare help parents work more? *Labour Economics*, 74, 102100.
- Callaway, B., & Sant'Anna, P. H. (2021). Difference-in-differences with multiple time periods. *Journal of Econometrics*, 225(2), 200-230.
- Chandola, T., Booker, C. L., Kumari, M., & Benzeval, M. (2019). Are Flexible Work Arrangements Associated with Lower Levels of Chronic Stress-Related Biomarkers? A Study of 6025 Employees in the UK Household Longitudinal Study. *Sociology*, 53(4), 779-799. <https://doi.org/10.1177/0038038519826014>
- Chandola, T., Martikainen, P., Bartley, M., Lahelma, E., Marmot, M., Michikazu, S., Nasermoaddeli, A., & Kagamimori, S. (2004). Does conflict between home and work explain the effect of multiple roles on mental health? A comparative study of Finland, Japan, and the UK. *International Journal of Epidemiology*, 33(4), 884-893. <https://doi.org/10.1093/ije/dyh155>
- Codreanu, M., & Waters, T. (2023). *Do work search requirements work? Evidence from a UK reform targeting single parents*. <https://ifs.org.uk/publications/do-work-search-requirements-work-evidence-uk-reform-targeting-single-parents>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Erlbaum Associates.
- Craig, L. (2005). The Money or the Care: a comparison of couple and sole parent households' time allocation to work and children\*. *Australian Journal of Social Issues*, 40(4), 521-540.
- De Chaisemartin, C., & d'Haultfoeuille, X. (2020). Two-way fixed effects estimators with heterogeneous treatment effects. *American Economic Review*, 110(9), 2964-2996.
- DWP. (2010). *Universal Credit: welfare that works* [Policy Paper]. <https://www.gov.uk/government/publications/universal-credit-welfare-that-works>
- DWP. (2023). *Universal Credit: further information for families*.

- Gingerbread. (2018). *One in four: a profile of single parents in the UK*.  
<https://www.gingerbread.org.uk/wp-content/uploads/2018/02/One-in-four-a-profile-of-single-parents-in-the-UK.compressed.pdf>
- Goldberg, D. P., Gater, R., Sartorius, N., Ustun, T. B., Piccinelli, M., Gureje, O., & Rutter, C. (1997). The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychological Medicine*, 27(1), 191-197.
- Goldberg, D. P., & Hillier, V. F. (1979). A scaled version of the General Health Questionnaire. *Psychological Medicine*, 9(1), 139-145.
- Greenhaus, J. H., & Powell, G. N. (2006). When Work and Family Are Allies: A Theory of Work-Family Enrichment. *The Academy of Management Review*, 31(1), 72-92.  
<http://www.jstor.org/stable/20159186>
- Hargis, M. B., Kotrba, L. M., Zhdanova, L., & Baltes, B. B. (2011). What's Really Important? Examining the Relative Importance of Antecedents to Work-Family Conflict. *Journal of Managerial Issues*, 23(4), 386-408.  
<http://www.jstor.org/stable/23209106>
- Jaumotte, F. (2004). Labour force participation of women: Empirical evidence on the role of policy and other determinants in OECD countries. *OECD Economic studies*, 2003(2), 51-108.
- Jospeh Rowntree Foundation. (2023). *UK Poverty 2023*. <https://www.jrf.org.uk/work/uk-poverty-2023-the-essential-guide-to-understanding-poverty-in-the-uk>
- Katikireddi, S. V., Molaodi, O. R., Gibson, M., Dundas, R., & Craig, P. (2018). Effects of restrictions to Income Support on health of lone mothers in the UK: a natural experiment study. *The Lancet Public Health*, 3(7), e333-e340.  
[https://doi.org/10.1016/S2468-2667\(18\)30109-9](https://doi.org/10.1016/S2468-2667(18)30109-9)
- Marks, S. R. (1977). Multiple Roles and Role Strain: Some Notes on Human Energy, Time and Commitment. *American Sociological Review*, 42(6), 921-936.  
<https://doi.org/10.2307/2094577>
- Mendolia, S. (2016). Maternal Working Hours and the Well-Being of Adolescent Children: Evidence from British Data. *Journal of Family and Economic Issues*, 37(4), 566-580.  
<https://doi.org/10.1007/s10834-015-9480-1>
- Michel, J. S., Kotrba, L. M., Mitchelson, J. K., Clark, M. A., & Baltes, B. B. (2011). Antecedents of work–family conflict: A meta-analytic review. *Journal of Organizational Behavior*, 32(5), 689-725.  
<https://doi.org/https://doi.org/10.1002/job.695>
- Modini, M., Joyce, S., Mykletun, A., Christensen, H., Bryant, R. A., Mitchell, P. B., & Harvey, S. B. (2016). The mental health benefits of employment: Results of a

- systematic meta-review. *Australasian Psychiatry*, 24(4), 331-336.  
<https://doi.org/10.1177/1039856215618523>
- OECD. (2024a). Childcare support. In.
- OECD. (2024b). Minimum relative to average wages of full-time workers. In *Data Explorer*.
- Office for National Statistics. (2022). *Families and the labour market, UK: 2021*.  
<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/familiesandthelabourmarketengland/2021>
- Ofsted. (2017). Official statistics: Childcare providers and inspections.  
[https://assets.publishing.service.gov.uk/media/5a821a7040f0b62305b927f6/02\\_Child\\_care\\_providers\\_and\\_inspections\\_main\\_findings\\_as\\_at\\_31\\_March\\_2017.pdf](https://assets.publishing.service.gov.uk/media/5a821a7040f0b62305b927f6/02_Child_care_providers_and_inspections_main_findings_as_at_31_March_2017.pdf)
- ONS. (2024). Childcare accessibility by neighbourhood.  
<https://www.ons.gov.uk/peoplepopulationandcommunity/educationandchildcare/articles/childcareaccessibilitybyneighbourhood/2024-06-04>
- Parliament of Australia. (2024). Expanding eligibility for Parenting Payment Single and ending ParentsNext.  
[https://www.aph.gov.au/About\\_Parliament/Parliamentary\\_departments/Parliamentary\\_Library/Budget/reviews/2023-24/ExpandingEligibilityParentingPayment](https://www.aph.gov.au/About_Parliament/Parliamentary_departments/Parliamentary_Library/Budget/reviews/2023-24/ExpandingEligibilityParentingPayment)
- Pepin, J. R., Sayer, L. C., & Casper, L. M. (2018). Marital Status and Mothers' Time Use: Childcare, Housework, Leisure, and Sleep. *Demography*, 55(1), 107-133.  
<https://doi.org/10.1007/s13524-018-0647-x>
- Robinson, L. D., Magee, C. A., & Caputi, P. (2014). Social support, work hours and health: A comparative study of sole and partnered Australian mothers. *Women's Studies International Forum*, 42, 19-27.  
<https://doi.org/https://doi.org/10.1016/j.wsif.2013.10.010>
- Robinson, L. D., Magee, C. A., & Caputi, P. (2018). Sole Mothers in the Workforce: A Systematic Review and Agenda for Future Work–Family Research. *Journal of Family Theory & Review*, 10(1), 280-303. <https://doi.org/https://doi.org/10.1111/jftr.12249>
- Sant'Anna, P. H. C., & Zhao, J. (2020). Doubly robust difference-in-differences estimators. *Journal of Econometrics*, 219(1), 101-122.  
<https://doi.org/https://doi.org/10.1016/j.jeconom.2020.06.003>
- Spencer-Dawe, E. (2005). Lone Mothers in Employment: Seeking Rational Solutions to Role Strain. *Journal of Social Welfare and Family Law*, 27(3-4), 251-264.  
<https://doi.org/10.1080/09649060500386711>

Targosz, S., Bebbington, P., Lewis, G., Brugha, T., Jenkins, R., Farrell, M., & Meltzer, H. (2003). Lone mothers, social exclusion and depression. *Psychological Medicine*, 33(4), 715-722.

Thomson, R. M., Igelström, E., Purba, A. K., Shimonovich, M., Thomson, H., McCartney, G., Reeves, A., Leyland, A., Pearce, A., & Katikireddi, S. V. (2022). How do income changes impact on mental health and wellbeing for working-age adults? A systematic review and meta-analysis. *Lancet Public Health*, 7(6), e515-e528.  
[https://doi.org/10.1016/s2468-2667\(22\)00058-5](https://doi.org/10.1016/s2468-2667(22)00058-5)

University of Essex. (2023). Understanding Society: Waves 1-13, 2009-2023 and Harmonised BHPS: Waves 1-18, 1991-2009. In. Kantar Public: UK Data Service.

Verbeek, M., & Nijman, T. (1992). Testing for selectivity bias in panel data models. *International Economic Review*, 33(3), 681-703.

Weston, G., Zilanawala, A., Webb, E., Carvalho, L. A., & McMunn, A. (2019). Long work hours, weekend working and depressive symptoms in men and women: findings from a UK population-based study. *Journal of Epidemiology and Community Health*, 73(5), 465-474. <https://doi.org/10.1136/jech-2018-211309>

Whitworth, A., & Griggs, J. (2013). Lone Parents and Welfare-to-work Conditionality: Necessary, Just, Effective? *Ethics and Social Welfare*, 7(2), 124-140.  
<https://doi.org/10.1080/17496535.2013.779001>