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ABSTRACT

The Great Recession and Children's Mental Health in Australia*

This paper analyzes the effects of 'shocks' to community-level unemployment expectations, induced by the onset of the Great Recession, on children's mental well-being. The Australian experience of the Great Recession represents a unique case study as despite little change in actual unemployment rates, levels of economic uncertainty grew. This affords us the ability to examine the effects of shocks to economic expectations independent of any actual changes to economic conditions. We draw on and link data from multiple sources, including a longitudinal cohort study of children, a consumer sentiment survey and data on local economic conditions. Using our purpose-built data set, we estimate difference-in-differences models to identify plausibly causal effects. We find, for boys, there is no detectable effect of community-level unemployment expectations shocks on mental health. For girls, however, there are modest increases in mental health problems and externalizing behaviors, as measured by the Strengths and Difficulties Questionnaire. We additionally find no discernable change in mother's psychological distress as a result of expectations shocks. These results are stable after controlling for actual labor market conditions.

JEL Classification: I31, G01, D84

Keywords: mental health, children, Great Recession, unemployment expectations, cohort studies

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Introduction

There is an extensive literature examining the effects of economic conditions on population health. In seminal work, Ruhm (2000) found economic downturns in the United States to be associated with reduced mortality due in large part to a reduction in preventable deaths. Subsequent researchers also found mortality to be procyclical in other countries, though the findings from more recent studies are much less conclusive (see Belles-Obrero, Jimenez-Martin, and Vall-Castello 2016: for a review). In contrast, there is little doubt that adult mental health worsens as macroeconomic conditions decline (Catalano et al. 2011; Charles and DeCicca 2008; Frasquilho et al. 2016; Goldman-Mellor, Saxton, and Catalano 2010; Karanikolos et al. 2016; Margerison-Zilko et al. 2016; Martin-Carrasco et al. 2016; Parker, Jerrim, and Anders 2016; Ruhm 2005; Suhrcke and Stuckler 2012; Zivin, Paczkowski, and Galea 2011). Researchers typically parameterize economic downturns using changes in labor market conditions (e.g., unemployment rates, mass layoffs), however, the relationship between macroeconomic conditions and population health holds more generally. Foreclosures, for example, have also been linked to hospital and emergency room visits (Currie and Tekin 2015). Greater vulnerability to the mental health effects of economic crises exists among those with previous mental illness, the unemployed, migrants, ethnic minorities, children, young people and the elderly (Martin-Carrasco et al. 2016; Suhrcke and Stuckler 2012; Wahlbeck and McDaid 2012).

Unfortunately, there is little consensus on the relationship between macroeconomic conditions and children's health (Golberstein, Gonzales, and Meara 2016; Page, Schaller, and Simon 2018). Increased unemployment is associated with more child abuse and neglect (Brown and De Cao 2018), an increased incidence of injuries (Page et al. 2018), and worse child and adolescent mental health (Golberstein et al. 2016; Page et al. 2018), but also lower obesity rates especially for young children and adolescents (Belles-Obrero et al. 2016). Similarly, US studies examining the effect of aggregate unemployment rates versus anticipated job losses on infant health arrive at opposite conclusions. Babies conceived during periods of high unemployment rates appear to have better health outcomes (specifically, a reduced incidence of low and very low birth weight, fewer congenital malformations, lower postneonatal mortality) (Dehejia and Lleras-Muney 2004; Lindo 2015), yet the announcement of impending job losses appears to lead to a temporary decline in birth weight (Carlson 2015).

This evidence that anticipated macroeconomic outcomes affect child health points to an important mechanism through which economic downturns may affect population health – economic fear and stress. Even if households do not personally experience job loss, they may experience an increase in job insecurity and stress when aggregate unemployment rises (Dooley, Catalano, and Rook 1988; Fenwick and Tausig 1994). Consistent with this, Golberstein et al. (2016) find that parental unemployment does not fully explain the relationship between child mental health and economic conditions. The authors conclude that other mechanisms, including increased family stress, are likely to be important pathways through which recessions negatively affect children's mental health.

At the same time, the worsening economic conditions that families anticipate during economic downturns are often highly correlated with the real deterioration in economic conditions they experience. Thus, economic recessions may also be linked to poorer child mental health through a range of other mechanisms including: job loss, job instability, low wages, poor work quality, residential moves, diminished parental investments, increased parental stress and lower parenting quality, marital tension, as well as subjective perceptions of economic hardship (Goldman-Mellor et al. 2010; Kalil 2013; Weiland and Yoshikawa 2012). For example, a study in Finland testing Conger's 'Family Economic Stress Model' during economic recession from 1990-95 confirmed pathways to poorer child mental health (12-year-olds) from economic hardship at the family level via poorer parental mental health, marital interactions and parenting quality (Solantaus, Leinonen, and Raija-Leena 2004). Studies examining the effects of parental job loss on children's well-being and achievement find that effects are concentrated in lower SES households (Weiland and Yoshikawa 2012). Recession may also affect children through changes at the community level including reduced expenditure on health and social services, higher unemployment and underemployment rates, aggregate household poverty and a concentration of disadvantage and negative peer influence (Kalil 2013).

As was true across the globe, the onset of the Great Recession in late 2007 resulted in a rapid rise in economic uncertainty and loss of consumer confidence among Australian families (Australian Government 2008; Housing Industry Association 2014). In the end, however, Australia is unique in avoiding the recession occurring elsewhere with GDP growth remaining strong and unemployment rates rising only two percentage points. The widely anticipated and severe economic downturn in large part did not materialize. In particular, the Rudd Government's $42

billion economic stimulus package was passed in the Senate in February 2009 (SBS News). The stimulus package had three components – a tax bonus for working Australians, a back to school bonus and a single income family bonus for families with children. Cash payments targeted at low income families were effective in stimulating consumption among low-income families with children.

International reviews of the health consequences of the Great Recession find the global economic downturn to be associated with a decline in mental health, larger for men than for women, particularly among men of working ages (Margerison-Zilko et al. 2016). This includes an increased risk of substance abuse and binge drinking (Martin-Carrasco et al. 2016; Modrek et al. 2013), suicide and distress (Goldman-Mellor et al. 2010; Margerison-Zilko et al. 2016). Other evidence is less consistent about gender differences. Based on data from the Medical Expenditure Panel Survey in the US before, during and after the Great Recession, Dagher, Chen, and Thomas (2015) find decreased diagnoses of depression during and post-recession. However, women had higher rates of anxiety diagnoses post-recession, especially those living in the Northeast, Midwest, the unemployed and those with low income. The same increase in anxiety diagnoses was not observed among men.

Much less is known about the effects of the Great Recession on child and adolescent mental health (Frasquilho et al. 2016; Kalil 2013; Martin-Carrasco et al. 2016; Rajmil et al. 2014). This is important because mental health problems often onset in childhood, are common and burdensome, and left untreated can negatively impact on health, social and economic outcomes into adulthood (Kessler et al. 2005; Patel et al. 2007). Although vulnerable adult sub-populations are more negatively affected by actual declines in economic conditions, amongst children the effects may be more universal. In the United States, for example, Golberstein et al. (2016) find negative effects of macroeconomic conditions (measured by area unemployment rates and housing prices) on child and adolescent mental health; effects that were pervasive in all population subgroups. Page et al. (2018) also found that an increase in local unemployment rates is associated with small but significant increases in severe emotional difficulties among children. There is further evidence that adolescent health may be worse in economic downturns. Job losses stemming from mass layoffs, for example, result in increased adolescent suicidality (Gassman-Pines, Ananat, and Gibson-Davis 2014) and more young people seeking emergency psychiatric care (Bruckner, Kim, and Snowden 2010). In contrast, in cross-national analyses, Pfoertner et al. (2014) found

little association between increased country level unemployment rates among adolescents and psychological health before and after the recession.

Those that focus on community perceptions of economic conditions during recessions indicate that sentiment matters as much for child and adolescent outcomes as do actual conditions; particularly for boys. Schneider and collegues (2015) show links between community perceptions of the economic environment during the Great Recession in the United States and child behaviors, high frequency spanking (Brooks-Gunn, Schneider, and Waldfogel 2013), and risks for maternal child abuse and neglect (Schneider, Waldfogel, and Brooks-Gunn 2017). Schneider et al. (2015) find the decline in consumer confidence during the Great Recession, as measured by the Consumer Sentiment Index, to be associated with higher rates of behavioral problems for boys but not girls. These behaviors are aggression, anxiety/depression, alcohol and drug use, and vandalism, with associations largely concentrating in single-parent families. Local unemployment rates, in contrast, display fewer associations with children's behavior, suggesting that, in the Great Recession, uncertainty about the national economy is the more salient risk for behavior problems rather than local labor markets.

Further evidence suggests that the Great Recession also affected the way parents relate to their children. Brooks-Gunn et al. (2013) show that the decline in the Consumer Sentiment Index during the Great Recession is associated with increased levels of high frequency spanking. Schneider et al. (2017) also find that the decline in the Consumer Sentiment Index during the Great Recession is associated with increased risk of child abuse but a decreased risk of child neglect. Households with social fathers present may have been particularly adversely affected. Furthermore, both the Consumer Sentiment Index and the unemployment rate had direct effects on the risk of abuse or neglect, which were not mediated by individual-level measures of economic hardship or poor mental health.

Finally, there are a handful of studies that have examined the effect of the Great Recession on population health in Australia. One study examining the psychological functioning of older adults before (2005-2006) and during the economic downturn (2009-2010) indicates poorer psychological functioning for those that reported being impacted by the Great Recession, although causality could not be determined (Sargent-Cox, Butterworth, and Anstey 2011). In South Australia, Shi and Colleagues (2011) find little evidence of an increase in doctor diagnosed mental

health problems between 2002 and 2009, apart from anxiety. As a limitation, the overall unemployment rate in the telephone sample (3 percent) was lower than the state average. In their study of youth pooling four cohorts of the Australian Longitudinal Study of Youth (LSAY), using propensity score matching for control cohorts and difference-in-differences techniques, Parker et al. (2016) find significantly lowered well-being across several measures at age 19 with less consistent results at age 22. In part, these measures reflect unhappiness with career and future prospects, however, there were no specific measures of mental health. They further find a decline in well-being from 2011-2013 after a recovery in 2010 which mapped to unemployment rates at the time.

Given this context, the objective of this paper is to further our understanding of the process by which economic conditions, particularly community perceptions of economic uncertainty, affect children's mental health. We do so using longitudinally gathered, and richly characterized developmental measures of parents, children and area level effects, covering the period before, during, and after the Great Recession. Australia represents a unique case study as despite little change in actual unemployment rates during the Great Recession levels of economic uncertainty grew. These data allow us to isolate the mental health effects of the stress generated by anticipation of the Great Recession from any mental health effects associated with deteriorating macroeconomic conditions. Specifically, we ask whether there is an adverse effect on child mental health during the period of the Great Recession associated with local unemployment expectations, whether this differs between boys and girls, and whether there is also an increase in levels of mothers' distress associated with local unemployment expectations during this time.

Materials and methods

Data

For this project, we link multiple data sources to construct a data set which includes information on a sample of mothers and their children, local unemployment expectations and local labor market conditions. The data sets, key variables and linkage process are described below.

LSAC

The Longitudinal Study of Australian Children (LSAC) is a national study which was designed to deepen the understanding of child development, in the context of Australia's social, economic and cultural environment (Soloff, Lawrence, and Johnstone 2005; Soloff et al. 2006; Misson and Sipthorp 2007; Edwards 2012). The study recruited two cohorts, a birth cohort (comprising 5,107 children aged 0-1 years) and a child cohort (4,983 children aged 4-5 years), known as cohort B and K, respectively. LSAC interviews multiple informants, these include the child, the primary caregiver (97 percent of which are the biological mother) and their partner, and the child's teacher. Interviews for wave one were undertaken in 2004, with follow-up interviews conducted on a bi-annual basis. There are currently six waves of data released, covering the years 2004 to 2014, which allows us to capture the pre- and post-crisis periods.

Children's mental health is measured using the Strengths and Difficulties Questionnaire (SDQ). The questionnaire comprises 25 items that collapse into five problem scales: emotional symptoms, conduct problems, hyperactivity-inattention, peer problems and prosocial behavior (Goodman 1997). The questions for each sub-scale are the same at each age, other than two questions on the conduct disorders sub-scale which vary slightly for 4-year-olds, with two items on antisocial behavior replaced by items on oppositionality.

The SDQ total score is a sum of scores on 20 items (omitting prosocial items), with higher scores representing poorer psychosocial functioning. Each item is scored a zero, one or two based on the scoring key (not true, somewhat true, certainly true), giving a maximum score of 10 for each sub-scale and an SDQ total ranging from zero to 40. A number of items are reverse coded. Where there is missing data, scores are averaged within subscales, so long as there are two or more items answered within the sub-scale. The SDQ total score forms our outcome measure of child mental health because it has been shown to be a psychometrically sound measure of overall child mental health problems (Goodman 1997, 1999; Goodman et al. 2000; Goodman and Scott 1999; Klasen et al. 2000; Mullick and Goodman 2001; Achenbach et al. 2008; Goodman and Goodman 2009).

The SDQ total difficulties score can be disaggregated into two sub-components: internalizing and externalizing difficulties (Goodman and Goodman 2009). The internalizing score is the sum of the emotional and peer problems scales, while the externalizing score is the sum of

the conduct and hyperactivity scales. Both scores are also increasing in the degree of difficulties the child has. For ease of interpretation, the SDQ total, internalizing and externalizing scores have been standardized to have a mean of zero and a standard deviation of one.

In addition to the parent-reported SDQ measures, we use the LSAC data to create the SDQ total, internalizing and externalizing scores for children as rated by their teachers. Here, we think that teacher-reported measures might be less subjective than parent-reported measures, and thus use both parent- and teacher-reported measures in our analysis. However, given the lower survey response rates of teachers we do lose sample size (69% of eligible children have teachers who filled in the survey at wave one).

Our measure of mothers' mental well-being is derived from the Kessler Psychological Distress Scale (K6) (Kessler et al. 2003). The K6 comprises six items on a five-point response scale, which are designed to assess the frequency of distress / depression in the previous four weeks. Items are summed to produce a score that ranges from zero to 24. For ease of interpretation, the K6 score has been standardized to have a mean of zero and a standard deviation of one. Although declining labor market conditions are just as likely, if not more likely, to have impacted on fathers, data on K6 was missing for 25 percent of fathers who were present in the household, and thus the data were considered unreliable for analyzing fathers' distress.

Using the LSAC data we utilize a set of control variables, which are motivated by prior research on child and adolescent mental health, with a particular emphasis on socio-demographic determinants of child and adolescent mental health. Our controls comprise the child's age; the mother's education level and employment status; family structure (number of children in the household, two biological parents, one parent, blended family, an indicator for whether there was a change in household structure since the previous wave); an indicator for whether the family moved house since the previous wave; the log of equivalized real household income; homeownership structure (outright, mortgage, rent, other, missing); a measure of the socio-economic disadvantage of the region (SEIFA) (Australian Bureau of Statistics 2001); and area remoteness (major city, inner regional, outer regional, remote). Control variables differ slightly depending on whether the well-being of the child or mother is the outcome of interest.

Additionally, we utilize a set of local labor market controls to differentiate economic sentiment from actual economic conditions. These include the unemployment rate for males, the

unemployment rate for females, the employment to population ratio for males, and the employment to population ratio for females. These variables are derived from ABS labor force statistics for local labor market regions (defined as Statistical Area 4 - SA4) (Australian Bureau of Statistics 2017).

For a detailed summary and descriptive statistics for all variables see S1 Table in the supplementary material.

CASiE

The Consumer Attitudes, Sentiments and Expectations in Australia Survey (CASiE), is a monthly telephone survey of 1,200 households across Australia, that is conducted by the Melbourne Institute of Applied Economic and Social Research. The CASiE Survey is funded principally by the Westpac Banking Corporation and is supported by contributions from other sources, including the Reserve Bank of Australia. The survey began in 1974 and is modelled after the University of Michigan's Survey of Consumers. It is aimed at gauging public perceptions of the state of the economy, collecting information on topics such as price and unemployment expectations. These consumer expectations data are particularly valuable for creating indices and forecasting the state of the economy.

Among other key topics, the CASiE data asks each respondent about their unemployment expectations, specifically:

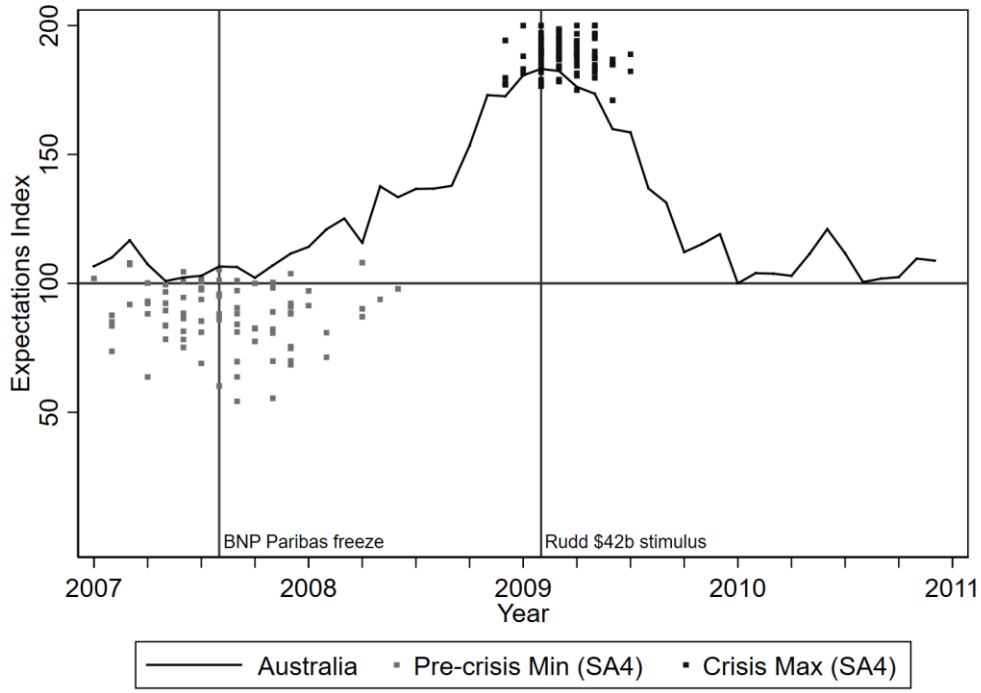
"Now about people being out of work during the coming 12 months. Do you think there'll be more unemployment than now, about the same, or less?"

Possible responses include: more unemployment, about the same, less unemployment or don't know. Based on aggregating and weighting the person-level responses to these questions, we calculate a monthly unemployment expectations index (UEI) for each labor market region (details on the aggregation of CASiE data provided in S1 Appendix). This index follows the "balanced approach" which was developed by the University of Michigan and is standard in the expectations literature. It is calculated by taking the proportion of people who say unemployment will increase minus the proportion of people who think it will decrease and adding 100. Thus, the index ranges from zero to 200. An index greater than 100 means a region has pessimistic employment

expectations (i.e., expects more unemployment) and an index below 100 means a region is optimistic about employment conditions.

The solid line in Fig 1 plots the national unemployment expectations index for Australia over the period 2007 to 2011. It is evident that at the peak of the Great Recession, when Prime Minister Kevin Rudd released a $42b stimulus package, that unemployment expectations were also peaking. The index suggests that approximately four in five persons expected unemployment to increase over the next 12 months. Further, Fig 1 also plots the most optimistic expectations (minimum index) prior to the crisis and the most pessimistic expectations during the crisis (maximum index) for each labor market region. The most pessimistic community-level expectations were highly concentrated around the first quarter of 2009, while the most optimistic expectations were more dispersed over 2007 – 2008. The change in the index between the minimum and maximum represents each community's "shock to expectations". The mean change is 100 points, with a standard deviation (SD) of 13. This suggests that there were regions that experienced larger "shocks" to their expectations than others.

Fig 1. National and community-level unemployment expectations index (UEI) from 2007 to 2011.



We use this variation in expectations shocks to classify regions into two groups. Specifically, we create a binary variable that equals one if a region experienced a shock in the top 25th percentile of the distribution (i.e., a very intense shock to expectations over the crisis period), and zero otherwise. The mean change for the treated is 118.43 points, the mean change for the untreated is 94.96 points. This unemployment "expectations shocks" is a key variable in our difference-in-differences estimation strategy to be described below. In addition, we create a less intense measure of "expectations shocks", which equals one if the region experienced an unemployment expectations shock greater than the average and zero otherwise, to be used in sensitivity analyses.

Data linkage

We link our data sets together using a geographic measure defined by the Australian Bureau Statistics: Statistical Area Level 4 (SA4s) (Australian Bureau of Statistics 2011). Given our focus on unemployment expectations, SA4s are particularly relevant because they are reflective of labor markets within each state and territory. Regional SA4s typically have 100,000 to 300,000 persons, while metropolitan SA4s have up to 500,000 persons. There is a total of 107 SA4s in Australia. Our sample covers 83 SA4s; we exclude 19 SA4s with the classification of migratory - offshore - shipping or no usual address and five SA4s with unavailable CASiE data.

We merge the CASiE data to LSAC observations using the respondents' SA4 of residency. Since our expectations shock variable does not change over time we do not need to merge on a time dimension. However, we merge ABS data to each LSAC observation using each respondents' SA4 of residency and the month/year of interview, to capture local labor market conditions at the time of reporting.

Analysis sample

For our analysis, we draw on data from the 4,983 children in cohort K and focus on the unbalanced panel using waves one, two and four (13,616 observations). Wave three (2008) is excluded because child outcomes might have already been influenced by the Great Recession throughout 2008 and waves five and six are excluded because outcomes are likely influenced by the Euro Crisis. We

drop observations which are missing data for the key variables in our analysis: the expectations shock (3.11 percent of observations), parent-reported SDQ measures (2.14 percent) and control variables (1.26 percent). The resulting sample includes 4,862 children (12,788 observations). Finally, part of our estimation strategy (explained below) requires that children be present in both waves one and two. This reduces our analysis sample to 4,089 children (11,694 observations), which is mostly driven by sample attrition. At waves two and four, children are aged 6-7 years and 10-11 years old respectively.

A similar method is used to select the sample of mothers for the analysis of mother's psychological distress. Our base sample consists of the 4,853 primary female guardians of the children in cohort K, over waves one, two and four (13,178 observations). We exclude observations which have missing data for the expectations shock (3.03 percent), psychological distress (8.43 percent) and control variables (4.07 percent). Again, we restrict the sample to mothers who were present in both waves one and two. The final analysis sample consists of 3,321 mothers (9,562 observations), 99.7 percent of which are biological.

Statistical analysis

The difference-in-differences (DID) estimator

Our statistical analysis involves estimating difference-in-differences (DID) models to assess the impact of community-level unemployment expectations shocks over the Great Recession period on children's mental health (SDQ) and mothers' psychological distress (K6).

The timing of the Great Recession and LSAC interviews inform our choice of pre- and post-crisis periods (described in detail in S2 Appendix). We focus on waves one and two (2004 and 2006) as the pre-crisis periods and wave four (2010) as the post-crisis period. The expectations shocks variable allows us to separate regions into those who experienced an intense change in unemployment expectations due to the Great Recession (top 25^{th} percentile) and those who did not. We will refer to these communities as experiencing "expectations shocks". In essence, the DID model compares the pre- and post-crisis outcomes of children who live in communities that experienced expectations shocks (treatment group) to those that did not experience them (control group).

In formalizing the DID model, we estimate the following equation:

$$SDQ_{irt} = \beta_0 + \beta_1 post_t + \beta_2 shock + \beta_3 (post_t \times shock_r) + \boldsymbol{X}'_{irt}\gamma + e_{irt} \quad (1)$$

where, SDQ_{irt} is the SDQ outcome for child *i*, in region *r*, at time *t*, $post_t$ is a binary variable which equals one if the LSAC wave is post crisis, $shock_r$ is the binary unemployment expectations shock variable, $post_t \times shock_r$ is an interaction of the two. While, $\boldsymbol{X}_{irt}$ is a vector of demographic and geographic control variables and e_{irt} is the error term.

In our model, β_0 estimates an overall 'intercept', β_1 estimates the average change in the SDQ scores from the pre- to post-crisis periods for the control group, and β_2 estimates the average difference in SDQ scores between treatment and control groups prior to the GFC. The coefficient for the interaction term, β_3 (also known as the DID coefficient), captures the differential effect of the Great Recession on children's mental health in communities that experienced a large shock in unemployment expectations versus in those communities that did not. That is, β_3 addresses the study question of whether community perceptions of macroeconomic conditions during the Great Recession had a causal impact on children's mental health.

In the handful of studies that examined differences in macroeconomic conditions and child mental health, findings by child gender are mixed. Schneider et al. (2017) report more behavioral problems for boys, not girls, associated with a decline in consumer confidence during the Great Recession, whereas Golberstein et al. (2016) found effects of poor economic conditions on the mental well-being of boys and girls, however, girls were found to be twice as likely to have a psychological problem in response to worsening economic conditions. Therefore, we estimate equation (1) separately by child sex to assess whether boys and girls respond differently to changes in unemployment expectations.

Further, there may be concerns that parent-rated measures might be reflective of the mental well-being of the parent themselves. Golberstein et al. (2016) describe the difficulty in disentangling the true effects of economic conditions on children's mental health from parental perceptions and reporting, which might be influenced by economic conditions. One strength of the LSAC data is that the child's teachers complete the SDQ. This gives us the opportunity to use a potentially less subjective measure of child mental health as an alternative outcome.

We also want to assess if the changes in unemployment expectations affect the psychological distress of mothers. To do so, we re-estimate equation (1) with the mother's standardized K6 score as the outcome variable. Also, note that the explanatory variables for this model are slightly changed to reflect that the person of interest is now the mother, rather than the child.

Given our focus on expectations shocks, we wish to examine the extent to which the expectations of a crisis influence children's and mother's mental well-being independent of actual labor market conditions. Even though Australia mostly avoided the effects of the Great Recession, it is evident that some local labor markets were hit harder than others. For example, in 2009 across local labor markets unemployment rates ranged from one to 17 percentage points (Australian Bureau of Statistics 2017). Thus, we estimate equation (1), for children and mothers, with and without local labor market controls.

Identification

Equation (1) captures the causal effect of a worsening in economic expectations on children's mental health so long as the time trend in children's mental health is the same in communities that do and do not experience expectations shocks. That is, the trends in mental health should be the same in the absence of any treatment. This is the so-called parallel trends assumption (Angrist and Pischke 2008).

To verify this assumption, we test for statistical differences in pre-crisis SDQ scores between treatment and control groups. Using unadjusted linear regression models where the outcome is the change in the SDQ variable (between waves one and two) and our binary expectations shocks variable is the only explanatory variable, we verify the parallel trends assumption is reasonable (see S2 and S3 Tables). That is, prior to the Great Recession the children in communities that did and did not experience expectations shocks have similar trends in their outcomes. Further, the parallel trends assumption holds for boys and girls, separately. For mothers, the assumption does **not** hold, but does hold when using our alternative definition of expectations shocks (i.e., unemployment expectations shocks greater than the average).

Results

Table 1 presents the results for the effects of unemployment expectations shocks (in the top 25th percentile) on parent-rated standardized SDQ outcomes for boys and girls (Panels A and B respectively). We estimate two sets of models, columns (1)-(3) exclude local labor market controls and columns (4)-(6) include them. The DID coefficient shows that, on average, there is no significant difference in boys' parent-rated SDQ (total, internalizing, and externalizing) scores as a result of the Great Recession, regardless of whether local labor market conditions are controlled for. This suggests that boys' mental well-being is not affected by unemployment expectations shocks. It is worth noting that, on average, the boys in communities that experience larger expectations shocks have more difficulties and externalizing behaviors prior to the crisis. For girls, there is a modest increase in the SDQ total (0.133 of a standard deviation) and SDQ externalizing scales (0.128 SD). That is, the difference in levels of mental health problems and externalizing problems pre- and post-crisis is greater among girls living in regions that experience an intense unemployment expectations shock during the crisis. The result is stable and slightly larger after controlling for local labor market conditions, suggesting that unemployment expectations affect the mental well-being of girls independent of objective unemployment conditions.

Table 1. The effects of unemployment expectations shocks (top 25th percentile) on parent-rated SDQ outcomes, separately for boys and girls.

	Models excluding local labor market controls			Models including local labor market controls		
	SDQ total (1)	Internalizing (2)	Externalizing (3)	SDQ total (4)	Internalizing (5)	Externalizing (6)
A: Boys						
Expectations shock	0.082**	0.021	0.108***	0.069*	0.016	0.092**
	(0.040)	(0.040)	(0.040)	(0.041)	(0.042)	(0.041)
Post-crisis	-0.056	-0.010	-0.076	-0.044	0.002	-0.068
	(0.127)	(0.128)	(0.127)	(0.128)	(0.128)	(0.127)
DID	0.002	-0.030	0.027	-0.002	-0.034	0.024
	(0.071)	(0.072)	(0.071)	(0.072)	(0.072)	(0.072)
H_1: DID > 0 (p-value)	0.491	0.663	0.352	0.513	0.682	0.368
R-Square	0.083	0.057	0.076	0.084	0.058	0.077
N	5960	5960	5960	5960	5960	5960
B: Girls						
Expectations shock	-0.026	-0.014	-0.029	-0.042	-0.034	-0.035
	(0.037)	(0.039)	(0.036)	(0.038)	(0.040)	(0.037)
Post-crisis	0.034	0.194	-0.106	0.044	0.209*	-0.103
	(0.113)	(0.119)	(0.112)	(0.113)	(0.119)	(0.112)
DID	0.133**	0.091	0.128**	0.152**	0.108	0.143**
	(0.066)	(0.069)	(0.065)	(0.066)	(0.070)	(0.065)
H_1: DID > 0 (p-value)	0.021**	0.094*	0.024**	0.011**	0.060*	0.015**
R-Square	0.108	0.062	0.113	0.110	0.063	0.113
N	5734	5734	5734	5734	5734	5734

Notes: Estimated OLS coefficients presented and standard errors in parentheses. All models control for demographic, financial and regional variables, unless otherwise indicated. Complete regression results can be found in S4 Table for boys and S5 Table for girls. *, **, *** indicates significance at the 10%, 5 % and 1% levels respectively.

Given concerns that parent-rated measures might be reflective of the mental well-being of the parent themselves, we replicate Table 1 replacing parent-rated SDQ measures with teacher-rated measures. Table 2 presents the results for boys and girls. Consistent with the parent-rated measures, we find no significant effects of changes unemployment expectations on boys' SDQ scales (Panel A). For girls, when using the teacher-rated SDQ outcomes we also find no significant difference in SDQ scores caused by unemployment expectations shocks (Panel B).

Table 2. The effects of unemployment expectations shocks (top 25th percentile) on teacher-rated SDQ outcomes, separately for boys and girls.

	SDQ total (1)	Internalizing (2)	Externalizing (3)
A: Boys			
Expectations shock	0.014	-0.007	0.024
	(0.051)	(0.049)	(0.052)
Post-crisis	-0.410***	-0.361**	-0.322**
	(0.154)	(0.150)	(0.156)
DID	0.062	0.076	0.029
	(0.085)	(0.083)	(0.086)
H_1: DID > 0 (p-value)	0.235	0.177	0.368
R-Square	0.047	0.030	0.038
N	4500	4502	4502
B: Girls			
Expectations shock	0.036	-0.010	0.059
	(0.041)	(0.047)	(0.039)
Post-crisis	-0.053	0.131	-0.173
	(0.120)	(0.136)	(0.112)
DID	0.019	0.001	0.032
	(0.069)	(0.079)	(0.065)
H_1: DID > 0 (p-value)	0.393	0.496	0.310
R-Square	0.065	0.036	0.055
N	4394	4394	4397

Notes: Estimated OLS coefficients presented and standard errors in parentheses. All models control for demographic, financial, regional and local labor market controls, which is our preferred specification. *, **, *** indicates significance at the 10%, 5 % and 1% levels respectively.

To test the sensitivity of our child results to our definition of expectations shocks, we replicate the results using a less intense measure. Specifically, expectations shocks are now defined to be 'a change in unemployment expectations over crisis period greater than the average change', rather than a change in unemployment expectations in the top 25th percentile. Table 3 presents the results for boys and girls, for both parent- and teacher-reported outcomes and includes the labor market controls. Using a less intense measure of shocks does not change our conclusions for boys. That is, they still appear to be emotionally unresponsive to changes in unemployment expectations. For girls, we continue to find no effects, on average, when using teacher-rated measures. Perhaps unsurprisingly, the modest effect sizes previously found for girls, when using parent-reported outcomes, are smaller when using the less intense measure of shocks. For example, the increase in SDQ total problems is reduced by almost half, from 0.152 to 0.089 of a standard deviation. A similar result is found for externalizing problems. Additionally, these estimates are less precise.

Table 3. The effects of less intense unemployment expectations shocks (greater than average) on parent- and teacher-rated SDQ outcomes, separately for boys and girls.

	Parent-rated			Teacher-rated		
	SDQ total (1)	Internalizing (2)	Externalizing (3)	SDQ total (4)	Internalizing (5)	Externalizing (6)
A: Boys						
Expectations shock	0.027	-0.034	0.068**	0.033	-0.001	0.046
	(0.033)	(0.034)	(0.033)	(0.041)	(0.040)	(0.041)
Post-crisis	-0.033	0.001	-0.052	-0.385**	-0.347**	-0.300*
	(0.129)	(0.129)	(0.128)	(0.156)	(0.151)	(0.158)
DID	-0.023	-0.032	-0.010	-0.027	-0.003	-0.035
	(0.058)	(0.058)	(0.058)	(0.069)	(0.067)	(0.070)
H_1: DID > 0 (p-value)	0.655	0.706	0.566	0.654	0.518	0.689
R-Square	0.083	0.058	0.076	0.047	0.030	0.044
N	5960	5960	5960	4500	4502	4502
B: Girls						
Expectations shock	-0.066**	-0.047	-0.062**	0.002	0.001	0.003
	(0.030)	(0.032)	(0.030)	(0.033)	(0.037)	(0.030)
Post-crisis	0.034	0.203*	-0.112	-0.078	0.108	-0.202*
	(0.114)	(0.121)	(0.113)	(0.121)	(0.137)	(0.113)
DID	0.089*	0.062	0.085	0.061	0.056	0.045
	(0.052)	(0.055)	(0.052)	(0.055)	(0.062)	(0.051)
H_1: DID > 0 (p-value)	0.043**	0.129	0.050**	0.135	0.183	0.190
R-Square	0.110	0.063	0.113	0.065	0.036	0.060
N	5734	5734	5734	4394	4394	4397

Notes: Estimated OLS coefficients presented and standard errors in parentheses. All models control for demographic, financial, regional and local labor market controls, which is our preferred specification. *, **, *** indicates significance at the 10%, 5 % and 1% levels respectively.

Next, we turn our attention to the mothers of the children to determine if their psychological distress is affected by the changes to unemployment expectations over the Great Recession period. In Table 4 we present estimates for the difference-in-differences models of mother's standardized Kessler 6 score. The results in Panel A suggest that, on average, the levels of psychological distress are no different as a result of the Great Recession between mothers living in areas that experienced an unemployment "expectations shock" in the top 25th percentile to those living in areas with more mild shocks. This result is independent of the actual local labor market conditions. We should, however, interpret this result with caution given that the parallel trends assumption does not hold for this treatment variable. That is, there were already

Table 4. The effects of unemployment expectations shocks on mother's psychological distress score (Kessler 6).

	Model excluding local labor market controls	Model including local labor market controls
A: "Expectations shock": top 25th percentile		
Expectations shock	0.061**	0.077**
	(0.031)	(0.032)
Post-crisis	0.104***	0.098***
	(0.028)	(0.029)
DID	-0.069	-0.074
	(0.055)	(0.056)
H_1: DID > 0 (p-value)	0.893	0.909
R-Square	0.061	0.062
N	9562	9562
B: "Expectations shock": >average		
Expectations shock	-0.022	-0.018
	(0.025)	(0.026)
Post-crisis	0.092***	0.087***
	(0.032)	(0.032)
DID	-0.004	-0.006
	(0.044)	(0.044)
H_1: DID > 0 (p-value)	0.534	0.555
R-Square	0.061	0.061
N	9562	9562

Notes: Estimated OLS coefficients presented and standard errors in parentheses. All models control for demographic, financial and regional variables, unless otherwise indicated. Complete regression results can be found in S6 Table. *, **, *** indicates significance at the 10%, 5 % and 1% levels respectively.

differences in the trends of psychological distress prior to the crisis between mothers in the treatment and control groups. Interestingly, post-crisis all mothers experience elevated levels of distress by approximately a 10th of a standard deviation. Panel B repeats the analysis for mothers using the alternative definition of "expectations shocks" (i.e., greater than the average), for which the parallel trends assumption holds, and the results are largely unchanged.

Discussion

In this paper, we set out to find the impact of the Great Recession on child mental health. We exploit the unique Australian circumstance, where a crisis did not eventuate, to differentiate economic conditions from shocks in community-level expectations about local economic conditions. Overall, we find a story of very little association between shock to unemployment expectations and child mental health outcomes or mothers' psychological distress. For boys, there is no detectable effect of expectations shocks on mental health. For girls, there are modest effects on total SDQ and the externalizing sub-scale, when using parent-rated but not teacher-rated outcomes. These results are stable after controlling for actual labor market conditions.

It is reassuring that despite significant changes in community-level economic sentiment in Australia, children's mental health is mostly unaffected. The treatment group communities have shocks to unemployment expectations that are 25 percent higher than those in the control groups. During peak crisis times, on average, nine in ten persons in these communities expected unemployment would increase in the next 12 months. Despite this, expectations shocks do not appear to affect child mental health from pre- to post-crisis periods (between 2006 and 2010). Where there is a treatment effect, it is notably modest in effect size.

Within the Australian context, there is only one study that we are aware of amongst youth with which to compare these results. During the Great Recession period, Parker et al. (2016) found lower well-being across several measures at age 19 including career and future prospects, which perhaps maps more closely to the UEI (unemployment index) than the mental health measures in our study. In Australia, the shock to unemployment expectations dissipated dramatically after the introduction of the stimulus package in February 2009, which may have meant that fear and stress within families associated with expected worsening job conditions and potential layoffs quickly subsided, easing any effects of perceived economic hardship on children. Perhaps unsurprisingly, countries with strong social safety nets and those that introduced budgetary stimulus seemingly buffered some of the negative effects on adult mental health (Martin-Carrasco et al. 2016; Modrek et al. 2013; Wahlbeck and McDaid 2012).

Previous findings on the mental health consequences of poor macroeconomic conditions are based on only a handful of studies from the United States, where the economic crisis hit harder.

Studies based on actual area level economic conditions (e.g., unemployment rates, housing prices, layoffs) report an increase in children's mental health problems (Golberstein et al. 2016; Page et al. 2018), suicidal behaviors in adolescents (Gassman-Pines et al. 2014) and in youth seeking emergency psychiatric care (Bruckner et al. 2010). Further evidence from the US demonstrated that community fear and uncertainty about national economic conditions during the Great Recession independently predicted behavioral and emotional problems amongst 9-year-old boys, not girls, more consistently than local labor market conditions (Schneider et al. 2015). These significant effects were concentrated in single-parent families and partially explained by parenting behaviors. Part of the reason we find no substantial effects on child mental health, in addition to the country setting, may be the timing of outcome measurement. Although our study captures a similar age group, Schneider et al. covered the period before and during the crisis (2007-2010), whereas we measure changes in child mental health before and after the peak. The effects on the family environment, such as via parental distress or more undesirable parenting practices, may be more temporal, especially given the short reference period for the SDQ (last six months).

In our analyses, living in regions experiencing an expectations shock is associated with increased externalizing behaviors based on parent-rated SDQ for girls but not boys. As previous studies have produced mixed findings about the effects of macro-economic conditions (real or perceived) on the mental health of boys and girls, we could not hypothesize stronger effects either way. While past work suggests girl's mental health may be more susceptible to actual economic conditions (Elder, Nguyen, and Caspi 1985; Golberstein et al. 2016), worsening consumer confidence in the US during the Great Recession were associated with an increased in emotional and behavioral problems among boys not girls (Schneider et al. 2015). More generally, in their review of moderating effects between stressors and psychopathology, Grant and colleagues (2006) reported that boys tend to respond to stressors with externalizing symptoms while girls respond more with internalizing symptoms; particularly the case for studies of poverty, divorce and abuse

In contrast to models using parent-rated SDQ, we find no significant effect among girls (or boys) based on teacher-rated SDQ. The parent- and teacher-rated SDQ is known to yield different results in terms of identifying mental health problems in children (Cheng et al. 2018). This is partly explained by the different behaviors observed by parents in the context of their own home and the relationship with their children, compared to what might be a different set of behaviors observed by teachers in the classroom setting. Furthermore, examining changes in mental health over time

using teacher-rated SDQ is also subject to lower reliability due to the potential change of teacher over time. Additionally, we have a reduced sample size for teacher versus parent assessments.

We do not find any association between unemployment expectations shocks and maternal psychological distress, which we considered as a potential mechanism by which shocks could be transmitted from parents to children. One explanation may be the limited reference period for experiencing symptoms (four weeks) as measured by the Kessler 6 which may not have captured elevated stress levels caused by the shock to expectations during the peak of the crisis. Other work on mechanisms has considered the impact on parenting. Studies have found negative effects of the Great Recession on parenting in the form of more spanking (Brooks-Gunn et al. 2013) and increased levels of neglect and abuse (Brown and De Cao 2018).

Strengths and limitations

This study has several strengths. First, the Australian economic setting through the Great Recession was unique in so far as the shock was largely contained to a perceived global threat rather than an actual economic crisis. Second, the LSAC data captures a large cohort of Australian children that is nationally representative for Australia and who lived contemporaneously through this event. Third, the data afford a unique data linkage of the LSAC cohort with the CASiE data covering pre, mid and post-recession periods in Australia. In doing so, we combine the rich contextual information of LSAC with a community-level set of economic sentiments. Fourth, the further linkage of LSAC data with ABS labor force statistics allows us to examine the specific effect of community-level sentiment without economic conditions confounding the results, which is a particular feature of the Australian Great Recession experience. We also use an internationally validated measure of emotional and behavioral problems in the SDQ, and in comparison to Golberstein et al. (2016) who were limited to an abbreviated version, LSAC administers the full instrument at each wave. Finally, by using a difference-in-differences methodology with longitudinal data we find plausible causal estimates.

There are also limitations. First, we have mostly a story of null findings. Care needs to be taken in interpreting these null findings. We try to avoid the inverse probability fallacy; we do not wish to conflate a lack of statistical significance with proof of non-existence (Cumming and Calin-

Jageman 2017). In contrasting boys vs. girls, parent vs. teacher we take care to not over-interpret our findings. We have not performed pairwise comparisons, and we are not interested in contrasting significant and non-significant effects (Gelman and Stern 2006).

We have not considered father distress. The primary respondent in the LSAC is almost always the mother, and we have substantially less data for fathers, particularly when the father lives elsewhere. However, we acknowledge that father distress is another potential mechanism by which expectations shocks could affect children, in the context of the modest effects seen for girls.

In the model of mothers' psychological distress, the parallel trends assumption is violated in some cases indicating that those mothers living in areas that experienced intense expectations shocks were on a different trajectory of distress compared to those who did not experienced a shock. This means that the results for these models should be interpreted with caution.

Conclusions

Our study provides a unique examination of the mental health effects of the Great Recession as experienced in Australia with a focus on the sharp rise in pessimistic employment expectations during the peak of the crisis. We find little effect which could have been due to the timely and seemingly effective response of the Australian Government in protecting the economy or due to other reasons.

Our key research finding was an impact for girls but not boys. This is a population-level effect and we do not fully understand the mechanisms via which girls' mental health is affected, or whether the effects are stronger in vulnerable sub-groups of the population (e.g., low-income families who were targeted by the Government's stimulus package). Further research applying individual and family-level analyses may be able to give us a better understanding of the potential pathways and the role of coping mechanisms that do or don't allow economic stress to impact on children and their mothers.

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Supporting Information

Table S1. Variable definitions and summary statistics

Variable name	Definition	Mean (SD) Child sample	Mean (SD) Mother sample
Outcomes			
SDQ total	The strengths and difficulties questionnaire (SDQ) comprises 25 items that collapse into five problem scales (emotional; conduct; hyperactivity; peer; prosocial). The total difficulties score is generated by summing scores from all the scales except the prosocial scale. The resultant score ranges from zero to 40. For ease of interpretation, the total score has been standardized to have a mean of zero and a standard deviation of one.	0 (1)	-
SDQ Internalizing	The internalizing score ranges from zero to 20 and is the sum of the emotional and peer problems scales. For ease of interpretation, the internalizing score has been standardized to have a mean of zero and a standard deviation of one.	0 (1)	-
SDQ Externalizing	The externalizing score ranges from zero to 20 and is the sum of the conduct and hyperactivity scales. For ease of interpretation, the externalizing score has been standardized to have a mean of zero and a standard deviation of one.	0 (1)	-
Kessler 6	The Kessler 6 (K6) comprises six items on a five-point response scale, which assess the frequency of distress / depression in the previous four weeks. Items are summed to produce a score that ranges from zero to 24. For ease of interpretation, the K6 score has been standardized to have a mean of zero and a standard deviation of one.	-	0 (1)
Expectations Shocks (CASiE)			
We use the CASiE data to develop a monthly Unemployment Expectations Index for each Statistical Area 4 (SA4), based on weighting and aggregating person-level CASiE respondents. This index is based on the "balanced approach" which is standard in the expectations literature and was developed by the University of Michigan (also the creators of the consumer sentiment survey). The index ranges from zero to 200. An index >100 means a region has pessimistic unemployment expectations and an index <100 means a region has optimistic unemployment expectations. From this monthly index, for each SA4, we find the difference between the minimum score (more optimistic) prior to the Great Recession and the maximum score during the Great Recession (pessimistic).			
Expectations Shock	Equals 1 if an SA4's min-to-max change is in the top 25th percentile across all SA4s (i.e., experiences a more intense expectation shock).	0.197 (0.397)	0.193 (0.394)
Alternative Expectations Shock	Equals 1 if an SA4's min-to-max change is greater than the average min-to-max change across all SA4s (i.e., a larger than average expectations shock).	0.405 (0.491)	0.406 (0.491)
LSAC Controls			

Child's age	Child's age in years.	6.763 (2.538)	-
Mother's age	Mother's age in years.	-	37.632 (5.613)
Number of children	Number of children aged less than 18 in the household.	2.515 (1.004)	2.495 (0.962)
Lone parent	Equals 1 if child resides in a lone-parent household (reference category: two biological parents present).	0.151 (0.358)	0.134 (0.340)
Blended family	Equals 1 if child resides in a blended family (e.g., step parent, adopted parents, aunts/uncles, grandparents) (ref cat: two biological parents present).	0.035 (0.183)	0.028 (0.164)
Change in household	Equals 1 if there was any change at all in household composition between waves. For wave one, this information is missing so set the variable equal to zero and use the wave one missing dummy to account for this.	0.155 (0.362)	0.143 (0.350)
Moved home	Equals 1 if moved in past two years. For wave one, this information is missing so set the variable equal to zero and use the wave one missing dummy to account for this.	0.152 (0.359)	0.144 (0.351)
Ln equiv.household weekly income	Log of real equivalized household weekly income (at 2010 prices) with missing values imputed where possible and missing/negative incomes set to $1. The equivalence scale used is the OECD modified scale (which assigns a weight of 1 to the first adult in the household, 0.5 for each other adult, and 0.3 for each child). For wave one, this information is missing so set the variable equal to zero and use the wave one missing dummy to account for this.	4.092 (3.236)	4.136 (3.237)
Imputation flag	Equals 1 if household income is imputed.	0.038 (0.192)	0.037 (0.188)
Income missing	Equals 1 if household income is missing and was not imputed.	0.030 (0.170)	0.028 (0.163)
Home: Mortgage	Equals 1 if home is owned with a mortgage (reference category: home is owned outright).	0.620 (0.486)	0.640 (0.480)
Home: Renting	Equals 1 if home is rented (ref cat: home is owned outright).	0.221 (0.415)	0.199 (0.399)
Home: Other	Equals 1 if home is in a rent-buy scheme or life tenure scheme etc. (ref cat: home is owned outright).	0.030 (0.170)	0.028 (0.165)
SEIFA	Decile of index of relative socio-economic disadvantage for regions, where one represents highest relative disadvantage and 10 highest relative advantage (ABS 2001). It takes into account variables such as the proportion of families with high incomes, people with a tertiary education, and people employed in a skilled occupation.	4.936 (2.568)	4.999 (2.546)
Inner regional	Equals 1 if respondent lives in inner regional Australia (as defined in the Australian Standard Geographical Classification [ASGC]) (reference category: Major urban).	0.206 (0.405)	0.208 (0.406)
Outer regional	Equals 1 if respondent lives in outer regional Australia (ref cat: Major urban).	0.105 (0.307)	0.104 (0.305)
Remote	Equals 1 if respondent lives in remote or very remote location in Australia. (ref cat: Major urban)	0.014 (0.118)	0.015 (0.121)

Wave 1 missing	Equals 1 if wave one information is missing on the following variables: Change in household; Moved home; Ln equiv.household weekly income.	0.350 (0.477)	0.347 (0.476)
Year 12	Equals 1 if the mother's highest level of education is the completion of year 12 (reference category: year 11 or below).	0.132 (0.338)	0.132 (0.339)
Certificate	Equals 1 if the mother's highest level of education is the completion of a certificate (ref cat: year 11 or below).	0.289 (0.453)	0.278 (0.448)
Diploma	Equals 1 if the mother's highest level of education is the completion of a diploma or advanced diploma (ref cat: year 11 or below).	0.094 (0.293)	0.099 (0.299)
Bachelor or above	Equals 1 if the mother's highest level of education is the completion of a bachelors or higher (reference category: year 11 or below).	0.311 (0.463)	0.325 (0.468)
Employed	Equals 1 if the mother is currently employed (reference category: not in the labor force).	0.676 (0.438)	0.690 (0.462)
Unemployed	Equals 1 if the mother is currently unemployed (ref cat: not in the labor force).	0.030 (0.171)	0.026 (0.160)
Labor Market Controls			
Unemployment – males	The unemployment rate of males, at the month of the LSAC respondents' interview, in the local labor market region (SA4) for which the LSAC respondent resides.	4.938 (2.104)	4.950 (2.105)
Unemployment – females	The unemployment rate of females, at the month of the LSAC respondents' interview, in the local labor market region (SA4) for which the LSAC respondent resides.	5.307 (2.257)	5.308 (2.271)
Emp to pop ratio – males	The employment to population ratio of males, at the month of the LSAC respondents' interview, in the local labor market region (SA4) for which the LSAC respondent resides.	68.297 (5.938)	68.257 (6.032)
Emp to pop ratio – females	The employment to population ratio of females, at the month of the LSAC respondents' interview, in the local labor market region (SA4) for which the LSAC respondent resides.	54.180 (5.999)	54.156 (6.026)

Table S2. Tests of parallel trends between treatment and control, children.

	Parent-rated			Teacher-rated		
	SDQ total	Internalizing	Externalizing	SDQ total	Internalizing	Externalizing
	(1)	(2)	(3)	(4)	(5)	(6)
A: Expectations shock: top 25th percentile						
Expectations shock	0.023	0.020	0.018	0.082	0.150**	0.006
	(0.032)	(0.036)	(0.033)	(0.054)	(0.062)	(0.052)
Constant	-0.258***	-0.072***	-0.332***	0.016	-0.020	0.040*
	(0.014)	(0.016)	(0.015)	(0.024)	(0.027)	(0.023)
R-Square	0.000	0.000	0.000	0.000	0.001	0.000
N	4089	4089	4089	2256	2258	2261
B: Expectations shock: >average						
Expectations shock	0.014	0.002	0.019	0.026	0.070	-0.014
	(0.026)	(0.029)	(0.027)	(0.044)	(0.050)	(0.042)
Constant	-0.259***	-0.069***	-0.336***	0.022	-0.019	0.047*
	(0.017)	(0.019)	(0.017)	(0.028)	(0.032)	(0.027)
R-Square	0.000	0.000	0.000	0.001	0.003	0.000
N	4089	4089	4089	2256	2258	2261

Notes: Estimated OLS coefficients presented and standard errors in parentheses. *, **, *** indicates significance at the 10%, 5 % and 1% levels respectively.

Table S3. Tests of parallel trends between treatment and control, mothers.

	K6 Score
A: Expectations shock: top 25th percentile	
Expectations shock	0.116***
	(0.042)
Constant	-0.287***
	(0.019)
R-square	0.002
N	3321
B: Expectations shock: >average	
Expectations shock	0.025
	(0.034)
Constant	-0.275***
	(0.022)
R-square	0.000
N	3321

Notes: Estimated OLS coefficients presented and standard errors in parentheses. *, **, *** indicates significance at the 10%, 5 % and 1% levels respectively.

Table S4. Complete results for the of unemployment expectations shocks (top 25th percentile) on parent-rated SDQ outcomes, boys.

	SDQ total (1)	Internalizing (2)	Externalizing (3)	SDQ total (4)	Internalizing (5)	Externalizing (6)
Expectations shock	0.082**	0.021	0.108***	0.069*	0.016	0.092**
	(0.040)	(0.040)	(0.040)	(0.041)	(0.042)	(0.041)
Post-crisis	-0.056	-0.010	-0.076	-0.044	0.002	-0.068
	(0.127)	(0.128)	(0.127)	(0.128)	(0.128)	(0.127)
DID	0.002	-0.030	0.027	-0.002	-0.034	0.024
	(0.071)	(0.072)	(0.071)	(0.072)	(0.072)	(0.072)
Child's age	0.027	0.039	0.009	0.025	0.038	0.007
	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)
Number of children	-0.073***	-0.093***	-0.034**	-0.074***	-0.094***	-0.035**
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Lone-parent	0.211***	0.163***	0.188***	0.212***	0.164***	0.188***
	(0.042)	(0.042)	(0.041)	(0.042)	(0.042)	(0.041)
Blended family	0.167**	0.149**	0.133*	0.168**	0.149**	0.134*
	(0.073)	(0.073)	(0.073)	(0.073)	(0.073)	(0.073)
Year 12 (mother)	-0.121**	-0.101**	-0.101**	-0.120**	-0.099**	-0.101**
	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)
Certificate (mother)	-0.097**	-0.054	-0.103**	-0.094**	-0.052	-0.100**
	(0.041)	(0.041)	(0.040)	(0.041)	(0.041)	(0.040)
Diploma (mother)	-0.269***	-0.173***	-0.268***	-0.267***	-0.172***	-0.265***
	(0.053)	(0.054)	(0.053)	(0.054)	(0.054)	(0.053)
Bachelor or above (mother)	-0.260***	-0.112***	-0.303***	-0.257***	-0.110**	-0.300***
	(0.043)	(0.043)	(0.042)	(0.043)	(0.043)	(0.042)
Employed (mother)	-0.156***	-0.199***	-0.075**	-0.156***	-0.198***	-0.076**
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Unemployed (mother)	-0.022	-0.092	0.042	-0.025	-0.093	0.038
	(0.079)	(0.079)	(0.078)	(0.079)	(0.079)	(0.078)
Change in household	0.102**	0.062	0.105**	0.101**	0.061	0.103**
	(0.041)	(0.042)	(0.041)	(0.041)	(0.042)	(0.041)
Moved home	-0.036	-0.057	-0.008	-0.035	-0.056	-0.008
	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)
Ln equiv.household weekly income	-0.115***	-0.146***	-0.056*	-0.117***	-0.148***	-0.058*
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Imputation flag	-0.008	-0.003	-0.010	-0.005	0.001	-0.008
	(0.070)	(0.071)	(0.070)	(0.070)	(0.071)	(0.070)
Missing income	-0.744***	-0.896***	-0.401*	-0.761***	-0.910***	-0.416*
	(0.217)	(0.218)	(0.216)	(0.217)	(0.219)	(0.216)
Home: Mortgage	0.077*	0.050	0.076*	0.076*	0.050	0.075*
	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)
Home: Renting	0.235***	0.197***	0.196***	0.233***	0.197***	0.194***
	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)
Home: Other	0.096	0.098	0.065	0.095	0.099	0.064
	(0.083)	(0.083)	(0.082)	(0.083)	(0.083)	(0.082)
SEIFA	-0.039***	-0.035***	-0.030***	-0.041***	-0.036***	-0.033***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Inner regional	0.008	-0.012	0.022	0.022	-0.003	0.036
	(0.034)	(0.035)	(0.034)	(0.035)	(0.036)	(0.035)
Outer regional	-0.011	-0.020	-0.000	-0.010	-0.014	-0.004
	(0.045)	(0.046)	(0.045)	(0.046)	(0.046)	(0.046)
Remote	-0.086	0.038	-0.161	-0.066	0.043	-0.135
	(0.108)	(0.108)	(0.107)	(0.109)	(0.109)	(0.108)

Wave 1 missing	-0.468**	-0.813***	-0.051	-0.485**	-0.831***	-0.063
	(0.217)	(0.218)	(0.216)	(0.217)	(0.218)	(0.216)
Unemployment – males	-	-	-	0.004	0.009	-0.001
				(0.008)	(0.008)	(0.008)
Unemployment – females	-	-	-	0.001	-0.007	0.007
				(0.007)	(0.007)	(0.007)
Emp to pop – males	-	-	-	0.008*	0.008**	0.005
				(0.004)	(0.004)	(0.004)
Emp to pop – females	-	-	-	-0.003	-0.005	0.000
				(0.004)	(0.004)	(0.004)
Constant	1.093***	1.195***	0.688**	0.735**	0.966***	0.332
	(0.286)	(0.288)	(0.285)	(0.357)	(0.359)	(0.355)
R-Square	0.083	0.057	0.076	0.084	0.058	0.077
N	5960	5960	5960	5960	5960	5960

Notes: Estimated OLS coefficients presented and standard errors in parentheses. *, **, *** indicates significance at the 10%, 5 % and 1% levels respectively.

Table S5. Complete results for the effects of unemployment expectations shocks (top 25th percentile) on parent-rated SDQ outcomes, girls.

	SDQ total (1)	Internalizing (2)	Externalizing (3)	SDQ total (4)	Internalizing (5)	Externalizing (6)
Expectations shock	-0.026	-0.014	-0.029	-0.042	-0.034	-0.035
	(0.037)	(0.039)	(0.036)	(0.038)	(0.040)	(0.037)
Post-crisis	0.034	0.194	-0.106	0.044	0.209*	-0.103
	(0.113)	(0.119)	(0.112)	(0.113)	(0.119)	(0.112)
DID	0.133**	0.091	0.128**	0.152**	0.108	0.143**
	(0.066)	(0.069)	(0.065)	(0.066)	(0.070)	(0.065)
Child's age	-0.008	-0.023	0.006	-0.010	-0.026	0.005
	(0.027)	(0.028)	(0.027)	(0.027)	(0.028)	(0.027)
Number of children	-0.034***	-0.037***	-0.021*	-0.033***	-0.036***	-0.021*
	(0.012)	(0.013)	(0.012)	(0.012)	(0.013)	(0.012)
Lone-parent	0.283***	0.265***	0.214***	0.282***	0.264***	0.213***
	(0.038)	(0.040)	(0.037)	(0.038)	(0.040)	(0.037)
Blended family	0.253***	0.237***	0.192***	0.255***	0.239***	0.193***
	(0.066)	(0.069)	(0.065)	(0.066)	(0.069)	(0.065)
Year 12 (mother)	-0.131***	-0.169***	-0.063	-0.132***	-0.168***	-0.064
	(0.043)	(0.046)	(0.043)	(0.043)	(0.046)	(0.043)
Certificate (mother)	-0.063*	-0.041	-0.063*	-0.066*	-0.043	-0.065*
	(0.036)	(0.038)	(0.035)	(0.036)	(0.038)	(0.035)
Diploma (mother)	-0.207***	-0.130**	-0.209***	-0.207***	-0.129**	-0.209***
	(0.048)	(0.051)	(0.048)	(0.048)	(0.051)	(0.048)
Bachelor or above (mother)	-0.315***	-0.196***	-0.318***	-0.316***	-0.196***	-0.320***
	(0.037)	(0.039)	(0.037)	(0.037)	(0.039)	(0.037)
Employed (mother)	-0.140***	-0.153***	-0.089***	-0.138***	-0.149***	-0.088***
	(0.028)	(0.030)	(0.028)	(0.028)	(0.030)	(0.028)
Unemployed (mother)	-0.047	0.014	-0.082	-0.044	0.017	-0.081
	(0.072)	(0.076)	(0.071)	(0.072)	(0.076)	(0.071)
Change in household	0.044	0.045	0.030	0.044	0.045	0.030
	(0.037)	(0.039)	(0.036)	(0.037)	(0.039)	(0.036)
Moved home	-0.021	0.029	-0.055	-0.020	0.030	-0.055
	(0.036)	(0.038)	(0.035)	(0.036)	(0.038)	(0.035)
Ln equiv.household weekly income	-0.105***	-0.119***	-0.062**	-0.104***	-0.119***	-0.061**
	(0.028)	(0.029)	(0.028)	(0.028)	(0.029)	(0.028)
Imputation flag	-0.004	0.034	-0.033	-0.004	0.032	-0.033
	(0.061)	(0.064)	(0.060)	(0.061)	(0.064)	(0.060)
Missing income	-0.689***	-0.779***	-0.414**	-0.681***	-0.773***	-0.407**
	(0.192)	(0.203)	(0.190)	(0.192)	(0.203)	(0.190)
Home: Mortgage	0.097***	0.074**	0.086**	0.095***	0.073*	0.085**
	(0.035)	(0.037)	(0.035)	(0.035)	(0.037)	(0.035)
Home: Renting	0.224***	0.128***	0.235***	0.220***	0.125***	0.232***
	(0.043)	(0.046)	(0.043)	(0.043)	(0.046)	(0.043)
Home: Other	0.137*	0.070	0.151*	0.137*	0.071	0.150*
	(0.079)	(0.084)	(0.078)	(0.079)	(0.084)	(0.078)
SEIFA	-0.023***	-0.023***	-0.016***	-0.025***	-0.025***	-0.017***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)
Inner regional	-0.065**	-0.065**	-0.046	-0.065**	-0.061*	-0.049
	(0.030)	(0.032)	(0.030)	(0.031)	(0.033)	(0.031)
Outer regional	-0.101**	-0.124***	-0.053	-0.099**	-0.117***	-0.055
	(0.042)	(0.044)	(0.041)	(0.042)	(0.044)	(0.042)
Remote	-0.271**	-0.359***	-0.120	-0.236**	-0.314***	-0.104
	(0.112)	(0.118)	(0.110)	(0.112)	(0.119)	(0.111)

Wave 1 missing	-0.429**	-0.766***	-0.030	-0.421**	-0.762***	-0.021
	(0.194)	(0.205)	(0.192)	(0.194)	(0.205)	(0.192)
Unemployment – males				-0.022***	-0.022***	-0.016**
				(0.007)	(0.008)	(0.007)
Unemployment – females				0.002	0.002	0.002
				(0.006)	(0.007)	(0.006)
Emp to pop – males				-0.003	0.001	-0.006*
				(0.003)	(0.004)	(0.003)
Emp to pop – females				-0.001	-0.004	0.002
				(0.003)	(0.004)	(0.003)
Constant	0.811***	1.163***	0.288	1.205***	1.447***	0.655**
	(0.255)	(0.270)	(0.253)	(0.322)	(0.341)	(0.319)
R-Square	0.108	0.062	0.113	0.110	0.063	0.113
N	5734	5734	5734	5734	5734	5734

Notes: Estimated OLS coefficients presented and standard errors in parentheses. *, **, *** indicates significance at the 10%, 5 % and 1% levels respectively.

Table S6. Complete results for the effects of unemployment expectations shocks on mother's psychological distress (Kessler 6).

	Model excluding local labor market controls		Model including local labor market controls	
	(1)	(2)	(3)	(4)
Expectations shock (25th percentile)	0.061**		0.077**	
	(0.031)		(0.032)	
Expectations shock (>average)		-0.022		-0.018
		(0.025)		(0.026)
Post-crisis	0.104***	0.092***	0.098***	0.087***
	(0.028)	(0.032)	(0.029)	(0.032)
DID	-0.069	-0.004	-0.074	-0.006
	(0.055)	(0.044)	(0.056)	(0.044)
Mother's age	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Number of children	-0.013	-0.012	-0.013	-0.012
	(0.011)	(0.011)	(0.011)	(0.011)
Lone-parent	0.291***	0.290***	0.289***	0.288***
	(0.033)	(0.033)	(0.033)	(0.033)
Blended family	0.036	0.037	0.035	0.036
	(0.062)	(0.062)	(0.062)	(0.062)
Change in household	0.049	0.049	0.049	0.049
	(0.032)	(0.032)	(0.032)	(0.032)
Moved home	0.065**	0.067**	0.064**	0.066**
	(0.032)	(0.032)	(0.032)	(0.032)
Ln equiv.household weekly income	-0.183***	-0.182***	-0.182***	-0.180***
	(0.024)	(0.024)	(0.024)	(0.024)
Imputation flag	0.005	0.002	0.004	0.002
	(0.054)	(0.054)	(0.054)	(0.054)
Missing income	-1.177***	-1.163***	-1.167***	-1.155***
	(0.169)	(0.169)	(0.169)	(0.169)
Home: Mortgage	0.077**	0.077**	0.076**	0.076**
	(0.030)	(0.030)	(0.030)	(0.030)
Home: Renting	0.154***	0.156***	0.154***	0.155***
	(0.039)	(0.039)	(0.039)	(0.039)
Home: Other	0.152**	0.154**	0.151**	0.152**
	(0.067)	(0.067)	(0.067)	(0.067)
SEIFA	-0.016***	-0.016***	-0.014***	-0.015***
	(0.004)	(0.004)	(0.005)	(0.005)
Inner regional	-0.138***	-0.135***	-0.148***	-0.141***
	(0.026)	(0.026)	(0.027)	(0.027)
Outer regional	-0.056	-0.043	-0.062*	-0.048
	(0.035)	(0.035)	(0.036)	(0.035)
Remote	-0.188**	-0.139*	-0.210**	-0.148*
	(0.086)	(0.084)	(0.087)	(0.085)
Wave 1 missing	-0.918***	-0.907***	-0.912***	-0.900***
	(0.161)	(0.161)	(0.161)	(0.161)
Year 12	-0.042	-0.040	-0.043	-0.041
	(0.037)	(0.037)	(0.037)	(0.037)
Certificate	0.048	0.049	0.047	0.049
	(0.031)	(0.031)	(0.031)	(0.031)
Diploma	0.027	0.028	0.026	0.028
	(0.041)	(0.041)	(0.041)	(0.041)
Bachelor or above	0.061*	0.062*	0.061*	0.061*

	(0.032)	(0.032)	(0.032)	(0.032)
Employed	-0.171***	-0.171***	-0.173***	-0.173***
	(0.024)	(0.024)	(0.024)	(0.024)
Unemployed	0.062	0.063	0.060	0.061
	(0.064)	(0.064)	(0.064)	(0.064)
Unemployment – males	-	-	0.004	0.001
			(0.006)	(0.006)
Unemployment – females	-	-	0.003	0.004
			(0.006)	(0.006)
Emp to pop – males	-	-	-0.005*	-0.005
			(0.003)	(0.003)
Emp to pop – females	-	-	0.004	0.004
			(0.003)	(0.003)
Constant	1.116***	1.123***	1.207***	1.168***
	(0.186)	(0.186)	(0.249)	(0.248)
R-Square	0.061	0.061	0.062	0.061
N	9562	9562	9562	9562

Notes: Estimated OLS coefficients presented and standard errors in parentheses. *, **, *** indicates significance at the 10%, 5 % and 1% levels respectively.

Appendix S1 — Aggregation of CASiE data

The CASiE data interviews 1,200 random people each month in each year for the period 2003-2016. The data contains each person's unemployment expectations about the 12 months ahead, residential postcode and population weight (based on age, gender and location). Using correspondence files provided by the Australian Bureau of Statistics, we match each person's postcode to their Statistical Area 4 (SA4), which are larger than postcodes and represent local labor markets. Using the population weights and the SA4 data allows us to aggregate person-level responses to an expectations index that is a more accurate representation of unemployment expectations in each local labor market. The process is described in detail below.

The process for creating the monthly unemployment expectations index for each SA4 is as follows:

1. Each CASiE respondent answers the unemployment expectations question by selecting one out of four mutually exclusive categories: More unemployment; About the same; Less unemployment; Don't know. For each category we generate a binary variable that equals one if the respondent chose those expectations and zero otherwise. Each person's response is then weighted by their population weight.
2. We need to aggregate the individual-level data to an area-level SA4, so for each SA4 we sum the number of (weighted) responses in each category. We then divide the sum of the (weighted) responses by the sum of the total number of (weighted) respondents in a given SA4. This produces the (weighted) proportion of the SA4's population who has expectations in each of the four categories (e.g., the (weighted) proportion of the SA4 who believe there will be 'more unemployment' over the next 12 months) for each SA4-month combination.
3. There are 85 SA4s covered in the CASiE data, so aggregating over one month of data to produce a monthly unemployment expectation means that we are aggregating over an average of 13.6 CASiE respondents per SA4. The concern here is that the sample for each SA4 is too small to be representative (even with the weights). Thus, for each SA4-month observation, we aggregate expectations over the current month and previous two months.
4. The next step is to create the Unemployment Expectations Index for each SA4. To calculate the index for each SA4-month, we take the (weighted) proportion of people who think there will be more unemployment minus the (weighted) proportion of people who think there will less and plus 100. Thus, the index ranges from zero to 200. An index greater than 100 means a region has pessimistic unemployment expectations and an index below 100 means a region is optimistic about employment conditions.

Appendix S2 — Pre-and post-crisis periods

Here we describe the timing of the unemployment expectations and LSAC interviews to determine the pre- and post-Great Recession periods. Figure S2A graphs the Australian unemployment expectations index (left axis) and the number of LSAC interviews across time (right axis), which represents each wave's interview distribution. Here we focus on wave two (2006) to wave four (2010) interviews. Wave two interviews take place pre-crisis, wave three coincides with the beginning of the crisis, while wave four interviews take place when expectations return to a neutral point, before the Euro Crisis leads to another increase in the unemployment expectations during 2011. From the graph, we can identify waves one and two as pre-crisis periods and wave four as the post-crisis period. We choose to drop wave three because outcomes might already be influenced by the beginning crisis (rising expectations, but not the full impact of the Great Recession), and wave five and six because it might capture the Euro Crisis, cofounded with any remaining Great Recession effects. Thus, we only use waves one, two, and four for the analysis.

Figure S2A. National unemployment expectations index (UEI) and the LSAC interviews, from 2006 to 2012.