

Does transition into parenthood lead to changes in mental health? Findings from three waves of a population based panel study

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ABSTRACT

Background Longitudinal studies specifically looking at the transition into parenthood and changes in mental health in the general population are scarce. This study aimed to investigate the impact of transition into parenthood on mental health and psychological distress using longitudinal survey data.

Methods The analysis used three waves from the longitudinal Survey of Family, Income and Employment. Parenthood was classified as first time parent (first and only child <12 months at interview date), subsequent parent (child <12 months and other children in the family), existing parent (no children <12 months but other existing children in the family) and not a parent. We used fixed effects generalised linear modelling, controlling for all time-invariant and time-varying sources of confounding in a sample of 6670 adults within families.

Results After adjusting for confounding from time-varying partner status, area deprivation, labour force status and household income, those who became first time parents reported an increase in mental health (β 1.22, 95% CI -0.06 to 2.50; mean=83.8, SD=14.1) and a decrease in psychological distress (β -0.70 95% CI -1.10 to -0.29; mean=13.4, SD=5.0). Subsequent parents reported a decrease in psychological distress (β -0.60 95% CI -0.95 to -0.24).

Conclusions Our findings suggest that a transition into parenthood for the first time leads to changes in mental health and psychological distress. Understanding the relationship between becoming a parent and mental health outcomes is important given that parental mental health is integral to effective parenting.

INTRODUCTION

The transition to parenthood is considered one of the most significant transitions in the life course of an individual. It is a time of change where parents learn to cope with new roles and responsibilities and has the potential to drastically disrupt the lives of individuals.¹⁻⁶ Although the majority of parents eventually adjust to this major life transition, recent parenthood is often accompanied by psychological and interpersonal stress which may in turn impact on mental health.⁷⁻⁹ Understanding the relationship between parenthood and mental health is important given that parental mental health is integral to effective parenting.¹⁰⁻¹³ The birth of a first child especially can transform the lifestyles of couples, forcing families to undergo some significant changes.

Most previous research has used cross-sectional data and shown that certain types of parenthood

are associated with poorer mental health such as single parents¹⁴ or non-coresident parents.¹⁵ Studies exploring the mental health of parents compared with non-parents have shown inconsistent results¹⁶⁻¹⁸ and to our knowledge no studies have examined the different relationship of becoming a parent for the first time compared with second or more with mental health. A major limitation of these existing studies is the use of cross-sectional data and the lack of control for a wide range of both confounding and mediating measures that may be associated with both parental status and mental health. For example, close to the arrival of a first child, many parents, mostly women, change their employment status¹⁹ which in turn may impact their household income. Given that those with higher incomes may have access to additional resources and supports which may buffer new parents from declines in mental health, changes in employment and income need to be adjusted for in assessing the impact of becoming a parent on mental health. With regard to partnership status, singlehood and cohabitation have been shown to be associated with the postponement of parenthood, especially for women²⁰ and decisions to cohabit or get married are often linked to the arrival of a first child.²¹ Partnership status in turn is associated with mental health with studies showing that those who cohabit gain similar mental health benefits to those who are married who in turn have better mental health than their non-married counterparts.²²⁻²⁵ It is therefore important to control for this time-varying confounding in any examination of the impact of parenthood on mental health.

Longitudinal studies specifically looking at the transition into parenthood and changes in mental health in the general population are scarce. One reason for this is that much research has either focused on women only,⁴ men only^{6, 26} or young adults.^{8, 27, 28} A second reason is that a number of studies have used small samples of (mainly married) couples examining the effect that the arrival of a child has on changes in marriage/relationship satisfaction or division of labour rather than focusing on health or well-being of the parent.^{2, 7, 29, 30}

Three longitudinal studies have specifically looked at transition into parenthood and changes in mental health using nationally representative samples of men and women using multiple years of data. Keizer *et al*³¹ investigated the consequences of transitioning into parenthood on multiple outcomes of well-being including changes in negative affect (using the three negative items from the Short-Form-36 (SF-36) mental health scale) and

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positive affect (using the two positive items from the same scale) separately in men and women. After adjustment for transitions in partner status (eg, cohabiting to marriage) and transitions in work hours they found no significant change in negative or positive affect for either men or women becoming parents. However, this work was limited to a small sample of respondents ($n=600$) who were continuously partnered between waves, excluding single parents or those who repartnered. A larger study from the USA ($n=1933$) compared six indicators of adult's lives for those who became parents versus those remaining childless and whether effects varied by gender and marital status. They found no difference in levels of depression between those who became new parents and those who remained childless but did find a significant effect of becoming a parent on social integration, self-efficacy and hours of housework.³² These results however covered a 5–7-year interval between waves and may therefore have washed out any effect of transitioning into parenthood on mental health. A recent study by Fergusson *et al*³³ has reported on the links between the transition to parenthood and substance use disorders. After adjustment for both observed and non-observed sources of confounding they found that becoming a custodial parent (ie, becoming a parent and caring for dependent children) led to a reduced risk of alcohol abuse/dependence and that this effect was generally greater in women.

None of these studies differentiated between becoming a parent for the first time or a second or greater time. Our paper adds to the literature by using three waves of data from a large longitudinal survey over a period of 5 years to determine whether the transition to parenthood for the first time or greater leads to changes in mental health or psychological distress and whether there are any sex differences in the effects. The use of repeated measures and a fixed effects approach controls for both observed time-invariant characteristics such as age, sex and ethnicity and unobserved time-invariant characteristics such as biological or genetic differences. It does this by modelling changes within individuals over time ignoring 'between-individual' differences meaning each individual is effectively used as his or her own control.³⁴ It is therefore well suited to answering our research question as it looks beyond how parents are doing relative to one another and instead assesses how mental health changes within individuals as a result of transitioning into parenthood.

METHODS

Data

This study used three waves (wave 3 collected 2004/05, wave 5 collected 2006/07 and wave 7 collected 2008/09) of the longitudinal Survey of Family, Income and Employment (SoFIE), an 8-year household panel survey (2002–2010) run by Statistics New Zealand (NZ) (wave 1–7 data V2).³⁵ Data were collected using computer assisted interview schedules to collect annual information on socioeconomic, family and demographic factors. The population covered is the usually resident population of NZ living in private dwellings, with the initial sample consisting of approximately 11 500 responding private households and 22 265 adults (aged 15 years and over) sampled within them. In wave 7, there were 18 785 (63% of wave 1) original sample members still participating. Attrition rates in SoFIE are higher in younger people, ethnic minority groups, lower income, unemployed and those living in more deprived areas.³⁶ A detailed health module, including measures of mental health and psychological distress, was included in the wave 3, 5 and 7 interviews; therefore, the present analysis was restricted to adult

sample members responding in all three of these waves ($n=15\ 095$). This was further restricted to those aged between 15 and 60 years old at wave 3 who reported being in a parent role at any of the three waves ($n=6670$).

Ethics approval for the SoFIE-Health module was obtained from the University of Otago Human Ethics Committee. Ethical oversight of SoFIE was governed by the Statistics Act 1975, as SoFIE was administered as part of the work programme of Statistics New Zealand.

MEASURES

Parental status (transition to parenthood)

The parental status of each respondent was based on waves 3, 5 and 7 and derived by: (i) whether they were in a parent role of a dependent child (yes/no), (ii) whether they had a child under 12 months (yes/no) at interview date and (iii) whether there were any other children in the family. Respondents in a parent role with a child under 12 months and no other children in the family at the time of the interview were classed as first time parents. Respondents in a parent role with a child under 12 months and other children in the family were classed as a subsequent parent, that is, parent for the second time or greater. Respondents in a parent role with no children under 12 months but with other children in the family were classed as existing parents; otherwise, respondents not in a parent role were classed as not a parent. In the fixed effects analysis change in parental status was modelled, for example, from not a parent to a first time parent. Respondents may have more than one transition over the three waves, that is, respondents can transition from not a parent at wave 3 to a first time parent at wave 5 to a subsequent parent at wave 7 (after the recent birth of a subsequent child).

Mental health

The main outcome was changes in mental health between waves 3, 5 and 7. This was measured using two measures. General mental health was measured using five questions from the SF-36 health survey.³⁷ These questions ask about the presence of negative and positive feelings during the past 4 weeks and have been shown to be valid and reliable in the NZ population.³⁸ The score for mental health (MH) is computed by summing the questions scores and then transforming the raw score to a 0–100 point scale with increasing scores reflecting an increasing degree of good mental health. Non-specific psychological distress was measured using the Kessler Psychological Distress Scale (K10)^{39–41} which contains 10 questions regarding negative emotional states (eg, feeling nervous, hopeless or worthless) in the 4 weeks prior to interview. K10 scores range from 10 to 50 with increasing scores reflecting an increasing degree of non-specific psychological distress. In the fixed effects analysis both sets of scores were modelled as continuous variables.

Observed (time-varying) confounding factors

The partnership status of each adult at each wave was derived from information on both legal marital status and social marital status or living arrangements—married (those who are legally married), partnered (not legally married but cohabiting) and not partnered. Three socioeconomic measures were included: (i) labour force status (employed, unemployed and inactive); (ii) the NZ deprivation index (NZDep2001), a measure of small area deprivation score (ranging from 1 to 10) derived from census data reflecting aspects of material and social deprivation, modelled as a continuous variable where the lowest decile is the least deprived, and the highest decile is the most deprived

(grouped into quintiles in the descriptive table);⁴² and (iii) household income, equivalised for household size and composition and adjusted for inflation using the Consumers Price Index (October 2002), derived from combining the total gross personal income received by all adults in a household over the 12 months prior to interview (modelled as a continuous variable transformed to the log scale).

Statistical analyses

Fixed effect generalised linear regression models were used to investigate the longitudinal associations between a transition in parenthood status (from not a parent to a first time parent; from first time to subsequent parent; or from first time or subsequent parent to existing parent) on change in mental health and psychological distress scores between waves. The first model represents the crude longitudinal association of the impact of a transition in parenthood status on mental health controlling for year of the study. Next, the time-varying confounding variable partner status was added to this model. Finally, time-varying socioeconomic confounding variables were added. The following model was used:

$$y_{it} = \beta_{0t} + \beta_1 x_{it} + \beta_2 Z_i + \alpha_i + \varepsilon_{it}$$

where y_{it} is the dependent variable (mental health/psychological distress) observed for individual i ($i=1\dots n$ where n is sample size) at time t (where t is number of data collection periods), β_{0t} is the intercept (which varies with time), x_{it} is the time-varying exposure variable (parenthood status) with coefficient β_1 , Z_i is the time-invariant exposure with coefficient β_2 , α_i is the unobserved individual effect and ε_{it} is the error term. The fixed effect model absorbs all observed and unobserved time-invariant characteristics through fitting dummy variables for all α_i (ie, a dummy variable for all $n-1$ individuals) or through individual mean centring of time-varying covariates (therefore, Z_i and α_i drop out of the model).³⁴ In the fixed effects models those with missing parenthood data do not completely drop out of the model; they only provide any information to the estimate of change at the time where they have complete data.

To examine whether there were any significant differences between women and men in the impact of transitioning to parenthood on changes on mental health or psychological distress, interactions between parenthood and sex were included in the final model. All analyses were conducted using SAS V.8.2 on individual unit level data in the Statistics New Zealand data laboratory. All numbers of participants presented in this paper are rounded to the nearest multiple of five, with a minimum value of five, as per Statistics New Zealand confidentiality protocol.

RESULTS

Table 1 shows that of the 6670 respondents, 130 (2.0%) were first time parents at wave 3, 280 (4.0%) were subsequent parents, 5320 (80.0%) were existing parents and 820 (12.0%) were not parents. At wave 5 (not shown), there were a further 150 first time and 125 subsequent parents and at wave 7, there were 125 first time and 225 subsequent parents. Of those 820 respondents who were not a parent at wave 3, all became a parent over the study period, with over half becoming first time (with a <12-month-old) or other parents (with a 12–24-month-old) by wave 5 and the rest by the wave 7 interview. The mean MH and K10 scores across all parental groups at wave 3 are presented at the top of table 1 and were fairly consistent across parental groupings and at subsequent waves

(not shown). The majority of first time and subsequent parents were aged between 26 and 35 years. There were more women who were parents than men. The majority of parents were married whereas the majority of non-parents were not partnered. Not surprisingly, a greater proportion of first time and subsequent parents were inactive from the labour force compared with existing or non-parents. First time parents reported higher incomes (quintiles 3–4) compared with subsequent parents who were more likely to report lower incomes (quintile 1–2) which probably reflects parents moving out of the work force.

Table 2 presents the results from the fixed effects regression of parenthood and SF-36 mental health. Type III p values are presented which show the overall effect of parenthood on the outcome rather than the different groups of parenthood. In the crude model (model 1), there was an impact of becoming a first time parent on mental health scores (model 1; β 1.27, 95% CI 0.02 to 2.53). β represents the change in SF-36 mental health score for those who became a first time parent compared with those who were not a parent. In the fully adjusted model (model 3), there was an overall impact of parenthood on mental health (type III p value=0.0256) with a change in SF-36 score for first time parents compared with those who were not a parent (Model 3; β 1.22, 95% CI –0.06 to 2.50). This central estimate of 1.22 is about 9% of a SD. Although the CI marginally crosses the null the increase in mental health score could be up to 2.5.

Table 3 presents the results from the fixed effects regression of parenthood and K10 psychological distress. In the crude model (model 1), there was an overall impact of parenthood on psychological health (type III p value ≤ 0.001) and this was mainly seen in first time parents (model 1; β –0.67, 95% CI –1.08 to –0.27) and subsequent parents (model 1: β –0.58, 95% CI –0.93 to –0.24). β values represent the change in psychological distress score for those who became a first time parent or subsequent parent compared with those who were not a parent. In the fully adjusted model (model 3), there was an overall impact of parenthood on psychological distress (type III p value ≤ 0.001) with a change in psychological distress score for first time parents (model 3: β –0.70, 95% CI –1.10 to –0.29) and subsequent parents (model 3: β –0.60, 95% CI –0.95 to –0.24) compared with those who were not parents. These effect sizes fall between 10% and 20% of a K10 score SD.

The addition of an interaction term between parenthood and sex to the full main model was not statistically significant for mental health (type III p value=0.775) or psychological distress (type III p value=0.141) suggesting that the effect of transitioning into parenthood on mental health did not significantly differ between men and women in this analysis.

DISCUSSION

We have shown that adults who become first time parents show improvements in both their mental health score and levels of psychological distress using a fixed effect analysis that allows for adjustment of observed confounding and time-invariant characteristics. Subsequent parents (parents with a child under 12 months and other children in the family) also show decrease in their levels of psychological distress. The magnitude of these effects is small with the estimate for mental health representing about 9% of a SD and the effect sizes for psychological distress falling between 10% and 20% of a SD.

Our findings are not consistent with the findings of previous longitudinal studies on the association between parenthood and mental health in which Nomaguchi and Milkie (2003) found no

Table 1 Characteristics of respondents at wave 3 interview by parenthood status (n=6670)

	Total N	Missing parenthood at wave 3	First time parent	Subsequent parent	Existing parent	Not a parent
SF-36 mental health mean (SD)	6670	215	83.8 (14.1)	82.3 (12.7)	83.2 (13.9)	82.5 (14.4)
Kessler 10 mean (SD)	6670	235	13.4 (5.0)	13.2 (3.8)	13.3 (4.5)	13.8 (4.7)
Total n (row %)	6670	120 (2.0)	130 (2.0)	280 (4.0)	5320 (80.0)	820 (12.0)
Age, years						
15–25	430	15	25 (18.5)	20 (7.1)	115 (2.2)	255 (31.1)
26–35	1600	40	80 (59.3)	155 (55.4)	1015 (19.1)	310 (37.8)
36–45	2645	45	20 (14.8)	90 (32.1)	2360 (44.4)	130 (15.9)
46+	2005	25	10 (7.4)	15 (5.4)	1830 (34.4)	125 (15.2)
Sex						
Male	2870	45	60 (46.2)	125 (46.3)	2245 (42.2)	395 (47.9)
Female	3800	75	70 (53.8)	145 (53.7)	3080 (57.8)	430 (52.1)
Ethnicity						
NZ European	4835	70	100 (74.1)	200 (74.1)	3865 (72.6)	600 (72.7)
Māori	910	25	15 (11.1)	30 (11.1)	720 (13.5)	120 (14.5)
Pacific	345	10	5 (3.7)	20 (7.4)	265 (5.0)	45 (5.5)
Asian	415	10	10 (7.4)	10 (3.7)	345 (6.5)	40 (4.8)
Other	170	5	5 (3.7)	10 (3.7)	130 (2.4)	20 (2.4)
Partner status						
Married	4360	0	75 (60.0)	190 (70.4)	3805 (72.2)	290 (35.8)
Partnered	985	0	40 (32.0)	70 (25.9)	665 (12.6)	210 (25.9)
Not partnered	1130	0	10 (8.0)	10 (3.7)	800 (15.2)	310 (38.3)
Education						
Degree or higher	1260	25	25 (21.7)	60 (21.8)	970 (18.2)	165 (20.0)
Postschool qualification	2570	40	45 (39.1)	105 (38.2)	2070 (38.9)	310 (37.6)
School qualification	1720	30	35 (30.4)	75 (27.3)	1360 (25.6)	220 (26.7)
No qualification	1120	25	10 (8.7)	35 (12.7)	920 (17.3)	130 (15.8)
Labour force status						
Employed	5445	85	85 (63.0)	170 (61.8)	4420 (83.0)	685 (83.0)
Unemployed	125	5	5 (3.7)	5 (1.8)	95 (1.8)	15 (1.8)
Inactive	1110	30	45 (33.3)	100 (36.4)	810 (15.2)	125 (15.2)
NZ area deprivation						
NZDep Q1 (least)	1540	0	20 (15.4)	60 (21.8)	1310 (24.6)	150 (18.2)
NZDep Q2	1390	0	35 (26.9)	65 (23.6)	1140 (21.4)	150 (18.2)
NZDep Q3	1230	0	35 (26.9)	55 (20.0)	970 (18.2)	170 (20.6)
NZDep Q4	1235	0	25 (19.2)	50 (18.2)	965 (18.1)	195 (23.6)
NZDep Q5 (most)	1155	0	15 (11.5)	45 (16.4)	935 (17.6)	160 (19.4)
Household income (\$)						
q1: low<24 117	1185	40	15 (11.5)	70 (25.9)	955 (18.0)	105 (12.7)
q2: 24 117<37 763	1505	20	20 (15.4)	90 (33.3)	1250 (23.5)	125 (15.2)
q3: 37 763<53 376	1505	15	35 (26.9)	55 (20.4)	1260 (23.7)	140 (17.0)
q4: 53 376<77 049	1335	20	35 (26.9)	40 (14.8)	1025 (19.3)	215 (26.1)
q5: 77 049<high	1130	20	25 (19.2)	15 (5.6)	830 (15.6)	240 (29.1)

All numbers are rounded to the nearest five as per statistics New Zealand protocol. NZ, New Zealand; NZDep, NZ deprivation index. All dollar values are NZ dollars.

association between becoming a new parent and psychological well-being³² and Keizer *et al* (2010) found no significant effect of transition into parenthood on positive or negative affect after adjusting for partner status and work hours.³¹ There are a number of reasons why our findings may differ. First, our sample was larger and included men and women, married, single and cohabiting parents whereas previous research has focused on certain population groups. Second, our study does not just compare parents with non-parents but actually focuses on within individual changes in parenthood and changes in mental health. It therefore provides a better estimate of the short run causal association. Third, our study separates the impact of first time parents from second time or greater parents

which to our knowledge no previous studies have done. The children of participants who became first time parents between waves in our study were aged under 12 months whereas in earlier work children could be up to 5–7-years-old.³² This difference in time frame used to study the transition to parenthood makes it difficult to compare findings between studies. Finally, in this analysis we are interested in the main effect of becoming a parent on mental health or psychological distress controlling for time variant and time-invariant confounding. We, therefore, have hypothesised and controlled for partnership status and a greater number of socioeconomic measures (labour force status, income and area deprivation) compared with earlier studies.^{31 32} These socioeconomic measures could be

Table 2 SF-36 mental health, parenthood and time-varying confounders using fixed effects linear regression models (n=20 000 observations)

	Model 1			Model 2 (plus partner status)				Model 3 (fully adjusted model)				
	Estimate	SE	95% CI	Type III p value	Estimate	SE	95% CI	Type III p value	Estimate	SE	95% CI	Type III p value
Parenthood				0.0608				0.076				0.0256
First time	1.27	0.64	0.02 to 2.53		0.92	0.65	-0.35 to 2.19		1.22	0.65	-0.06 to 2.50	
Subsequent	0.57	0.55	-0.50 to 1.65		0.26	0.56	-0.84 to 1.35		0.54	0.56	-0.57 to 1.64	
Existing	-0.24	0.31	-0.84 to 0.36		-0.46	0.31	-1.07 to 0.15		-0.41	0.31	-1.03 to 0.20	
Not a parent (ref)	0				0				0			
Partner status								0.0013				0.0027
Married					1.86*	0.52	0.84 to 2.89		1.77*	0.52	0.74 to 2.80	
Partnered					1.29	0.50	0.32 to 2.27		1.19	0.50	0.22 to 2.17	
Not partnered (ref)					0				0			
Area deprivation												0.2454
NZ area deprivation									-0.08	0.07	-0.23 to 0.06	
Labour force status												0.0005
Inactive									-1.38*	0.37	-2.11 to -0.66	
Unemployed									-1.34	0.78	-2.86 to 0.18	
Employed (ref)									0			
Household income												0.3300
Income (log)									0.16	0.16	-0.16 to 0.48	

Model 1—crude model; Model 2—plus partnership status; Model 3—model 2 plus area deprivation, labour force status, household income.

*p<0.005.

NZ, New Zealand; SF-36, Short-Form-36 health survey.

confounders or mediators of the association between parenthood and mental well-being. For example, becoming a parent may lead to increased financial stress which in turn could lead to poor mental health. Combining work with family life and increasing time pressures has been shown to have negative repercussions on well-being.⁴³ Alternatively, those with higher

incomes who have access to additional resources and supports may be more likely to become parents and have the financial resources that buffer them from declines in mental health. Further work needs to be done examining the differential impact of socioeconomic changes on mental health in those transitioning to parenthood. Either way it is important for

Table 3 Psychological distress and parenthood and time-varying confounders using fixed effects linear regression (n=20 000 observations)

	Model 1			Model 2 (plus partner status)				Model 3 (fully adjusted model)				
	Estimate	SE	95% CI	Type III p value	Estimate	SE	95% CI	Type III p value	Estimate	SE	95% CI	Type III p value
Parenthood				<0.0001				0.0002				<0.0001
First time	-0.67**	0.20	-1.08 to -0.27		-0.57*	0.21	-0.98 to -0.17	0.0002	-0.70**	0.21	-1.10 to -0.29	<0.0001
Subsequent	-0.58	0.17	-0.93 to -0.24		-0.49	0.18	-0.84 to -0.14		-0.60*	0.18	-0.95 to -0.24	
Existing	0.06	0.10	-0.19 to -0.20		0.08	0.10	-0.12 to 0.27		0.06	0.10	-0.14 to 0.26	
Not a parent (ref)	0				0				0			
Partner status								0.0016				0.0026
Married					-0.59*	0.17	-0.92 to -0.26		-0.56*	0.17	-0.89 to -0.23	
Partnered					-0.22	0.16	-0.53 to 0.09		-0.19	0.16	-0.50 to 0.13	
Not partnered (ref)					0				0			
Area deprivation												0.5694
NZ area deprivation									0.01	0.02	-0.03 to 0.06	
Labour force status												<0.0001
Inactive									0.62**	0.12	0.39 to 0.86	
Unemployed									0.68	0.25	0.19 to 1.17	
Employed (ref)									0			
Household income												0.6111
Income (log)									0.03	0.05	-0.13 to 0.08	

Model 1—crude model; Model 2—plus partnership status; Model 3—model 2 plus area deprivation, labour force status, household income.

*p<0.005.

**p<0.0001.

NZ, New Zealand.

welfare policies to support the economic positions of new parents and ensure their mental health is supported during this major life course transition.

A limitation of many studies on parenthood is that they do not capture the intentions of those who become parents and whether pregnancies are unplanned or unwanted. The difficulties in measuring these intentions to become pregnant have been previously highlighted.⁴⁴ There is literature that argues that coming to terms with an unplanned or unwanted pregnancy is a risk factor for mental health.⁴⁵ We do not know anything about the pregnancy intentions in our sample of parents, as SoFIE was not designed to answer this question. We therefore do not know whether the transition to parenthood is uniformly beneficial for the mental health of all parents in our sample. Further longitudinal research is needed to explore the relationship of unintended pregnancies and mental health for both men and women.

We did not find a statistically significant difference between men and women in the relationship of transitioning to parenthood on mental health, which is in agreement with earlier work by Keizer *et al* who did not find an effect of becoming a parent on positive or negative affect after adjustment for work hours transitions and partner status in men or women.³¹ Our results do however differ from Nomaguchi and Milkie³² who found little difference between new parents and non-parents in levels of depression, but when they included interaction terms for both gender and marital status found that new mothers were less vulnerable to depression than new fathers. Furthermore, that continuously unmarried (ie, never married) men had higher levels of depression when becoming new parents. Our lack of any gender differences may be due to a lack of statistical power in our interaction models.

This study makes an important contribution to the parenthood literature and the limited research on changes in mental health resulting from becoming a parent. A key strength of this study is the use of a large sample of longitudinal data and fixed effect regression modelling which removes bias from unobserved heterogeneity by only examining changes that occur in the outcome within individuals over time.

However, with the strengths of the model come a number of limitations. First, the fixed effects model, although controlling for confounding by unobserved heterogeneity, does not rule out the reverse pathway. A possible explanation for our results may be reverse causation where those with pre-existing low psychological distress are more likely to become parents. However, the transition to parenthood is measured in the 12 months prior to interview and psychological distress 4 weeks prior, so we argue that there is limited, if any, possibility of reverse causation in the model. Furthermore, this reverse pathway would have to be very strong to bias the estimate of the pathway from parenthood to mental health. In other words, people who have better mental health would have to be more likely to have a baby (with the intention to become pregnant).

Second, there are limitations in our outcomes as they are subjective measures and therefore more susceptible to measurement error. Both the K10 and SF-36 are screening measures as opposed to clinical measures of disease state and although adequate at describing overall levels of psychological functioning they do not provide a comprehensive assessment of mental health problems. This same limitation is also observed in earlier longitudinal studies on parenthood using similar subjective scales. However, measurement error in our parenthood variable is likely to be more important because the fixed effects regression model is driven by changes in the exposure variable.³⁴ Our measure of parenthood was based on the 12 months prior to

the interview date. It could be argued that there is a difference between a parent with a new born versus a parent with an 11-month-old, meaning that our definition of 'first time' parent may be too broad and has washed out any mental health impacts over 1 year. However, this would likely mean that we have in fact underestimated the association between a change in parenthood status and change in mental health or psychological distress in our models.

Third, our analyses may have been affected by selection bias if those who became parents after the first interview and who were more highly distressed by having a child were more likely to drop out of the sample. However, this is unlikely as we have shown that unless attrition from the sample is related to both the exposure and outcome of interest then there is limited bias from drop out over time.³⁶

Fourth, the fixed effects model controls for measured time-varying confounders and for unobserved individual heterogeneity such as biological or genetic differences. However, it is important to recognise that there are some unmeasured time-varying factors that may have impacted the relationship between parenthood and change in mental health that we have not been able to control for such as quality and satisfaction of relationship, division of household work or length/duration of relationships. We may therefore have overestimated the strength of the association between our exposure and outcome due to this unmeasured positive confounding.

Finally, our analysis does not take into account the fact that households were sampled and multiple adults per families within households were included in the analysis. This is however an econometric fixed effects analysis which deals only with within-person variation (over time) and discards all between-person variability. Household level confounding, to the extent that it is time-invariant, has therefore been conditioned out of the model.

In conclusion, this study found that becoming a parent for the first time leads to an increase in mental health and decrease in psychological distress after adjustment for partner status and other socioeconomic factors. Parents who have a subsequent child also experience a beneficial impact of reduced psychological distress. The present findings have a number of implications. As researchers we should be a little more cautious about conclusions suggesting that overall the effect of having children is detrimental to parent's health and well-being and future research should make use of longitudinal data with repeated measures to thoroughly examine the mechanisms through which becoming a parent impacts on mental health, including unintended pregnancies. Furthermore, future studies should explore what the differential impact of socioeconomic changes may be on the mental health of new parents in order to inform policy to support the mental health of parents during this major life course transition.

What is already known on this subject

- ▶ Cross-sectional studies have shown that certain types of parenthood are associated with poorer mental health outcomes.
- ▶ Studies looking at longitudinal associations in the general population are scarce and the findings are inconsistent due to different types of parental groups being sampled and compared.

What this study adds

- ▶ This study focuses on within individual changes in parenthood and changes in mental health and therefore provides a better estimate of the short run causal association.
- ▶ Transition into parenthood for the first time leads to an increase in mental health and a decrease in psychological distress.
- ▶ Transition into parenthood for a second time or greater leads to a decrease in psychological distress only.
- ▶ Researchers should be cautious about conclusions suggesting that overall the effect of having children is detrimental to parent's health and well-being.

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