

Parents' mental health and children's cognitive and social development

Families in England in the Millennium Cohort Study

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Abstract

Background The development of children of parents who are experiencing mental health difficulties is a continuing cause of concern for professionals working in health, social care and education as well as policy makers. In light of this interest our study investigates the interplay between the mental health of mothers and fathers and family socioeconomic resources, and the impact for children's cognitive and social development.

Methods The study uses survey data from the Millennium Cohort Study linked with the Foundation Stage Profile assessment for children in the primary year of school in England between 2005 and 2006. The study includes 4,781 families from England where both parents' mental health had been assessed using the Kessler 6 scale. Associations between parents' mental health and children's cognitive and social development were estimated using regression models. Multivariate models were used to explore the mediating role of the families' socioeconomic resources. Gender interaction models were used to explore whether effects of parents' mental health differ for girls and boys.

Results The study finds lower attainment in communication, language and literacy, mathematical development and personal, social and emotional development among children whose parents were experiencing high levels of psychological distress. Parents' age and qualifications and families' socioeconomic resources strongly mediated the effects of parents' psychological distress on children's attainment, and although independent effects of mother's mental health were maintained, effects of father's mental

health were not. Stronger effects of mothers' mental health were found for boys than for girls.

Conclusions These findings highlight the interplay between the mental health of parents, families' socioeconomic resources and children's development which speaks for the need for close integration of mental health and social interventions to improve the well being of families.

Keywords Children's cognitive development · Children's social development · Mother's mental health · Father's mental health · Family socioeconomic situation

Abbreviations

MCS	Millennium cohort study
FSP	Foundation stage profile
CLL	Communication, language and literacy
MATH	Mathematical development
PSE	Personal, social and emotional development

Introduction

There is a longstanding recognition and concern that parental mental health difficulties can impact on children's development [11, 50]. Associations between mother's mental health and children's adjustment and behaviour have been consistently described, see for example reviews by Cummings and Davies [6] and others [14, 49]. A strong picture of the impact of mother's mental health on children's cognitive development is presented in reviews by Grace et al. [15] and Sohr-Preston and Scaramella [51]. The importance of father's mental health for children's adjustment and behaviour is being increasingly recognised

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[3, 22, 23, 46]. However, to our knowledge, whether fathers' mental health influences children's cognitive development remains unaddressed. In the Millennium cohort study (MCS) of children in the UK assessments of both their fathers' and mothers' mental health were made. We use these data to compare the impacts of mothers' and fathers' mental health for children's cognitive and social development at age 5.

Unemployment [1, 10], socioeconomic deprivation and financial difficulties [20, 21, 41], family instability, early parenthood and low education [29, 52] each frequently co-occur with mental health difficulties. Additionally there is some evidence of increased mental health difficulties among ethnic minority mothers [37] and evidence that the neighbourhood and residential environment may influence mental health [34, 37]. An examination of both the families' socio-demographic situation and parents' mental health provides a broader picture of the family environment and we document associations between these two aspects of the family. Socioeconomic adversity is a strong influence for poorer development through children's early years, see for example reviews by Feinstein et al. [13] and Shonkoff and Phillips [48] and also prior work using the experiences of the Millennium cohort children [30, 31]. Socioeconomic adversity may thus be an important mediator between parents' mental health difficulties and poorer child development and we use multivariate models to explore this mediating effect.

Gender differences have been found in relation to the cognitive and behavioural development of children both at young and older ages. Girls tend to achieve a higher level of cognitive attainment [7, 8, 33] and are also less likely to experience behavioural difficulties than boys [35, 42, 57]. Previous work using the MCS has also shown gender differences in children's early behavioural and cognitive development [31]. Similar effects have been found for girls and boys behaviour in relation to mother's mental health during infancy and early childhood [5, 42], however there is some evidence that behavioural difficulties are heightened for boys in early and later childhood where fathers have poor mental health [22, 46]. Boys' cognitive development compared with girls' has been found to be more sensitive to mother's mental health during infancy and early childhood [18, 32, 38, 41]. As yet the effects of fathers' mental health for children's cognitive development remain unaddressed for both boys and girls. In this study we use models for gender interaction to explore whether effects of parents' mental health differ for the boys and girls.

Our analysis is based on assessments of children's development and parent's mental health made at or near to age 5. We take a broad view of children's cognitive and social development covering three key areas of learning,

communication, language and literacy (CLL), mathematical development (MATH) and personal, social and emotional development (PSE) set out by the Department for Children, Schools and Families [45]. For parents we use the Kessler 6 scale which is a measure of common mental health symptoms which would often be described among people experiencing anxiety and depression [24]. We include families where both the mother and father had reported on their mental health which allows a comparison of parents' mental health and children's development based on the same set of children.

Methods

Sample

The data for this study come from the first three waves of the MCS. The MCS is a large-scale longitudinal survey of children in the United Kingdom [9]. For this analysis we include children from the sample born in England, for whom the educational assessment which we are interested in is routinely made. The first sweep was carried out in England during 2001–2002 and contained information from 11,533 families, including 11,695 children from ages 9 to 11 months. Children born between September 2000 and August 2001 were included, representing those who would begin attending primary school in 2005.

The sample design allowed for over-representation of families living in areas with high rates of child poverty or high proportions of ethnic minorities which increased the power of the study to describe effects for these groups of families. The families were followed up when the child was aged 3 and 5 years with achieved response rates of 78 and 79% of the target sample respectively. The study is weighted to take account of the initial sampling design as well as non-response in the recruitment of the original sample and sample attrition over the follow up period to age 5, thus the study is representative for England [26, 43]. Detailed information on the sampling strategy and response rates for the surveys can be found in [16]. Full details on the survey, its origins, objectives, sampling and content of the surveys are contained in the documentation attached to the data deposited with the UK Data Archive at Essex University.

Measures

Parents' mental health

Parents' mental health was measured using the Kessler 6 scale [24] which was administered to parents who were resident in the household as a computerised self-report at

the age 5 survey. The Kessler 6 scale provides a measure of psychological distress from the respondent's report of how often over the last 30 days they had felt depressed, hopeless, restless or fidgety, that everything you did was an effort, worthless and nervous. For each item the respondent indicates whether they have felt this way none, a little, some, most or all of the time which are scored from 0 to 4, respectively. The questions form a 24-point scale and for this study scores were grouped as 0–3, 4–6, 7–12 and 13–24 indicating a gradient in levels of psychological distress. The Kessler scale has been evaluated as a screen for prevalence of serious mental illness within a community population of US adults. In this evaluation a score of 13 or more was indicated as an appropriate reference level to estimate the prevalence of serious mental illness in the population [25]. Amongst responding mothers within the MCS sample of England 3.2% reported symptoms at this level, as did 2.3% of the fathers. At a less stringent definition, 7–24 points, 14.2% of the mothers and 11.8% of the fathers could be identified as experiencing high symptom levels. We acknowledge we are unable to determine a clinical diagnosis of mental illness from our data and intend our analysis to recognise mental health symptoms commonly experienced in the community rather than specific clinical diagnoses. For illustration in our descriptive analysis we differentiate between the groups with scores from 7 to 12 and 13 to 24. In later analyses where statistical power would be limited for these groups separately we combine the two together in order to obtain reliable estimates.

Parents' qualifications, age and ethnicity

Parents' academic or vocational qualifications were reported at the first survey and updated at the follow up surveys. These were classified into five levels equivalent to the National Vocational Qualification scale (NVQ) ranging from no qualifications to level 4 or 5 representing professional or academic qualifications at degree level, nursing or other medical qualifications.

Parents were asked which ethnic identity category they felt they belonged to corresponding to the categories used in the UK census [40]. For this analysis parents' ethnicity was grouped into the six group categorisation White, Mixed, Indian, Pakistani or Bangladeshi, Black or Black British, and other ethnic groups.

Family socioeconomic resources

Household income, housing tenure and the quality of the local area where the family resided were included as descriptors of the socioeconomic resources available to the families. A history of whether there had been an employed

parent in the home and family structure and history were included to enrich the description of the socioeconomic situation of the family, and to provide an indication of the stability of family resources. A brief description of the derivation of these measures follows:

The annual income of the family was reported at the age 5 survey by 92.5% of families. For the remainder income data were imputed according to a prediction model based on socio-demographic characteristics. All income data were adjusted for the number and ages of the people in the family home using the equivalence scales produced by the Organisation for Economic Co-operation and Development (OECD). These equivalised data were then classified into quintiles for England. A fuller description of how income data are collected and used within the 5 year survey is detailed by Ketende and Joshi [27].

The tenure of the family home at the age 5 survey was classified as owner occupier, privately rented, rented from a local authority or housing association, or other type of tenure which for the majority of families represented living with their parents. The main respondent was asked to rate the area within 1 mile or 20 min walking distance of the family home as excellent, good, average, poor or very poor for bringing up children.

The family employment measure included the employment status of parents who were resident in the family home at each of the 9 month, 3 year and 5 year surveys. The categories derived were: a parent in employment at all surveys; a parent in employment at the 5-year survey but no parent in employment at either of the previous surveys; no parent in employment at the 5-year surveys but employment at a previous survey; and no parent in employment at any of the three surveys.

The family structure and history measure included five groups of families based on their situation at the time of the 5-year survey and also took into account previous family transitions. These were: biological parents who were married to one another; biological parents who were cohabiting; biological parents who were married or cohabiting but had lived separately at some period since the birth of the cohort child; lone mother families and step families.

Children's development

Children's attainment in CLL, MATH and PSE were assessed via the Foundation Stage Profile (FSP). The FSP is an assessment of children's developmental achievement over the first year of primary school, assessing the Early Learning Goals for the children between ages 4 and 5 [45]. The assessment was completed by the child's teacher based on their observation of the child through the year in six areas of learning: PSE; CLL; MATH; knowledge and

understanding of the world; creative development and physical development. These data are collected for children in English state schools by the Department for Children, Schools and Families (formerly known as the Department for Education and Skills). Moderation of the assessments is performed by the Local Education Authorities to maintain a comparable measure of attainment within and across schools [45]. The MCS survey data were linked to FSP assessments made over the academic year from 2005 to 2006, with a success rate of 95% for the cohort children who were in state schools in England [17].

Communication, language and literacy includes assessments of the early learning goals in: language for communicating and thinking; linking sounds and letters; reading; and writing. MATH includes assessments of the early learning goals in: numbers as labels and for counting; calculating; and shape, space and measure. PSE includes assessments of the early learning goals in: dispositions and attitudes, social development and emotional development. Each early learning goal has nine points, the first three points describe a child who is still progressing towards the goal, scores of 4–8 are drawn from the goals and represent an approximate order of difficulty, and the final point in each scale describes a child who has achieved all the points on the scale and is working consistently beyond the level of the goal. The children's total scores of up to 36 for CLL, up to 27 for MATH and up to 27 for PSE were rescaled from 0 to 100. Children working beyond the level of all the assessment goals received a score of 100 and it is likely that these children differed in their attainment beyond this point, thus the scores are in effect right censored. Tobit regression was used to take account of this censoring while allowing us to take into account the full range of observed scores.¹

Study analysis

This study includes 4,781 children whose family had taken part in the both the baseline and the age 5 surveys, for whom an educational assessment was available, and for whom two parents were resident in the home and had completed the mental health assessment. Only one child from twin or triplet births was included. This represents a

selective population due to the requirements of residency and participation of both parents and complete reporting on the Kessler scale. Our discussion includes an assessment of how this selection may have affected the results.

The associations between children's attainment in each of the areas of learning and parents' mental health were estimated using a series of Tobit regression models.² The models sequentially included mother's Kessler score only, father's Kessler score only, and both parents' Kessler scores. Multivariate models including also parents' age, qualifications and ethnicity and measures of family socio-economic resources and stability were used to explore the mediating role of these factors. In order to test the hypothesis that the parents' mental health may have a different impact for boys and girls, gender interaction tests were carried out for parents' Kessler scores;³ and the models were re-estimated including estimates of the effects of parents' mental health specifically for girls and for boys.

Results

Mothers' and fathers' Kessler scores measuring levels of psychological distress are presented in Table 1. In 19.5% of the families either parent was experiencing a high level of psychological distress, at least 7 points. In 8.3% of families this was the mother only, in 8.6% the father only, and in 2.6% both parents. Mothers' and fathers' scores were strongly associated (χ^2 test, $P < 0.001$) where a mother had a high score it was more likely that the father also had a high score.

² The Tobit regression model estimates coefficients which represent the difference in the score attained by children in a particular category compared to children in the reference group, for example the difference between children whose mothers experienced high levels of psychological distress (7–24 points on the Kessler scale) and those experiencing very low levels (0–3 points on the Kessler scale). The model additionally estimates the standard error of the coefficients and the P value indicating the statistical significance of the coefficients. The constant term estimates the score for children in the reference group, and sigma estimates the standard error of the regression. The R^2 statistic is estimated as the square of the correlation between the observed scores and the scores predicted by the model, this may be interpreted as the proportion of the variability in the scores which is predicted by the model [55].

³ A gender interaction test involves including an additional term within the model which estimates the difference between the coefficients estimated for boys and for girls when these are estimated separately. For the measures of parents' mental health, terms were included in the model which reflected the difference in the coefficient for girls and boys for each of the two categories compared to the reference group. The combined statistical significance of these terms was assessed using the Wald test which calculates a P value from which it may be determined whether there is evidence for a gender interaction [54].

¹ Tobit regression is a model devised by Tobin [53] in which it is assumed that the dependent variable has a number of its values clustered at a limiting value, thus the data may be considered to be censored at this limiting value. The estimates obtained from Tobit regression are improved compared to those which would be obtained using an ordinary least squares regression as the censoring in the data is taken into account. In the case of this study the limiting value is 100 representing children who were working beyond the levels of the goals included in the assessment. For CLL 4.1% of children in the sample analysed were scored at 100, for MATH 6.0% of children and for PSE 10.2% of children.

Table 1 Mothers' and fathers' mental health

Mother's Kessler score ^a	Father's Kessler score ^a				
	0–3	4–6	7–12	13–24	Total
0–3	52.0	13.8	5.2	1.3	72.3
4–6	10.8	3.9	1.7	0.4	16.8
7–12	4.7	2.1	1.4	0.4	8.7
13–24	1.1	0.4	0.6	0.2	2.3
Total	68.6	20.2	9.0	2.2	100.0
<i>P</i> (χ^2)	<0.001				

Values are weighted percentages of the survey population; un-weighted sample size 4,781 families

^a Kessler score derived from 6 item scale assessing psychological distress

Mother's Kessler scores and their age, qualifications and ethnic origin are presented in Table 2. Younger mothers were more likely to be experiencing high levels of psychological distress than older mothers (χ^2 test, $P < 0.001$). Mothers who were 24 or under, who were those who had their child before they were 20, were the most likely to be experiencing high levels of psychological distress, 21.7%, and mothers who were 35–39 were the least likely, 8.5%. Mothers who were more highly educated were less likely to

be experiencing high levels of psychological distress than less educated mothers (χ^2 test, $P < 0.001$). There was evidence that the frequency of psychological distress varied by ethnic origin (χ^2 test, $P = 0.016$). South Asian and Black or Black British mothers were more likely to be experiencing high levels of psychological distress than White and Mixed Heritage mothers. We interpret these findings with caution as cultural differences may influence measures of mental health [2, 39] and to our knowledge the Kessler scale has not been specifically validated among minority ethnic populations in Britain.

Father's Kessler scores and their age, qualifications and ethnic origin are presented in Table 3. The patterns for fathers mainly followed those seen for mothers with some differences among some of the smaller subgroups. Among the very young fathers and the Black or Black British fathers lower frequencies of psychological distress were reported than may have been expected given our results for mothers. We note however that these are both groups where non-residency of fathers is common and that this may have affected these findings [28].

Parents' mental health and the families' socioeconomic situation and stability are presented in Table 4. There were clear associations between parents' mental health and each aspect of the family situation examined (χ^2 test, $P < 0.001$

Table 2 Mother's mental health and age, qualifications and ethnicity

	Sample (%)	Mother's Kessler score ^a			
		0–3 (72.3) %	4–6 (16.8) %	7–12 (8.7) %	13–24 (2.3) %
Mother's age					
Under 24	4.2	63.3	15.0	18.2	3.5
25–29	12.3	66.6	17.0	11.7	4.6
30–34	28.4	71.9	17.9	8.2	2.0
35–59	35.3	75.4	16.2	6.5	2.0
40 and above	19.9	72.8	16.6	9.4	1.3
<i>P</i> (χ^2)					<0.001
Mother's qualifications					
NVQ level 4/5	41.2	76.9	15.8	6.1	1.2
NVQ level 3	14.9	70.6	18.0	9.3	2.1
NVQ level 2	29.2	71.6	16.7	9.2	2.5
NVQ level 1	8.6	62.4	18.5	13.1	6.0
No qualifications	6.1	62.3	18.5	15.7	3.5
<i>P</i> (χ^2)					<0.001
Mother's ethnicity					
White	93.3	72.9	16.7	8.3	2.2
Mixed	0.7	71.9	18.4	6.4	3.3
Indian	2.0	62.7	20.9	13.3	3.1
Pakistani or Bangladeshi	1.6	61.3	18.6	17.0	3.2
Black or Black British	1.3	68.1	15.0	15.8	1.1
Other ethnic origin	1.1	62.4	14.4	16.7	6.6
<i>P</i> (χ^2)					0.016

Values are weighted percentages of the survey population; un-weighted sample size 4,781 families

^a Kessler score derived from 6 item scale assessing psychological distress

Table 3 Father's mental health and age, qualifications and ethnicity

	Sample (%)	Father's Kessler score ^a			
		0–3 (68.6) %	4–6 (20.2) %	7–12 (9.0) %	13–24 (2.2) %
Father's age					
Under 24	1.3	60.8	26.5	7.9	4.9
25–29	8.2	63.3	19.8	14.8	2.2
30–34	20.5	69.0	19.8	8.9	2.3
35–59	35.1	69.2	21.0	8.4	1.5
40 and above	34.9	69.3	19.6	8.3	2.8
<i>P</i> (χ^2)					0.039
Father's qualifications					
NVQ level 4/5	40.8	69.2	22.4	7.2	1.3
NVQ level 3	15.9	69.3	20.4	8.6	1.7
NVQ level 2	27.1	70.3	18.4	9.0	2.2
NVQ level 1	9.2	65.5	18.1	12.9	3.4
No qualifications	7.0	60.8	18.5	13.1	7.5
<i>P</i> (χ^2)					<0.001
Father's ethnicity					
White	92.6	69.1	20.2	8.5	2.2
Mixed	0.9	53.7	30.2	16.1	0.0
Indian	2.0	69.1	15.7	12.1	3.2
Pakistani or Bangladeshi	1.5	55.3	24.5	15.9	4.4
Black or Black British	1.9	68.6	23.5	7.5	0.4
Other ethnic origin	1.1	48.8	24.7	19.8	6.8
<i>P</i> (χ^2)					0.002

Values are weighted percentages of the survey population; un-weighted sample size 4,781 families

^a Kessler score derived from 6 item scale assessing psychological distress

for all comparisons). Household income was strongly related to parents' mental health: either or both parents were experiencing high levels of psychological distress in 41.6% of the families with the lowest incomes in marked contrast to 11.9% of the families with the highest incomes. Similar disadvantages in mental health were seen among families who rented their accommodation privately or from a local authority or housing association compared to owner occupiers, and among families living in the more poorly rated residential areas.

Psychological distress was strongly related to a lack of paid employment in the family. Amongst families where there had been no employment at any of the surveys high levels of psychological distress were experienced by either the mother or the father in 40.9%, and by both in a further 12.9% of the cases. Amongst families who were without work at the age 5 survey but had been in work previously the rates of psychological distress were also higher, particularly in fathers.

Family structure and history were significantly associated with parents' mental health even amongst this group of parents who were all living as two parent families. High levels of psychological distress were more common amongst cohabiting parents than parents who were married. Psychological distress was more common again amongst the fathers in families where there had been a history of

separation of the parents at any period since the birth of the child, and amongst mothers who had re-partnered since the birth of the child.

In Tables 1, 2, 3, and 4 we showed the inter-relations between parents' mental health and the associations which hold with socioeconomic adversity, providing insights into the types of family environments in which these young children live. We now go on to investigate how these factors may impact on children's development, examining in turn the effects of parents' mental health and the mediating effects of socioeconomic adversity.

The associations between parents' mental health and their children's development are presented in Table 5 for each of the outcomes, CLL, MATH and PSE. We describe the results for CLL in detail as an illustration. On a scale of 0–100, children whose mothers were experiencing high levels of psychological distress were estimated as scoring 8.1 points less than children whose mothers were experiencing the lowest levels of psychological distress, $P < 0.001$. The model R^2 statistic estimated that mother's mental health explained 1.9% of the variability in children's CLL scores. Father's mental health was estimated to have less impact explaining only 0.6% of the variability in children's CLL scores. Children whose fathers were experiencing high levels of psychological distress were estimated to score 4.8 points less than children whose

Table 4 Parents' mental health and family resources and stability

	Sample (%)	Parents experiencing psychological distress ^b			
		Neither parent (80.5%)	Mother only (8.3%)	Father only (8.6%)	Both parents (2.6%)
Equivalised household income					
Highest quintile	25.9	88.0	4.9	6.2	0.8
Quintile 2	26.5	85.3	6.1	7.2	1.5
Quintile 3	23.4	80.2	9.2	8.3	2.3
Quintile 4	16.4	71.8	12.3	10.9	4.9
Lowest quintile	7.8	58.4	16.1	17.2	8.3
$P(\chi^2)$					<0.001
Housing tenure					
Owner occupier	79.5	84.0	6.8	7.4	1.8
Rent privately	5.6	67.8	10.8	15.1	6.3
Rent from LA/HA ^a	13.2	65.0	16.3	13.2	5.6
Other	1.8	77.0	10.0	9.1	3.9
$P(\chi^2)$					<0.001
Good area to bring up children					
Excellent	34.3	84.3	6.1	7.5	2.1
Good	43.9	81.1	7.9	9.0	1.9
Average	18.1	75.3	12.0	9.0	3.6
Poor or very poor	3.7	61.8	15.4	12.1	10.7
$P(\chi^2)$					<0.001
Parental employment history					
Employment at all surveys	89.4	83.0	7.5	7.5	2.1
Employment at 5 years	5.7	70.8	13.6	12.4	3.2
Employment earlier survey	2.8	51.9	10.1	26.9	11.0
No employment any survey	2.1	46.2	21.0	19.9	12.9
$P(\chi^2)$					<0.001
Family structure and history					
Married	74.0	82.6	7.3	7.9	2.3
Cohabiting	14.6	76.4	11.0	10.0	2.6
Previously separated	6.6	73.4	8.8	12.3	5.5
Step family	4.9	70.9	14.7	10.7	3.7
$P(\chi^2)$					<0.001

Values are weighted percentages of the survey population, un-weighted sample size 4,781 families

^a LA/HA local authority or housing association

^b Kessler score derived from 6 item scale assessing psychological distress, 7+ points used to indicate distress

fathers were experiencing the lowest levels of psychological distress, $P < 0.001$.

The individual effects of mothers and fathers mental health were only slightly attenuated when both were considered, and taken together both parents mental health explained 2.3% of the variability in children's CLL scores. The model is additive thus children whose mother and father were both experiencing high levels of distress were estimated as scoring 11.1 points less than children whose parents were both experiencing the lowest levels of psychological distress, the sum of the 7.5 and the 3.6 point effects for mothers and fathers mental health.

Including controls for parents' characteristics, and family socioeconomic resources and stability strongly attenuated the effects of parents' mental health on

children's CLL scores. A significant but much reduced effect of the mother's mental health was maintained: children whose mothers were experiencing high levels of psychological distress were estimated as scoring 3.5 points less than children whose mothers were experiencing the lowest levels of psychological distress, $P < 0.001$. In contrast no statistically significant effects of father's mental health were maintained.

Similar patterns to those described for CLL were also seen for the other developmental outcomes MATH and PSE. For each of the three outcomes mother's mental health was clearly associated in both the unadjusted models and the models which controlled for parents' characteristics, and family socioeconomic resources and stability. Father's mental health was clearly associated in the

Table 5 Parents' mental health and children's attainment in the Foundation Stage Profile assessment

	Mother's Kessler score		Father's Kessler score		Both parents' Kessler scores		Both parents' Kessler scores—adjusted model ^a	
	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.
Communication, language and literacy								
Mother's Kessler score								
0–3	0 (ref)				0 (ref)		0 (ref)	
4–6	–3.15	0.74***			–2.99	0.74***	–1.63	0.68*
7–24	–8.06	1.02***			–7.50	1.01***	–3.52	0.98***
Father's Kessler score								
0–3			0 (ref)		0 (ref)		0 (ref)	
4–6			–1.20	0.66	–0.78	0.65	–0.76	0.64
7–24			–4.77	0.87***	–3.55	0.85***	–0.56	0.84
Model R^2	0.019		0.006		0.023		0.152	
Mathematical development								
Mother's Kessler score								
0–3	0 (ref)				0 (ref)		0 (ref)	
4–6	–2.58	0.61***			–2.46	0.61***	–1.35	0.61*
7–24	–6.72	0.98***			–6.29	0.99***	–3.07	0.93**
Father's Kessler score								
0–3			0 (ref)		0 (ref)		0 (ref)	
4–6			–0.99	0.54	–0.64	0.54	–0.65	0.55
7–24			–3.68	0.81***	–2.66	0.79**	–0.17	0.76
Model R^2	0.016		0.005		0.019		0.127	
Personal, social and emotional development								
Mother's Kessler score								
0–3	0 (ref)				0 (ref)		0 (ref)	
4–6	–2.54	0.66***			–2.40	0.67***	–1.33	0.63*
7–24	–5.08	0.92***			–4.62	0.92***	–1.78	0.89*
Father's Kessler score								
0–3			0 (ref)		0 (ref)		0 (ref)	
4–6			–1.14	0.55*	–0.87	0.54	–0.73	0.54
7–24			–3.56	0.73***	–2.79	0.71***	–0.84	0.73
Model R^2	0.011		0.005		0.014		0.103	

Values are regression coefficients representing differences between parental Kessler score category and the reference category for each of the area of learning scores scaled from 0 to 100; un-weighted sample size 4,781 families for all models; Kessler score derived from 6 item scale assessing psychological distress

Significant difference from the reference category, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

^a Model adjusted for mothers' and fathers' age, qualifications and ethnicity, equivalised household income, housing tenure, good area to bring up children, parental employment history and family structure and history

unadjusted models for all outcomes but did not maintain significance in any of the adjusted models.

The results from the analyses exploring the importance of the child's gender are presented in Table 6 for each of the outcomes, CLL, MATH and PSE. For each outcome we show estimates of the difference in outcome according to gender, estimates of the impact of parental mental health for girls and boys, and a formal comparison of the impact of parents' mental health for boys and girls by a gender interaction test. Again we describe the results for CLL in

some detail. In the first model, where no adjustment is made for family socio-demographic characteristics, the coefficient for gender estimated boys score 5.7 points less than girls where neither parent was experiencing psychological distress. A gender interaction test did not provide statistically significant evidence for a difference in impact of mother's mental health for boys and for girls ($P = 0.165$), however the estimated impacts for boys appeared somewhat stronger than for girls. No evidence for gender interaction was provided for the impact of father's

Table 6 Gender, parents' mental health and children's attainment, in the Foundation Stage Profile assessment

	Communication, language and literacy			Mathematical development			Personal, social and emotional development		
	Unadjusted model		Adjusted model ^a	Unadjusted model		Adjusted model ^a	Unadjusted model		Adjusted model ^a
	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients
Gender coefficient									
Girls	0 (ref)		0 (ref)		0 (ref)		0 (ref)		0 (ref)
Boys	-5.73	0.73***	-5.63	0.67***	-1.08	0.66	-4.97	0.61***	-4.96
Mother's Kessler score									
Effect for girls									
0-3	0 (ref)		0 (ref)		0 (ref)		0 (ref)		0 (ref)
4-6	-2.53	1.06*	-0.74	1.03	-1.82	0.91*	-2.86	0.89**	-1.58
7-24	-5.89	1.34***	-2.15	1.21	-4.14	1.20**	-2.83	1.12*	-0.22
Effect for boys									
0-3	0 (ref)		0 (ref)		0 (ref)		0 (ref)		0 (ref)
4-6	-3.09	1.02**	-2.18	0.96*	-2.94	0.84**	-1.73	0.88*	-0.90
7-24	-9.63	1.40***	-5.42	1.30***	-8.75	1.42***	-6.90	1.30***	-3.83
Test for gender interaction (<i>P</i> value)	0.165		0.074		0.034		0.021		0.012
Father's Kessler score									
Effect for girls									
0-3	0 (ref)		0 (ref)		0 (ref)		0 (ref)		0 (ref)
4-6	-0.70	0.76	-1.05	0.71	-0.35	0.74	-0.61	0.75	-0.76
7-24	-2.98	1.21*	0.50	1.17	-1.75	1.04	-2.41	1.05*	-0.27
Effect for boys									
0-3	0 (ref)		0 (ref)		0 (ref)		0 (ref)		0 (ref)
4-6	-0.79	1.04	-0.42	0.98	-0.93	0.91	-1.07	0.86	-0.68
7-24	-4.01	1.28**	-1.40	1.16	-3.54	1.26**	-3.05	1.20*	-1.23
Test for gender interaction (<i>P</i> value)	0.856		0.565		0.572		0.898		0.891
Model <i>R</i> ²	0.051		0.180		0.026		0.044		0.132

Values are regression coefficients representing differences for each of the area of learning scores scaled from 0 to 100; the gender coefficient represents differences in boys scores compared to girls; the coefficients for parental Kessler scores represent differences compared to the reference category estimated for girls and for boys; un-weighted sample size 4,781 families for all models; Kessler score derived from 6 item scale assessing psychological distress

Significant difference from the reference category, * *P*-value < 0.05, ** *P* value < 0.01, *** *P*-value < 0.001

^a Model adjusted for mothers' and fathers' age, qualifications and ethnicity, equalised household income, housing tenure, good area to bring up children, parental employment history and family structure and history

mental health ($P = 0.856$). In the second model where adjustment is made for family socio-demographic characteristics, the gender interaction test provided slightly stronger evidence for a difference in impact of mother's mental health for boys and for girls ($P = 0.074$). Boys whose mothers were experiencing high levels of psychological distress were estimated as scoring 5.4 points less than boys whose mothers were experiencing the lowest levels of psychological distress, $P < 0.001$, for girls the corresponding estimate was 2.2 points, $P = 0.076$. The gender interaction test was not statistically significant for father's mental health ($P = 0.565$).

Similar patterns to those described for CLL were seen for the impact of parents' mental health for the other outcomes among boys and girls. The models consistently showed that the impact of mother's mental health was stronger for boys than for girls, and the evidence for gender interaction was stronger in the models for MATH and PSE than for CLL. These patterns were consistently seen in models which were not adjusted for the families' socio-demographic characteristics and in the adjusted models. Gender interaction tests for father's mental health were not significant for any of the three outcomes in either the unadjusted or adjusted models.

Discussion

This study is amongst the few to have examined the mental health of both the mother and the father and has shown how these are both related to children's cognitive and social development. While reinforcing important associations between parents' mental health and children's early development, our study showed the important mediating effects of families' socioeconomic resources. The attainment scores among children's whose mother or father were experiencing high levels of psychological distress were clearly lower than among children whose parents had lower psychological distress. Parents' age and qualifications and families' socioeconomic resources strongly mediated the effects of parents' mental health on children's attainment, and although independent effects of mother's mental health were maintained effects of father's mental health were not. Our exploration of gender differences showed that the effects of mother's mental health were stronger for boys than for girls. These findings held true for children's development across each the three areas of development we examined: CLL; MATH; and PSE.

This study finds a deleterious association between poor mental health in fathers and children's development for each of the three outcomes; however the observed effects were almost entirely mediated by associated socioeconomic adversity. The importance of father's mental health

for children's behaviour has been established in findings by Connell and Goodman [3] and other studies [22, 23, 46], but our findings are more novel in relation to children's cognitive development and their broader social development which is considered in the FSP. The finding that the socioeconomic adversity associated with poor mental health amongst fathers may be more salient for their children's development than their symptoms of psychological distress per se contrasts with the findings for mothers for whom measures of mental health symptoms maintained an independent contribution for children's development. This suggests that there may be different routes through which parents' mental health impact on children's development which may need to be considered in integrating mental health and social interventions for improving family well being.

The increased sensitivity of boys to poor maternal mental health is in line with findings by Hay [18] and others [32, 38, 41]. That boy's development may suffer more if their mother is experiencing poor mental health supports the premise that boys may have a greater need for a sensitive and emotionally-healthy caregiver to facilitate regulation of their attention and emotion than girls [15, 18]. Our study benefitted from having a large sample of children which provided the capacity to formally evaluate gender interaction. Moreover, the consistency of gender differences for the three outcomes suggests that there is some robustness to our findings.

Our findings are derived from cross-sectional observational data and thus we cannot infer the direction of the relationship between parents' mental health and children's outcomes. Parent and child interactions are dynamic in nature in that parents' mental health can influence children's development and children's difficulties and conduct can be a source of distress to parents and these processes may become cyclical [12].

Similarly the nature of the associations between parents' mental health and socioeconomic circumstances are often described as bidirectional in nature [1, 20]. For this reason we flag both parent's mental health and socioeconomic adversity as two often co-occurring difficulties amongst families and suggest both need to be targeted with the intention of improving well being in families and children's development.

Strengths and limitations

This study benefits from being able to use outcomes from the FSP assessment which through observation of the child over a school year provide a picture of their progress and development. Using an assessment which is made by the child's teacher rather than either of the parents allays concerns that parent's mental health may influence the

assessments they would make of their child's development particularly their behaviour [47].

However, despite moderation of the assessment [45] there is of course the potential for subjectivity in the teachers' assessments. Our results may not be directly comparable to studies which have used more traditional outcome measures of performance or behaviour scales and we bear this in mind in relating our study to current literature.

The study uses the data from the recent MCS cohort of children representing those born in England between 2000 and 2001. Although care was taken to ensure this cohort was representative [26, 43] our study includes only a subset of the cohort which is the families where both parents were resident and both had completed the mental health assessment. This decision was taken so that the study could specifically contrast the effects of mothers and fathers mental health for the same group of children. Although beyond the bounds of this particular study we briefly consider the families who were not included in the study. The largest group of families who were missing from our analysis were the lone parent families. These were typically lone mother families and represented 19% of the cohort. As has been found in other UK studies, for example [4], lone mothers were more likely to be experiencing high levels of psychological distress than the partnered mothers included in the study analysis; 25% compared with 11%. We have no information regarding the mental health of the non-resident parents. Studies using data from the US Fragile Families Study have described more frequent mental health difficulties among non-resident fathers [19, 36] and we might expect a similar story for the non-resident fathers in our cohort of families. Other families who were missing from our analysis included 11% where a resident parent had not been interviewed and 7% where either parent had not completed the mental health assessment. As might be expected these missing families tended to be more disadvantaged and their children's developmental outcomes also tended to be poorer than those included in our analysis. Thus although our findings may be robust for the families we included they may not generalise to the full population. Indeed we might expect an even stronger picture of psychological distress, socioeconomic disadvantage and poor developmental outcomes among families who were not included in the analysis.

Implications for policy and practice

Parents' mental health and associated socioeconomic adversity represent identifiable markers for developmental difficulties in children and are strong candidate areas for targeting interventions. Positive effects for children's development have begun to be seen through interventions

for maternal mental health difficulties. Reductions in maternal depression following treatment have been shown to have a positive effect for children's behaviour [56]; mother–infant relationships and cognitive development in children can be improved through effective and sustained interventions for postnatal depression [44], and interventions targeting parenting practices of depressed mothers have been found to increase children's competence during early childhood [51]. The effectiveness of interventions that take into account the mental health of mothers and fathers together with the families' socioeconomic well being is an important area for further evaluation.

Conclusion

This study examined the interplay between the mental health of parents, families' socioeconomic resources and children's development. Psychological distress among parents is often also a signal of socioeconomic adversity in the family and both are influential for children's cognitive and social development. Whereas mothers' mental health appears to be influential for children's development over and above associated socioeconomic adversity, the relationship between fathers' mental health and children's development appears to be largely mediated by socioeconomic adversity. From a policy perspective, this speaks to the need for a closer integration of mental health and social interventions to improve the well being of families and children's development.

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References

1. Bartley M (1994) Unemployment and ill health: understanding the relationship. *J Epidemiol Community Health* 48:333–337
2. Bhugra D, Ayonrinde O (2004) Depression in migrants and ethnic minorities. *Adv Psychiatr Treat* 10:13–17
3. Connell AM, Goodman SH (2002) The association between psychopathology in fathers versus mothers and children's internalizing and externalizing behavior problems: a meta-analysis. *Psychol Bull* 128:746–773
4. Cooper C, Bebbington PE, Meltzer H, Bhugra D, Brugha T, Jenkins R, Farrell M, King M (2008) Depression and common mental disorders in lone parents: results of the 2000 National Psychiatric Morbidity Survey. *Psychol Med* 38:335–342
5. Cornish AM, McMahon CA, Ungerer JA, Barnett B, Kowalenko N, Tennant C (2005) Postnatal depression and infant cognitive and motor development in the second postnatal year: the impact of depression chronicity and infant gender. *Infant Behav Dev* 28:407–417
6. Cummings EM, Davies PT (1994) Maternal depression and child development. *J Child Psychol Psychiatry* 35:73–112

7. Department for Children Schools and Families (2008) Foundation stage profile results in England 2007/08. National Statistics, London
8. Department for Education and Skills (2008) Gender and education: the evidence on pupils in England. DfES Publications, Nottingham
9. Dex S, Joshi H (2005) Children of the 21st century: from birth to 9 months. Policy Press, Bristol
10. Dooley D, Fielding J, Levi L (1996) Health and unemployment. *Annu Rev Public Health* 17:449–465
11. Downey G, Coyne JC (1990) Children of depressed parents: an integrative review. *Psychol Bull* 108:50–76
12. Elgar FJ, McGrath PJ, Waschbusch DA, Stewart SH, Curtis LJ (2004) Mutual influences on maternal depression and child adjustment problems. *Clin Psychol Rev* 24:441–459
13. Feinstein L, Duckworth K, Sabates R (2008) Education and the family: passing success across the generations. Routledge, London
14. Goodman SH, Gotlib IH (1999) Risk for psychopathology in the children of depressed mothers: a developmental model for understanding mechanisms of transmission. *Psychol Rev* 106:458–490
15. Grace SL, Evindar A, Stewart DE (2003) The effect of postpartum depression on child cognitive development and behavior: a review and critical analysis of the literature. *Arch Womens Ment Health* 6:263–274
16. Hansen K (2008) Millennium Cohort Study first, second and third surveys: a guide to the datasets 3rd edn. Centre for Longitudinal Studies. Institute of Education, London
17. Hansen K, Jones EM, Joshi H (2008) Foundation stage profile and devolved administration teacher survey. In: Hansen K, Joshi H (eds) Millennium Cohort Study, third survey: a user's guide to initial findings. Centre for Longitudinal Studies, Institute of Education, London
18. Hay DF (1997) Postpartum depression and cognitive development. In: Murray L, Cooper PJ (eds) Postpartum depression and child development. Guilford Press, New York
19. Huang CC, Warner LA (2005) Relationship characteristics and depression among fathers with newborns. *Soc Serv Rev* 79:95–118
20. Hudson CG (2005) Socioeconomic status and mental illness: tests of the social causation and selection hypotheses. *Am J Orthopsychiatry* 75:3–18
21. Jenkins R, Bhugra D, Bebbington P, Brugha T, Farrell M, Coid J, Fryers T, Weich S, Singleton N, Meltzer H (2008) Debt, income and mental disorder in the general population. *Psychol Med* 38:1485–1493
22. Kahn RS, Brandt D, Whitaker RC (2004) Combined effect of mothers' and fathers' mental health symptoms on children's behavioral and emotional well-being. *Arch Pediatr Adolesc Med* 158:721–729
23. Kane P, Garber J (2004) The relations among depression in fathers, children's psychopathology, and father-child conflict: a meta-analysis. *Clin Psychol Rev* 24:339–360
24. Kessler RC, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand SL, Walters EE, Zaslavsky AM (2002) Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychol Med* 32:959–976
25. Kessler RC, Barker PR, Colpe LJ, Epstein JF, Gfroerer JC, Hiripi E, Howes MJ, Normand SL, Manderscheid RW, Walters EE, Zaslavsky AM (2003) Screening for serious mental illness in the general population. *Arch Gen Psychiatry* 60:184–189
26. Ketende S (2008) Millennium Cohort Study: technical report on response (2nd edn). Centre for Longitudinal Studies, Institute of Education, London
27. Ketende S, Joshi H (2008) Income and poverty. In: Hansen K, Joshi H (eds) Millennium Cohort Study, third survey: a user's guide to initial findings. Centre for Longitudinal Studies, Institute of Education, London
28. Kiernan K (2006) Non-residential fatherhood and child involvement: evidence from the Millennium Cohort Study. *J Soc Policy* 35:651–669
29. Kiernan K, Pickett KE (2006) Marital status disparities in maternal smoking during pregnancy, breastfeeding and maternal depression. *Soc Sci Med* 63:335–346
30. Kiernan KE, Huerta MC (2008) Economic deprivation, maternal depression, parenting and children's cognitive and emotional development in early childhood. *Br J Sociol* 59:783–806
31. Kiernan KE, Mensah FK (2009) Poverty, maternal depression, family status and children's cognitive and behavioural development in early childhood: a longitudinal study. *J Soc Policy* 38(4):569–588
32. Kurstjens S, Wolke D (2001) Effects of maternal depression on cognitive development of children over the first 7 years of life. *J Child Psychol Psychiatry* 42:623–636
33. Machin S, McNally S (2005) Gender and student achievement in English schools. *Oxf Rev Econ Policy* 21:357–372
34. Mair C, Roux AV, Galea S (2008) Are neighbourhood characteristics associated with depressive symptoms? A review of evidence. *J Epidemiol Community Health* 62:940–946
35. Maughan B, Collishaw S, Meltzer H, Goodman R (2008) Recent trends in UK child and adolescent mental health. *Soc Psychiatry Psychiatr Epidemiol* 43:305–310
36. Meadows SO, McLanahan SS, Brooks-Gunn J (2007) Parental depression and anxiety and early childhood behavior problems across family types. *J Marriage Fam* 69:1162–1177
37. Mulvaney C, Kendrick D (2005) Depressive symptoms in mothers of pre-school children—effects of deprivation, social support, stress and neighbourhood social capital. *Soc Psychiatry Psychiatr Epidemiol* 40:202–208
38. Murray L (1992) The impact of postnatal depression on infant development. *J Child Psychol Psychiatry* 33:543–561
39. Nazroo JY (1997) Ethnicity and mental health: findings from a national community survey. Policy Studies Institute, London
40. Office for National Statistics (2003) Ethnic group statistics: a guide for the collection and classification of ethnicity data. HMSO, London
41. Petterson SM, Albers AB (2001) Effects of poverty and maternal depression on early child development. *Child Dev* 72:1794–1813
42. Pike A, Iervolino AC, Eley TC, Price TS, Plomin R (2006) Environmental risk and young children's cognitive and behavioral development. *Int J Behav Dev* 30:55–66
43. Plewis I (2007) Non-response in a Birth Cohort Study: the case of the Millennium Cohort Study. *Int J Soc Res Methodol* 10:325–334
44. Poobalan AS, Aucott LS, Ross L, Smith WC, Helms PJ, Williams JH (2007) Effects of treating postnatal depression on mother-infant interaction and child development: systematic review. *Br J Psychiatry* 191:378–386
45. Qualifications and Curriculum Authority (2003) Foundation stage profile handbook. Department for Education and Skills, London
46. Ramchandani P, Stein A, Evans J, O'Connor TG (2005) Paternal depression in the postnatal period and child development: a prospective population study. *Lancet* 365:2201–2205
47. Richters JE (1992) Depressed mothers as informants about their children—a critical-review of the evidence for distortion. *Psychol Bull* 112:485–499
48. Shonkoff J, Phillips DA (2000) Family resources. In: From neurons to neighborhoods. National Academy Press, Washington D.C

49. Shonkoff J, Phillips DA (2000) Nurturing relationships. In: From neurons to neighborhoods. National Academy Press, Washington D.C
50. Smith M (2004) Parental mental health: disruptions to parenting and outcomes for children. *Child Fam Soc Work* 9:3–11
51. Sohr-Preston SL, Scaramella LV (2006) Implications of timing of maternal depressive symptoms for early cognitive and language development. *Clin Child Fam Psychol Rev* 9:65–83
52. Talala K, Huurre T, Aro H, Martelin T, Prättälä R (forthcoming) Trends in socio-economic differences in self-reported depression during the years 1979–2002 in Finland. *Soc Psychiatry Psychiatr Epidemiol*
53. Tobin J (1958) Estimation of relationships for limited dependent-variables. *Econometrica* 26:24–36
54. UCLA Academic Technology Services (2008) Regression with Stata: chapter 3—regression with categorical predictors. Available online at: <http://www.ats.ucla.edu/stat/stata/webbooks/reg/chapter3/statareg3.htm>. Accessed 2 December 2008
55. UCLA Academic Technology Services (2008) Stata data analysis examples Tobit analysis. Available online at: <http://www.ats.ucla.edu/stat/stata/dae/tobit.htm>. Accessed 2 December 2008
56. Weissman MM, Pilowsky DJ, Wickramaratne PJ, Talati A, Wisniewski SR, Fava M, Hughes CW, Garber J, Malloy E, King CA, Cerda G, Sood AB, Alpert JE, Trivedi MH, Rush AJ (2006) Remissions in maternal depression and child psychopathology—a STAR* D-child report. *JAMA* 295:1389–1398
57. Zahn-Waxler C (1993) Warriors and worriers—gender and psychopathology. *Dev Psychopathol* 5:79–89