The effects of early paternal depression on children's development

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MJA 2011; 195: 685–689
doi: 10.5694/mja11.10192

Abstract

Objective: To examine the effects of paternal depression during children's first year on their wellbeing at 4–5 years of age using a large, representative sample of Australian families.

Design, setting and participants: Prospective study of Australian families from 2004 to 2008. Two-biological-parent families ($n = 2620$) from the Longitudinal Study of Australian Children were included if depression measures were available for both parents in 2004, behavioural and developmental measures were available for children in 2008, and the families had not separated by 2008.

Main outcome measure: Child scores on the Strengths and Difficulties Questionnaire and on a set of Derived Outcome Indices, measured when the child was 4–5 years old. Logistic regression modelling was used to investigate how early paternal depression in 2004 influenced child outcomes 4 years later.

Results: Early paternal depression was a significant predictor of a range of poorer child outcomes (odds ratio [OR] for behavioural difficulties, 3.34 [95% CI, 3.06–3.65]; OR for a low development and wellbeing score, 2.70 [95% CI, 2.44–2.98]). These effects remained significant after controlling for both early maternal depression and later paternal depression (adjusted OR for behavioural difficulties, 1.93 [95% CI, 1.75–2.14]; OR for a low development and wellbeing score, 1.65 [95% CI, 1.48–1.85]).

Conclusions: Depression in fathers during the first year of a child's life can have a detrimental impact on their child's behaviour, and social and emotional development at the point of school entry, in addition to and uniquely compared with depression in mothers. Early intervention to identify and address the mental health needs of fathers is required for the benefit of fathers, children and families.

Infants depend on parents to develop their cognitive and emotional capacities. Internationally, maternal postnatal depression has been shown to adversely affect child wellbeing and development, so much so that maternal screening is standard in many countries. In Australia, the National Perinatal Depression Initiative (NPDI) is underway to provide universal screening and follow-up support for women assessed as being at risk of or experiencing perinatal depression.[1] Assessments of the impact of fathers' depression on early child development have relied on cross-sectional studies[2] and fathers are not currently targeted for screening or treatment in the NPDI.

However, more recently, evidence suggesting a causal relationship between fathers' postnatal depression and children's disrupted development has emerged. A United Kingdom study of 13 351 families assessed fathers' depression using the Edinburgh Postnatal Depression Scale (the Edinburgh Scale) at 8 weeks after birth, and children's behaviour using maternal reports on the Rutter revised preschool scales at 3.5 years.[3] Fathers' scores above 12 on the Edinburgh Scale were strongly associated with an increased risk of high total problems scores on the Rutter scales (odds ratio [OR], 2.19; 95% CI, 1.55–3.08) and with high scores on the three subscales indicating problems with emotional regulation (eg, often unhappy), conduct (eg, often lies or cheats) and hyperactivity (eg, constantly fidgeting). After controlling for social class, degree of education and maternal depression, only the association between fathers' postnatal depression and children's later conduct problems (OR, 1.73; 95% CI, 1.06–2.85) and hyperactivity (OR, 1.96; 95% CI, 1.12–3.43) remained. However, when the scores for boys and girls were considered separately, fathers' depression was associated with raised levels of problems for boys but not for girls (mothers' depression affected both boys and girls). Thus, in the UK context, children, especially boys, of postnatally depressed fathers are at increased risk of behavioural problems.

The aim of the present study was to examine the effects of early paternal depression during children's first year on their wellbeing at 4–5 years of age, using a large, representative sample of Australian families. We hypothesised that, after controlling for early maternal depression, children whose fathers had signs of early paternal depression would show poorer emotional and behavioural outcomes compared with children whose fathers had not shown early depressive symptoms. Our work extends that of previous studies by using multiple child outcome measures, thus allowing for a more complete understanding of the long-term effects of early paternal depression on child outcomes.

Method

Sample

Our study sample was drawn from the Longitudinal Study of Australian Children (LSAC). The LSAC was initiated by and is funded by the Australian Government Department of Families, Community Services and Indigenous Affairs, and includes two representative samples of Australian children (see Soloff[4] for methodological details). The LSAC collects data on children's early development, health, education and living circumstances.[4] In this study, we used a confidentialised dataset made available to Australian academic researchers. We focused on the cohort of children aged 3–19 months ($n = 5104$; family-level response rate, 64%) at the first wave of data collection (2004), 2–3 years old at the second wave (2006), and 4–5 years old in the third wave (2008). In order to ensure a similar level of exposure to paternal presence, we limited our sample to two-biological-parent families that were still intact 4 years after the initial wave of data collection ($n = 2620$).

Measures

The LSAC contains the shortened version of the Kessler Psychological Distress Scale (K6).[5] All parents were assessed on the six items of the K6

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1 Early parental depressive symptoms and Strengths and Difficulties Questionnaire (SDQ) scores for children aged 4–5 years

	Proportion with high SDQ scores		Odds ratio (95% CI)		
	Depressed	Not depressed	Crude	Adjusted*	Adjusted†
Maternal depression					
Prosocial‡	10.2%	12.4%	0.76 (0.68–0.86)	0.69 (0.61–0.78)	0.75 (0.66–0.84)
Hyperactivity	15.3%	11.4%	1.66 (1.51–1.82)	1.44 (1.30–1.58)	1.48 (1.35–1.63)
Emotional	20.3%	17.2%	1.25 (1.14–1.37)	1.14 (1.04–1.25)	1.18 (1.08–1.29)
Peer problems	32.2%	17.5%	2.96 (2.75–3.19)	2.73 (2.53–2.94)	2.81 (2.60–3.03)
Conduct	35.6%	18.6%	2.38 (2.20–2.57)	2.16 (2.00–2.34)	2.18 (2.02–2.36)
Total difficulties	23.7%	10.7%	2.48 (2.28–2.70)	2.06 (1.88–2.25)	2.14 (1.96–2.33)
Paternal depression					
Prosocial‡	21.4%	12.2%	2.10 (1.90–2.31)	2.16 (1.96–2.39)	2.65 (2.39–2.94)
Hyperactivity	26.2%	11.3%	2.47 (2.25–2.71)	1.95 (1.77–2.14)	1.41 (1.26–1.58)
Emotional	26.2%	17.1%	1.62 (1.48–1.78)	1.39 (1.27–1.53)	1.10 (0.98–1.22)
Peer problems	26.2%	17.7%	1.64 (1.50–1.80)	1.16 (1.06–1.27)	0.74 (0.66–0.83)
Conduct	26.2%	18.9%	1.69 (1.55–1.85)	1.22 (1.11–1.34)	0.92 (0.83–1.02)
Total difficulties	28.6%	10.7%	3.34 (3.06–3.65)	2.30 (2.10–2.52)	1.93 (1.75–2.14)

*Adjusted for socioeconomic position, maternal education, and depression in the other parent. †Adjusted for socioeconomic position, maternal education, depression in the other parent, and later paternal depression. ‡For prosocial behaviour, bottom 10% of scores were used to indicate a poor outcome. ◆

(rated 0–4, maximum score of 24), which asks respondents how they have been feeling over the past 30 days. Scores of 8–12 have been shown to predict moderate psychiatric symptoms, while scores >12 have been shown to indicate clinically significant depressive symptoms.[6] The K6 has been shown to have good internal consistency and concordance with other, longer measures of depression (eg, the *Diagnostic and statistical manual of mental disorders*, 4th edition)[6] and has been used effectively in Australian populations to measure mood and anxiety disorders.[7] The K6 has also been used as an indicator of depression in a wide range of studies[8-10] and is recommended as a screening measure for depression in population mental health surveys.[11] We created a dichotomous variable identifying parents who had symptoms consistent with depression during the perinatal period (ie, K6 scores >12; Wave 1 data collection in 2004).

Child outcome measures

The Strengths and Difficulties Questionnaire (SDQ) is a widely used and validated measure of a child's emotional and behavioural functioning, with reasonable internal consistency (Cronbach's α, 0.73), and retest stability.[12] In LSAC, it was completed by the primary parent (98% mothers). The SDQ was developed from the Rutter scales and consists of five subscales (hyperactivity, emotional problems, conduct problems, peer problems and prosocial behaviour scores) and a total difficulties score.[13] Following Ramchandani and colleagues,[3] we dichotomised scores at the top 10% to indicate a high score on each of the five difficulty scores and at the bottom 10% to indicate a low prosocial score. SDQ difficulties scores above the 90th percentile indicate problem behaviours and are associated with a substantially increased risk of developing a psychiatric disorder.[12]

Derived Outcome Indices (DOIs) were developed specifically for the LSAC as aggregate indicators of children's overall development and well-being.[13] They cover physical, learning and social/emotional outcomes, and can be combined to give an overall outcome index. The DOIs are derived from a multistage standardisation process that cumulates in a standardised score for each domain (mean = 100; SD, 10). Following the recommendation by Sanson,[13] we dichotomised scores at the bottom 15% to indicate poor child outcomes.

Statistical analysis

Analyses were conducted with PASW Statistics, version 18 (SPSS Inc, Chicago, Ill, USA). As per Ramchandani et al,[3] we calculated the prevalence of depression in both mothers and fathers and then conducted LSAC-population-weighted logistic regression analyses to examine the associations between paternal depression and our child outcome measures, controlling for socioeconomic position, maternal education, and maternal depression. Maternal and paternal education were significantly correlated and maternal education data was more complete, so we chose to replicate the procedure outlined by Ramchandani et al[3] by using only maternal education in each of our models. Additional models controlling for the effects of later paternal depression (measured in 2006) using a dummy coded indicator variable were run in order to ensure that the effects of paternal depression were specific to the perinatal period. Additionally, we tested for statistical interactions between parental depression and the sex of the child, and report separate odds ratios for boys and girls for each outcome measure.

Our study did not require ethics approval, as it was an analysis of a de-identified publicly available dataset.

Results

The prevalence of early depression in this sample was similar to the rates for the full LSAC sample, with 2.6% of mothers and 1.3% of fathers having K6 scores >12. Maternal and paternal scores on the K6 were significantly correlated ($r = 0.19$; $P < 0.001$).

Strengths and Difficulties Questionnaire

Early paternal depression was associated with an increased risk of a high SDQ total difficulties score (OR, 3.34; 95% CI, 3.06–3.65). It was also associated with all the other subscales. After controlling for socioeconomic position, education and maternal depression, these associations remained significant (Box 1). Early maternal depression was also associated with an increased risk of a high SDQ total difficulties score (OR, 2.48; 95% CI, 2.28–2.70). Maternal depression was also associated with all the SDQ subscales and these associations remained significant after controlling for socioeconomic position, education and paternal depression. When we

controlled for later paternal depression, prosocial behaviour, hyperactivity, and SDQ total difficulties scores were still significantly associated with early paternal depression. Associations with maternal depression remained stable (Box 1). Early paternal depression was found to have a larger effect on boys' hyperactivity and prosocial scores than on those of girls, but a larger effect on girls' emotional, conduct and total difficulties scores. Additionally, early maternal depression was found to have a larger effect on boys' prosocial and on girls' conduct scores (Box 2).

Derived Outcome Indices

Early paternal depression was associated with an increased risk of a low DOI overall outcome score (OR, 2.70; 95% CI, 2.44–2.98) and was associated with lower scores on all of the DOI subscales. After controlling for socioeconomic position, education, and maternal depression, only the associations with social/emotional outcome and overall outcome scores remained significant (Box 3). Early maternal depression was associated with an increased risk of a low overall outcome score (OR, 2.87; 95% CI, 2.63–3.14) and with each of the DOI subscales. After controlling for socioeconomic position, education, and paternal depression, these associations remained significant. When we controlled for later paternal depression, early paternal depression was associated with an increased risk of lower overall outcome and social/emotional outcome scores and maternal depression was associated with all DOI scales (Box 3). All the associations between paternal depression and DOI scores were stronger for girls than boys. The associations between maternal depression and social/emotional outcome scores were stronger for girls than boys, but the associations with learning scores and overall outcome scores were stronger for boys (Box 4).

2 Differential effects of parental depression on boys' and girls' Strengths and Difficulties Questionnaire scores

	Adjusted odds ratio* (95% CI)			
	Boys	Girls	Likelihood ratio test for interaction†	*P*
Maternal depression				
Prosocial	1.12 (0.78–1.28)	0.24 (0.1–0.33)	92	< 0.001
Hyperactivity	1.60 (1.41–1.81)	1.42 (1.22–1.66)	1	> 0.05
Emotional	1.11 (0.97–1.27)	1.21 (1.07–1.36)	2	> 0.05
Peer problems	2.91 (2.62–3.24)	2.84 (2.54–3.16)	<1	> 0.05
Conduct	1.94 (1.73–2.17)	2.46 (2.21–2.74)	10	< 0.01
Total difficulties	2.22 (1.97–2.52)	2.12 (1.87–2.41)	<1	> 0.05
Paternal depression				
Prosocial	3.50 (3.02–4.06)	2.54 (2.16–2.99)	187	< 0.001
Hyperactivity	1.89 (1.62–2.21)	1.26 (1.06–1.50)	169	< 0.001
Emotional	0.57 (0.46–0.71)	1.44 (1.26–1.64)	146	< 0.001
Peer problems	0.67 (0.56–0.80)	0.88 (0.76–1.02)	32	< 0.001
Conduct	0.66 (0.55–0.79)	1.16 (1.02–1.33)	109	< 0.001
Total difficulties	1.09 (0.91–1.31)	2.98 (2.62–3.39)	305	< 0.001

*Adjusted for socioeconomic position, maternal education, depression in the other parent, and later paternal depression. †By sex. ◆

3 Early parental depressive symptoms and Derived Outcome Indices (DOI) scores for children aged 4–5 years

	Proportion with low DOI scores		Odds ratio (95% CI)		
	Depressed	Not depressed	Crude	Adjusted*	Adjusted†
Maternal depression					
Physical	27.1%	10.8%	3.59 (3.32–3.89)	3.45 (3.18–3.74)	3.44 (3.18–3.73)
Learning	8.5%	9.0%	0.87 (0.77–0.99)	0.73 (0.64–0.83)	0.77 (0.68–0.88)
Social/emotional	18.6%	8.2%	2.76 (2.52–3.02)	2.30 (2.10–2.52)	2.44 (2.22–2.67)
Overall	16.9%	7.8%	2.87 (2.63–3.14)	2.45 (2.23–2.68)	2.59 (2.36–2.84)
Paternal depression					
Physical	14.3%	11.1%	1.42 (1.27–1.59)	1.06 (0.95–1.19)	1.04 (0.92–1.18)
Learning	17.1%	8.9%	1.90 (1.71–2.11)	1.11 (0.98–1.24)	0.98 (0.86–1.11)
Social/emotional	23.8%	8.1%	3.37 (3.07–3.70)	2.36 (2.14–2.60)	1.75 (1.57–1.96)
Overall	17.1%	7.9%	2.70 (2.44–2.98)	1.42 (1.28–1.58)	1.65 (1.48–1.85)

*Adjusted for socioeconomic position, maternal education, and depression in the other parent. † Adjusted for socioeconomic position, maternal education, depression in the other parent, and later paternal depression. ◆

Discussion

Our results confirm our hypothesis that children whose fathers reported depressive symptoms when they were infants would have poorer outcomes at 4–5 years of age than children whose fathers did not have early depressive symptoms. Specifically, children whose fathers had early depressive symptoms were more likely to score above the 90th percentile on the SDQ total difficulties, hyperactivity, emotional, peer problems and conduct scales, and below the 10th percentile on the prosocial scale. These associations remained significant after controlling for demographic characteristics, early maternal depression and, with the exceptions of emotional, peer and conduct problems, later paternal depression. A number of these associations were found to interact with the sex of the child. For example, early paternal depression was found to be more strongly associated with hyperactivity problems in boys than girls, but was more strongly associated with emotional problems in girls than boys. With regard to the more generalised developmental outcomes, we found that early paternal depression was associated with poorer social/emotional and overall outcomes in children, and that this effect was stronger for girls than boys. These findings contrast with those of other studies,[3,14] which found a greater effect of early paternal depression on boys' outcomes.

Although our results confirm the importance of maternal depression on child outcomes, when focusing on paternal depression our results support previous research,[3,14,15] and demonstrate that early paternal

depression is also important for child outcomes regardless of whether maternal depressive symptoms are present or not. In addition, the effects of maternal and paternal depression vary with the sex of the child, suggesting that maternal and paternal depression differ in the way that they affect child development.

Previous findings that depressed fathers are less likely to participate in physical play with their young children,[16] an activity purported to assist children with their regulation of behaviours,[17,18] suggests a possible area for future investigations.

Our findings also showed differences by sex across all child outcome measures for fathers, but only a few outcomes showed sex differences for mothers. Other areas of research have also shown stronger sex differences for fathers than mothers. For example, it has been suggested that fathers engage in more gender socialisation than mothers across a wide range of aspects of children's social and emotional development.[19] Fathers have been shown to engage in warmer and more structured interactions and to be more sensitive with their daughters than with their sons, whereas mothers showed no such differentiation.[20] If, as the research suggests, fathers, but not mothers, differentially interact with their sons and daughters, then finding sex differences in the impact of early paternal, but not maternal, depression on child outcomes should be expected.

Although the underlying mechanism remains unclear, our findings indicate that interventions to detect and treat fathers who are at risk of depression early in their infant's life may be justified. While evidence is currently lacking to justify routine screening, guidance for primary care practitioners seeking to identify distressed fathers is available. Strategies to access fathers when mothers attend antenatal and postnatal consultations, and ice-breaking strategies for clinicians to engage fathers in discussions about their adjustment to fatherhood have also been proposed.[21,22] While specific treatment programs for fathers suffering perinatal depression have not been reported, clinical approaches to men with depression are widely discussed.[23]

Our study has numerous strengths. We used a large representative sample and a longitudinal design, which allowed for a more complete understanding of the effects of early paternal depression on later child outcomes. Also, because in the majority of cases (98%), mothers completed the SDQ, the likelihood that early paternal depression may have influenced the results was reduced. Furthermore, the DOIs were composed of a composite of maternal report, interviewer report and direct child measurement, thereby limiting rater bias.

The study had some limitations. First, only 64% of eligible families participated in the LSAC, and although weighting was used in all analyses to account for differences in non-responders, generalisation to underrepresented population groups may be limited. Compared with the full LSAC sample, parents in our sample were more highly educated, had a higher weekly income, and a higher percentage were in full-time employment. The rate of depressive symptoms among both mothers and fathers in this sample is lower than that reported in other Australian samples.[24,25] It is possible that non-completers may have been more depressed, but if this were the case, the association between early paternal depression and later child outcomes would likely be strengthened. Future research should examine the effects of early paternal depression in these populations and ideally would replace the self-report measure of depression (the K6) with formal psychiatric diagnoses.

Another limitation of our study was the variability in the age range of the infants at Wave 1 of LSAC data collection, with underrepresentation of recently born children in the sample. As such, the results from our study need to be interpreted as being associated with early paternal depression, not paternal postnatal depression, which is usually defined as occurring in the first few months after a child's birth.[3] Nevertheless, given the dearth of research on the long-term effect of paternal depression on children, our findings are notable.

Our study has demonstrated that self-reported depression in fathers during the first year of a child's life can have a detrimental impact on their child's behaviour, and social and emotional development at the point of school entry. Furthermore, these effects are independent from mothers' symptomatology, supporting the notion that fathers play an important role in a child's development that is independent of the mother's role. Although the causal pathways leading from early paternal depression to poor child outcomes have yet to be explicated, our study adds to the literature identifying this as a discrete and important issue for families and children. Early intervention to identify and address the mental health needs of fathers may be required for the benefit of fathers, children and families.

4 Differential effects of parental depression on boys' and girls' Derived Outcome Indices scores

	Adjusted odds ratio* (95% CI)			
	Boys	Girls	Likelihood ratio test for interaction†	*P*
Maternal depression				
Physical	3.66 (3.27–4.09)	3.29 (2.93–3.70)	2	> 0.05
Learning	1.26 (1.08–1.46)	0.40 (0.30–0.54)	42	< 0.001
Social/emotional	2.08 (1.82–2.38)	3.16 (2.78–3.59)	41	< 0.001
Overall	3.77 (3.34–4.25)	1.82 (1.57–2.11)	40	< 0.001
Paternal depression				
Physical	0.21 (0.16–0.29)	2.45 (2.14–2.81)	183	< 0.001
Learning	0.63 (0.51–0.78)	2.08 (1.77–2.46)	293	< 0.001
Social/emotional	0.72 (0.57–0.90)	3.36 (2.93–3.87)	405	< 0.001
Overall	0.72 (0.59–0.89)	3.06 (2.66–3.51)	145	< 0.001

* Adjusted for socioeconomic position, maternal education, depression in the other parent, and later paternal depression. † By sex. ◆

Acknowledgements: This study was supported by a Strategic Initiatives research grant funded by the Faculty of Health, University of Newcastle. The researchers are independent from the funder. We used data from the

LSAC, which was conducted in partnership between the Department of Families, Housing, Community Services and Indigenous Affairs (FaHSCIA), the Australian Institute of Family Studies (AIFS) and the Australian Bureau of Statistics (ABS). The findings reported in this article are those of the authors and should not be attributed to FaHCSIA, the AIFS or the ABS.

Competing interests: No relevant disclosures.

Received 23 Feb 2011, accepted 27 Jul 2011.

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