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Paternal psychological distress and child problem behaviour from early childhood to middle adolescence

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Keywords: Maternal depression; paternal depression; child problem behaviour

Abstract

Objective: To explore if paternal psychological distress is related to the longitudinal course of child problem behaviour after accounting for maternal psychological distress.

Method: We used data from the Millennium Cohort Study (MCS), a large general-population birth cohort in the UK. Maternal and paternal psychological distress was measured with the Kessler 6-item psychological distress scale (K-6) at child ages 3, 5, 7, 11 and 14 years. Problem behaviour was measured with the Strengths and Difficulties Questionnaire at these ages. Data were analyzed using growth curve modelling, before and after adjustment for confounders (N = 13,442).

Results: The effect of paternal psychological distress was weaker than that of maternal psychological distress. However, even after adjustment for maternal psychological distress and confounding, paternal psychological distress predicted all four domains of child problem behaviour we examined (hyperactivity, conduct, emotional and peer problems). Child problem scores were generally lower in biological father families, but the effect of paternal psychological distress was the same for children in biological and non-biological father families, and did not depend on the level of maternal psychological distress. High levels of paternal psychological distress predicted some problems (emotional symptoms and hyperactivity) more strongly in boys than girls.

Conclusion: There was evidence for a robust association between psychological distress in fathers and problem behaviour in their offspring. Our findings suggest that the mental health of both fathers and mothers is important for the behaviour of their children.

Keywords: Maternal depression; paternal depression; child problem behavior

Introduction

Poor maternal mental health is a powerful risk factor of poor emotional and behavioural outcomes in children[1,2]. The evidence on the role of paternal mental health is relatively limited by comparison, but it does suggest that paternal psychological distress may also be an important risk factor[3], thought to reflect, like maternal psychological distress, a genetic risk for psychopathology, and/or operate via reducing responsive parenting and the quality of the parent-child interaction. However, most studies to date on the role of paternal psychological distress in child emotional and behavioural problems (henceforth 'problem behaviour') are cross-sectional, or small, or based on selective samples, or do not adjust for maternal psychological distress, an important confounder. The very few general-population longitudinal studies that also controlled for maternal psychological distress measured both outcomes and exposures at single points in time and typically, but not exclusively[4], focussed on exposures to parent psychological distress at the post-partum period.[5-7] We do not know if exposure to paternal psychological distress across childhood and adolescence changes the longitudinal course of several aspects of problem behaviour in the general child population, after controlling for maternal psychological distress. We carried out this study to explore this.

We also investigated factors within the family (child gender, maternal psychological distress and father's biological status) that, because of either 'nature' or 'socialisation', would moderate such paternal effects. With respect to child gender, it is suggested that fathers engage in more gender socialisation than mothers.[8] We therefore expected to find gender differences in the impact of paternal psychological distress on child problem behaviour. The extant evidence (but with the caveats described above) shows either no gender differences or stronger effects on boys compared to girls.[5-6] The second possible moderator, maternal psychological distress, was chosen in view of the evidence for assortative mating for psychiatric traits. Assortative mating is the tendency for parents to have similar genotypes or phenotypes than would be expected if they were mated at random. Compared with controls, for example, depressed individuals are more likely to have a partner with

depression[9], and some studies have shown that the adverse effects of paternal depression on youth socio-emotional adjustment were exacerbated by the presence of maternal depression.[10] We chose the third possible moderator, biological relatedness, to account for the possibility of genetic transmission across generations, given the heritability of depression and anxiety. We expected that paternal psychological distress would have larger effects on child problem behaviour among biological compared to non-biological father families.

Method

Sample

To meet our aim, we used data from the Millennium Cohort Study (MCS), an ongoing general-population study of children born in 2000-2002 in the UK (**www.cls.ioe.ac.uk/mcs)**. MCS was designed to over-represent families living in areas of high child poverty, areas with high proportions of ethnic minority populations across England, and the three smaller UK countries. Parent-reported data were collected through interviews and self-completion questionnaires. To date, six sweeps of data collection have taken place: when children were 9 months (MCS1), 3 years (MCS2), 5 years (MCS3), 7 years (MCS4), 11 years (MCS5) and 14 years (MCS6). Ethical approval was gained from NHS Multi-Centre Ethics Committees, and parents (and children at the age 11 and 14 sweeps) gave informed consent before interviews took place. At Sweep 1, 18,552 families participated in MCS. The numbers of productive families at Sweeps 2, 3, 4, 5 and 6 were 15,590, 15,246, 13,857, 13,287 and 11,714, respectively. A total of 19,244 families have participated in MCS to date (692 'new families' joined the study at Sweep 2). Child problem behaviour was measured at Sweeps 2-6. The analytic sample of the study was children (singletons and first-born twins or triplets) with valid data on problem behaviour in at least one of Sweeps 2-6 and whose mothers and fathers had valid data on psychological distress in at least one of these time-points (N = 13,442).

Measures

All variables below, unless otherwise specified, were measured at each time-point, i.e., ages 3, 5, 7, 11 and 14 years.

Problem behaviour. This was measured with the parent-reported Strengths and Difficulties Questionnaire (SDQ)[11] subscales of emotional symptoms, hyperactivity/inattention, conduct problems and peer problems. Each SDQ subscale has 5 items and each item is a statement about a specific behaviour, scored 0 if the response is 'not true', 1 for 'somewhat true' and 2 for 'certainly true'. The four subscale scores can be summed to a total difficulties scale score, indicating overall problem behaviour. Cronbach's alphas across sweeps ranged 0.70 to 0.76 for emotional symptoms, 0.81 to 0.86 for hyperactivity, 0.70 to 0.77 for peer problems, 0.75 to 0.81 for conduct problems and 0.83 to 0.87 for total difficulties.

Parent psychological distress. Both parents, if resident with the child, completed the Kessler 6-item psychological distress scale (K-6)[12]. The K-6 assesses general distress in the past month, using items such as 'how often did you feel so depressed that nothing could cheer you up?' and 'how often did you feel hopeless?' Participants respond using a five-point Likert scale, 'none' to 'all of the time.' Possible scores range from 0 to 24, with higher scores indicating more severe symptoms. The scale has good psychometric properties and an estimated area under under the curve of 0.83 (range 0.76-0.89, IQR 0.81-0.85) against a standard diagnostic assessment of depression (the World Mental Health Composite International Diagnostic Interview module for major depression).[12] For both parents, and across sweeps, the K-6 had good reliability (Cronbach's alpha values ranging 0.79 to 0.89).

Confounders. We identified variables previously associated with exposure and outcome: gender, ethnicity, socio-economic disadvantage, parent biological status, parent education, quality of the inter-parental relationship (henceforth 'marital quality') and parent alcohol use. Ethnicity was coded white, black, Indian, Pakistani/Bangladeshi, mixed or other, as per the UK census classification of ethnicity. Socio-economic disadvantage was measured by a summative score of 4 binary indicators of family poverty: receipt of income support, overcrowding (>1.5 people per room excluding kitchen

and bathroom), lack of home ownership, and income poverty (equivalised net family income below 60% of the national median household income)[13]. Parent biological status was a dummy variable indicating, for each parent, if they were the child's natural parent. Parent education was measured by a dummy variable indicating, for each parent, if they were university-educated or not. Marital quality was measured (at Sweep 3 only) with the 4-item version the Golombok Rust Inventory of Marital State[14]. Each partner was asked four questions (on 5-point scales) about the quality of their relationship with their partner. In our sample, internal consistency was good for both mother-reported ($\alpha = 0.77$) and father-reported ($\alpha = 0.71$) marital quality. Parent alcohol use was measured, for each parent, by a binary variable indicating if they drank most days of the week or not.

Statistical analysis

First we examined descriptive statistics and sample bias by running a sensitivity analysis comparing the analytic and non-analytic samples on the study variables (Table S1 and Table S2, available online). Next we computed the correlations between all the main study variables across sweeps (Table S3, available online). Finally, we fitted a series of growth curve models to explore the role of paternal and maternal psychological distress in the longitudinal course of child problem behaviour at ages 3 to 14 years. These were 2-level regression models[15] where occasions of SDQ measurements (Level 1) were nested in children (Level 2), allowing us to estimate the average level of problems at a particular time-point, the intercept (which we grand-mean centered at age around 8 years), and the average growth rate in problems over time. By specifying a random linear slope on the child's age to allow for changes in problems across time to vary between children, we could also model individual trajectories of problems from ages 3 to 14 years. The stratified sampling design of MCS was recognised by including the nine MCS strata in all models: England-advantaged, England-disadvantaged, England-ethnic, Wales-advantaged, Wales-disadvantaged, Scotland-advantaged, Scotland-disadvantaged, Northern Ireland-advantaged and Northern Ireland-disadvantaged. These are subgroups of the population from which cohort families were sampled. As explained, cohort

families were oversampled from disadvantaged areas, areas with high proportions of ethnic minorities in England, and the smaller UK countries. The full sequence of models estimated is outlined in Table 1. Model 1 examined the effect of paternal psychological distress and Model 2 that of maternal psychological distress on the course of child problem behaviour. Model 3 examined the effects of maternal and paternal psychological distress jointly, and Model 4 (presented in Table 2) added the covariates. Models 5-7 examined the effects of the interactions of a) parent distress with parent biological status, b) parent distress with child gender, and c) paternal with maternal psychological distress. Thus, these models tested whether the effect of parent psychological distress varied by biological relatedness (Model 5) or the gender of the child (Model 6), and whether the effect of one parent's psychological distress depended on the other's level of distress (Model 7). Given that we used additive rather than multiplicative models, and because these interaction tests could be under-powered, these interaction tests were all exploratory[16]. All analyses were conducted in SPSS 24 and MLwiN 3.00.

(Table 1)

Results

As can be seen in Tables S1 and S2, available online, the families not included in the analytic sample scored higher on parent psychological distress and child problem behaviour, were poorer and less educated, and were less likely to be white and biological. Correlations (Table S3, available online) between maternal and paternal psychological distress, between maternal psychological distress and child problem behaviour, and between paternal psychological distress and child problem behaviour were all generally weak. Both parent psychological distress and child problem behaviour showed moderate stability between time-points. The unadjusted and minimally-adjusted growth curve models fitted (Models 1-3) showed that compared to paternal psychological distress, maternal psychological distress had, in general, a larger effect on child problem behaviour. Table 2, which presents the results of the fully-adjusted growth curve model, suggests that this pattern of

relationships did not change after adjustment for confounders. Although weaker, the effect of paternal psychological distress was still significant for all child outcomes. Father's biological status also had an effect on all outcomes as did mother (but not father) reported marital quality, both in the expected direction.

Models 5-7 which test the effects of the interactions of parent psychological distress with child gender, parent biological status and other parent's psychological distress showed some evidence for effect modification by child gender but little else. High levels of paternal psychological distress predicted emotional symptoms and hyperactivity (Figure 1 for an illustration) more strongly in boys than girls. Maternal psychological distress also had a larger effect on boys than girls' peer problems. There was one other significant interaction, between maternal biological status and maternal psychological distress, again on peer problems.

(Table 2, Figure 1)

Discussion

Using longitudinal data from a large, contemporary, population-based cohort from the UK, we found that paternal psychological distress was associated with child problem behaviour. Although the association between maternal psychological distress and child problem behaviour was larger, the association between paternal psychological distress and child problem behaviour was also significant and, importantly, robust. For example, it was independent of the mother's level of psychological distress and the child's biological relatedness to the father. It also persisted after accounting for potential common causes of paternal psychological distress and child problem behaviour, such as inter-parental conflict and socio-economic disadvantage. Furthermore, it was not different for biological and non-biological father families, nor did it vary by level of maternal psychological distress.

Our study has several strengths. Our sample was large and nationally-representative, our adjustment for maternal psychological distress robust, and, with 5 time-points of data spanning childhood and adolescence, the age range wide. However, it also has limitations. We used brief self-report assessments of psychological distress instead of clinical interviews. However, there are some important advantages of symptom measures in studies such as ours. Psychological distress exists as a continuum in the general population and so symptom measures capture this variation in severity as well as increasing statistical power. Another limitation is that we did not include single-parent families in our study because MCS did not follow up non-resident parents. Thus, our findings cannot be generalised across family structures. Furthermore, residual confounding, always a possibility in observational studies such as ours, may still have influenced the findings. In addition, child problem behaviour was mother-reported for the majority of our sample, and so shared method variance may have inflated the correlations between maternal psychological distress and child problem behaviour. Finally, it is important to acknowledge that, for both maternal and paternal psychological distress, effect sizes were small. Nonetheless, small effects can still be clinically meaningful.

In conclusion, our study showed that paternal psychological distress was related to several aspects of child problem behaviour. This effect was independent of that of maternal psychological distress and was similar for biological and non-biological families. A priority for future studies should be to examine the mechanisms of this effect, which are likely both genetic[17] and environmental.[18] Our own study however clearly suggests that interventions to prevent and treat psychological distress in fathers may have much benefit for their children. The first step in doing that is increasing awareness of the role that paternal psychological distress can have in child development.

Table 1 Model Summary

Model 1
Centred age (months)[a] + MCS stratum + paternal K6 + paternal K6 x age[b]
Model 2
Centred age (months) + MCS stratum + maternal K6 + maternal K6 x age[b]
Model 3
Model 2 + Model 1
Model 4
Model 3 + covariates[c]
Model 5
Model 4 + bio mother x maternal K6 + bio father x paternal K6
Model 6
Model 4 + child gender x paternal K6 + child gender x maternal K6
Model 7
Model 4 + maternal K6 x paternal K6

Note: K6 = Kessler 6-item psychological distress scale; MCS = Millennium Cohort Study

[a] centred age was 98.34 months.

[b] the effect of parent psychological distress on the trajectory of child problem behaviour was extremely weak (b =.000; se = .000, for both maternal and paternal psychological distress and for all five child behaviour outcomes), and therefore we excluded it in Models 3-7.

[c] gender, ethnicity, socio-economic disadvantage, maternal biological status, paternal biological status, maternal education, paternal education, maternal alcohol use, paternal alcohol use, mother-reported marital quality, father-reported marital quality.

Table 2 Fixed and Random Effects (and Standard Errors) of the Fully-Adjusted Growth Curve Model of Child Problem Behaviour (Model 4)

	Total difficulties		**Emotional symptoms**		**Conduct problems**		**Hyperactivity**		**Peer problems**	
Fixed effects	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Centred age (months)	-0.012***	0.001	0.004***	0.000	-0.009***	0.000	-0.007***	0.000	0.000	0.000
Maternal psychological distress	0.289***	0.009	0.085***	0.003	0.076***	0.003	0.081***	0.004	0.060***	0.003
Paternal psychological distress	0.048***	0.009	0.010***	0.003	0.012***	0.003	0.019***	0.004	0.009**	0.003
Mother is biological	0.572	0.641	-0.035	0.232	0.418*	0.198	0.003	0.297	-0.183	0.211
Father is biological	-1.486***	0.206	-0.229**	0.072	-0.377***	0.063	-0.597***	0.097	-0.312***	0.066
Mother drinks most days	0.048	0.101	0.006	0.037	0.039	0.035	-0.025	0.048	-0.015	0.035
Father drinks most days	-0.028	0.081	-0.026	0.029	-0.033	0.028	0.008	0.039	-0.019	0.028
Mother-reported marital quality	-0.206***	0.017	-0.038***	0.005	-0.039***	0.005	-0.074***	0.008	-0.043***	0.005
Father-reported marital quality	-0.039*	0.018	0.003	0.005	-0.023***	0.005	-0.020*	0.009	0.004	0.005
Mother is university-educated	-0.860***	0.113	-0.085*	0.034	-0.158***	0.033	-0.460***	0.055	-0.103**	0.032
Father is university-educated	-0.590***	0.113	-0.058	0.034	-0.118***	0.033	-0.290***	0.055	-0.118***	0.032
Socio-economic disadvantage	0.376***	0.052	0.094***	0.018	0.144***	0.017	0.114***	0.025	0.094***	0.017
Male	1.036***	0.087	-0.092***	0.026	0.217***	0.025	0.790***	0.042	0.159***	0.025
MCS stratum (ref. England-advantaged)										
England-disadvantaged	0.424***	0.121	0.048	0.037	0.145***	0.035	0.120*	0.059	0.113***	0.034
England-ethnic	0.091	0.248	0.062	0.075	-0.003	0.072	-0.039	0.121	0.081	0.071
Wales-advantaged	-0.260	0.193	-0.056	0.059	-0.027	0.056	-0.044	0.094	-0.081	0.055
Wales-disadvantaged	0.295	0.160	0.023	0.048	0.016	0.047	0.126	0.078	0.103*	0.046
Scotland-advantaged	-0.167	0.175	-0.022	0.053	0.051	0.051	-0.162	0.085	-0.014	0.050
Scotland-disadvantaged	0.218	0.198	-0.032	0.060	0.052	0.058	0.108	0.097	0.035	0.057
Northern Ireland-advantaged	-0.202	0.207	0.068	0.063	-0.044	0.060	-0.126	0.101	-0.082	0.059
Northern Ireland-disadvantaged	0.344	0.219	0.084	0.067	0.100	0.064	0.043	0.107	0.088	0.063
Ethnicity (ref. White)										
Mixed	-0.478	0.314	-0.193*	0.096	-0.161	0.091	-0.065	0.153	-0.065	0.090
Indian	0.351	0.331	-0.058	0.102	0.016	0.096	0.059	0.160	0.292**	0.095

Pakistani/Bangladeshi	1.142**	0.357	0.201	0.109	-0.082	0.106	0.340	0.174	0.677***	0.103
Black	-0.643	0.433	-0.297*	0.133	-0.150	0.128	-0.221	0.211	0.065	0.125
Other	0.077	0.527	-0.022	0.162	-0.082	0.151	-0.140	0.255	0.520***	0.150
Constant	10.309***	0.734	1.953***	0.257	1.983***	0.224	4.51***	0.344	1.928***	0.235
Random effects										
Between-child intercept variance	10.922***	0.229	0.933***	0.023	0.792***	0.020	2.566***	0.053	0.760***	0.019
Between-child slope variance	0.001***	0.000	0.000***	0.000	0.000***	0.000	0.000***	0.000	0.000***	0.000
Between-child intercept slope covariance	0.021***	0.002	0.005***	0.000	-0.002***	0.000	0.000	0.000	0.002***	0.000
Between-occasion variance	8.411***	0.102	1.308***	0.000	1.211***	0.014	1.923***	0.023	1.132***	0.014
Note: MCS = Millennium Cohort Study *p < .05; **p < .01; ***p < .001										

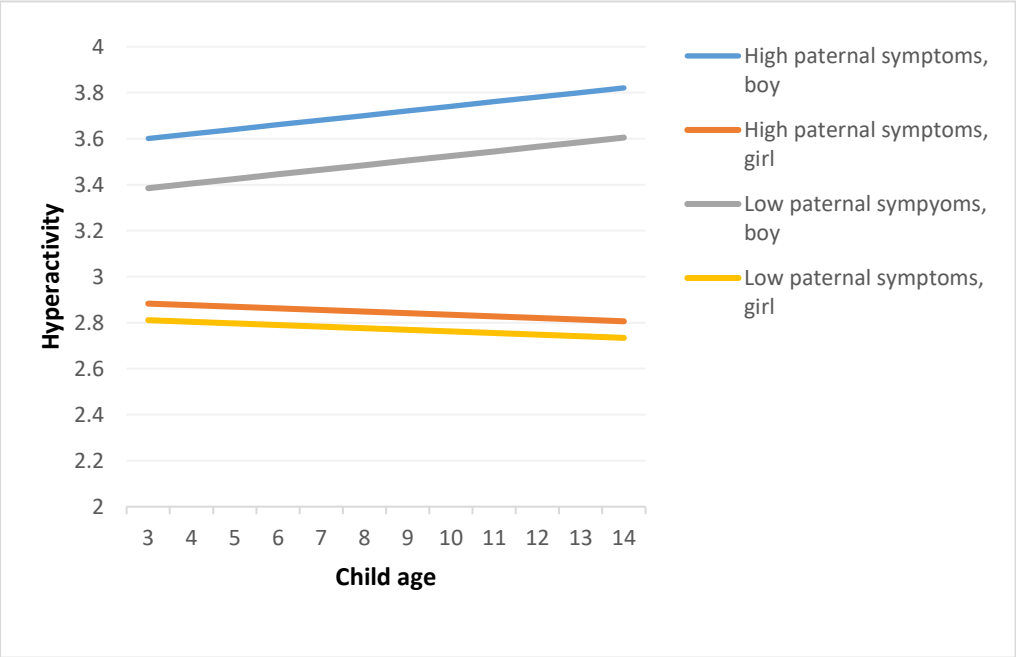

Figure 1. Predicted hyperactivity trajectories (Model 6) by high/low levels of paternal psychological distress (10^{th} and 90^{th} percentiles on the K6, respectively) and child gender. Predictions are plotted for the most common group of each categorical variable, and at the mean of each continuous variable.

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