

Father departure from the household and childhood mental health: how does timing matter?

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Abstract

Father's permanent departure from the household in childhood is an event that has the potential to affect child functioning. The event is non-random, and a major limitation in most previous studies is the lack of adequate control for unobserved confounders. Using new data from the Millennium Cohort Study, an ongoing nationally representative longitudinal study, this paper uses fixed effect models to examine the effect of paternal absence on children's socio-emotional development. Heterogeneity of effects are examined across child gender, parental education, and parent relationship quality. A novel aspect is to examine how the timing of and timing since departure matters, and to assess whether there are developmental periods that are especially sensitive to family disruption, and whether effects are temporary or enduring. Results show that father's departure has a negative effect on child functioning, particularly internalising symptoms. Timing of the event and child gender matter: only boys see increases in externalising problems, and they are affected in both externalising and internalising when the father departed late but not early on in childhood. Girls are unaffected in terms of externalising problems, but their internalising symptoms increase following paternal departure, regardless of when it occurs, although effects of departure in early childhood are only manifest as girls reach adolescence. High maternal education cushions negative effects of dissolution, but children of parents with a high quality relationship pre-departure are more negatively affected.

Keywords: Father absence; Family instability; Child externalising; Child internalising; Millennium Cohort Study; Fixed effects

Introduction

A major disruption to family life can have serious consequences for children. A particularly significant event is the father's permanent departure from the household. The implications for children's wellbeing are complex and theoretically ambiguous. On the one hand, the major shift in living arrangements and frequency of paternal contact arising from the absence of the father may adversely affect the child, and the associated reduction in household income may also be welfare-reducing; on the other hand, the dissolution of emotionally or physically harmful partnerships can have benefits for children (Emery, 1999). The effects are complex, and further depend on several factors including changes in mental health functioning, quality of parenting, ability to maintain a positive parent-child relationship and parental bargaining power (Amato 2010; Whiteside and Becker 2000). Moreover, effects are likely to vary depending on when in childhood the departure occurs, and are also likely to vary over time, as the child moves through adolescence and beyond.

There is an extensive literature supporting the notion that there are significant detrimental effects of family breakdown on a range of child and adolescent outcomes, including conduct and emotional problems, amongst the most prevalent adjustment problems in childhood (Green et al. 2005). The meta-analysis of Amato and Keith (1991) on early studies on divorce reported average standardised effect sizes of 0.23 for conduct problems (56 studies) and 0.08 for emotional problems (50 studies). In the updated meta-analysis that included only studies from the 1990s, even larger average effect sizes were found, of around 0.3 for conduct and emotional problems (Amato 2001). However, a limitation of these studies relates to the non-random nature of departure of the father from the household (see Van de Walle 2011). For instance, couples may separate because they have different preferences for investment in children, rendering it important to untangle the effects of separation from the effects of unmeasured preferences, in order to estimate the causal effect of separation on

children's outcomes. Although most studies control for a range of confounding factors, one cannot rule out the presence of unobserved factors that influence both family dissolution and children's outcomes. Previous work has attempted to exploit exogenous variation to overcome this problem, for instance, in divorce laws (Gruber 2004) and child sex composition (Dahl and Moretti 2008). In a review of studies that used methods more specifically focused on causal identification, McLanahan et al. (2013) identified 57 studies considering outcomes such as educational attainment, mental health, relationship formation and stability, and labour force success. The evidence from this literature points to parental separation having a negative effect on children's developmental outcomes.

In this paper we employ a fixed effects method to estimate the effect of paternal departure from the household on children's socio-emotional outcomes. Our focus on mental health is important not only for wellbeing in childhood and adolescence, but also for other related domains of children's lives including learning and cognitive functioning (Rapport et al. 2001; Maguin and Loeber, 1996), social skills and peer problems (Reijntjes et al. 2010), and adverse outcomes in adulthood including mental health problems, alcohol and drug abuse, educational underachievement, unemployment and criminality (Fergusson et al. 2005; Woodward and Fergusson 2001).

We use data from the UK Millennium Cohort Study, a longitudinal study following individuals from birth, and study the effects up to early adolescence (age 14), including how these vary by gender and parental education. We distinguish between departures that occur at different stages of childhood – in particular “early childhood” (before age 7) and “mid-childhood” (between ages 7 and 11) - and estimate the short- and medium-run effects on children. To our knowledge, this is the first paper that explicitly examines whether and how the timing of paternal departure matters for children's outcomes,

using robust empirical methods on a longitudinal sample to account for the non-random nature of fathers leaving the household.

In the UK setting we consider, we find that the father's departure from the household has a small but detrimental impact on children's mental health, with children's internalising symptoms, reflecting inward anxiety, depressed and withdrawal behaviour, being more affected than externalising problems, relating to outwardly negative, oppositional, rule breaking and aggressive behaviour. In looking at heterogeneity of effects, we find that children of mothers with a relatively high educational level experience less severe adverse effects in terms of internalising symptoms, whilst children of parents with a high-quality relationship prior to the event are more negatively affected on both behavioural dimensions. A key finding of the paper concerns how effects vary by timing of and since the departure: we find that departure in early childhood adversely affects internalising behaviour in females; moreover there appears to be a sleeper effect, with a larger effect manifesting itself in middle to late childhood than in the developmental period immediately following the father's departure. Departure in middle to late childhood increases significantly internalising problems in both males and females, and externalising problems in males only.

Related Literature

Our work fits into several strands of the literature. First, it is related to the growing literature considering how the effects of family dissolution and structure on children's outcomes vary across different groups. To the extent that some children may be more resilient or vulnerable to this event than others, our work considers heterogeneity in effects along three key dimensions: sex, maternal education, and (pre-departure) quality of parental relationships.

Regarding sex, there is evidence that males tend to exhibit more externalising behaviours from preschool, and females more internalising symptoms from early adolescence (Bongers et al. 2003). It is conceivable that the prevalence of these problems for males and females may be amplified following shifts in family stability. Previous studies that have examined this show mixed results (Amato, 2010), although most existing studies do not explicitly account for the endogeneity of the father's departure from the household. In a related study that focused on the effect of living in a family structure other than with two biological parents and full siblings, using the Millennium Cohort Study and employing sibling fixed effects, it was found that males are impacted in terms of increases in both externalising and internalising problems, whilst only internalising problems increase for females (Mostafa et al. in press).

The second dimension of heterogeneity we consider is maternal education. There is evidence that families with more economic and educational resources may be better able to withstand detrimental effects of this event because of higher economic and personal resources. For instance, Mandemakers and Kalmijn (2014) find that children of more highly educated mothers are less adversely affected by divorce in terms of their psychological wellbeing; Weaver and Schofield (2015) find that children from high-income families are less affected by behavioural problems following separation. We contribute to this body of research by examining heterogeneity across levels of maternal education. Because the mother tends to become the main caregiver following parental separation¹, maternal education is hypothesised to exert the more significant impact on children's outcomes.

¹ In the large UK representative Millennium Cohort Study, children tend to stay with their mothers following separation of natural parents, especially when separation happens when children are very young. Following separation of natural parents between sweep 1 and 2 (child age 9 months to 3 years) 96% remained with their mothers. Between sweep 2 and 3 (age 3 to 5) this figure was 97%, between sweep 3 and 4 (child age 5 to 7) 96%, between sweep 4 and 5 (age 7 to 11) 93%, and between sweep 5 and 6 (age 11 to 14) 88%.

Third, we consider heterogeneity in effect by pre-departure parental relationship quality. Amato (2010) highlights the quality of family relationships prior to dissolution as an important yet understudied moderator; drawing on the stress relief hypothesis by Wheaton (1990) proposing that in families characterised by conflict and dysfunction, dissolution can lead to positive change. Indeed, a number of studies have found that in families characterised by high conflict and dysfunctionality, child outcomes improve after family dissolution (Booth and Amato 2001; Strohschein 2005). Recent work by Moroni (2017), also using the Millennium Cohort Study, considers parental conflict as an explanatory factor in the gap between children from divorced versus intact families. Using a Oaxaca-Blinder decomposition she finds that differences in children's combined externalising and internalising problems to a large extent are accounted for by differences in pre-divorce parental conflict (50%), and to a lesser extent by pre-divorce financial resources (30%) and other family background factors.

A related strand of the literature concerns the importance of timing of parental relationship breakdown, and its effects over time. In particular, an important question is whether there are particularly sensitive periods during which children are more adversely affected by parental dissolution. Some have suggested that experiences in the early years are especially salient as they lay the foundation for children's future developmental pathways (Sroufe et al. 1990; Heckman 2007); others have proposed that early childhood experiences are less important as they are overshadowed by later experiences (Bruer 1999; Lewis 1997).

A related question concerns the longevity of any impact of family disruption on children's outcomes. In particular, it is important to understand whether any observed short-run effects fade out, persist or indeed become accentuated over time. Whilst the meta-analysis of Amato and Keith (1991) finds that the effects of divorce tend to become attenuated over time, the caveat is that this is based on methods that do not adequately account for the endogeneity of father departure from the household. We

are aware of two studies that examine temporal effects of divorce on children's mental health outcomes, using methods to explicitly deal with the endogeneity of divorce. Arkes et al. (2015) find evidence of fade-out in the effects on children's behavioural problems over time; Pronzato and Aassve (2013), using data from the Millennium Cohort Study as we do, find that children's peer problems and hyperactivity are affected in the short-term only, whilst emotional problems are affected in both the short- and long- term.

Data

This study examines the effect of paternal departure using data from the UK Millennium Cohort Study (MCS). This is an ongoing longitudinal study that follows a cohort of over 19,000 children in the UK born between 2000 and 2002 (see Joshi and Fitzsimons 2016). A total of 19,244 families were recruited, representing an overall response rate of 71%. Families were first assessed when children were 9 months old, and subsequently followed up at ages 3, 5, 7, 11 and 14. 61% of the initial respondents were in the study at the sixth sweep, though attrition is not absorbing, and re-entry is possible. Due to differential patterns of response, weights are used to adjust for inter-sweep attrition (MCS6 User Guide, 2017).

In each sweep, an interview is carried out with the main parent (normally the mother), resident partners, and, increasingly as the child grows older, with the cohort member. Each sweep contains detailed information on the family, including: parental education; employment and income; housing; family structure; ethnicity; parenting activities such as reading to child; developmental indicators such as bedwetting; parental relationship status; and parental mental health. Items specific to a certain stage of life are collected - at age 9 months, child birth weight and gestational age; as well as early life conditions including breastfeeding and infant development. Cognitive development is measured

directly from children from 3 years. Social and behavioural development is measured via parental reports.

Sample Selection

The sample is selected to meet the focus and methodological approach of our current study. The sampling process is fully detailed in Table 1. Because we study the effect of family dissolution on child mental health outcomes and we employ a fixed effects methodology, a primary consideration is the availability of a baseline measure of child externalising and internalising, which is collected for the first time in the MCS in sweep 2 (at child age 3) and at each consecutive follow-up. Therefore, we first select families who participated in sweep 2. The sample is further restricted to children living with both their natural parents at baseline (sweep 2, in our case) in order to estimate the effect of any subsequent departure. A small number of families where parents separated multiple times are also excluded, and we restrict the sample to those where mothers are the main respondent (the vast majority – 96%), which in effect means that we consider departures of the father from the household. Families with twins and triplets are also excluded, which is fairly standard procedure as different child developmental models are likely to apply. In the final step we reduce the sample to those with valid responses on both the child externalising and internalising measure at all sweeps (i.e. who did not attrit from the study). The final study sample includes 6,319 children.

Table 1 Sample selection

Families participating in MCS	N=19,244 ^a
Families participating at child age 3	N=15,588
Families with two natural parents at child age 3	N=11,877 ^b
Families with multiple divorces excluded	N=11,665
Families with mothers as main respondent	N=11,176
Families with twins and triplet excluded	N=11,015
Families participating at all sweeps from 2 to 6	N=7,062
Families with complete child SDQ externalising and internalising sweep 2 to 6 ^c	N=6,319

Notes:

^a 691 families entered in sweep 2

^b Most of those excluded in this step were single mothers (N=2,646) and also excluded were natural parents who were together at sweep 2 but not at sweep 1 (N=908). Natural fathers made up only 63 of those excluded, and 12 were adoptive parents.

^cAs a minimum two items out of five had to be available for each of the four SDQ subscales making up the externalising and internalising scales. Usual norm is a minimum of three items. Criterion was changed as an alternative to imputation.

Measures

Childhood Mental Health

The widely used 25-item Strengths and Difficulties Questionnaire (SDQ; Goodman 1997) was administered to mothers for assessment of child mental health dimensions *externalising* and *internalising*. This instrument consists of 25 items relating to the child's behaviour (e.g. 'often has temper tantrums', 'easily distracted, concentration wanders', 'many fears, easily scared', 'has at least one good friend') rated as not true (0), somewhat true (1), or certainly true (2). Child externalising is based on the subscales conduct problems and hyperactivity/inactivity, whilst child internalising summarises the subscales emotional symptoms and peer problems. Both measures are scored from 0 to 20, with higher scores signifying higher levels of child externalising and internalising symptoms. Changes on the SDQ have been shown to correspond well to changes in clinician-rated child mental health (Mathai et al. 2003), and the SDQ has been found to be as good as the Child Behaviour Checklist at detecting externalising and internalising problems (Goodman and Scott 1999). In the current

study sample the internal consistency of the items making up the scales, across assessments points at child age 3, 5, 7, 11 and 14, ranged from $\alpha=.76$ to $\alpha=.79$ for externalising, and from $\alpha=.60$ to $\alpha=.77$ for internalising.

Paternal Departure

The key independent variable of interest is the permanent departure of the child's natural father from the household at some stage after age 3 (second survey). Information on who lived in the household and their relationship to all other members in the household was provided by the main respondent at each survey round. To measure the incidence of permanent departure of the father, we combine information on the marital or partnership status of the mother at times $t - 1$ and t , and the status of the father at time t . In particular, if the mother's status at time $t - 1$ is married/cohabiting with father, and at time t is no longer living with the child's father, and if the father's status at time t is no longer in the household, we consider this a permanent departure of the father. In our sample of 6,316 families intact at baseline, 20% experienced paternal departures when the cohort child was aged between 3 and 14 years. Throughout the paper we refer to father's departure from the household, though note that in the vast majority of cases (94%) the father becomes absent due to breakdown of the parental relationship, and in a small number of cases (6%) the father died. On account of the small number of deaths, we do not perform separate analyses for this group.

Control Variables

In OLS models predicting child externalising and internalising problems we control for baseline measures (sweep 2): maternal education, maternal ethnicity, and social class based on the UK National Statistics Socio-economic Classification system (NS-SEC) with 13 categories. Additional control variables are maternal age at birth, child gender, child age and age squared in months (time variant), country dummies, and dummies

for study sweep (time variant). All models are weighted to adjust for non-random attrition from the survey (Mostafa 2015).

Methods

Estimation

We employ child fixed effects to address the key issue of endogeneity of parental separation. The equation we estimate is

$$y_{ijt} = \beta_0 + \beta_1 D_{jt} + X'_{ijt} \beta_2 + f_i + \delta_t + u_{ijt} \quad (1)$$

where i denotes the cohort member; j denotes the household; t denotes time ($t = 1$ denotes age 3/survey 2... $t=5$ denotes age 14/survey 6); y_{ijt} is a measure of internalising/externalising behaviour; and D_{jt} is an indicator that takes the value one if parental dissolution has occurred by time t and zero otherwise. Note that, by definition, $D_{j1} = 0$ (as it is departure that occurred by time t ; but we restrict to intact families at time $t=1$). So for instance, if the departure occurred between ages 3 and 5, then $D_{j1}=D_{j2}=D_{j3}=D_{j4}=D_{j5}=1$; if it occurred between ages 5 and 7, then $D_{j1}=0$, $D_{j2}=D_{j3}=D_{j4}=D_{j5}=1$. X_{ijt} is a vector of observed time-varying child age and quadratic age; f_j is a household fixed effect capturing the effects of unobserved time-invariant household characteristics; δ_t is a survey-round dummy; and u_{ijt} is an error term that we assume to be independent and identically distributed.

The coefficient of interest is β_1 , which estimates the effect of father departure on the outcome of interest. It may be that children's outcomes were affected even prior to the dissolution event, for instance due to conflict in the household, though we do not estimate this effect. Rather, if we observe negative (positive) effects on children, we can say that they are worse (better) off after the event than before it, whilst remaining silent on the extent to which their outcomes were affected pre-event.

We modify equation (1) to allow for the effects of parental dissolution to vary depending on the period of childhood it occurred, and for dissolution in early childhood we also separate out short- and medium-term effects. Specifically, we estimate

$$y_{ijt} = \beta_0 + \beta_1 D_{j1} \cdot 1[t = 2|3] + \beta_2 D_{j1} \cdot 1[t = 4|5] + \beta_3 D_{j2} + X'_{ijt} \beta_2 + f_i + \delta_t + u_{ijt} \quad (2)$$

where $D_{j1} = 1$ if dissolution occurs in early childhood (between ages 3 and 7), 0 otherwise; $D_{j2} = 1$ if dissolution occurs in middle to late childhood (between ages 7 and 14), 0 otherwise. In this set-up, β_1 estimates the (short-run) effect of parental dissolution in early childhood on outcomes in mid-childhood (ages 5-7); β_2 is the (medium-run) effect of early childhood dissolution on outcomes in later childhood (ages 11-14), and β_3 is the (short-run) effect of middle to late childhood dissolution (ages 7-14) on late childhood outcomes (ages 11-14).

Analysis

The dependent variables are standardised prior to being entered into regression models, and therefore estimates can be interpreted as standard deviation change in the dependent variable per unit change in the independent variable.

Missing data is addressed in a number of ways. For unit-non response attrition weights developed for the MCS are included in regressions (Mostafa 2015). Item non-response on the main child outcomes is reduced by using a more relaxed criterion for calculating sub scales of the SDQ, as a minimum two items out of five have to be available for each of the four SDQ subscales making up the respective externalising and internalising scales. The norm is a minimum of three items per subscale.² Any missing

² As a robustness check, we ran all analyses using the conventional criteria, which resulted in a slightly smaller sample size, however the results of estimates were substantially the same as those presented in this paper that use a more relaxed criterion.

data on control variables are accounted for by including a dummy variable for missing values.

Results

Descriptives

Table 2 shows descriptive characteristics of the current sample (N=6,319) at age 3, and how it compares to the whole of the MCS sample (N=19,244). The study sample is generally more socioeconomically advantaged by being more highly educated, more affluent, and belong to a higher social class. Furthermore, the sample is less ethnically diverse with 91% of mothers who are White versus 84% in the overall MCS sample. Sample mothers are also older, and have lower levels of depression, and their children have fewer externalising and internalising problems.

Table 2 Characteristics of current sample and whole MCS sample

	Current sample (N=6,319)		Whole MCS sample (N=19,244)		T-test difference (p-value)
	N	Percentage or mean	N	Percentage or mean	
Household highest educational level	6,319		19,204		
NVQ1		5.8% (23.39)		8.3% (27.56)	p<.001
NVQ2		25.8% (43.78)		28.4% (45.10)	p<.001
NVQ3		15.6% (36.31)		14.3% (35.01)	p=.01
NVQ4		39.8% (48.94)		26.2% (43.94)	p<.001
NVQ5		5.8% (23.39)		3.7% (18.81)	p<.001
Overseas		1.8% (13.20)		3.3% (17.94)	p<.001
None of these		5.4% (22.60)		15.9% (36.53)	p<.001
Household highest socioeconomic class	6,287		18,144		
SEC1		25.8% (43.75)		18.35% (38.71)	p<.001
SEC2		14.3% (34.98)		12.0% (32.51)	p<.001
SEC3		13.7% (34.35)		10.4% (30.46)	p<.001
SEC4		10.1% (30.16)		9.7% (29.63)	p=.30
SEC5		36.2.0% (48.05)		49.6% (50.00)	p<.001
Household mean annual income ^a	6,306	£21,300 (11,804)	19,120	£16,202 (11,158)	p<.001
Maternal ethnicity (white)	6,319	90.5% (29.34)	19,153	83.50% (37.13)	p<.001
Father departure					
Age 9 months to 3 years	0	0%	16,376	9.4%	-
Age 3 to 5	6,319	4.4% (20.47)	15,244	7.0%	p<.001
Age 5 to 7	6,319	4.0% (19.57)	14,267	6.2%	p<.001
Age 7 to 11	6,319	7.4% (26.13)	12,922	8.9%	p<.001
Age 11 to 14	6,319	4.4% (20.58)	11,357	7.0%	p<.001
Age 9 months to 14 years	6,319	20.1% (40.09)	12,047	37.1%	p<.001
Child sex (female)	6,319	50.8% (50.00)	19,244	48.6% (49.98)	p<.001
Maternal age at birth	6,319	30.2 (5.08)	19,234	28.31 (6.01)	p<.001
Maternal depression	6,029	2.80 (3.19)	13,590	3.28 (3.76)	p<.001
Partner relationship quality	6,004	4.05 (0.75)	11,179	4.02 (0.77)	p<.001
Child externalising	6,319	6.10 (3.52)	14,778	6.77 (3.84)	p<.001
Child internalising	6,319	2.63 (2.39)	14,781	2.97 (2.58)	p<.001

Notes:

Figures are for baseline at child age 3 if not otherwise indicated.

NVQ=National Vocational Qualifications (higher levels signify higher educational achievement and training)

SEC1= Higher managerial, administrative and professional, SEC2= Small employers and self-employed, SEC3= Small employers and self-employed, SEC4= Lower supervisory and technical, SEC5= Semi-routine and routine.

Standard deviations are shown in parentheses.

^a OECD equalised annual income.

Table 3 shows the characteristics of the sample at baseline (age 3), respectively for those families who remain intact and for those who experience paternal departure from the household during the period examined in this study. Families that subsequently experience the father's departure (20%) are less socioeconomically advantaged (educational level, social class, household income). Mothers are more likely to be White, slightly younger, and report higher levels of depression. Their children display higher levels of adjustment problems, especially externalising problems ($p < .001$), but also more internalising problems ($p < .05$). These differences by observable characteristics highlight the fact that the event is not random, and underline the importance of accounting for potential selection on unobservables in the empirical analysis. In terms of timing of paternal departure, 22% of break-ups took place between the ages of 3 and 5, 20% between age 5 and 7, 36% between 7 and 11, and 22% between ages 11 and 14. The higher figure between ages 7 and 11 should be considered in the light of a higher number of years between these sweeps, and therefore the incidence of departure seems evenly distributed across the time period covered in this study.

Table 3 Characteristics of families: intact families versus families with father departure

	Intact families (N=5,048)	Father departure families (N=1,271)	T-test difference (p-value)
Household highest educational level			
NVQ1	5.2%	8.4%	p < .001
NVQ2	24.8%	30.1%	p < .001
NVQ3	15.4%	16.4%	p = .41
NVQ4	41.7%	32.0%	p < .001
NVQ5	6.3%	3.7%	p < .001
Overseas qualifications	1.8%	1.7%	p = .72
None of these	4.8%	7.8%	p < .001
Household highest socioeconomic class	5,024	1,263	
SEC1	26.7%	18.3%	p < .001
SEC2	14.9%	11.8%	p < .01
SEC3	14.0%	12.4%	p = .15
SEC4	9.8%	11.3%	p = .11
SEC5	33.7%	46.2%	p < .001
Household annual income ^b	£22,069 (12,041)	£18,253 (10,268)	p < .001
Maternal ethnicity (white)	89.7%	93.6%	p < .001
Child sex (female)	50.5%	51.9%	p = .37
Maternal age at birth	30.6 (4.94)	29.0 (5.41)	p < .001
Maternal depression age 3	2.64 (3.04)	3.43 (3.63)	p < .001
Partner relationship quality	4.15 (0.69)	3.69 (0.88)	p < .001
Child externalising behaviour age 3	5.98 (3.46)	6.61 (3.68)	p < .001
Child internalising behaviour age 3	2.60 (2.39)	2.77 (2.37)	p < .05

Notes:

Figures are for baseline at child age 3 if not otherwise indicated.

SEC1= Higher managerial, administrative and professional, SEC2= Small employers and self-employed, SEC3= Small employers and self-employed, SEC4= Lower supervisory and technical, SEC5= Semi-routine and routine.

Standard deviations are shown in parentheses.

^a OECD equalised annual income.

Main Effects

Estimates from equation (1), based on unadjusted and adjusted OLS models and fixed effect models (Columns 1-3 respectively) are shown in Table 4. The estimated effects of dissolution on child externalising and internalising behaviour are higher in the unadjusted OLS model, reducing in the adjusted OLS model, and diminishing further in the FE model that accounts for unobserved time-invariant differences between the families. In the fixed effects model, however, there remains a significant effect of

dissolution on both child externalising (0.07 *SD*, $p < .01$) and particularly child internalising (0.13 *SD*, $p < .001$). This illustrates the upward bias inherent in OLS estimates of the effect of paternal departure on children's outcomes, which reduces when the effects of unobserved time-invariant heterogeneity correlated with departure is purged from the estimates.

Table 4 Effects of father departure on child externalising and internalising

	OLS unadjusted		OLS adjusted		Fixed effects (FE)	
	B	S.E	B	S.E	B	S.E
EXTERNALISING						
Father departure	0.27***	0.021	0.18***	0.021	0.07**	0.028
R ²		.06		.09		.58
INTERNALISING						
Father departure	0.23***	0.021	0.17***	0.021	0.13***	0.025
R ²		.05		.05		.46
Observations		31,595		31,595		31,595
N		6,319		6,319		6,319

Notes:

Unadjusted OLS model adjusted for sweep. Adjusted OLS model adjusted for: child gender, child age, child age squared, maternal age at birth, ethnicity, maternal educational level, household social economic class, household income, UK country, survey sweep. FE model adjusted for child age and child age squared.

Dependent variables are standardized.

Standard errors are robust.

† $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Heterogeneity

Table 5 shows the effects by gender. In the OLS model all estimates for child externalising and internalising problems are significant for males and females. Whilst effects of departure appear larger for males' internalising problems than for females, this gender difference is not statistically significant. When we account for endogeneity, we see in the FE model that father's departure from the household adversely affects internalising symptoms of both males and females, and to a similar degree (0.13 *SD*, $p < .001$). For externalising, however, only boys are negatively affected (0.09 *SD*, $p < .01$).

Table 5 Effects of father departure on child externalising and internalising – by gender

MALES				
	OLS adjusted		FE	
	B	S.E	B	S.E
EXTERNALISING				
Father departure	0.18***	0.032	0.09**	0.034
R ²		.06		.59
INTERNALISING				
Father departure	0.18***	0.031	0.13***	0.031
R ²		.05		0.48
Observations		15,545		15,545
N		3,109		3,109
FEMALES				
	OLS adjusted		FE	
	B	S.E	B	S.E
EXTERNALISING				
Father departure	0.18***	0.027	0.05	0.031
R ²		.07		0.54
INTERNALISING				
Father departure	0.15***	0.030	0.13***	0.034
R ²		.05		.44
Observations		16,050		16,050
N		3,210		3,210

Notes:

Unadjusted OLS model adjusted for sweep. Adjusted OLS model adjusted for: child age, child age squared, maternal age at birth, ethnicity, maternal educational level, household social economic class, household income, UK country, survey sweep. FE model adjusted for child age and child age squared.

Dependent variables are standardized.

Standard errors are robust.

†p<.10, *p<.05, ** p<.01, ***p<.001.

Maternal education is examined by high education (NVQ 3 to 5) vs. low education (NVQ level 1 or 2, or no qualifications). Turning to results of estimates of departure effects by high and low maternal education, we see from Table 6 that estimates for both externalising and internalising problems are significant for children from households of high as well as low education. Estimates from both models are larger for children of mothers with low education, especially for internalising problems and less so for externalising. In the FE model the effect of departure on child internalising is 0.16 *SD* for the low education group and 0.09 *SD* for mothers with high education.

FE results for effect on externalising is 0.09 *SD* for mothers with lower education and 0.07 *SD* for the more highly educated group.

Table 6 Effects of father departure on child externalising and internalising, by maternal education

	LOW EDUCATION			
	OLS adjusted		FE	
	B	S.E	B	S.E
EXTERNALISING				
Father departure	0.20***	0.33	0.08*	0.036
R ²		.06		.56
INTERNALISING				
Father departure	0.22***	0.033	0.16***	0.038
R ²		.04		.47
Observations	11,705		11,705	
N	2,215		2,215	
	HIGH EDUCATION			
	OLS adjusted		FE	
	B	S.E	B	S.E
EXTERNALISING				
Father departure	0.15***	0.027	0.06*	0.029
R ²		.06		.58
INTERNALISING				
Father departure	0.12***	0.027	0.09**	0.033
R ²		.02		.43
Observations	19,330		19,330	
N	3,866		3,866	

Notes:

Unadjusted OLS model adjusted for sweep. Adjusted OLS model adjusted for: child gender, child age, child age squared, maternal age at birth, ethnicity, household social economic class, household income, UK country, survey sweep. FE model adjusted for child age and child age squared.

Low education: NVQ level 1 or 2, or no qualifications. High education: NVQ 3 to 5.

Dependent variables are standardized.

Standard errors are robust.

†p<.10, *p<.05, ** p<.01, ***p<.001.

The third potential effect modifier is the quality of the parental relationship. This is assessed when all families are intact (child age 3) using an adapted version of the Golombok Rust Inventory of Marital State (GRIMS, Rust et al. 1986), which is

administered to the main respondent via self-completion.³ We divide this into quintiles, so higher quintiles represent better quality relationships at age 3. Results are shown in Table 7. Focusing on the FE estimates, we see that there is a significant effect of departure on externalising behaviour for the top two quintiles (0.17 *SD*, $p < .01$ and 0.13 *SD*, $p < .05$). The lower quintiles estimates are smaller and nonsignificant except for the second where there is a borderline effect (0.06 *SD*, $p < .10$), suggesting that children of mothers with the lowest scores on the parental relationship measure are least affected by paternal departure in terms of externalising symptoms. The difference in estimates between the top and the bottom quintiles is borderline statistically significant but no other quintile groups differ significantly. In terms of child internalising problems, reported in the lower panel of Table 7, a somewhat different pattern emerges. Estimates of the effects of departure on child internalising are largest for the top quintile (0.19 *SD*, $p < .01$), and also for the bottom quintile (0.16 *SD*, $p < .001$), but estimates are noticeably lower and non-significant for the groups in-between, with the exception of the second quintile where the effect is borderline significant.⁴

³ Five items are used: 'Partner is sensitive and aware of my needs', 'Partner does not listen to me', 'Sometimes I feel lonely even when I am with my partner', and 'I suspect we may be on the brink of separation' (rated from 1=strongly agree to 5=strongly disagree), and 'How happy are you in your relationship?' (rated from 1 to 7). Before summing the items by taking the mean the first item was reverse coded, and the score on the last item was reduced from seven to five. Scores on the final measure ranged from 1 to 5, with higher scores indicating a better parental relationship. Items in the measure demonstrate a very good inter-item reliability of $\alpha = .82$. The mean score was 4.05 ($sd = 0.75$), which means that mothers generally rated their relationship with their partner as very good.

⁴ Additional analyses showed that father absence due to death showed large borderline statistically significant effects on child internalising (0.30 *SD*, $p < .07$), which may account for larger effects for parents with a good relationship. Therefore analyses were also carried out on a sample that excluded fathers who died but results show the same concave pattern.

Table 7 Effects of father departure on child externalising and internalising, by quality of parental relationship

EXTERNALISING		OLS adjusted		FE	
		B	S.E	B	S.E
Relationship quality					
Quintile 1 (lowest)	Father departure	0.09*	0.035	0.05	0.039
	R ²		.10		.57
	Observations		7,845		7,845
	N		1,569		1,569
Quintile 2	Father departure	0.01	0.045	0.09 [†]	0.050
	R ²		.09		.56
	Observations		5,615		5,615
	N		1,123		1,123
Quintile 3	Father departure	0.18**	0.067	0.07	0.071
	R ²		.09		.56
	Observations		4,155		4,155
	N		831		831
Quintile 4	Father departure	0.21***	0.053	0.13*	0.056
	R ²		.08		.56
	Observations		5,865		5,865
	N		1,173		1,173
Quintile 5 (highest)	Father departure	0.12*	0.061	0.17**	0.061
	R ²		.07		.57
	Observations		6,540		6,540
	N		1,308		1,308
INTERNALISING					
		OLS adjusted		FE	
		B	S.E	B	S.E
Relationship quality					
Quintile 1 (lowest)	Father departure	0.08*	0.037	0.16***	0.045
	R ²		.05		.46
	Observations		7,845		7,845
	N		1,569		1,569
Quintile 2	Father departure	0.03	0.044	0.09 [†]	0.051
	R ²		.06		.46
	Observations		5,615		5,615
	N		1,123		1,123
Quintile 3	Father departure	0.08	0.069	0.06	0.076
	R ²		.07		.44
	Observations		4,155		4,155
	N		831		831
Quintile 4	Father departure	0.14**	0.057	0.09	0.065
	R ²		.03		.42
	Observations		5,865		5,865
	N		1,173		1,173
Quintile 5	Father departure	0.19**	0.060	0.19**	0.062
	R ²		.04		.43
	Observations		6,540		6,540
	N		1,308		1,308

Notes:

Unadjusted OLS model adjusted for sweep. Adjusted OLS model adjusted for: child gender, child age, child age squared, maternal age at birth, ethnicity, maternal educational level, household social economic class, household income, UK country, survey sweep. FE model adjusted for child age and child age squared.

Dependent variables are standardized. Standard errors are robust.

[†]p<.10, *p<.05, ** p<.01, ***p<.001.

Timing and Duration of Effects

We next analyse how the effects of paternal departure from the household vary across childhood, looking separately at the effects in mid-childhood (ages 5-7) and late childhood (ages 7-14). In late childhood, we can also separate the effects of departure that has occurred in early childhood from the effects of departure that has occurred later on in childhood, to see the extent of how the timing of the event and time since the event matter, and understand persistence/fade out/in effects. All timing and duration effects are modelled simultaneously.

Results of the FE regression in Table 8 show that there is no significant effect of early parental departure (age 3 to 7) on child externalising behaviour in mid or late childhood (ages 5 to 7, 11 to 14). Children's externalising outcomes in late childhood (11-14) are affected by departure that occurs in middle to late childhood (7-14) (0.09 *SD*, $p < .01$).

The effects on child internalising symptoms are shown in the lower panel of Table 8. Parallel to findings for externalising problems, the FE model indicates that there is no significant effect of early paternal departure on children's internalising problems in mid childhood, but in late childhood we find a borderline significant increase in internalising symptoms (0.07 *SD*, $p < .10$). However, in term of paternal departure in middle to late childhood we find a large increase in child internalising symptoms (0.17 *SD*, $p < .001$).

Table 8 Temporal effects of father departure on child externalising and internalising problems

	OLS adjusted		FE	
	B	S.E	B	S.E
EXTERNALISING				
Early father departure – short term effects ^a	0.18***	0.039	0.03	0.041
Early father departure – medium term effects ^b	0.19***	0.034	0.05	0.039
Later father departure – short term effects ^c	0.16***	0.033	0.09**	0.028
R ²		.09		.58
INTERNALISING				
Early father departure – short term effects ^a	0.12**	0.040	0.06	0.045
Early father departure – medium term effects ^b	0.14***	0.034	0.07 [†]	0.044
Later father departure – short term effects ^c	0.23***	0.034	0.17***	0.031
R ²		.05		.46
Observations		31,595		31,595
N		6,319		6,319

Notes:

^a Father departure age 3 to 5 on child outcomes age 5 and 7, and father departure age 5 to 7 on child outcomes age 7.

^b Father departure age 3 to 7 on child outcomes age 11 to 14.

^c Father departure age 7 to 11 on child outcomes age 11 and 14, and father departure age 11 to 14 on child outcomes age 14.

Unadjusted OLS model adjusted for sweep. Adjusted OLS model adjusted for: child gender, child age, child age squared, maternal age at birth, ethnicity, maternal educational level, household social economic class, household income, UK country, survey sweep. FE model adjusted for child age and child age squared.

Dependent variables are standardized.

Standard errors are robust.

[†]p<.10, *p<.05, ** p<.01, ***p<.001.

Effects across childhood by gender are shown in Table 9. The results reveal that the detrimental effect of departure in later childhood on externalising behaviour in late childhood is driven by effects on males (0.15 *SD*, p<.01), whilst the estimate for females is not statistically significant. For internalising problems on the other hand, it is noticeable that females are affected by departure of the father in early childhood, not in the short term, but longer term in late childhood we see a significant increase in symptoms (0.13 *SD*, p<.05). Father's departure in middle to late childhood intensifies internalising problems in late childhood amongst both males (0.20 *SD*, p<.001) and females (0.14 *SD*, p<.01).

Table 9 Temporal effects of father departure on child externalising and internalising, by gender

	Boys (FE)		Girls (FE)	
	B	S.E	B	S.E
EXTERNALISING				
Early father departure – short term effects ^a	-0.01	0.061	0.07	0.055
Early father departure – medium term effects ^b	0.05	0.057	0.05	0.054
Later father departure – short term effects ^c	0.15**	0.042	0.04	0.038
R ²	.59		.54	
INTERNALISING				
Early father departure – short term effects ^a	0.03	0.069	0.09	0.061
Early father departure – medium term effects ^b	0.01	0.062	0.13*	0.061
Later father departure – short term effects ^c	0.20***	0.044	0.14**	0.043
R ²	.48		.44	
Observations	15,545		16,050	
N	3,109		3,210	

Notes:

^a Father departure age 3 to 5 on child outcomes age 5 and 7, and father departure age 5 to 7 on child outcomes age 7.

^b Father departure age 3 to 7 on child outcomes age 11 to 14.

^c Father departure age 7 to 11 on child outcomes age 11 and 14, and father departure age 11 to 14 on child outcomes age 14.

Unadjusted OLS model adjusted for sweep. Adjusted OLS model adjusted for: child gender, child age, child age squared, maternal age at birth, ethnicity, maternal educational level, household social economic class, household income, UK country, survey sweep. FE model adjusted for child age and child age squared.

Dependent variables are standardized.

Standard errors are robust.

†p<.10, *p<.05, ** p<.01, ***p<.001.

Mechanisms

Two potential channels through which the departure of the father may affect children's outcomes are through its effect on maternal mental health and household income. We explore these in Table 10, where we show the estimated effects of departure on maternal mental health and on household income. We estimate effects at different stages of childhood, and as in the previous section we allow them to vary depending on when in childhood the departure occurs.

In terms of maternal mental health, OLS models show moderate and significant effects throughout, indicating that paternal departure has a detrimental effect on maternal mental health both in the shorter-term following separation but also in the medium

term. The FE estimates are somewhat reduced. Paternal departure in early childhood has no significant effect on increases maternal depressive symptoms in mid-childhood, and later in childhood there is a trend towards an improvement in maternal mental health following early parental dissolution (-0.08 *SD*, $p < .10$). Paternal departure in middle to late childhood negatively affects maternal mental health in late childhood (0.15 *SD*, $p < .001$).

Regarding household income, shown in the lower panel of Table 10, we find large negative correlations between departure and household income, which reduce but remain sizeable in the FE model. The pattern is such that the loss of household income following paternal departure from the household is largest for dissolutions that occur in middle to late childhood.

Table 10 Temporal effects of father departure on maternal mental health and household income

	OLS adjusted		FE	
	B	S.E	B	S.E
MATERNAL MENTAL HEALTH				
Early father departure – short term effects ^a	0.38***	0.050	0.09	0.053
Early father departure – medium term effects ^b	0.24***	0.039	-0.08 [†]	0.048
Later father departure – short term effects ^c	0.32***	0.038	0.15***	0.034
R ²		.05		.53
Observations		30,568		30,568
HOUSEHOLD INCOME				
Early father departure – short term effects ^a	-0.59***	0.025	-0.40***	0.029
Early father departure – medium term effects ^b	-0.80***	0.022	-0.51***	0.026
Later father departure – short term effects ^c	-0.91***	0.019	-0.65***	0.020
R ²		.42		.67
Observations		31,390		31,390
N		6,278		6,278

Notes:

^a Father departure age 3 to 5 on maternal outcomes age 5 and 7, and father departure age 5 to 7 on maternal outcomes age 7.

^b Father departure age 3 to 7 on maternal outcomes age 11 to 14.

^c Father departure age 7 to 11 on maternal outcomes age 11 and 14, and father departure age 11 to 14 on maternal outcomes age 14.

Unadjusted OLS model adjusted for sweep.

Unadjusted OLS model adjusted for: ethnicity, maternal educational level, household social economic class, household income, UK country, survey sweep.

Unadjusted OLS model adjusted for: ethnicity, maternal educational level, household social economic class, UK country, sweep. Dependent variables are standardized.

Standard errors are robust.

[†] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

A childhood event such as father's permanent departure has the potential to affect child adjustment, and although many previous studies exist, only few properly account for the well-known problems of endogeneity of father's departure and child functioning. Using a large sample from the UK Millennium Cohort Study, that has followed children from an early age through to early adolescence, we examine effects of paternal departure on child externalising and internalising problems. A child fixed effects approach is used to account for unobserved confounding factors. A key contribution is to investigate the important aspect of timing of father's departure and duration of effects. We also consider heterogeneity in effects along several dimensions.

In summary, we find father departure to have a negative effect on child functioning by increasing internalising symptoms in particular. There are no short-term effects of early departure, but over time girls show an increase in internalising symptoms. Departure of the father in later childhood is associated with an increase in internalising problems in both boys and girls, but only boys exhibit higher levels of externalising behaviours. High maternal education is a protective factor, but children are more adversely affected in families where parents have a better quality relationship prior to the departure.

In relation to gender differences, our analysis highlights the importance of considering timing of and timing since the event: overall, we found no evidence of father's departure affecting boys more than girls, in line with Amato (2010). However, striking gender differences emerged in examining effects by timing and duration: only boys experienced an increase in their externalising problems following paternal departure, and only in the context of the father becoming absent in the later stage of childhood (between age 7 and 14). Boys were also sensitive during this later developmental period in terms of increases in internalising behaviours. Girls did not exhibit increases

in externalising problems, but they experienced increases in their internalising symptoms following paternal departure regardless of whether this event happened in early or in later childhood. However, father's departure in early childhood appeared to have a delayed - or a *sleeper effect* on girls' internalising problems, as significant effects were only evident in early adolescence. Girls' vulnerability to early family disruption may be related to females tending to show higher levels of empathy (Eisenberg and Lennon 1983), which is thought to be linked to the development of depressive symptoms (Zahn-Waxler et al. 1991). In our sample, and in line with the wider prevalence literature (Bongers et al 2003), girls show a significant increase in internalising symptoms in adolescence, and the delayed effect we find in this study seems to coincide with this spike. It is also plausible that divorced mothers impose their problems more on their daughters than their sons, possibly more so as girls age, which may account for the delayed effect on girls internalising symptoms of early childhood father departure.

We find that children of highly educated mothers are less adversely affected following their father's departure. This result mirrors Mandemakers and Kalmijn (2014) who also used a large cohort sample. Children tend to stay with their mothers after family dissolution, and it is conceivable that highly educated mothers are better equipped with personal resources and skills for supporting their children following the father's departure. Further study of the underlying mechanisms is warranted, such as whether better-educated mothers are able to maintain adequate parenting skills, to seek out social support from others such as grandparents, or maintain better mental health following the event. Mothers with higher education are perhaps also less likely to move due to economic strains, and their children may therefore be less likely to change school and experience disruption to peer relationships.

The quality of the parental relationship prior to father's departure moderates the effect of family disruption on child functioning. Children whose parents enjoyed a good

relationship experience the highest increase in externalising problems following father's departure. For internalising outcomes, children at both ends of the distribution were affected most adversely, meaning that children of mothers with the best and also those with the poorest partner relationships deteriorated the most following paternal departure. Our results are in support of the stress relief hypothesis (Wheaton 1990), at least in relation to child externalising symptoms.

We examined some of the mechanisms that may contribute to the detrimental effect on children of paternal departure. When the father became absent in early childhood, maternal mental health showed an improvement, not in the short-term, but in the longer term (four to eleven years after the event). However, father departure in later childhood was associated with detrimental effects on maternal mental health, at least in the short term, although we do not yet have data that elucidate longer-term impact on mothers. It is possible that with time there will be a positive impact on maternal mental health as observed for departure in early childhood. A previous study has shown a similar pattern with an initial decline and later increase in maternal mental health (Lorenz et al. 2006); whilst Andreß and Bröckel (2007) found that mothers experienced a decline in their wellbeing leading up to divorce, but afterwards there was an improvement. It seems that mothers are able to recover from this critical family event in terms of their psychological functioning: with remarriage or recoupling possibly playing an important part of this process (Johnson and Wu 2002).

Regarding the impact on household income on father departure, we found large reductions following this event, particularly when the departure occurred in middle to late stages of childhood. A decline in income may force the family to move house, and the child to move school and therefore be uprooted from his or her familiar surroundings and peers. This process may be especially detrimental to older children and early adolescents, for whom peer relationships have become increasingly

important (Parker et al. 2006), which may be an explanatory factor for the larger impact on child wellbeing when the father departs later in childhood.

Our results indicate the importance of accounting for unmeasured confounding: in adjusted OLS models the effect sizes are consistently higher than the fixed effect estimates, thereby overstating the adverse effects on children's outcomes. Nonetheless, fixed effects models show that following paternal departure, children exhibit significant, albeit small, increases in both externalising and internalising symptoms. This reduction in bias using models that account for unmeasured confounding is echoed in previous studies (McLanahan et al. 2013). The higher effects on child internalising symptoms compared to externalising are also in line with previous studies (Amato and Anthony 2014, Strohschein 2005).

Despite the number of strengths of this study, there are limitations to our approach that warrant discussion. First, whilst the fixed effects analytical approach deals efficiently with time invariant confounders, it is not immune to unobserved factors that vary over time *within* families that affect both paternal departure and child mental health functioning. For example, the onset or escalation of domestic violence in the household, child abuse, parent alcohol or substance use, or critical illness, could be significant causal factors for the father becoming absent and for child conduct and emotional problems. The potential bias depends not only on the prevalence of these events, but the crucial threats to our fixed effects estimates are any changes that may occur over time.

A second limitation relates to the sample, which are all intact families at child age three when child mental health was first measured. We are therefore not able to shed light on the impact of paternal departure in very early childhood from infancy to age three. It is possible that children are affected only minimally at this very young age, similarly to children whose father departed between age 3 and 7. Although, it is equally possible

that consequences for children who experience the loss of a parent before the age of three are amplified at this attachment-sensitive stage in development (Bowlby 1960).

In terms of generalisability of our study results, our analytical sample included families with two natural parents still intact at child age three. These were more affluent, better educated and mothers had better mental health functioning compared to the nationally representative MCS sample as a whole. Our estimates are therefore likely to be conservative as we found that children of better educated mothers experienced less detrimental effects of father departure.

We also note that our study considers the effects after the departure, and not the entire process through which it may have affected children. It is conceivable that children's symptoms and behaviour are affected prior to the departure (Arkes 2015) – indeed we saw that children who went on to experience paternal departure were already exhibiting higher levels of externalising problems compared to children who remained in intact families – but this is not considered in the current study.

In conclusion, our study highlights the importance of accounting for unmeasured confounding in estimating the causal effects of paternal departure on children's outcomes, with OLS methods overstating the adverse effects relative to fixed effect methods. Nonetheless, the event clearly has a detrimental effect on children's externalising and internalising symptoms, with the latter being more affected. Moreover, we find that the effects are more pronounced when the event takes place later in childhood, but there are important gender differences as girls' internalising is adversely affected later on by an early break-up. High maternal education is a protective factor that cushions negative effects of this event on child internalising symptoms. Understanding how the effects manifest themselves as children move through adolescence and beyond is an important area for future research as new data become available as the cohort ages.

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Data availability

Data for the Millennium Cohort Study used in this paper is available from the UK

Data Service. <https://www.ukdataservice.ac.uk/>

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