Family structure and socio-emotional wellbeing in the early years: a life course approach

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Abstract

Children living in reconstituted and lone parent families are at greater risk of poorer socio-emotional wellbeing than those in couple families. A life course approach can help us to understand the dynamics of family structure and how they influence child wellbeing, through consideration of sensitive and critical periods, accumulation, and trajectories of stability or change. We do this using data on 10,357 children from the UK Millennium Cohort Study from infancy to middle childhood. Family structure (natural couple, lone parent, reconstituted family) was measured at 9 months, 3, 5 and 7 years. We used a structured life course approach to examine how family structure might influence socio-emotional wellbeing throughout childhood. We also considered the role of early-life selection, and cumulative poverty (number of sweeps spent in income poverty). We found no evidence of sensitive or critical periods for exposure to certain family types. A measure capturing trajectories of family structure stability or change was as predictive of socio-emotional wellbeing at age 7 as a saturated measure representing all permutations of family structure over time. Compared to children living in a natural couple family throughout, all other groups were more likely to experience poor socio-emotional wellbeing, although children who were living in a natural couple family which transitioned to a lone parent family had a lower prevalence ratio (PR 1.80 [95% confidence interval: 1.54, 2.10]) than the other trajectory types, such as lone parent family throughout (PR=2.77 [2.34, 3.29]), or a lone parent family which transitioned to a reconstituted family (2.66 [1.99, 3.56]). Number of sweeps spent in a lone parent or reconstituted family was also as predictive of poor socio-emotional wellbeing as the saturated model, with the elevated risk increasing incrementally with every sweep spent in either of these family types (PR=1.86 [1.52, 2.26]) for 1 sweep, rising to 2.87 [2.46, 3.56] for 4). The association between both family structure measures and socio-emotional wellbeing were, in most cases, substantially attenuated after adjustment for early-life selection factors (such as maternal social class and separation of the mother's parents in childhood) and cumulative poverty throughout childhood. This analysis confirms that policies to provide support to vulnerable families in the early years and to reduce poverty are likely to benefit child wellbeing.

Introduction

Significant changes have occurred over recent decades in the family environments of children, including dramatic rises in lone parenthood and the incidence of family reconstitution (Bradshaw 2011; Ferri & Smith, 2003). Cross-sectional evidence has shown that children from lone parent and reconstituted families are at increased risk of poorer socio-emotional health in childhood (Amato & Keith, 1991; Dunn, Deater-Deckard, Pickering, O'Connor, & Golding, 1998; McMunn, Nazroo, Marmot, Boreham, & Goodman, 2001; Pearce, Lewis, & Law, 2013; Wadsworth, Burnell, Taylor, & Butler, 1985), although, due to the fluidity of family structure, it is important to examine these relationships longitudinally.

In life course epidemiology there are several complementary perspectives regarding the ways in which an individual's environment might affect their health and wellbeing over time. These have traditionally been examined across the whole of the life course, although they are also relevant over shorter periods of time, such as throughout childhood. They therefore might be used to enhance our understanding of the relationship between family structure dynamics and child socio-emotional wellbeing. The first perspective is referred to as *accumulation*, whereby the longer spent in adverse circumstances the greater the negative impact on health (Mishra et al., 2009). It is possible that potential negative effects of long-term lone parenthood on child socio-emotional wellbeing may strengthen over time, as exposure to economic hardship accumulates; on the other hand a child's wellbeing may improve with time, for example, as the level of conflict resulting from an initial family breakdown subsides (Amato & Keith, 1991). The second perspective pays more attention to the timing of exposure and hypothesises that there are particular periods during which exposures will have greater (*sensitive period*) or essential/irreversible (*critical period*) effects on health (Mishra et al., 2009). For example there is evidence that younger children find it easier than adolescents to adapt to a natural parent re-partnering (Rodgers & Pryor, 1998). A third perspective proposes that transitions or continuity in an exposure can influence outcomes (Hardy, Mishra & Kuh, 2008). Particular transitions in family circumstances may be especially influential for child wellbeing; for example the formation of step-families might be

protective (through buffering against economic hardship), or stressful (due to changing relationship dynamics in the household) for children (Amato & Keith, 1991). A fourth perspective refers to social and health selection, whereby individuals have a greater or lesser likelihood of experiencing particular health and social statuses based on earlier experiences or exposures (Graham & Power, 2004). For example, mothers born into more disadvantaged backgrounds are more likely to experience relationship breakdown and to have poorer mental wellbeing (both of which may in turn influence the socio-emotional health of their child) (Conger, Conger, & Martin, 2010). However, few studies have investigated if any of these potential life course influences can be demonstrated empirically.

Analysis of the UK Millennium Cohort study examined whether transitions between family types (married, cohabiting, lone) between two time points were associated with behaviour at the start of primary school (Kiernan & Mensah, 2010). Compared to children living with married parents at age 9 months and at 5 years, children who lived in other family types (such as stable lone parent families, or where married parents separated and a new family was formed) were more likely to display externalising behavioural problems at age 5 years, before and after adjustment for a range of maternal socio-economic, demographic and health factors. Differences were also seen in internalising behaviour, although these were removed after adjustment for maternal characteristics. Two US studies set out to examine multiple life course processes through which family structure might be related to child socio-emotional wellbeing. One aimed to disentangle the independent effects of continuous exposure to lone parent and reconstituted families, and the number and nature of any transitions experienced, on socio-emotional wellbeing. The authors found evidence of cumulative effects of living in a lone parent or reconstituted family; they also found that behavioural problems increased with the number of transitions experienced, but that the type of transition mattered (a transition into a lone parent family by age 12 was associated with poorer behaviour scores, whereas a transition into a reconstituted family was not) (Magnuson & Berger, 2009). The other study found that time spent in a lone parent family between infancy and age 4 years

was associated with poorer socio-emotional wellbeing (suggesting accumulation), but that this relationship was removed after adjustment for baseline maternal characteristics (suggesting selection). The number of transitions in family structure ('instability') between ages 5 and 14 years were also predictive of behavioural problems over the same period, and remained so after adjustment for maternal characteristics and cumulative lone parenthood in the early years (Fomby & Cherlin, 2007). These findings may indicate that transitions in family structure, and the frequency of change, influence child wellbeing; they might also suggest that adolescence is a sensitive period for exposure to lone parenthood or reconstituted families, whereas early childhood is not.

It can be hard to disentangle which life course processes are truly occurring, due to the overlap between them (Hallqvist, Lynch, Bartley, Lang & Blane 2004). Mishra and colleagues have proposed a structured approach for considering how exposure via the various life course processes might influence an outcome of interest (Mishra et al., 2009). Firstly a model is estimated, containing a saturated exposure (comprising all permutations of status over time) to predict the outcome. Next, a number of alternative models are estimated, containing measures representing the different life course processes. Each life course model is compared (in terms of model fit using likelihood ratio (LR) tests) with the model containing the saturated measure. Any life course model which offers a model fit as good as the saturated model is then considered further. Since its proposal, the structured life course approach has been applied in several studies exploring the influence of social circumstances on health across the life course (Birnie, et al 2011; Cooper, Mishra & Kuh, 2011; Gustafsson, Persson & Hammarstrom, 2011; Murray et al., 2011; West et al., 2012 ; Wills, Hardy, Black & Kuh, 2010) and throughout childhood (Evans & Kohli, 1997; Giles et al., 2011; Lin, Leung, Hui, Lam and Schooling, 2011).

In this paper we aimed to investigate the relationships between family structure and socio-emotional wellbeing through early to middle childhood using a structured life course approach. In addition, we examined the potential explanatory roles of early-life selection and cumulative poverty.

Methods

We examined data from the Millennium Cohort Study (MCS), which follows children born in the UK in 2000-2002 and registered for the then universal Child Benefit. Data were downloaded from the UK Data Archive, University of Essex, in April 2014. A disproportionally stratified clustered sampling design was used to over-represent children living in Wales, Scotland and Northern Ireland, disadvantaged areas and areas with high proportions of ethnic minority groups (Plewis, 2004). Surveys were carried out by trained interviewers in the home with the main respondent (usually the mother). The first study contact with the cohort child was around age 9 months (MCS1), when information was collected on 18,818 infants (72% of those approached). We analysed data for a further three sweeps when the children were aged 3 (MCS2), 5 (MCS3) and 7 (MCS4) years. More information on the MCS is reported elsewhere (Connelly & Platt, 2014; Hansen, 2014).

Socio-emotional wellbeing

Socio-emotional wellbeing was assessed at 7 years using the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997), completed by the main respondent. We used the total difficulties score, which is made up of 20 items referring to four components: peer problems, conduct disorders, hyperactivity and emotional problems. We classified children, using recommended cut-offs (Goodman, Rowe, & Gan, 2010; Goodman, 1997), as having 'normal' or 'borderline-abnormal' scores. These cut-offs can be used in clinical or research settings to identify children at risk of psychiatric disorders. We also repeated our final models using linear regression and continuous SDQ scores for total difficulties.

Eighteen percent (2,149) of children had missing scores, mainly due to missing entries on 1-2 items on one or more components. We used a recommended method (Goodman et al., 2010) for imputing missing cases through rescaling the average (where data on just one or two items in any one component were missing). This reduced missing SDQ data to 3% (349).

Longitudinal measures of family structure

Family structure was classified at each sweep as: *natural couple families* consisting of two "natural" (wording used in the survey, meaning biological)

parents, *reconstituted families* (one natural parent and one adoptive/foster or step parent), *lone parent families* (one natural father or mother). The 0.8% (94) of children living in rare family structures (e.g. grandparent families) were excluded due to low numbers.

We considered a number of longitudinal family structure measures, each representing the life course processes outlined below and in Figure 1. These were compared to a saturated measure of family structure, which consisted of all permutations of family structure across the four sweeps. This provided 81 possible permutations (3^4), of which 55 were observed in the MCS (see supplementary data, Table S1).

Critical periods

A critical period was taken to occur when exposure at only a particular time point was of importance, and exposure at any other time was inconsequential. We explored ages 9 months, 3, 5 and 7 years as potential critical periods, whereby only family structure for a particular sweep was included in the model, and status at all other sweeps was held at 0. See Figure 1 for additional descriptions and notation.

Sensitive periods

Sensitive periods were said to occur if the effect of exposure at one point in time was larger than the effects of exposure at other times. We examined sensitive periods at MCS1, 2, 3 and 4 by entering family structure at each of the four sweeps into a single model. Where the risk of borderline-abnormal SDQ associated with exposure at any one sweep appeared to be larger compared to the others, we tested this using the *lincom* command in Stata.

Cumulative exposure

Cumulative measures consisted of time spent in a given state, and were therefore well suited to binary measures of exposure; although when dealing with interval variables (or equally spaced ordinal categorical variables) the value from each time point can be summed over time (Cooper et al., 2011). The family structure variable was made up of three nominal categories (natural couple, lone parent, reconstituted family) and it was not possible to assign quantitative values to these groups. We therefore created binary variables through comparing one group to the other two combined. We considered two cumulative measures. The first combined lone parents

and reconstituted families (baseline natural couple families), because the socio-emotional wellbeing scores of children from lone parent and reconstituted families were similar at age 7 (89% of children in natural couple families had 'normal' SDQ scores, compared to 75% in reconstituted families and 78% lone parent families) (Pearce et al., 2013). This measure referred to the number of sweeps spent either in a lone parent *or* reconstituted family (0-4).

For the second measure we combined *all* couples (natural and reconstituted) to create a baseline group, compared to lone parent families. We examined this measure because, as postulated by Amato and Keith (1991), it may be that the absence of two parental figures is detrimental to child socio-emotional wellbeing, or the resultant economic hardship comes from living in a lone parent as opposed to a couple family. Indeed the prevalence of income poverty at age 7 years was lower for natural couples (16%) and reconstituted (35%) families compared to lone parent families (60%). This cumulative measure therefore referred to the number of sweeps (0-4) spent living in a lone parent family.

There are two approaches to testing for accumulation (Cooper et al., 2011). With 'strict' accumulation, the level of risk would increase linearly with every sweep exposed, whereas for 'relaxed' accumulation the increase in risk does not have to be linear. Because intervals between MCS sweeps were relatively short and not uniform, we took a "relaxed" approach to measuring accumulation.

Family trajectories

This measure was designed to capture stability or change in family structure. As pointed out by Mishra and colleagues, a 'social mobility' model capturing exposures over more than three time points cannot easily be parameterised (Mishra et al., 2009). They suggest that, in these situations, simpler models ought to be identified. We constructed a measure made up of groups specified *a priori* (*Natural couple throughout, Lone family throughout, Natural couple to lone, Lone to reconstituted family, Natural couple to reconstituted family*). An additional group (*Lone to natural couple*) was included because it was relatively common in the sample (2.6%, N=319); and the smallest groups were combined into the *'Other'* category (comprising children who had experienced two or more changes in family structure, or who were living in a reconstituted family at age 9 months (Table S1)). This measure did not take into account timing of any change.

Poverty

Household income (including benefits) was reported in bands by the main respondent at each sweep. Income poverty was defined as a household income of below 60% of the contemporary national median, before housing costs, and using a modified OECD equivalence scale (Bradshaw & Holmes, 2010). This measure of poverty was chosen because it was collected at, and comparable across, all sweeps. It is also widely employed by researchers and used to monitor national targets and compare international trends. The risk of poor socio-emotional wellbeing has been shown to increase with time spent in poverty (Kiernan & Mensah, 2009; McLeod & Shanahan, 1996; Najman et al., 2010). Therefore we examined the number of sweeps spent in poverty between 9 months and 7 years ranging from 0 (not living in poverty at any sweep) to 4 (living in poverty at all sweeps). We confirmed that it was a suitable longitudinal measure for predicting socio-emotional wellbeing by comparing it to a saturated measure capturing all poverty combinations across the 4 sweeps (LR test p=0.62). The association between poverty and socio-emotional wellbeing is shown in Table 1. Missing income data were multiply-imputed by the data owners (Hansen, 2014).

Potential early-life selection factors

We examined a number of early-life selection factors that were likely to have occurred prior to pregnancy and might have influenced the likelihood of mothers moving into certain family types (Ferri & Smith, 2003; Pearce et al., 2013): whether the mother's parents had permanently separated before she was aged 18 years, her age at MCS child's birth, ethnicity (collapsed into white and non-white due to small numbers), social class (National Statistics Socio-economic Classification [NS-SEC]) and highest educational qualification. All of these selection variables, except ethnicity, were associated with family structure and socio-emotional health, and altered the association between them, and were therefore retained in adjusted models. Social class, education and poverty all capture aspects of social disadvantage. We checked for multi-collinearity using the Variance Inflation Factor (VIF). All VIF values were <5, indicating a low chance of multi-collinearity (Menard, 1995).

In the majority of cases of family breakdown recorded in the MCS the child remained with the mother; therefore we examined early life characteristics of the mother. However we repeated our final models using a measure of household social class (representing the highest social class of the two parents, where relevant, at MCS1/9months) and the pattern of results remained similar.

The association between the potential selection factors and socio-emotional wellbeing are shown in Table 1. The level of missing data for each variable is listed in Table 1.

Potential confounders

We explored a number of potential confounders which have been shown to be associated with family structure and/or child wellbeing. All were captured at 9 months: infant temperament (Carey Infant Temperament Scale), family size, birthweight (z-scores, sex and gestational age adjusted), gestational age (weeks), breast-feeding duration (months), and maternal psychological distress (using a modified Malaise inventory).

Cohort member age at MCS4, birthweight, gestational age, breastfeeding duration, and maternal psychological distress are presented as categorical measures in the descriptive statistics (Table 1), though were entered into regression models as continuous variables. Variables which were associated with the family trajectories variable and SDQ, and that significantly altered the association between them, were retained in adjusted models. These were maternal psychological distress, infant temperament and breastfeeding duration.

The association between the potential confounders and socio-emotional wellbeing are shown in Table 1. At age 7 years 6.7% (659) of children had borderline, and 7.2% (776) abnormal, SDQ scores. The prevalence of borderline-abnormal SDQ scores significantly increased from 8.1% in those never reporting poverty to 27.8% of those reporting it at all four sweeps. All of the confounders (except family size and child's age) and early-life selection factors were associated with borderline-abnormal scores. The level of missing data for each variable is listed in Table 1.

Sex was not considered to be a potential confounder (since it is not related to family structure), but instead was examined as a potential effect modifier. We found no significant interaction between family structure and sex, and so results are presented for both sexes combined.

Figure 1: Measures of family structure used in the saturated and life course models

	Life course measures of family structure	*Notation, where X=family structure; 1=MCS1, 2=MCS2, 3=MCS3, 4=MCS4*
Saturated	***"Natural couple", "lone parent", "reconstituted family"**: at MCS1, 2, 3 and 4= 81 possible permutations (55 were observed in the MCS).*	$E(Y) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \Theta_{12} X_1 X_2 + \Theta_{23} X_2 X_3 + \Theta_{13} X_1 X_3 + \Theta_{14} X_1 X_4 + \Theta_{24} X_2 X_4 + \Theta_{34} X_3 X_4 + \Theta_{123} X_1 X_2 X_3 + \Theta_{234} X_2 X_3 X_4 + \Theta_{134} X_1 X_3 X_4 + \Theta_{124} X_1 X_2 X_4 + \Theta_{1234} X_1 X_2 X_3 X_4$
Critical periods	***MCS1:** Family structure at 9 months: natural couple, reconstituted couple, or lone parent*	$E(Y) = \alpha + \beta 1 X1$ Constraints: $\beta_2 X_2 = \beta_3 X_3 = \beta_4 X_4 = 0$; $\Theta_{12} = \Theta_{23} = \Theta_{13} = \Theta_{14} = \Theta_{24} = \Theta_{34} = \Theta_{123} = \Theta_{234} = \Theta_{134} = \Theta_{124} = \Theta_{1234} = 0$
	***MCS2:** Family structure at 3 years: natural couple, reconstituted couple, or lone parent*	$E(Y) = \alpha + \beta 1 X_2$ Constraints: $\beta_1 X_1 = \beta_3 X_3 = \beta_4 X_4 = 0$; $\Theta_{12} = \Theta_{23} = \Theta_{13} = \Theta_{14} = \Theta_{24} = \Theta_{34} = \Theta_{123} = \Theta_{234} = \Theta_{134} = \Theta_{124} = \Theta_{1234} = 0$
	***MCS3:** Family structure at 5 years: natural couple, reconstituted couple, or lone parent*	$E(Y) = \alpha + \beta 1 X_3$ Constraints: $\beta_1 X_{1} = \beta_2 X_2 = \beta_4 X_4 = 0$; $\Theta_{12} = \Theta_{23} = \Theta_{13} = \Theta_{14} = \Theta_{24} = \Theta_{34} = \Theta_{123} = \Theta_{234} = \Theta_{134} = \Theta_{124} = \Theta_{1234} = 0$
	***MCS4:** Family structure at 7 years: natural couple, reconstituted couple, or lone parent*	$E(Y) = \alpha + \beta 1 X_4$ Constraints: $\beta_1 X_1 = \beta_2 X_2 = \beta_3 X_3 = 0$; $\Theta_{12} = \Theta_{23} = \Theta_{13} = \Theta_{14} = \Theta_{24} = \Theta_{34} = \Theta_{123} = \Theta_{234} = \Theta_{134} = \Theta_{124} = \Theta_{1234} = 0$
Sensitive periods	***MCS1:** Family structure at MCS1, 2, 3 and 4: natural couple, reconstituted couple, or lone parent; mutually adjusted.*	$E(Y) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4$ Constraints: $\beta_1 X_1 > \beta_2 X_2, \beta_3 X_3, \beta_4 X_4$; $\Theta_{12} = \Theta_{23} = \Theta_{13} = \Theta_{14} = \Theta_{24} = \Theta_{34} = \Theta_{123} = \Theta_{234} = \Theta_{134} = \Theta_{124} = \Theta_{1234} = 0$
	***MCS2:** Family structure at MCS1, 2, 3 and 4: natural couple, reconstituted couple, or lone parent; mutually adjusted.*	$E(Y) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4$ Constraints: $\beta_2 X_2 > \beta_1 X_1, \beta_3 X_3, \beta_4 X_4$; $\Theta_{12} = \Theta_{23} = \Theta_{13} = \Theta_{14} = \Theta_{24} = \Theta_{34} = \Theta_{123} = \Theta_{234} = \Theta_{134} = \Theta_{124} = \Theta_{1234} = 0$
	***MCS3:** Family structure at MCS1, 2, 3 and 4: natural couple, reconstituted couple, or lone parent; mutually adjusted.*	$E(Y) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4$ Constraints: $\beta_3 X_3 > \beta_1 X_1, \beta_2 X_2, \beta_3 X_3$; $\Theta_{12} = \Theta_{23} = \Theta_{13} = \Theta_{14} = \Theta_{24} = \Theta_{34} = \Theta_{123} = \Theta_{234} = \Theta_{134} = \Theta_{124} = \Theta_{1234} = 0$

(Figure 1 cont'd)

	MCS4: *Family structure at MCS1, 2, 3 and 4: natural couple, reconstituted couple, or lone parent; mutually adjusted.*	$E(Y) = α + β_1X_1 + β_2X_2 + β_3X_3 + β_4X_4$ Constraints: $β_4X_4 > β_1X_1, β_2X_2, β_3X_3$; $Θ_{12} = Θ_{23} = Θ_{13} = Θ_{14} = Θ_{24} = Θ_{34} = Θ_{123} = Θ_{234} = Θ_{134} = Θ_{124} = Θ_{1234} = 0$
Cumulative exposures	**Number of sweeps spent in a lone parent or reconstituted family** *(vs. natural couple): 5 categories ranging from 0-4.* **Number of sweeps spent in lone parent family** *(vs. natural couple or reconstituted family): 5 categories ranging from 0-4.*	$α + β_1X_1 + β_2X_2 + β_3X_3 + β_4X_4$ Constraints: $Θ_{12} = Θ_{23} = Θ_{23} = Θ_{13} = Θ_{14} = Θ_{24} = Θ_{34} = Θ_{123} = Θ_{234} = Θ_{134} = Θ_{124} = Θ_{1234} = 0$
Family trajectories	**7 groups representing stability or change:** *Natural couple throughout; Lone parent throughout; Natural to lone; Lone to natural; Lone to reconstituted; Natural to reconstituted; Other (2+ transitions [except for natural-lone-reconstituted], or started off as reconstituted family).*	*N/A*

Table 1. Prevalence of family structure, poverty and covariates, total weighted % (N) and weighted % (N) with borderline-abnormal difficulties scores*

	% (N) Total	% (N) borderline abnormal
Poverty score		
Never in poverty	55.1 (6008)	8.1 (459)
Poverty at 1 sweep	14.1 (1546)	14.4 (194)
Poverty at 2 sweeps	9.0 (984)	17.0 (161)
Poverty at 3 sweeps	8.9 (1005)	25.1 (237)
Poverty at 4 sweeps	13.0 (1444)	27.8 (370)
P value		*p*<0.001
Confounders		
Family size (MCS1, 9 months)		
1 child	42.0 (4618)	14.2 (611)
2-3 children	51.3 (5644)	13.3 (700)
4 plus children	6.8 (799)	16.0 (124)
P value		*p*=0.226
Child's sex		
Male	50.9 (5591)	16.5 (869)
Female	49.1 (5470)	11.1 (566)
P value		*p* <0.001
Child's age (MCS4, 7 years)		
6.5 years	1.9 (215)	13.8 (25)
7 years	52.2 (5792)	13.8 (747)
7.5 years	44.8 (4931)	14.0 (648)
8 years	1.0 (123)	12.9 (15)
P value		*p* = 0.977
Birthweight		
Low <2.5kg	6.0 (644)	20.13 (127)
Normal 2.5-4.5kg	92.2 (10110)	13.51 (1268)
High >4.5kg	1.8 (202)	9.21 (20)
P value		*p* =<0.001
Gestational age		
Preterm (23-31 weeks)	0.7 (76)	25.4 (22)
Moderate preterm (32-33 weeks)	0.8 (90)	13.3 (13)
Late preterm (34-36 weeks)	4.2 (444)	17.7 (68)
Early term (37-38 weeks)	14.1 (1539)	16.1 (225)
Late term (39-41 weeks)	69.0 (7579)	13.1 (934)
Post-term (42-43 weeks)	11.3 (1201)	13.0 (146)
P value		*p* =0.003
Breast-feeding duration		
Never	31.2 (3324)	18.5 (570)
1 week or less	11.8 (1458)	15.2 (211)
1-6 weeks	13.1 (1413)	17.6 (212)
6 weeks-4 months	16.3 (1812)	11.5 (203)
4 months and more	27.6 (3050)	7.6 (237)
P value		*p* =<0.001
Maternal psychological distress (MCS1, 9 months)		
Normal	86.7 (9323)	11.7 (1008)
Psychological distress	13.3 (1458)	26.8 (371)
P value		*p* =<0.001
Baby's temperament (MCS1; 9 months)		
Normal	18.5 (1972)	8.8 (168)

(Table 1 cont'd)

Difficult on 1-2 components^	68.7 (7285)	14.2 (929)
Difficult on all 3 components^	12.9 (1395)	18.2 (263)
P value		*p* =<0.001
Selection factors		
Carer age (at MCS birth)		
14-19	7.3 (695)	26.6 (179)
20-24	16.5 (1760)	21.8 (353)
25-29	28.3 (3099)	13.5 (396)
30-34	30.7 (3530)	9.6 (327)
35-39	15.0 (1714)	9.3 (160)
40-44	2.1 (261)	7.3 (19)
P value		*p* <0.001
Ethnicity (child)		
White	88.25 (9614)	13.5 (1194)
Non-white	11.8 (1421)	16.4 (237)
P value		*p* =0.036
Mother's parents separated in childhood		
No	75.0 (8446)	12.2 (981)
Yes	25.0 (2499)	19.0 (422)
P value		*p* <0.001
Maternal social class (MCS1, 9 months)		
Managerial & professional	31.1 (3530)	6.2 (222)
Intermediate	18.9 (2021)	11.0 (202)
Small employers & own accounts	4.3 (428)	12.0 (44)
Lower supervisory & technical	5.5 (615)	15.3 (87)
Semi routine & routine	34.0 (3636)	19.9 (666)
Never worked & L/T unemployed	6.6 (771)	27.1 (195)
P value		*p* <0.001
Maternal education (MCS1, 9 months)		
Higher degree	3.5 (437)	7.9 (34)
Degree	14.4 (1713)	4.4 (78)
Diploma	9.3 (1072)	9.6 (100)
A levels	9.7 (1149)	8.4 (98)
GCSE D-G	35.8 (3788)	13.3 (484)
GCSE A*-C	11.0 (1112)	21.1 (223)
Other	2.0 (234)	15.6 (39)
None	14.3 (1540)	26.7 (374)
P value		*p* <0.001

*Notes. ^positivity, receptiveness and regularity. Missing data: income poverty 74, family size 0, sex 0, child's age 0, birthweight 12, gestation 131, breastfeeding 4, maternal psychological distress 280, infant temperament 409, maternal age at birth of cohort child 2, ethnicity 26, mother's parents divorced/separated 150, social class 60, maternal education 16. *Ns are unweighted.*

Statistical Analysis

Analyses were conducted in Stata/SE 12.1 (Stata Corporation, TX), using 'svy' commands to account for the sampling design and attrition. Descriptive statistics (frequencies and weighted percentages) were estimated for all variables (Table 1). The associations between socio-emotional wellbeing and family structure and the covariates were assessed by estimating prevalence ratios (PR) and 95% confidence intervals (CIs) for borderline-abnormal SDQ scores, using Poisson regression models (and robust standard errors) (Barros & Hirakata, 2003; Lee, Chang, & Chia, 2009). Means

were estimated using linear regression, allowing for adjustment of other covariates. Analyses were carried out in the following stages:

A (1): Association between family structure and socio-emotional wellbeing (Table 2): we estimated a number of models for predicting borderline-abnormal SDQ, each containing one of the life course measures of family structure outlined earlier.

A (2): Comparing life course measures of family structure (Table 2): the life course measures of family structure were compared to a model containing the saturated measure of family structure (Table S1) using likelihood ratio (LR) tests, and Akaike information criterion (AIC)[i]. A life course measure was taken to be as parsimonious as the saturated measure when the p-value from the LR-test exceeded 0.20[ii]. Any family structure measures fitting this criterion were then examined further in stages C and D.

C: Examining family structure and poverty (Table 3): we estimated the mean number of sweeps spent in poverty, according to parsimonious life course family structure measures identified in B.

D: Unadjusted and adjusted relationships between family structure and SDQ (Table 4): we estimated unadjusted prevalence ratios (uPRs) for borderline-abnormal SDQ scores, according to the family structure measures identified in B, then adjusting for confounders (aPR[1]), selection factors (aPR[2]), and cumulative poverty (aPR[3]).

Working sample

11,538 (61% of the responding sample included in the analysis) singleton children took part in the four relevant MCS sweeps. Sixteen children were omitted from the analysis because the main respondent was not the natural mother at MCS1 (when the information on early-life factors such as breast-feeding and birthweight was collected), and a further 60 were excluded because the main respondent at MCS2-4 was not a parent (natural or otherwise). Sensitivity analyses were carried out to ensure that this did not bias the results (data not shown).

Children were further excluded from all analyses if they had missing data on family structure (52) or SDQ (349), reducing the sample size to 11,061. Further exclusions were made for analyses in C and D above, so that PRs could be directly compared before and after adjustment: income (74), or any of the selection measures or potential confounders (630; missing data listed for each variable under Table 1). This reduced the working sample to 10,357.

Results

A. Family structure and SDQ

Table 2 shows PRs for borderline-abnormal SDQ scores (at age 7 years) for each of the family structure measures (Column C), and degrees of freedom (D), p-values (E) and AIC (F) for the comparisons made with the saturated measure of family structure (which consisted of all permutations across the four sweeps [Table S1]) using LR tests. There appeared to be no *critical periods*. The PRs in lone and reconstituted families at MCS4 appeared to be higher than in earlier sweeps, however the *sensitive periods measure* did not quite reach the arbitrary level for parsimony. While there was no indication of a *cumulative effect of lone parenthood* (with all couples as the baseline), the *cumulative measure capturing the number of sweeps spent in either a lone parent or reconstituted family* provided a model fit that was as good as the saturated family structure measure. Finally, the *family trajectories* also proved to fit the data well.

In the following sections we focus on the two most parsimonious measures of family structure (family trajectories and the number of sweeps spent in a lone parent or reconstituted family).

Table 2. Percentage (N) and prevalence ratios (PRs) for borderline-abnormal (b-a) SDQ scores, according to the life course measures of family structure. N=11,061.

Column:	A	B	C	D	E	F
Family structure measure	% (N) overall	%(N) b-a scores	PR (95% CI)	Degrees of freedom	P value	AIC
Saturated measure				54		8555
Critical periods (unadjusted)						
MCS1 (9 months)						
Natural couple	86.9 (9,615)	11.4 (1091)	1	*3*	P<0.001	8611
Reconstituted family	0.2 (26)	34.6 (9)	3.05 (1.58, 2.88)			
Lone parent	12.8 (1,420)	23.6 (335)	2.08 (1.84, 2.35)			
MCS2 (3 years)						
Natural couple	86.5 (9,232)	10.8 (995)	1	*3*	P<0.001	8562
Reconstituted family	2.0 (220)	27.7 (61)	2.57 (1.99, 3.33)			
Lone parent	14.6 (1609)	23.6 (379)	2.19 (1.94, 2.46)			
MCS3 (5 years)						
Natural couple	79.2 (8,760)	10.5 (916)	1	*3*	P<0.001	8551
Reconstituted family	4.2 (459)	27.9 (128)	2.67 (2.22, 3.21)			
Lone parent	16.7 (1842)	21.2 (391)	2.03 (1.80, 2.29)			
MCS4 (7 years)						
Natural couple	75.5 (8351)	10.1 (843)	1	*3*	P=0.001	8540
Reconstituted family	5.9 (656)	24.9 (163)	2.46 (2.08, 2.91)			
Lone parent	18.6 (2054)	20.9 (429)	2.07 (1.84, 2.32)			
Sensitive periods (mutually adjusted)						
MCS1 (9 months)				9	P=0.177	8519
Natural couple	86.9 (9,615)	11.4 (1091)	1			
Reconstituted family	0.2 (26)	34.6 (9)	1.55 (0.79, 3.07)			
Lone parent	12.8 (1,420)	23.6 (335)	1.27 (1.08, 1.50)			
MCS2 (3 years)						
Natural couple	86.5 (9,232)	10.8 (995)	1			
Reconstituted family	2.0 (220)	27.7 (61)	1.23 (0.87, 1.76)			
Lone parent	14.6 (1609)	23.6 (379)	1.27 (1.02, 1.58)			
MCS3 (5 years)						
Natural couple	79.2 (8,760)	10.5 (916)	1			
Reconstituted family	4.2 (459)	27.9 (128)	1.23 (0.86, 1.76)			
Lone parent	16.7 (1842)	21.2 (391)	0.97 (0.75, 1.26)			
MCS4 (7 years)						
Natural couple	75.5 (8351)	10.1 (843)	1			
Reconstituted family	5.9 (656)	24.9 (163)	1.67 (1.24, 2.25)			
Lone parent	18.6 (2054)	20.9 (429)	1.64 (1.33, 2.02)^			
Cumulative lone parent/reconstituted family (baseline natural couples)						
0 sweeps	71.9 (7947)	9.6 (762)	1	5	**P=0.63**	**8502**
1 sweeps	6.5 (718)	18.4 (132)	1.92 (1.59, 2.31)			
2 sweeps	5.9 (650)	19.2 (125)	2.01 (1.66, 2.42)			
3 sweeps	6.5 (716)	21.1 (151)	2.20 (1.85, 2.62)			
4 sweeps	9.3 (1030)	25.7 (265)	2.68 (2.33, 3.09)			
Cumulative lone parent (baseline all couples)						
0 sweeps	73.4 (8188)	10.0 (808)	1	5	P<0.01	8542
1 sweeps	8.7 (965)	20.2 (195)	2.03 (1.74, 2.37)			
2 sweeps	6.2 (682)	19.7 (134)	1.97 (1.64, 2.37)			
3 sweeps	5.3 (588)	20.6 (121)	2.07 (1.71, 2.50)			
4 sweeps	6.4 (708)	25.0 (177)	2.51 (2.13, 2.96)			

(Table 2 cont'd)

Family trajectories						
Natural couple throughout	71.9 (7947)	9.6 (762)	1	7	*P*=0.56	8506
Lone parent throughout	6.4 (708)	25.0 (177)	2.61 (2.21, 3.07)			
Natural couple to lone	10.2 (1130)	18.1 (204)	1.88 (1.61, 2.20)			
Lone to natural couple	2.7 (300)	21.0 (63)	2.19 (1.69, 2.83)			
Lone to reconstituted	2.2 (240)	25.4 (61)	2.65 (2.04, 3.44)			
Natural to reconstituted	3.4 (371)	24.3 (90)	2.53 (2.03, 3.15)			
Other	3.3 (365)	21.5 (78)	2.23 (1.77, 2.81)			

Notes. Percentages and PRs are not weighted (in order to carry out likelihood ratio tests). ^ Significantly higher than at MCS3, but not MCS2 or 1.

B. Family structure and poverty

Mean number of sweeps spent in poverty increased incrementally with number of sweeps spent in a lone parent or reconstituted family, from 0.58 sweeps in poverty for those not living in a lone parent/reconstituted family at any sweep, to 2.83 for those living in one at all four sweeps (Table 3). Differences between groups were reduced slightly after adjustment for confounders and selection factors.

In the family trajectories measure, children living with a lone parent throughout experienced the longest periods of poverty (mean of 2.99 sweeps); unsurprisingly the mean value was similar to those identified in the cumulative measure as living with a lone parent or a reconstituted family for four sweeps (2.83 sweeps, as discussed above). However, the trajectories measure also indicated that children living in natural couple families which became reconstituted, or natural couple families which became lone, spent relatively short periods in poverty (with respective means of 1.48 and 1.73 sweeps). In contrast, lone parent families which transitioned to a reconstituted family or returned to being a natural couple, experienced relatively high rates of poverty (2.40 and 2.36 respectively). Again, differences between groups were reduced after adjustment for confounders and selection factors.

Table 3. Mean number of sweeps in poverty according to family structure, before and after adjustment for baseline characteristics (confounders and early-life selection factors), N=10,357

	Mean (CI) sweeps in poverty	Adj. baseline characteristics*
No. sweeps in lone parent/reconstituted family		
0	0.58 (0.52, 0.63)	1.32 (1.02, 1.61)
1	1.58 (1.44, 1.72)	1.91 (1.60, 2.22)
2	1.74 (1.58, 1.89)	2.08 (1.77, 2.39)
3	2.19 (2.03, 2.35)	2.38 (2.09, 2.68)
4	2.83 (2.73, 2.92)	2.83 (2.55, 3.14)
Family trajectories		
Natural couple at all 4 sweeps	0.58 (0.52, 0.63)	1.33 (1.03, 1.62)
Lone at all 4 sweeps	2.99 (2.88, 3.10)	3.00 (2.71, 3.30)
Natural to lone	1.73 (1.60, 1.86)	2.14 (1.83, 2.44)
Lone to natural couple	2.36 (2.16, 2.56)	2.34 (2.01, 2.67)
Lone to reconstituted	2.40 (2.20, 2.60)	2.43 (2.12, 2.73)
Natural to reconstituted	1.48 (1.28, 1.67)	1.80 (1.50, 2.11)
Other	2.47 (2.29, 2.65)	2.54 (2.23, 2.86)

*Notes. *maternal psychological distress, breastfeeding duration in weeks, baby's temperament, maternal age at birth of MCS child, education (baseline: higher degree) and social class (baseline: managerial and professional), and whether mother's parents separated when she was < 18 years (baseline: no separation).*

C. Family structure and socio-emotional wellbeing, before and after adjustment for poverty

Table 4 presents PRs for borderline-abnormal SDQ scores according to the two life course family structure measures (number of sweeps spent in a lone parent/reconstituted family, and trajectories of family type), before and after adjustment for covariates. There was no interaction between child's sex and time spent in a lone parent/ reconstituted family (*p*=0.12) or family trajectories (*p*= 0.36)

The prevalence of borderline-abnormal SDQ increased with duration spent in a lone parent or reconstituted family, from a PR of 1.86 (1.52, 2.26) for one sweep, to 2.87 (2.46, 3.56) for all four sweeps. PRs were attenuated after adjustment for confounders, early-life selection factors and poverty (ranging from 1.27 [1.03, 1.57] to 1.41 [1.18, 1.68]).

All family structure trajectories were associated with an elevated prevalence of borderline-abnormal socio-emotional wellbeing, when compared to children who were living with a natural couple throughout. Children who were living in a family which transitioned from a natural couple to a lone parent family had the lowest PR (1.80 [1.54, 2.10]); prevalence ratios ranged from 2.5 to 2.8 for all other groups. The elevated prevalence ratios seen in all of the family trajectory groups were reduced considerably, but remained significant, after adjustment for selection factors (aPR[2]). Further attenuation occurred after adjustment for cumulative poverty (aPR[3]).

Patterns remained the same when analyses were repeated using the total SDQ score as a continuous outcome (data not shown).

Table 4. Cumulative family structure (model 1) and family trajectories (model 2). Weighted prevalence ratios (PR) and 95% confidence intervals (CIs) for borderline–abnormal SDQ scores, unadjusted and adjusted for confounders, selection factors and poverty   N=10,357

	Unadjusted PR	aPR[1]	aPR[2]	aPR[3]
Model 1: Cumulative family structure (number of sweeps spent in a reconstituted/lone parent family				
No sweeps	1	1	1	1
One	1.86 (1.52, 2.26)	1.64 (1.34, 2.01)	1.35 (1.11, 1.65)	1.27 (1.03, 1.57)
Two	2.05 (1.64, 2,57)	1.69 (1.34, 2.13)	1.42 (1.13, 1.79)	1.33 (1.05, 1.69)
Three	2.33 (1.93, 2.80)	1.82 (1.52, 2.19)	1.43 (1.18, 1.71)	1.29 (1.07, 1.55)
Four	2.87 (2.46, 3.56)	2.18 (1.86, 2.54)	1.71 (1.36, 1.87)	1.41 (1.18, 1.68)
Model 1: Family trajectories				
Natural couple at all sweeps	1	1	1	1
Lone at all sweeps	2.77 (2.34, 3.29)	2.13 (1.81, 2.51)	1.57 (1.33, 1.87)	1.36 (1.13, 1.64)
Natural to lone	1.80 (1.54, 2.10)	1.53 (1.30, 1.81)	1.29 (1.09, 1.53)	1.20 (1.01, 1.43)
Lone to natural couple	2.62 (2.01, 3.40)	2.04 (1.55, 2.68)	1.50 (1.15, 1.70)	1.36 (1.03, 1.79)
Lone to reconstituted	2.66 (1.99, 3.56)	2.05 (1.53, 2.76)	1.51 (1.13, 2.01)	1.37 (1.02, 1.83)
Natural to reconstituted	2.53 (1.98, 3.22)	2.07 (1.63, 2.65)	1.71 (1.35, 2.17)	1.62 (1.27, 2.06)
Other	2.60 (2.02, 2.60)	1.95 (1.53, 2.50)	1.46 (1.13, 1.88)	1.31 (1.01, 1.69)

Notes. aPR[1]:PR for borderline-abnormal SDQ by family structure, adjusting for maternal psychological distress at MCS1, breast-feeding duration in weeks and baby's temperament. aPR[2]: adjusting for [1] and maternal age at birth of MCS child, education (baseline: higher degree) and social class (baseline: managerial and professional), and whether mother's parents separated when she was < 18 years (baseline: no separation). aPR[3]: Adjusting for [2] and cumulative poverty.

Discussion

Summary of findings

Using a structured life course approach we assessed how family structure over the first seven years might influence socio-emotional wellbeing at age 7 years. We found no evidence of critical periods for exposure to certain family structure types between birth and 7 years, although there was some indication that age 7 might be a sensitive period for exposure to lone parenthood. A cumulative measure capturing the number of sweeps spent in a lone parent family did not predict socio-emotional wellbeing as well as the saturated model, although number of sweeps in either a lone parent *or* reconstituted family did. The family trajectories measure also provided a good model fit. Thirty percent of children lived in these higher risk groups (i.e. families which were not headed by a natural couple throughout the period under study).

Through considering two measures of family structure we have observed the differences in prevalence of borderline-abnormal SDQ scores between family structure trajectories and the increase in scores associated with time spent in lone or reconstituted families. After adjustment for confounders, but before adjustment for selection or poverty, children living in a lone parent or reconstituted family for one sweep were 60% more likely to display borderline-abnormal scores than those living with both natural parents throughout. This rose to a greater than twofold risk for those living in a lone parent or reconstituted family at all four sweeps. When looking at trajectories, children who were living with both natural parents in infancy but had moved to a lone parent family by age 7 years were 53% more likely to experience borderline-abnormal scores than those living with a natural lone parent throughout. The remaining trajectory groups were all around twice as likely to experience borderline-abnormal behaviour. A reduction in PRs after adjustment for selection factors (such as the mother's social class, or whether her parents had separated when she was a child) reflects the potential importance of factors from the mother's own childhood through to the birth of the cohort child. Intervention and support in early life and across generations is therefore likely to be important for family and child wellbeing.

Comparison with other findings

An earlier analysis of the Millennium Cohort found that children who were not living with both natural parents during the preschool years were more likely to experience externalising (but not internalising) behavioural problems. As in the present analysis, children who were living in a stable lone parent family and those whose mothers re-partnered were particularly at risk, although this was to some extent confounded by maternal characteristics and poverty (Kiernan & Mensah, 2010). Two studies, examining a number of different life course processes through which family structure might influence behaviour, found that selection and the number of transitions (or 'instability') were predictive of child behaviour (Fomby & Cherlin, 2007; Magnuson & Berger, 2009). Magnuson & Berger also found that cumulative exposure to lone parent or reconstituted families and type of transition was important; children who had moved into a lone parent family by age 12 years had poorer behaviour scores than children living with both parents, while those who transitioned into a reconstituted family did not (Magnuson & Berger, 2009). Findings from the present analysis also indicate that the type of transition matters for child socio-emotional wellbeing; for example, children experiencing a transition from a natural couple to a reconstituted family had higher PRs than those who experienced the transition from a natural couple to a lone parent family. Children who experienced two or more transitions also had higher rates of borderline-abnormal SDQ scores. There was some indication that the prevalence of borderline-abnormal SDQ scores associated with lone parenthood was greater when the child were slightly older (age 7). This may be because the exposure was coterminous with the outcome, or could indicate increasing sensitivity to family changes with age, as reported in earlier work (Rogers & Pryor, 1998).

Children living in lone parent or reconstituted families are more likely to experience poverty (Department for Work and Pensions, 2012), and changes in family structure are often accompanied by changes in household income (Bradshaw & Homes, 2008; Tomlinson & Walker, 2012;) Bradshaw & Holmes, 2010; Panico, Bartley, Kelly, McMunn, & Sacker, 2010). Cross-sectional research has demonstrated that living in poverty influences children's health and wellbeing (Marmot, 2012; Ridge, 2011), and that accounting for the higher

rates of poverty in some family types reduces the association between family structure and child wellbeing (Pearce et al., 2013; Spencer, 2005). However, poverty can be fluid in nature (Graham & Power, 2004), and experiences of those who are exposed to persistent, rather than transient, poverty are likely very different (Bradshaw 2011a). Time spent in poverty has been associated with the risk of poor socio-emotional wellbeing in childhood (Kiernan & Mensah, 2009; McLeod & Shanahan, 1996; Najman et al., 2010), and our findings support this. Although one study found that cumulative poverty throughout early childhood attenuated the cross-sectional association between family structure and socio-emotional wellbeing at age three years (Kiernan & Mensah, 2009), and a second found that cross-sectional poverty mediated the association between a longitudinal measure of family structure and socio-emotional health by primary school age (Kiernan & Mensah, 2010), to our knowledge no study has examined these relationships using longitudinal measures of both family structure and poverty in the UK. In this paper we have identified subtleties in relationships not apparent from earlier analyses using cross-sectional data. For example, of the children living in a lone parent family at age 7 years, those living in a natural couple family in infancy had a substantially lower prevalence of poor socio-emotional wellbeing than those who had lived in a lone parent family throughout. However after adjustment for poverty, differences in prevalences of borderline-abnormal socio-emotional behaviour between these two groups was reduced.

Strengths and limitations

A strength of this study is that it has examined a number ways in which family structure might influence child socio-emotional wellbeing longitudinally, using a structured life course approach (Mishra et al., 2009). Findings indicate that change (or stability) in family structure is associated with child socio-emotional wellbeing, and that duration of exposure to certain family types might also be important. However, there was a degree of overlap between the two measures of family structure and it may be that these commonalities drive both associations. The family trajectories measure largely consisted of groupings specified *a priori*; in other studies, the commonly occurring trajectories may differ, which could lead to results that differ from those reported here. We assessed

life course models by comparing them to a saturated model which contained all possible permutations of family structure over time. Many of these permutations were rare (see Table S1), despite the large MCS sample. It is therefore possible that the predictive power of the saturated model has been underestimated.

Longitudinal measures were derived from family structure status at four time-points and will not fully capture the experiences of all families. For example, it was not possible to account for short-term changes to family structure that may have occurred between sweeps (e.g. periods of temporary separation), or periods of lone parenthood that were likely to have been experienced in *Natural couple to reconstituted* families. Due to small numbers, it was necessary to aggregate the less common family structure types in the trajectories measure. In doing so, we may have overlooked small but informative trajectory groups. Finally, children of cohabiting couples tend to have lower levels of wellbeing than those living with married parents (Goodman & Greaves, 2010; Panico et al., 2010). However, there is evidence to suggest that this is due to "differential selection into marriage compared with cohabitation" governed by socio-economic background (Goodman & Greaves, 2010), and it was not an aim of our study to examine differences between cohabiting and married couples.

Cumulative poverty was operationalised as a count of sweeps at which income poverty was recorded; however, periods covered by the surveys ranged from nine months to two years. Short-term fluctuations in poverty status may have occurred between sweeps and these would have been overlooked. We classified poverty as <60% median national income (because it is a comparable measure across sweeps and commonly used in other studies), but it does not capture all aspects of disadvantage (Graham & Power, 2004). Changes in poverty status between sweeps may reflect very small changes in income from just above and below the threshold, which might not be expected to impact on socio-emotional wellbeing. If so, the association between poverty and socio-emotional wellbeing may have been underestimated. It is possible that poverty occurring before age 9 months may have preceded changes in family structure during pregnancy or early infancy. Earlier measures of income poverty were not available, although we were able to adjust for maternal education and social class, which are relatively stable and therefore likely to reflect prior

socio-economic circumstances. Equally, it is possible that family structure preceded some covariates (such as maternal psychological distress), and that child behavioural problems preceded relationship break-down. However it is hard to disentangle these causal pathways, since changes in family structure tend to be a process rather than an event (Ferri & Smith, 2003). Behavioural problems in a child may put pressure on parental relations, but may also be indicative of family unrest before the relationship breakdown itself occurs.

We assessed socio-emotional wellbeing using the SDQ, which was reported by the main respondent (usually the mother). Although is a validated and reliable measure for monitoring socio-emotional wellbeing at the population level (Goodman, 1997, 2001), it is possible that parents may be more or less inclined to rate their children poorly depending on their family and economic background and own psychological state. Similarly, the borderline-abnormal cut-offs have been validated at a population level, but may also be subject to bias. When we repeated analyses using the continuous SDQ score the pattern of results remained, implying that our findings are not merely the consequence of the cut-offs used.

The MCS is a contemporary and nationally representative cohort, and therefore our findings are generalisable to the UK population. Attrition is a problem common to all longitudinal analyses. Response weights were used to account for attrition by the fourth survey (at age 7). However, of the 13,681 children included in MCS4, only 11,538 (75%) had data for all 4 sweeps. Children were more likely to have taken part in all four sweeps if at age 7 years they were living in a natural couple family (88%) compared to those living in reconstituted (77%) or lone parent families (76%). This was also more likely if they had 'normal' (85%) rather than borderline-abnormal SDQ scores (80%). Thus, our results may be subject to bias despite the use of response weights to account for attrition, possibly leading to associations being underestimated. The range of relevant information collected in the MCS allowed us to adjust for a number of early-life selection factors and confounders. However it remains possible that the observed associations between the family trajectories and socio-emotional wellbeing are due to residual confounding. We focussed on maternal early life characteristics in our analyses, because in

the majority of cases where family breakdown occurred, children remained with the mother. However, we acknowledge the importance of fathers, and therefore repeated our analyses adjusting for a measure of family social class, based on the highest social class of either parent, and results were unaltered.

Finally, we employed a structured life course approach as a method for considering a number of different life course processes systematically. However, we acknowledge that other methods exist for investigating longitudinal associations in survey data, including structural equation modelling (SEM).

Conclusion

In this paper we found that children who did not live in families which were continuously headed by two natural parents were at greater risk of poorer socio-emotional wellbeing. A cumulative measure of family structure indicated an increase in prevalence of borderline-abnormal socio-emotional behaviour with the number of sweeps spent in a lone parent or reconstituted family. Findings using a family trajectories measure highlighted that the level of risk also varied depending on the type of trajectory experienced; for example, children who were living with a natural couple in infancy but were living with a lone parent by age seven years, had a lower risk than those who were living in a natural couple in infancy and a reconstituted family by age seven years. In many cases, early life characteristics and time spent in income poverty were contributing to the patterns observed, suggesting the importance of support for families early in their child's life and across generations. The UK Coalition Government continues to monitor and strive towards poverty targets established under the Child Poverty Act (Department for Work and Pensions & Department for Education, 2011). However, spending cuts, such as those to the childcare element of the Working Tax Credit and Local Housing Allowances, are likely to hit low income households with children and non-working lone parent families the hardest. Finally, children living in some family types remained at risk of poor socio-emotional wellbeing even after early life characteristics and poverty were taken into account. Future research should examine alternative mechanisms through which family structure may influence socio-emotional wellbeing.

Ethics

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Endnotes

[i] We opted to use the AIC rather than the Bayesian information criterion (BIC), because the AIC is less likely to favour models with fewer degrees of freedom .

[ii] To our knowledge there is no consensus over the size of p-value that should be used, and we adopted a conservative cut-off of 0.20, as used by Gustafsson et al (2011).