Health & Place 37 (2016) 8–15

Contents lists available at ScienceDirect

Health & Place

journal homepage: www.elsevier.com/locate/healthplace

Socio–economic status and family structure differences in early trajectories of child adjustment: Individual and neighbourhood effects ☆

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ARTICLE INFO

Article history:
Received 30 September 2015
Received in revised form
10 November 2015
Accepted 23 November 2015
Available online 14 December 2015

Keywords:
Child behaviour
Millennium Cohort Study
Neighbourhood composition
Neighbourhood effects
Single parenthood
Socio–economic status

ABSTRACT

We examined the effects of single-parent family status and high parental socio-economic status (SES) on the trajectories of children's emotional/behavioural adjustment in early-to-middle childhood (ages 3–7 years). We also assessed whether these family characteristics interact with the equivalent neighbourhood characteristics of shares of single-parent families and high-SES adults in predicting these trajectories. Using data on 9850 children in England participating in the Millennium Cohort Study, we found that family status and parental SES predicted children's trajectories of adjustment. Even after controlling for these family factors and key child and parent characteristics, the neighbourhood shares of high-SES adults and single-parent families were related (negatively and positively, respectively) to child problem behaviour. Importantly, children of low-SES parents in neighbourhoods with a high concentration of high-SES adults had fewer emotional symptoms than their counterparts in areas with fewer high-SES adults. Surprisingly, the adverse effect of single-parent family status on child hyperactivity was attenuated in areas with a higher share of single-parent families.

There is much research to suggest that low socio–economic status (SES) children (Bradley and Corwyn, 2002) or those in single-parent families (Lee and McLanahan, 2015) have more emotional and behavioural problems than their counterparts. However, the effects of these family characteristics may vary significantly by the equivalent contextual characteristics. Yet the evidence with respect to the direction of such moderator effects is mixed. For example, there is evidence that, rather than protecting from it, high-SES neighbourhoods (usually associated with positive outcomes in general) amplify the adverse effect of individual-level low SES on adult health (Winkleby, Cubbin, and Ahn, 2006). For child behaviour outcomes too, disparities by neighbourhood of residence among low-SES families suggest that disadvantaged families do not always benefit from the higher quality of resources and knowledge generally associated with higher-SES neighbourhoods (Flouri, Midouhas, and Tzatzaki, 2015).

The evidence with respect to the main effects of neighbourhood SES on child behaviour is less mixed. In studies carried out in the USA and the UK, the concentration of low-SES neighbourhood residents has been found to have a moderately adverse impact on children's emotional and behavioural adjustment, even when family background characteristics are accounted for (Kohen et al., 2008; Leventhal and Brooks-Gunn, 2000; McCulloch, 2006; Midouhas et al., 2014). High-SES adults in the neighborhood may act as positive role models, provide economic, social and educational resources, and help to maintain social control, thereby promoting opportunities and minimising antisocial behaviour (Sampson et al., 1999). Neighbourhood share of single-parent families, a good proxy measure of structural disadvantage and a correlate of low SES, can also relate to individual children's emotional and behavioural problems. This association has also been tested, but mostly in cross-sectional studies (Boyle and Lipman, 2002), frequently using small samples (Shumow et al., 1998). The link is certainly plausible. Single parenthood is related to poor material circumstances, which predict poor child outcomes (Bradley and Corwyn, 2002). At the same time, single parents are subject to numerous stressors (other than low income, unemployment or low SES), such as conflict with partners and steep parenting demands, that could weaken their involvement in the community, and, in turn, the institutional and social supports available to the children. To the extent that neighbourhood share of single-parent families has

☆This paper was written while EF and EM were supported by grant ES/J001414/1 from the UK Economic and Social Research Council. The work presented here extends the work submitted by Charlotte Armor for her Master's dissertation (supervised by EF).

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http://dx.doi.org/10.1016/j.healthplace.2015.11.005

a genuine (net of neighbourhood SES) effect on individual child behaviour, the processes that may explain why children in neighbourhoods with a higher share of single parents are more likely to adopt deviant behaviours or show emotional problems appear to be inadequate supervision and difficulties in maintaining social control. With higher levels of single-parent households, it may be more difficult for a community to sustain a sense of empowerment or control the appearance of their neighbourhood or the behaviour of its residents.

We carried out this study to test the moderator effects of neighbourhood SES and share of single-parent families in the neighbourhood on the longitudinal associations, respectively, between parental SES and early child emotional/behavioural adjustment, and between single-parent family status and early child emotional/behavioural adjustment. Neighbourhood SES in our study was measured as the neighbourhood share of females in high-SES occupations[1] (i.e., in higher managerial, administrative or professional jobs). Neighbourhood share of single-parent families captured essentially the proportion of female-headed single-parent families in the neighbourhood.[2] In line with theory, we expected that both these neighbourhood composition measures would be associated with child adjustment, and would be interrelated but orthogonal constructs (Anderson et al., 2014; Beyers et al., 2003). We also expected that neighbourhood SES would be a more telling indicator of child health and behaviour than neighbourhood share of single-parent families, given its association with health-enhancing resources such as material and social benefits (Alegría et al., 2014).

1. The present study

To meet our research objective, we used data from all early and middle childhood sweeps (ages 3, 5 and 7 years) of the UK's Millennium Cohort Study (MCS), a large population cohort born in 2000–2002. We attempted to account for selection bias caused by families' selective sorting into neighbourhoods by adjusting, alongside parental SES and family structure, for family poverty and maternal education. As our outcomes were children's emotional and behavioural problems, we also controlled for maternal psychological distress, and child gender and ethnicity. Maternal depression is strongly associated with child problem behaviour (Goodman et al., 2011), but is also correlated with low SES and single motherhood and is higher in low-SES neighbourhoods (Ross, 2000). Girls, in general, are at lower risk of behavioural problems than boys (Egger and Angold, 2006). The main ethnic minority groups in the UK have similar or lower rates of emotional, behavioural and hyperactivity problems than white British children (Goodman et al. 2008), despite experiencing more poverty (Platt, 2007).

2. Method

2.1. Sample

MCS (www.cls.ioe.ac.uk/mcs) is a longitudinal survey, designed to over-represent areas with high proportions of ethnic minorities in England, areas of high child poverty, and the three smaller UK countries. Sweep 1 took place when the children were around 9 months. We analysed data from the early and middle childhood sweeps which had information about children's emotional and behavioural problems (Sweeps 2–4, corresponding to children's ages 3, 5 and 7 years). We used records for only one child per family (the first-born where there were twins or triplets), and, to avoid conflating neighbourhood with country effects, we used data from the largest UK country. Our analytic sample comprised children living in England at age 3 ($n=10,086$) and with a score for emotional and behavioural problems in at least one of ages 3, 5 or 7 ($n=9850$). Complete data on emotional and behavioural problems were not necessary as growth curve modelling, that we adopted, is able to handle unbalanced data (Snijders and Bosker, 1999).

2.2. Measures

The following describes how the key study variables were measured. All variables were measured at all three time-points unless otherwise specified. *Neighbourhood socio-economic status (NSES)*, measured with data from the 2001 UK Census, was the percentage of high-SES females in the neighbourhood [Lower layer Super Output Area (LSOA), which contains 1500 people on average]. The social class of all 16–74 year olds for each LSOA was grouped into five categories using the National Statistics Socio–economic Classification (NS-SEC). The category representing the highest social class is "higher managerial, administrative and professional occupations". In this study, the percentage (banded in deciles) of female residents with such occupations was used to measure NSES. *Parental socio–economic status (SES)* was measured at Sweep 4 with an indicator of whether the mother had been in the highest NS-SEC category at any point during the study period, from age 9 months to age 7 years. We chose to measure maternal SES by the highest occupational prestige achieved by the mother in order to both preserve as many cases as possible in the dataset (mothers taking time off to raise their children are outside the labour force and so are not assigned an SES category) and present an accurate picture of SES for this group (mothers of young children are more likely than other women to trade off higher wages, associated with higher SES, for mother-friendly jobs). *Neighbourhood single parenthood (NSP),* also measured with LSOA-level data from the 2001 UK Census, was the percentage of single-parent households in the LSOA, banded in deciles. *Single-parent family status* was measured with an indicator of whether the family was single-parent or not. *Emotional and behavioural problems* were measured by the parent scores on four domains of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997): emotional symptoms, conduct problems, hyperactivity/inattention and peer problems. Each domain is measured with five items on 3-point scales from 0 to 2, with higher scores indicating more serious problems. Across the three sweeps, Cronbach's alpha ranged from .50 to .65 for emotional, .55 to .68 for conduct, .71 to .78 for hyperactivity and .47 to .58 for peer problems.

As explained, the *key covariates* were the child-level variables of gender and ethnicity, and the family-level variables of poverty, maternal education and maternal psychological distress. Poverty was measured (following Malmberg and Flouri, 2011) as the sum of four binary indicators of the family's level of material or economic deprivation at Sweeps 2–4. This measure captures poverty and its associated material conditions more broadly than relying on measured income alone, and emphasises the interrelationships between family-level socio–economic risk factors. Its items are: overcrowding (>1.5 people per room excluding bathroom and kitchen), not owning the home, receipt of means-tested income support, and income poverty (below the poverty line, set as

[1] In view of the developmental stage of our sample (ages 3–7 years), we measured family SES by mother's SES. In order for neighbourhood and family SES to be equivalent, we measured neighbourhood SES by neighbourhood share of high-SES females. Neighbourhood shares of females and males in high-SES occupations are highly inter-related. In our sample, the correlation is about.90.

[2] In 2014, 91% of lone parents in the UK were mothers, a statistic which has changed little in the last decade (Office for National Statistics, 2015).

Table 1
Model Summary.

Model	Specification
Model 1 (unconditional)	Age (years)+age^2
Model 2	Model 1+NSP[a]+(NSP × age)+(NSP × age^2)+NSES[a]+(NSES × age)+(NSES × age^2)+MCS stratum[b]
Model 3	Model 2+single-parent family status+(single-parent family status × age)+(single-parent family status × age^2)+parental SES[c]+(parental SES × age)+(parental SES × age^2)
Model 4	Model 3+family[d] and child covariates[e]
Model 5	Model 4+(NSP × single-parent family status)+(NSP × single-parent family status × age)+(NSP × single-parent family status × age^2)+(NSES × parental SES)+(NSES × parental SES × age)+(NSES × parental SES × age^2)

Notes: age was centred at the grand mean of 5.06 years; '×'=interaction between variables.

[a] NSP=Neighbourhood single parenthood, i.e., percentage of single-parent families in the neighbourhood. NSES=Neighbourhood socio-economic status, i.e., percentage of high-SES females (i.e., females in higher managerial, administrative or professional occupations) in the neighbourhood.

[b] England-disadvantaged, England-ethnic, Wales-advantaged, Wales-disadvantaged, Scotland-advantaged, Scotland-disadvantaged, Northern Ireland-advantaged, and Northern-Ireland disadvantaged (compared to England-advantaged).

[c] Mother in 'higher managerial, administrative or professional occupation' or not.

[d] Maternal psychological distress (time-varying), maternal education (i.e., university-educated or not), and family poverty (time-varying).

[e] Gender and ethnicity: mixed, Indian, Pakistani/Bangladeshi, black, and other (compared to white).

equivalised net family income at 60% of the UK national median household income). Mother's education was measured by the highest academic qualification achieved by Sweep 4, and was coded as university degree or not. Mother's psychological distress was measured at Sweeps 2–4 with the 6-item Kessler scale (Kessler et al., 2003), which assesses the experience of recent non-specific psychological distress (α=.82−.84 across sweeps).

2.3. Analytic strategy

First, we investigated whether the families in our analytic sample (n=9850) were different (at $p<.05$) from those not in it (n=236) on our study variables. Next, we explored the shape of the children's average trajectories of problems. Following this, we inspected the correlations between our main variables. Finally, we fitted three-level growth curve models which enabled us to avoid the underestimation of standard errors due to the hierarchical nature of our data (Goldstein, 1995) by having repeated measures (at ages 3, 5 and 7 years) of child behaviour problems (Level 1) nested in children (Level 2) nested in areas[3] (Level 3). Growth curve models allowed us to estimate the average level of problems at a particular time-point and the average growth rate in problems over time. By specifying a random slope on the age of the child to allow for changes in problems across time to vary between children, we could also model individual trajectories of problems from age 3 to age 7. We fitted both fixed and random linear slopes, and we included a fixed quadratic term to account for the curved shape of children's average trajectories (see Section 3).

The sequence of models fitted is shown in Table 1. Model 1 (the unconditional model) investigated the average level and growth of problem scores by regressing them on age in years (grand mean centred at age 5.06 years) and its square (as the average trajectories were U-shaped). Grand mean centring age at the 'midpoint' minimises the correlation between age and age^2 thus stabilising the estimates (Raudenbush and Bryk, 2002). Model 2 added NSES and NSP, specified to be related to the intercept and slopes (linear and quadratic) of problems to examine whether the level of problems at around age 5, and the rate of change in problems over time, shifted with NSES and NSP. Model 3 added the equivalent family-level variables of parental SES and single-parent family status, also specified to be related to the intercept and slopes of problems. Models 4 added the child and family covariates. Model 5 tested the interaction effects of NSES and NSP by parental SES and single-parent family status, respectively, on both the intercept and slopes of problems. All models were fitted in MLwiN 2.32.

3. Results

3.1. Descriptives and bias analysis

Differences between the analytic and the non-analytic samples were small (Tables 2–3). In the former, there was a slight over-representation of white families and more educated and higher-SES mothers. The families in the analytic sample also experienced less poverty and lived in more affluent neighbourhoods and in neighbourhoods with a lower share of single-parent families. As can be seen in Table 4, correlations between the neighbourhood and the family/child variables were small in size. As expected, the two neighbourhood composition variables were inversely and moderately inter-related (correlations ranged .57 to .67 across sweeps).

4. Growth curve models

In Model 1, conduct, hyperactivity and peer problems dropped annually .39,.16 and .10 points on the SDQ scale, respectively. The significant positive age-squared terms for these domain scores (.14, .08 and .06, respectively) demonstrated an additional slight upward curve at older ages above and beyond the negative linear slope, suggesting U-shaped trajectories. The average trajectory of emotional symptoms was also non-linear (i.e., not following a straight line), but both age and age-squared terms were positive (.04, and .02, respectively), suggesting that scores steadily increased at a low rate until there was a slight acceleration of problems near the end of the trajectory. All random effects were statistically significant, with the most variation found between children at central age and within children over time.

In Model 2, controlling for the MCS sampling design, both NSES

[3] We accounted for area clustering at the level of electoral ward on which the MCS survey design was built. We allowed the children's average problems to vary by area of residence at the origin of the study to reflect the disproportionate chances of selection in the sample design. Electoral wards/divisions are the key building block of UK electoral geography. The average ward population is around 5000, though counts can vary substantially. The MCS sample was drawn on the basis of boundaries that existed before the 2001 Census. This geography was no longer applied once the survey started. In all our conditional models (i.e., Models 2–5) we also adjusted for stratum (a Level 3 variable), to reflect the stratified sample design of MCS. There are nine MCS strata: England-advantaged, England-disadvantaged, Wales-advantaged, Wales-disadvantaged, Scotland-advantaged, Scotland-disadvantaged, Northern Ireland-advantaged, and Northern Ireland-disadvantaged.

Table 2
Bias Analysis (Weighted Data) for Continuous Variables in the Analytic and Non-analytic Samples.

	Analytic Sample ($N=9850$)			Non-analytic Sample ($N=236$)				
Variable	***n***	***M***	***SE***	***n***	***M***	***SE***	***t***	***df***
Age 3								
Age	9844	3.13	0.004	236	3.22	0.022	4.06*	250.00
Emotional symptoms	9317	1.35	0.021	32	1.74	0.381	1.02	250.00
Conduct problems	9342	2.82	0.035	28	4.59	0.444	3.96*	250.00
Hyperactivity	9256	3.94	0.039	25	6.35	0.371	6.42*	250.00
Peer problems	9283	1.53	0.022	16	2.17	0.760	0.84	250.00
NSP	9849	4.79	0.100	236	6.69	0.302	6.57*	252.00
NSES	9849	6.00	0.144	236	3.99	0.345	−6.37*	252.00
Poverty	8318	0.80	0.028	121	1.91	0.133	8.21*	248.00
Maternal psychological distress	7725	3.24	0.050	24	5.40	0.874	2.46*	247.00
Age 5								
Age	8703	5.20	0.005	206	5.18	0.036	−0.482	244.00
Emotional symptoms	8519	1.39	0.022	15	2.55	0.596	1.95	243.00
Conduct problems	8532	1.50	0.023	16	1.42	0.487	−0.156	243.00
Hyperactivity	8475	3.31	0.037	4	5.16	1.133	1.63	243.00
Peer problems	8516	1.14	0.022	13	1.68	0.388	1.39	243.00
NSP	8804	4.84	0.094	105	6.76	0.502	3.98*	244.00
NSES	8804	5.92	0.141	105	3.64	0.512	−4.69*	244.00
Poverty	7493	0.82	0.026	59	1.91	0.189	5.69*	240.00
Maternal psychological distress	7898	3.11	0.053	7	7.17	2.447	1.66	243.00
Age 7								
Age	7996	7.23	0.005	183	7.24	0.033	0.344	241.00
Emotional symptoms	7897	1.60	0.027	7	2.26	0.368	1.82	240.00
Conduct problems	7918	1.45	0.025	10	2.74	0.607	2.11*	240.00
Hyperactivity	7891	3.45	0.043	3	3.30	1.062	−0.14	240.00
Peer problems	7904	1.30	0.026	10	3.13	0.702	2.62*	240.00
NSP	8103	5.03	0.094	74	6.45	0.659	2.24*	241.00
NSES	8103	5.73	0.139	74	4.06	0.735	−2.38*	241.00
Poverty	8027	0.84	0.027	71	1.79	0.149	6.20*	239.00
Maternal psychological distress	7333	3.22	0.063	3	6.13	0.141	18.78*	239.00

Note: NSP=Neighbourhood single-parenthood (% of single-parent families in the neighbourhood); NSES=Neighbourhood socio-economic status (% of high-SES females in the neighbourhood).

* $p < .05$.

and NSP were significant on emotional and behavioural problems at central age. For conduct problems, they were also related to both the linear and the quadratic slope. Moreover, NSES was related to the annual linear change in emotional symptoms, peer problems and hyperactivity, and NSP to the annual linear change in peer problems.

These associations remained largely unchanged in Model 3 (Table 5), which introduced the equivalent family characteristics. With the exception of emotional problems, however, NSP was less strongly related to these outcomes than NSES. In fact, NSP was related only to internalising (peer and emotional) problems. Model

Table 3
Descriptive Statistics (Weighted Data) for Categorical Variables in the Analytic and Non-analytic Samples.

Variable	Analytic Sample *n* (%)	Non-analytic Sample *n* (%)	χ^2	*df*
Girl	4857 (44.1)	103 (49.3)	1.54	1, 252
White	7507 (85.4)	58 (42.7)	142.17*	1, 252
Mixed	400 (3.6)	6 (0)	0.41	1, 252
Indian	374 (2.1)	15 (4.3)	3.16*	1, 252
Pakistani/Bangladeshi	897 (4.3)	104 (34.0)	362.47*	1, 252
Black	469 (3.1)	27 (9.4)	20.41*	1, 252
Other	195 (1.4)	17 (7.0)	31.70*	1, 252
Mother is university-educated	1769 (19.1)	9 (0.1)	23.26*	1, 252
Parental SES	3472 (41.5)	8 (8.0)	42.28*	1, 252
Single-parent family status (Age 3)	1722 (17.1)	57(30.3)	17.34*	1, 252
Single-parent family status (Age 5)	1616 (18.9)	17 (22.4)	0.543	1, 244
Single-parent family status (Age 7)	1621 (22.0)	12 (18.5)	0.38	1, 241

Note: Parental SES: mother in a higher managerial, administrative or professional occupation.

* $p < .05$.

4 (Table 5) showed that, after adjusting for key family and child covariates, the share of single-parent families in the neighbourhood was not related to either peer or emotional problems. Nonetheless, both NSP and NSES were related to the trajectories of conduct and peer problems, and NSES was related to both peer problems and hyperactivity at central age. Even after this adjustment, family risk was related to emotional and behavioural problems in children. In particular, parental SES was related to all types of problems at central age, and single-parent family status was related to externalising (hyperactivity and conduct) problems at central age. Parental SES was also related to the trajectories of peer and conduct problems, and single-parent family status to the trajectories of emotional, hyperactivity and peer problems.

Model 5 showed significant interactive associations between NSES and parental SES on the linear and quadratic slope of emotional symptoms, and between NSP and single-parent family status on the intercept and quadratic slope of hyperactivity. As can be seen in Fig. 1 which plots the significant interaction effect on emotional symptoms, the adverse effect of low parental SES is accentuated in neighbourhoods with a higher proportion of low-SES adults, particularly in the early years. Fig. 2, which shows the interaction effect on hyperactivity, demonstrates that children in single-parent families who live in areas with a high proportion of single-parent families are less hyperactive than children in single-parent families living in areas with a smaller share of single-parent families. Children in two-parent families living in neighbourhoods with a larger share of single-parent households are more hyperactive than any other children, although differences are small.

5. Discussion

There is much research on the role of neighbourhood composition, particularly socio-economic composition, in children's emotional and behavioural problems. This research shows that, even after accounting for families' selective sorting into neighbourhoods, the spatial concentration of 'high-status' adults has a positive effect on a range of child outcomes, in general (Leventhal and Brooks-Gunn, 2000). Research has also shown that neighbourhood socio-economic composition may not affect everyone equally, with studies pointing to both the adverse (Flouri et al., 2015; Winkleby et al., 2006) and the beneficial (Tsai et al., 2014) effect of living in neighbourhoods incongruent to one's socio-economic situation. This research suggests the importance of testing for cross-level interactions but the evidence with respect to the direction of such moderator effects is still equivocal. There are certainly arguments for either direction. Low-SES families may benefit from living in high-SES neighbourhoods because such neighbourhoods have better collective material and social resources. Conversely, being low (high) SES relative to the neighbourhood average may be associated with worse (better)

Table 4
Correlations among the Main Study Variables in the Analytic Sample.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Emotion 3 yr																					
2. Emotion 5 yr	.42																				
3. Emotion 7 yr	.35	.50																			
4. Conduct 3 yr	.31	.23	.24																		
5. Conduct 5 yr	.21	.32	.27	.50																	
6. Conduct 7 yr	.17	.22	.37	.45	.59																
7. Hyper 3 yr	.25	.18	.18	.47	.36	.33															
8. Hyper 5 yr	.17	.27	.23	.36	.53	.43	.57														
9. Hyper 7 yr	.15	.19	.29	.34	.43	.55	.50	.67													
10. Peer 3 yr	.34	.27	.25	.27	.20	.19	.25	.22	.20												
11. Peer 5 yr	.24	.39	.31	.22	.30	.24	.22	.30	.25	.40											
12. Peer 7 yr	.21	.27	.42	.22	.28	.35	.22	.27	.33	.35	.52										
13. NSP 3 yr	.15	.12	.12	.19	.16	.17	.15	.15	.14	.17	.19	.17									
14. NSP 5 yr	.14	.12	.12	.18	.16	.16	.15	.14	.13	.16	.19	.18	.90								
15. NSP 7 yr	.14	.13	.12	.18	.16	.17	.15	.14	.14	.15	.18	.17	.84	.91							
16. NSES 3 yr	−.17	−.12	−.12	−.20	−.17	−.17	−.18	−.16	−.15	−.20	−.20	−.18	−.66	−.62	−.59						
17. NSES 5 yr	−.16	−.12	−.12	−.20	−.16	−.16	−.18	−.16	−.15	−.19	−.19	−.18	−.61	−.67	−.63	.92					
18. NSES 7 yr	−.16	−.12	−.12	−.20	−.16	−.17	−.17	−.15	−.15	−.18	−.19	−.18	−.57	−.63	−.66	.87	.93				
19. Single-parent 3 yr	.08	.08	.10	.13	.15	.14	.10	.14	.13	.08	.12	.13	.24	.24	.24	−.16	−.16	−.16			
20. Single-parent 5 yr	.07	.08	.09	.12	.15	.13	.10	.13	.11	.07	.11	.11	.22	.23	.23	−.15	−.16	−.15	.69		
21. Single-parent 7 yr	.05	.08	.08	.11	.14	.12	.10	.09	.09	.06	.11	.10	.21	.22	.23	−.14	−.15	−.15	.52	.72	
22. SES	−.13	−.11	−.12	−.16	−.16	−.16	−.16	−.14	−.14	−.15	−.15	−.12	−.28	−.29	−.28	.34	.34	.35	−.14	−.13	−.13

Note: All correlations were significant at $p < .01$. Emotion=Emotional symptoms; Conduct=Conduct problems; Hyper=Hyperactivity; Peer=Peer problems; Single-parent=Single-parent family status; SES=Parental SES (mother in a higher managerial, administrative or professional occupation).

Table 5
Fixed effects estimates and variance covariance estimates of problem trajectories (Models 3 and 4).

Predictors	Emotional symptoms		Conduct problems		Hyperactivity		Peer problems	
	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4
Fixed Effects								
Stratum (ref.=England-adv.)								
England-disadv.	0.064(0.038)	0.025(0.033)	0.134(0.036)***	0.113(0.035)**	0.150(0.060)**	0.100(0.057)	0.142(0.034)***	0.080(0.032)*
England-ethnic	0.264(0.053)***	0.012(0.058)	0.010(0.050)	0.063(0.061)	0.170(0.085)*	0.029(0.099)	0.479(0.048)***	0.095(0.056)
Wales-adv.	−0.136(0.322)	−0.182 (0.300)	−0.155(0.335)	−0.161(0.317)	−0.439(0.519)	−0.308(0.501)	−0.009(0.301)	0.005(0.291)
Wales-disadv.	0.167(0.217)	0.023(0.205)	0.151(0.229)	0.037(0.218)	0.688(0.349)	0.564(0.340)	−0.094(0.204)	−0.181(0.200)
Scotland-adv.	−0.375(0.267)	−0.387 (0.263)	0.050(0.293)	0.142(0.286)	0.547(0.434)	0.732(0.440)	0.063(0.255)	0.047(0.258)
Scotland-disadv.	−0.354(0.478)	−0.313 (0.449)	0.693(0.517)	0.745(0.507)	0.684(0.768)	0.602(0.750)	0.483(0.453)	0.461(0.447)
Northern Ireland-adv.	−0.473(0.642)	−0.588 (0.585)	−0.851(0.760)	−1.002(0.712)	−1.906(1.038)	−2.165(0.993)*	−0.261(0.629)	−0.370(0.599)
Northern Ireland-disadv.	−0.248(0.603)	−0.225 (0.550)	−0.220(0.650)	−0.246(0.608)	−0.458(0.984)	−0.323(0.941)	0.625(0.570)	0.646(0.543)
Age	0.005(0.025)	0.009(0.027)	−0.435 (0.026)***	−0.399 (0.029)***	−0.215 (0.033)***	−0.180 (0.037)***	−0.154 (0.024)***	−0.171 (0.027)***
Age^2	0.030(0.018)	0.009(0.019)	0.152(0.017)***	0.147(0.018)***	0.094(0.022)***	0.077(0.025)**	0.089(0.016)***	0.082(0.018)***
NSP	0.020(0.008)*	0.000(0.008)	0.015(0.008)	−0.001(0.009)	0.019(0.011)	0.008(0.012)	0.025(0.008)**	0.006(0.008)
NSP × age	−0.000(0.003)	0.001(0.003)	−0.004(0.003)	−0.006 (0.003)*	0.001(0.003)	0.001(0.004)	0.003(0.002)	0.006(0.003)*
NSP × age^2	0.001(0.002)	0.003(0.002)	0.004(0.002)*	0.005(0.002)*	0.001(0.002)	0.003(0.003)	−0.002(0.002)	−0.001(0.002)
NSES	−0.010(0.008)	−0.007 (0.009)	−0.025 (0.008)**	−0.013(0.009)	−0.042 (0.012)***	−0.029(0.013)*	−0.029 (0.008)***	−0.029 (0.008)***
NSES × age	0.005(0.003)	0.005(0.003)	0.010(0.003)***	0.008(0.003)**	0.004(0.003)	0.002(0.004)	0.004(0.002)*	0.007(0.003)*
NSES × age^2	−0.003(0.002)	−0.001 (0.002)	−0.004 (0.002)*	−0.004 (0.002)*	−0.002(0.002)	−0.000(0.003)	−0.004 (0.002)*	−0.004 (0.002)*
Child's ethnicity (ref.=White)								
Mixed		−0.022 (0.070)		−0.056(0.074)		−0.001(0.115)		0.091(0.068)
Indian		0.031(0.085)		−0.121(0.087)		0.105(0.138)		0.456(0.081)*
Pakistani/Bangladeshi		0.329 (0.077)***		−0.196(0.079)*		0.203(0.126)		0.585(0.074)***
Black		−0.136 (0.079)		−0.415 (0.083)***		−0.450 (0.130)***		0.134(0.077)
Other		0.361 (0.126)**		−0.237(0.127)		−0.105(0.203)		0.416(0.120)***
Girl		0.027(0.026)		−0.262 (0.028)***		−0.670 (0.043)***		−0.196 (0.025)***
Single-parent	0.122(0.042)**	−0.051 (0.045)	0.308(0.041)***	0.099(0.045)*	0.327(0.056)***	0.136(0.063)*	0.185(0.039)***	0.042(0.043)
Single-parent × age	0.035(0.015)*	0.034(0.016)*	−0.017(0.015)	−0.017(0.017)	0.051(0.020)*	0.059(0.022)**	0.037(0.014)**	0.044(0.016)**
Single-parent × age^2	−0.002(0.010)	−0.002 (0.011)	−0.012(0.010)	−0.014(0.011)	−0.030(0.013)*	−0.031(0.014)*	−0.017(0.010)	−0.016(0.010)
SES	−0.259 (0.037)***	−0.083 (0.039)*	−0.349 (0.038)***	−0.126 (0.040)**	−0.497 (0.054)***	−0.121(0.059)*	−0.262 (0.034)***	−0.094 (0.037)*
SES × age	−0.004(0.011)	−0.006 (0.012)	0.033(0.012)**	−0.036 (0.012)**	0.027(0.015)	0.015(0.016)	0.034(0.011)**	0.027(0.012)*
SES × age^2	−0.006(0.008)	−0.006 (0.008)	−0.015(0.007)*	−0.020 (0.008)*	−0.005(0.010)	−0.011(0.011)	0.001(0.007)	−0.000(0.008)
Mother is university-educated		−0.072 (0.037)		−0.207 (0.039)***		−0.648 (0.061)***		−0.119 (0.036)***
Maternal psychological distress		0.088 (0.003)***		0.083(0.003)***		0.093(0.005)***		0.062 (0.003)***
Poverty		0.085 (0.015)***		0.145(0.015)***		0.099(0.022)***		0.096(0.014)***
Constant	1.341(0.083)***	1.038 (0.087)***	1.614(0.082)***	1.386(0.088)***	3.513(0.120)***	3.462(0.128)***	1.163(0.077)***	1.055(0.082)***
Random Effects								
Level 3 (ward)								
Intercept	0.012(0.005)*	0.003(0.003)	0.006(0.004)	0.003(0.004)	0.032(0.012)**	0.017(0.010)	0.008(0.004)*	0.003(0.003)
Level 2 (child)								
Intercept	1.067(0.025)***	0.883 (0.024)***	1.405(0.029)***	1.215(0.028)***	3.201(0.062)***	2.921(0.061)***	0.920(0.021)***	0.847(0.022)***
Slope	0.056(0.004)***	0.057 (0.004)***	0.090(0.004)***	0.088(0.005)***	0.119(0.007)***	0.109(0.008)***	0.063(0.004)***	0.064 (0.004)***
Covariance	0.099(0.006)***	0.103 (0.006)***	−0.176 (0.007)***	−0.153 (0.007)***	0.098(0.013)***	0.087(0.014)***	0.003(0.006)	0.004(0.006)
Level 1 (occasion)								
Intercept	1.248(0.021)***	1.128	1.090(0.018)***	0.980(0.019)***	1.930(0.032)***	1.824(0.035)***	1.074(0.018)***	0.963(0.018)***

Table 5 (*continued*)

Predictors	Emotional symptoms		Conduct problems		Hyperactivity		Peer problems	
	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4
		(0.021)***						
Log Likelihood	84497.956	68854.445	85403.542	69488.760	99710.159	82742.642	81782.368	66963.013

Note: NSP=Neighbourhood single-parenthood (% of single-parent families in the neighbourhood); NSES=Neighbourhood socio-economic status (% of high-SES females in the neighbourhood); Single-parent=Single-parent family status; SES=Parental SES (mother in a higher managerial, administrative or professional occupation); dis-adv=disadvantaged; adv=advantaged.

* $p < .05$.
** $p < .01$.
*** $p < .001$.

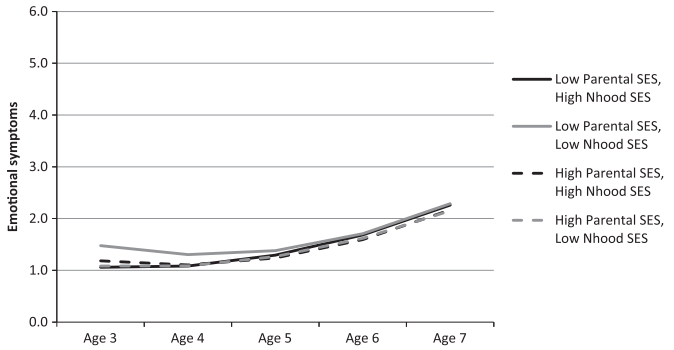

Fig. 1. Predicted emotional symptom trajectories for children by high/low parental SES and high/low share of high-SES adults in the neighbourhood. Low and high shares correspond to the 1st and 10th deciles, respectively.
Note: The predictions are plotted for the reference group for each categorical variable and at the mean of each continuous variable.

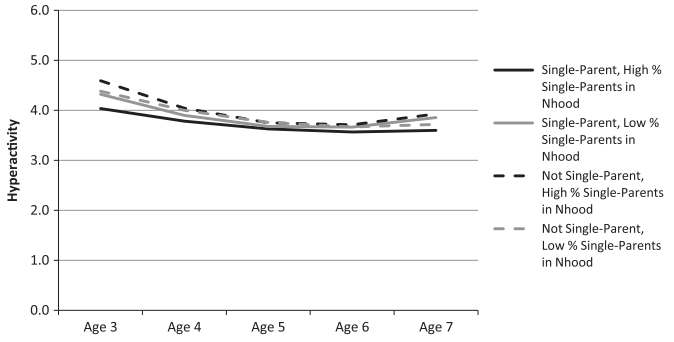

Fig. 2. Predicted hyperactivity trajectories for children by single-parent family status and high/low share of single-parent families in the neighbourhood. Low and high shares correspond to the 1st and 10th deciles, respectively.
Note: The predictions are plotted for the reference group for each categorical variable and at the mean of each continuous variable.

outcomes because of the discrepancy between an individual family's socio–economic situation and those around them.

We carried out this study to add to the evidence on these issues. Using data on a large population sample of young children in England, we investigated the role of neighbourhood shares of high-SES adults and single-parent families in the development of children's emotional and behavioural problems from ages 3–7 years. We also tested if these neighbourhood characteristics moderated the effects of the equivalent family characteristics of parental SES and single-parent family status. Our study showed that, as expected, children in low-SES or single-parent families had worse emotional and behavioural problems than their counterparts. It also showed, however, that even after accounting for these family characteristics, selection and important covariates of child problem behaviour, the shares of high-SES adults and single-parent families in the neighbourhood were related, respectively, to positive and negative child behaviour outcomes. Both neighbourhood composition effects were, as expected, modest in size, and weaker than those of the equivalent family characteristics.

Importantly, our study also showed some evidence for multiplicative effects. Children of low-SES families living in neighbourhoods with a larger share of high-SES adults had better emotional adjustment, especially in the preschool years, than their counterparts living in areas with a lower concentration of high-SES adults. However, the effect of single-parent family status on child hyperactivity was attenuated in neighbourhoods with a higher share of single-parent families. It is unclear why neighbourhood disadvantage would both attenuate and accentuate the effect of family socio-demographic risk on child outcomes. The 'protective' effect of high neighbourhood SES on children from low-SES families in the preschool years suggests that socialisation processes and infrastructure available in affluent areas may offset family disadvantages, elevating the outcomes of these children to a level on par with children in advantaged family circumstances. The direction of the interaction effect on child hyperactivity, on the other hand, could suggest reporting bias, such that when child hyperactivity is common, it can be seen as normative. Data on neighbourhood processes and services in affluent compared to deprived areas (not available and not linked, respectively, in MCS) could help test the first hypothesis. Observational data on hyperactivity, unavailable in MCS, could help test the second hypothesis. Neighbourhood social capital may be another mediator of this interaction effect on hyperactivity, but MCS has very limited data on neighbourhood social capital. It is unlikely that the person-environment fit effect found on hyperactivity is because children of single parents in areas with a larger share of single parents receive more neighbourhood supervision or access better services, as both resources and institutional capacity are limited in such areas.

Irrespective of their explanation, our findings about the multiplicative relationships between family and neighbourhood risk have important implications for practice. They suggest that health and education services need to continue to focus on vulnerable (such as single-parent or low-SES) families in order to reduce inequalities in child behaviour and mental health. However, they also show the need for community programmes to consider targeting potentially "hidden" populations at high risk of child ill-mental health. These findings, however, should be seen in the light of a significant limitation. Market forces dictate that poor people are less able to afford to live in affluent areas. This reduces the power to detect a statistically significant interaction between family and area SES because of the small number of low-SES families

in high-SES areas (and high-SES families in low-SES areas), particularly in less urban areas which have less diversity. It also limits the ability to generalise from such selective, and unusual, groups. Nonetheless, our findings suggest that there may be value in 'neighbourhood effects' studies investigating cross-level interactions. Future research should attempt to explain how any such interaction effects on child outcomes may be mediated.

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