

Internalising and externalising behaviour profiles across childhood: The consequences of changes in the family environment

ABSTRACT

Internalising and externalising behaviours may have heterogeneous patterns across childhood. Different aspects of young children's proximal family environments may influence these behavioural profiles. Previous studies have used indicators of family instability at one point in time or collapsed several indicators into an index. We assess whether patterns in internalising and externalising behaviours across childhood are in part determined by changes and events in multiple domains of the family environment across early childhood. Using Millennium Cohort Study data and Latent Profile Analysis, we created longitudinal latent profiles for internalising and externalising behaviour using child behaviour scores at ages 3, 5, 7, and 11. Time-varying markers of children's environments from ages 3 to 11 years included: poverty, family structure, number of siblings, residential moves, maternal depression, and hospital admissions. We derived five internalising profiles and two externalising profiles. Transitions into and out of poverty (ORs range: 1.9-3.3), changes in maternal depression (ORs range: 2.3-7.8), and persistent experiences of poverty and maternal depression had the strongest and most consistent associations with children's behaviours at all ages; early childhood experiences of maternal depression and poverty had independent longitudinal associations with children's behaviours; and residential moves were only related to externalising behaviours. This study emphasises the importance of investigating interrelated features of a child's proximal family environment alongside examining patterns in children's behaviour across childhood. To best support children and their families, policy solutions should focus on alleviating family poverty and depression and consider the holistic nature of a child's family environment.

Keywords: internalising and externalising behaviours; Millennium Cohort Study; family environment; latent class profiles

1. INTRODUCTION

Internalising and externalising behavioural profiles differ considerably (Kremer et al., 2016). Internalising behaviour is characterised by anxiety, withdrawal, and dysphoria whereas externalising problems include impulsivity, aggressiveness, and disruptiveness (Achenbach & Edelbrock, 1978). Internalising and externalising behaviours in childhood have been linked to a significant reduction in quality of life, resulting from academic failure, juvenile delinquency, and poor labour market outcomes (Caughy et al., 2016). Childhood is an important developmental period during which patterns, or profiles, in internalising and externalising problems can be identified (Alink et al., 2006). Accumulating evidence suggests that there may be subgroups of internalising and externalising behaviours that characterise the heterogeneity in developmental pathways of each of these problem behaviours across childhood (Campbell et al., 2009; Costello et al., 2003; Wiesner & Kim, 2006). Current evidence has used modelling strategies that do not consider the developmental subgroups of the two behaviours across time (Flouri et al., 2015; Kremer et al., 2016) or has relied on averages in one or two time periods (Bobbitt & Gershoff, 2016). Using a longitudinal approach that accounts for the heterogeneous individual profiles of internalising and externalising behaviours can lead to potential prevention opportunities (Wiesner & Kim, 2006). Revealing subgroups within each behaviour can help describe children who are at risk for high levels of problem behaviours, which is information that can be used to develop more fine-grained prevention and intervention strategies (Group, 2011).

1.1 Theoretical perspective

Research in the area of children's development and their proximal family environment is largely informed by Bronfenbrenner's (2006) ecological model of child development, but also more recently from the concept of developmental ecology (Mollborn, 2016). Both perspectives

conceptualize children's development occurring in, and as a product of, their proximal family environment. Different aspects of young children's environments, such as changes in family structure or experiences of poverty, are not necessarily independent of each other and can interact to adversely influence children's behaviour. According to both theoretical frameworks, family environments that provide opportunities, supports for growth, and that are consistent and predictable are beneficial for children's behavioural development. In contrast, children in unpredictable or unstable family environments characterised by chaos and a lack of structure have more problem behaviours and fewer social skills across childhood (Bobbitt & Gershoff, 2016).

Theoretically, studies define changes in children's proximal family environment in a number of ways. For example, 'environmental confusion' (Matheny et al., 1995), 'chronic and persistent instability' (Lichter & Wethington, 2010), 'disruptions in multiple domains, including household resources and routine family life' (Fiese et al., 2010), or 'sudden, unexpected, and unintended disruptions' (Dunn et al., 2010). More recently, the developmental ecology perspective incorporates a multifaceted approach of conceptualizing aspects of children's everyday environments that influence behavioural development, including socioeconomic resources, child health risks, and ecological changes (Mollborn, 2016). Importantly, for our study, both theoretical concepts of ecological model and developmental ecology facilitate empirical measurement; both perspectives consider multiple family characteristics and their disruption, stability, and collectively their influences on children's development.

1.2 Family environment and child behaviour

Empirical measurements of proximal family environments are numerous. On the one hand, studies have combined theoretically important constructs as an index, for example, the

Confusion, Hubbub, and Order Scale (CHAOS) (Matheny et al., 1995). Children in highly chaotic home environments have shown more problem behaviours and fewer social skills, above and beyond controls for child gender, family poverty, and parental depression (Bobbitt & Gershoff, 2016; Coldwell et al., 2006; Dumas et al., 2005). Similar results have been shown using the Adverse Life Events index (Tiet et al., 1998) in relation to increases in internalising and externalising problems across early childhood (Flouri et al., 2015).

On the other hand, the empirical literature on individual domains of the family environment is large. Household social and material resources, such as maternal depression and discrete changes in poverty status, are linked to more child behavioural problems (Turney, 2011; Wolf & Morrissey, 2017). Prior work has importantly focused on repeated changes in children's proximal environments as influential for children's development (DiPrete & Eirich, 2006). Parents' partnerships, residential moves, and the entry or exit of siblings all represent repeated changes in children's family and social environments that can compromise children's behaviour (Bernardi et al., 2013; Cavanagh & Huston, 2006; Fomby & Cherlin, 2007; Network, 2002).

These previous studies have used particular indicators of instability at one point in time, but the sole use of one indicator ignores the interrelated features of a child's proximal family environment across childhood (Mollborn, 2016). Equally, little research considers the temporal dimension of children's exposure to family changes and events. Life-course theory highlights the importance of duration, timing, and stability of circumstances because circumstances across ages have differential effects on childhood outcomes (Ben-Shlomo & Kuh, 2002). There is compelling evidence that chronic exposure to poverty and depression is detrimental to children's development (Turney, 2011; Wagmiller Jr et al., 2006). A growing number of studies consider the timing of different family structures and the types of different transitions for child

socioemotional development, demonstrating the important effects of the intersection of timing and instability (Lee & McLanahan, 2015; Osborne & McLanahan, 2007). In this paper we add to the literature by assessing multiple domains of children's family environment across childhood to better capture the lived everyday experience of children more holistically.

While instability or change in children's proximal family environments is defined and measured in numerous ways, either because the operationalization is under-developed or overly broad (Bobbitt & Gershoff, 2016), examining multiple domains of change is helpful to interrogate which key aspects of the family environment influence children's internalising and externalising behaviours (Wachs & Evans, 2010). Incorporating a constellation of risks or advantages can capture the contextual complexities in which children live. In this paper we consider both positive and negative changes, because turbulence may be deleterious if the child is unable to recover between transitions. Only a handful of studies to date have examined changes in multiple domains of children's proximal family environments across childhood (Bobbitt & Gershoff, 2016; Mollborn, 2016; Vernon-Feagans et al., 2012; Watamura et al., 2011). Although some of these studies investigate children's internalising and externalising behaviours (Bobbitt & Gershoff, 2016; Mollborn, 2016; Watamura et al., 2011), none have examined *subgroups* defined by children's behaviour across childhood alongside changes in the myriad of factors in the family environment. Other studies examining heterogeneity in children's behaviour have used an index, losing detail on changes or events in the family environment (Flouri et al., 2015).

1.3 Current study and hypotheses

The present study examines changes and events in children's proximal family environments and the extent to which these changes are associated with internalising and

externalising behavioural profiles across the first decade of life. Using the first five waves of the UK Millennium Cohort Study, we ask: (1) What are the patterns in children's internalising and externalising behaviours; (2) Which contemporaneous family changes and events are associated with internalising and externalising behaviours; and (3) Are family changes and events in early childhood longitudinally associated with internalising and externalising behaviours, and do subsequent family events account for any observed longitudinal relationships. Using Bronfenbrenner's perspective, the multidimensional framework of developmental ecology, and evidence from family studies suggesting the importance of stability, we predict changes in multiple indicators of the family environment to be associated with raised internalising and externalising scores across childhood. As suggested by life-course theory, we also predict early childhood exposure to family changes and events will be related to internalising and externalising behaviours, beyond subsequent family events.

2. DATA AND METHODS

2.1 Data

The Millennium Cohort Study (MCS) is a nationally representative longitudinal study of 18,552 infants born in the UK between September 2000 and January 2002. The sample design allows for disproportionate representation of families living in economically disadvantaged areas and in areas with high ethnic minority populations (Plewis et al., 2007). Ethical approval for the MCS was gained from NHS Multi-Centre Ethics Committees, and parents gave informed consent before interviews took place. The first interview was when cohort members were 9 months of age, and follow up interviews were conducted at ages three, five, seven, eleven and fourteen years. Data from the first five interviews were used for this study. During interviews,

the main respondent was asked about socioeconomic circumstances, household and demographic characteristics, and the cohort members' behaviour.

2.2 Internalising and Externalising Behaviours

Internalising and externalising behaviours were measured at ages 3, 5, 7, and 11 using maternal reports on the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997). Strengths of the SDQ are its psychometric properties and representation of children's socioemotional strengths and difficulties. The questionnaire asks five questions in each of five domains: emotional symptoms, conduct problems, hyperactivity–inattention, peer problems, and prosocial behaviour. Each question is scored 0 (not at all true), 1 (partly true), or 2 (certainly true), with some questions reverse coded. An internalising behaviour score is the sum of the ten items from the emotional symptoms and peer problems subscales and externalising behaviour was derived from the ten items from the conduct problems and hyperactivity–inattention subscales. Scores for each 10-item scale may range from 0 to 20.

2.3 Proximal Family Environment

All events or changes at ages 3, 5, 7, and 11 were measured between two consecutive interviews and used information from the main caregiver. For example, at age 3, changes or events were assessed between interviews occurring at 9 months and 3 years of age.

Family structure transitions identify changes in the child's household composition due to changes in the mother's marital status, cohabitation status, or caregiving status. We assume that the following changes were accompanied by changes in household composition: from single to either cohabiting or married, from cohabiting or married to single, from married to separated, divorced, or widowed, and from single parent to a different single parent (Fomby & Cherlin, 2007). We do not consider the change from cohabiting with a partner to marrying that same

partner as a family structure transition. The following four categories were derived: single to coupled, coupled to single, multiple transitions, and stable parent(s). A change from a single parent to a different single parent family was categorized as a multiple transition. Changes in number of siblings focused on information from the household grid on number of natural, half, step, adopted, and foster siblings. Three indicators on changes in sibling composition were derived: new sibling, sibling left home, or same number of siblings. A binary measure of any residential moves was constructed from reports of moving home between interviews. Family poverty was defined as equivalised net family income below 60 % of the national median. Four binary variables were measured: moved into poverty, moved out of poverty, stable poor, and stable non-poor.

Changes in risk for maternal depression used the 6-item Kessler scale at ages 3, 5, 7, and 11 (Kessler et al., 2002), which assesses the experience of recent non-specific psychological distress. At the 9-month interview, depressive symptoms were assessed using the Malaise Inventory Score (Rutter et al., 1970). A binary variable indicated risk for depressive symptoms (score greater than 7 on the Malaise Inventory or 12 on the Kessler scale), hereafter referred to as depression (Kessler et al., 2002). Changes in maternal depression were measured as the following: experienced a new episode of depression, recovered from depression, consistently depressed, and consistently not depressed.

A binary indicator was derived from questions on whether the child had been admitted to a hospital because of an illness or health problem since the last interview.

Key covariates used in the latent classification were measured at the 9 month interview (MCS 1) and were the following: mother's age at birth (continuous); maternal attachment to her

child, assessed using 6 Likert items (continuous) (Condon & Corkindale, 1998); and a binary indicator of first birth. Descriptive statistics on these variables are available upon request.

2.4 Sample

Child internalising and externalising behaviours are moderated by multiple births and therefore we analysed data on singleton-born cohort members. To characterise longitudinal latent internalising and externalising profiles, we first analysed a sample of cohort members who had at least one SDQ assessment from the first four follow-up interviews and covariates assessed at MCS 1. The analytic sample for the latent profile analysis was 15,380 for internalising and 15,383 for externalising profile analyses. These sample sizes exclude children who were reported to have autism or Asperger's syndrome ($n = 256$). To examine the associations between family changes and events and child internalising and externalising behaviours, we considered variables contemporaneously and longitudinally and thus analytic sample sizes were allowed to vary. Models examining contemporaneous family changes and events at age 3 have sample sizes of nearly 12,550. Models with age 5 variables have nearly 11,060 observations, whereas models with age 7 variables have a sample approaching 11,220, and models with age 11 variables have nearly 9,780 observations.

Longitudinal regression models with age 3 variables have sample sizes of nearly 12,550. Models with variables from ages 3 and 5 have nearly 11,050 observations, adding age 7 reduces the observations to nearly 9,730, and finally adding age 11 variables reduces the sample to around 8,260. The sample sizes for the internalising and externalising regressions vary by no more than 5 observations.

2.5 Analytic Strategy

To describe the number and nature of latent profiles of children's internalising and externalising behaviours, we used a three-step latent profile analysis (R3STEP LPA) implemented in Mplus (Gibson, 1959; Muthén & Muthén, 2010). In the first step of latent profile classification, each measure of children's behaviour was adjusted for child age and gender. Covariates from the first wave of MCS (described above) were used as auxiliary variables to improve classification of the behavioural profiles. After the latent profiles were identified and described, we used the R3STEP framework to examine the extent to which family changes and events predicted latent profiles. First, we considered contemporaneous family variables by separately adjusting for family environment factors at each age (Tables 2 and 3). Model 1 investigates changes between 9 months and 3 years; Model 2 examines changes between 3 and 5 years; Model 3 considers changes between 5 and 7 years; and Model 4 analyses changes between 7 and 11 years. Second, we tested the longitudinal associations between early childhood family variables and latent profiles (Tables 4 and 5). Family variables were sequentially added to regressions. First, changes in early family circumstances from 9 months to age 3 were added, and then we progressively added variables at subsequent ages. Thus, Model 1 examines the simultaneous association between family environment variables at age 3 and latent profiles. Model 2 adds family variables at age 5 to Model 1; Model 3 adds age 7 variables to Model 2; and lastly Model 4 adjusts for family variables at ages 3, 5, 7, and 11. All analyses accounted for sample design and non-response.

3. RESULTS

3.1 Latent classification

LPA revealed the optimal solution to be five longitudinal latent internalising behaviour profiles. Fit indices are presented in Appendix Table 1. Models beyond five profiles were

contraindicated by the fit indices. The additional one or two profiles beyond a five-profile solution reflected variants of fluctuating scores and did not offer distinct substantive insight related to internalising scores. The 5 internalising profiles are depicted in Figure 1. The largest group was named *Low problems* (75.8% of the sample). The scores of this group, with mean scores ranging between 1.7 and 2.2 across the 4 assessment periods, were the closest to the overall sample mean (range 2.5-3.1 across waves). In contrast to this group, the other four profiles each had internalising scores that were elevated at one particular age and otherwise had moderately above average mean scores at other assessment points. Children whose internalising scores *peaked at age 3* (mean = 8.1), before declining and remaining moderately elevated from age 5 onward, comprised 6.0% of the sample. The three other groups had *peak scores at ages 5, 7, and 11* (6.0%, 5.6%, and 6.6% of the sample, respectively).

The two externalising profiles are shown in Figure 2. The largest group, *Low problems* (82.8%), had mean scores closest to the sample mean at each age (range 4.4-6.8 across waves). The second profile had scores consistently above average at each wave, *Always high* (17.2%).

Table 1 presents descriptive statistics on changes and events in children's proximal family environment across four waves of MCS. Approximately 10-14% of children at any age experience family structure instability. Although the proportion with each type of family structure change remained stable from ages 3 to 11 years, the most common change was transitioning from a couple to a single parent family structure (range: 5.5%-7.1%). Over a quarter (26.4%) of children at age 3 experienced a new sibling moving into the family. This proportion declined with age to just under 13% at age 11. Children were most likely to have a sibling leave their household at age 11 (8.7%). Nearly 30% of children experienced a residential move by age 3. Moving became less commonly reported at ages 5 and 7, but increased at age 11

to nearly 20%. With increasing age children were more likely to move out of poverty (9.1% at age 3; 14.0% at age 11) whereas the reverse trend was true for children who moved into poverty (7.9% at age 3; 3.9% at age 11). The prevalence of mothers who reported a new episode of depression remained stable and low (range: 1.2%-4.0%). The proportion of mothers who recovered from depression was highest at age 3 (11.4%) before declining to a stable proportion (nearly 2.0%). Lastly, children's hospital admission was highest at age 3 (17.5%) and declined from age 5 onward to 10% at age 11.

3.2 Contemporaneous changes and events in the family environment

Tables 2 and 3 illustrate the odds of membership in internalising and externalising profiles by contemporaneous family changes and events, respectively. Models 1-4 represent changes in family circumstances between consecutive interviews. In line with our second research question, we only show results for internalising profiles that are contemporaneous to family changes. The *low problem behaviour* profile was the reference group for both tables.

Overall, children's internalising and externalising behaviours reacted to immediate changes and events in the family environment across childhood. Transitions into and out of poverty and changes in maternal depression had the strongest and most consistent associations with children's behaviours. Moving into and out of poverty predicted higher internalising and externalising scores across childhood compared to the stable non-poor group; however, estimates for consistent poverty were larger relative to transitioning into and out of poverty (ORs range: 1.9 to 4.9). For internalising scores, odds ratios were larger for new episodes of depression and consistent depression compared to recovery from depression across childhood, whereas consistent experiences of maternal depression had the strongest associations with externalising behaviours. Family structure changes and residential moves at each age were more predictive of

externalising scores than internalising scores. Children who had a new sibling enter their households were more likely to have raised internalising and externalising scores (ORs range: 1.5 to 1.8), relative to children who did not experience changes in number of siblings. Hospital admissions were related to raised internalising and externalising scores across childhood (ORs range: 1.4 to 2.1).

3.3 Longitudinal associations between early childhood family circumstances and internalising profiles

Table 4 addresses our third research question and shows estimates for changes and events between 9 months and 3 years and raised internalising scores at ages 5, 7, and 11. We controlled for family events occurring after 3 years to assess the independence of early childhood proximal family associations. We also examined incremental adjustments for changes at ages 5 and 7 (not shown).

Overall, we found family experiences in the first 3 years of life to have longitudinal associations with higher internalising scores, even after adjusting for subsequent family events. Consistent with results from analyses on contemporaneous family events, changes in poverty and maternal depression had the strongest associations. Transitioning into and out of poverty and stable poverty in the first 3 years of life were strongly linked to higher internalising scores at ages 5, 7, and 11. Poverty transitions and stable poverty were still associated with internalising behaviours at ages 5 and 11 once subsequent family events were taken into account. Equally, longitudinal associations between internalising behaviour and both changes in maternal depression and consistent maternal depression experienced in the first 3 years of life were apparent after adjustment for subsequent family events. Children who experienced multiple family structure transitions in the first 3 years of life, compared to children with no family

structure changes, had higher internalising scores at age 11 (adjusted OR: 3.6, CI: 1.3, 9.8). A new sibling moving in was associated with more internalising problems at age 5.

3.4 Longitudinal associations between early childhood family circumstances and externalising profiles

Table 5 presents results for the relationship between family changes and events between 9 months and 3 years and the *always high* externalising profile. We also examined detailed adjustments for family events at ages 5 and 7 (results not shown).

Similar to internalising profiles, family circumstances in the first 3 years of life remained associated with externalising profiles after adjustments for subsequent family events. Experiencing transitions into and out of poverty and stable poverty in the first 3 years of life were associated with higher externalising scores independent of later poverty experiences. Children of mothers who recovered from depression in the first 3 years of life had persistently higher externalising behaviour scores, even after adjusting for subsequent family events. Fully adjusted models showed that multiple family transitions before age 3 were associated with higher externalising scores (OR: 3.3, CI: 1.1, 9.6). Although a residential move before children were 3 years old was predictive of higher externalising scores, this association was attenuated to non-significance after adjusting for subsequent family events. Lastly, children who experienced hospital admissions before age 3 had raised externalising scores, but this relationship was attenuated after adjusting for later family events.

4. DISCUSSION

This study highlights the importance of investigating interrelated features of a child's proximal family environment alongside examining patterns in children's behaviour across childhood. In addressing the first research question of this study, we move beyond studies

investigating internalising and externalising behaviours using one or two time periods or average slopes (Bobbitt & Gershoff, 2016; Flouri et al., 2015; Kremer et al., 2016) by using a longitudinal approach that accounts for heterogeneous patterns. The data driven method in this study revealed multiple internalising profiles, including a group characterised by low scores and four groups identified by internalising scores that were elevated at one particular age. We found two externalising profiles: a group characterised with no problems and a group with consistently high scores across childhood. Our findings highlight that distinctions can be made within and between internalising and externalising behaviours across childhood. Child behaviours are not static but have dynamic and intermittent features that should be considered to develop more fine-grained prevention and intervention strategies (Group, 2011). Consistent with previous studies investigating heterogeneity in externalising behaviour in this age group, most children exhibit low levels of externalising problems over time and a small percentage follow a high, persistent trajectory of conduct problems and aggression from early childhood (Fanti & Henrich, 2010). Late onset problems may be identified as the cohort moves into adolescence. Researchers using the same data and similar methodology presented in the current study posit that elevated, persistent behavioural problems may be more prevalent among boys (Gutman et al., 2018). Further evidence needs to understand the role of changes in the family environment in the context of gender differences in child behaviour patterns.

The second and third research questions of this study were to investigate whether patterns in internalising and externalising behaviours are predicted by concurrent and earlier childhood changes and events in family circumstances. There were three key findings: (1) consistent experiences of poverty and maternal depression at all ages predicted higher internalising and externalising scores; (2) early childhood experiences (before the age of 3) of maternal depression

and poverty had independent longitudinal associations with children's behaviours; and (3) residential moves were only associated with externalising behaviours.

Our findings confirm earlier work showing that multiple family environment factors predict more internalising and externalising behaviours (Bobbitt & Gershoff, 2016; Coldwell et al., 2006; Dumas et al., 2005; Mollborn, 2016). We extend previous studies by capturing the contextual complexities in which children live by incorporating positive *and* negative changes and events in the family environment, unlike other studies using cumulative indexes (Matheny et al., 1995; Tiet et al., 1998) or focusing on a single feature of the family environment (Wolf & Morrissey, 2017). Our study provides a clear extension to the concept of developmental ecology by considering the time-related dynamics of these changes in children's family environments throughout early and middle childhood (Mollborn, 2016). Studying family instability in multiple domains longitudinally is a promising aspect to further theoretical development as we, for example, isolated the chronicity of depression and poverty, alongside the adverse influence of residential mobility. We have retained a primary focus on proximal factors but acknowledge the wide-ranging influence of distal factors articulated by Bronfenbrenner's ecological model. Future research examining the interrelated features of a child's family environment need to articulate the distal processes and mechanisms that influence child behaviour.

Policies and interventions that focus on a single factor in the child's environment (e.g. family structure) may ignore the diversity of children's family environments and consequently may not be as effective. Prior studies on the proximal family environment have largely focused on early childhood and preschool ages (Dumas et al., 2005; Vernon-Feagans et al., 2012). Our study extends this literature by capturing changes and events in the family environment during early and middle childhood. For example, we were able to conclude that changes in internalising

scores were responsive to changes in number of siblings and maternal depression in early and middle childhood. Comparing our findings with studies using cumulative indices is difficult, because these studies have typically used low-income samples or studied economically advantaged children (Bobbitt & Gershoff, 2016; Watamura et al., 2011), whereas our findings use nationally representative data and make population level inferences. Lastly, most prior research has investigated children's proximal family environment using static, point-in-time indicators (Bobbitt & Gershoff, 2016; Coldwell et al., 2006; Dumas et al., 2005) and may therefore be an underestimate of the link between family changes and events and children's internalising and externalising behaviours. Our study is one of the first attempts to examine family changes and events as an accumulation of persistent and intermittent characteristics over multiple time points (Vernon-Feagans et al., 2012). Future studies should incorporate children's family environmental risks and advantages longitudinally to holistically capture a child's developmental context (Bronfenbrenner & Morris, 1998).

Our results on the influence of maternal depression are consistent with evidence documenting the deleterious consequences of maternal depression on children's internalising and externalising behaviours (Augustine & Crosnoe, 2010; Kiernan & Mensah, 2009; Turney, 2011). We make three important extensions to new evidence using the MCS on transitions into maternal depression (Fitzsimons et al., 2017): our work considers changes in depression throughout childhood; we examine patterns in child behaviour; and lastly our results are robust to other family changes and events occurring contemporaneously. That exposure to concurrent and consistent episodes of maternal depression were linked to raised internalising and externalising scores underscores the importance of event timing. More research needs to consider the chronicity of maternal depression given that its symptoms cycle over time and occasionally

disappear (Kendler et al., 2000). Additionally, we found children's internalising and externalising behaviours across childhood to be longitudinally associated with maternal depression, particularly when this occurs in the first 3 years of life. Early experiences of maternal depression and its relationship with externalising behaviour is similar to evidence considering patterns in child conduct problems in MCS (Gutman et al., 2018). This is an important period of a child's life as transition into primary school predicts outcomes throughout the life course, and behavioural difficulties in early childhood may be associated with much greater disadvantages over time (Entwisle et al., 2003; McLeod & Kaiser, 2004). These findings emphasise the importance of efforts to ameliorate maternal depression as a salient element of early intervention programs focused on healthy development (Council, 2009).

Our study benefited from examining multiple domains of a child's family environment to further the literature on the timing of family poverty and its effects on internalising and externalising scores across childhood (Duncan et al., 1998). Previous studies are hampered by focusing on a total child behaviour score (Gershoff et al., 2007), on early childhood poverty (Berger et al., 2009) or on experiencing two time periods of poverty (Fitzsimons et al., 2017), and collectively do not look at patterns in internalising and externalising behaviours. A clear result from our analyses was that family poverty before the age of 3 had an independent longitudinal impact on behaviour, while adjusting for other family changes and events in a child's early life and subsequent changes and events throughout childhood. The long arm of early experiences of poverty suggests a reinforcement of early childhood policy initiatives, some of which have shown meaningful improvement in children's behaviour by reducing poverty during early childhood (Berger et al., 2009; Duncan et al., 2011). This is a salient policy goal in the UK where child poverty rates have been increasing since 2011-12 to 30%, largely due to

reductions in benefits and tax credits (Barnard et al., 2017). Although we do not suggest that poverty experienced later in childhood is inconsequential, early childhood is a period during which children are particularly vulnerable to the deleterious effects of their families' limited resources (Chaudry & Wimer, 2016).

We find residential moves across childhood to be linked with raised externalising scores. These findings are consistent with research showing a strong association between residential mobility and increased behaviour problems (Gambaro & Joshi, 2016; Perkins, 2017), despite the fact that studies have not consistently disentangled family disruptions co-occurring with residential moves, nor considered the developmental timing of family environment factors or patterns of internalising and externalising problems across childhood (Flouri et al., 2013; Jelleyman & Spencer, 2008). Externalising problems may represent children's feelings and social adjustment subsequent to a move that are associated with the loss of familiar physical environments, activities, and routines (Adam, 2004). Residential moves may disrupt children's social connections, forcing children to make new friendships. Indeed, there are numerous motives to residential moves and residential mobility may be forced or voluntary, all of which may differentially impact children's outcomes (Gambaro & Joshi, 2016). Although a detailed examination of residential mobility, in terms of quality, quantity, and reason, is outside the scope of this paper, we found some evidence that school moves between ages 3 and 5 and ages 7 and 11 were also, but independently, associated with raised externalising scores. Our findings emphasise that research on residential mobility should account for other sources of family instability that may occur at the same time or near to a move so that independent effects can be isolated.

Although the MCS provides a unique wealth of data, there are limitations to this paper. Our description of family structure and sibling changes is not exhaustive. To maintain a manageable number of comparisons and reasonable cell sizes, we did not distinguish cohabiting from married parents. Our analysis combines full, step- and half-sibling relationships, but those relationships may differentially influence household relationships and in turn children's internalising and externalising behaviours. Further to variable measurement, the MCS does not provide information on changes in family structure transitions and sibling changes that occurred between waves. For example, cohabiting relationships that started and ended between interviews or siblings who moved in and out between interviews. Another limitation is that we used maternal reports of child behaviour and depressed mothers may have negative perceptions of their children. However, evidence suggests that mothers do not negatively distort or provide biased reports of their children's behaviours (Richters, 1992), including other research using these data (Zilanawala et al., 2015). Sensitivity analyses (not shown) using teacher reported child behaviour from ages 7 and 11 supported our key findings on contemporaneous and longitudinal associations between family changes and events and children's behaviour. Future research collection should consider multiple reports of children's behaviours across childhood.

This study contributes to our growing knowledge of children's proximal family environment and patterns in internalising and externalising behaviours across childhood. The findings highlight the home as an influential developmental context for influencing children's behaviours, but also reinforce the importance of taking a family approach to addressing children's problem behaviours. To best support children and their families, social policy efforts should protect families from financial hardship alongside effective treatment of parental depression and provision of health services for children. Promising interventions and solutions

have involved modifying risk *environments*: Head Start in the US offers wraparound services, such as health care and employment services; home nurse visits in the UK address multiple needs; and childcare subsidies address children's educational progress and parents' employment demands (Mollborn, 2016). The earlier interventions begin, the sooner we can level the playing field among children and reduce the intergenerational transmission of inequality.

Figure Captions

Fig 1 Latent Profiles of Internalising Scores

Notes: Sample is 15,380 and is restricted to cohort members with at least one assessment of internalising behaviour. Latent profile models include child age, gender, mother's age at birth, maternal attachment, and first birth.

Fig 2 Latent Profiles of Externalising Scores

Notes: Sample is 15,383 and is restricted to cohort members with at least one assessment of externalising behaviour. Latent profile models include child age, gender, mother's age at birth, maternal attachment, and first birth.

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