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# Family hardship, family instability, and cognitive development

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**What is already known on this subject?**

While the negative effects of both poverty and family structure on child development are well established, there is less knowledge about their relative impact on children's cognitive functioning. Furthermore, previous evidence focused mostly on poverty and family structure as states and has not taken into account continuity and change in family circumstances.

**What does this study add?**

This study is the first to assess the relative effects of persisting poverty and family status transitions on children's cognitive functioning at age five years using a large, longitudinal, general population sample. The study shows that early and persistent poverty undermine cognitive development, while family instability shows no significant association with cognitive functioning after controlling for family poverty and a set of control variables.

# Family hardship, family instability, and cognitive development


## Abstract

BACKGROUND: Associations between characteristics of the family environment, in particular poverty and family structure, and cognitive development are well established, yet little is known on the role of timing and accumulation of risk in early childhood. The aim of the paper is to assess the associations between income poverty, family instability, and cognitive development in early childhood. In particular we test the relative role of family economic hardship versus family instability in affecting cognitive functioning at age 5 years.

METHODS: The study draws on data from the UK Millennium Cohort, comprising a sample of 8,874 children born between 2000 and 2002 and their mothers. Cognitive ability was directly assessed at age 5 years with the British Ability Scales. Using regression models we examine associations between persistent income poverty, family transitions, and children's cognitive ability at age 5 years, controlling for family demographics and housing conditions, as well as child characteristics.

RESULTS: The findings suggest that the experience of persistent economic hardship as well as very early poverty undermines cognitive functioning at age 5 years. Family instability shows no significant association with cognitive functioning after controlling for family poverty, family demographics, housing and a set of control variables indicating child characteristics.

CONCLUSIONS: Persistent poverty is a crucial risk factor undermining children's cognitive development – more so than family instability.

# Family hardship, family instability, and cognitive development

Early cognitive development is a crucial indicator of developmental health, as it is associated with later educational and occupational attainment as well as health and wellbeing [1-7]. What happens to children early in their lives is critical for their future development [8-10]. A major risk factor undermining children's cognitive development is family poverty, in particular persistent poverty and adverse living conditions [11-14]. In recent years family instability has become recognized as a further salient risk factor affecting children's development [15-22]. Poverty and family instability are closely interlinked, as poverty affects families economically and socially, as well as on an emotional level. Economic hardship, for example, has been associated with greater risk for relationship break-up [16 23]. While the effects of both poverty and family structure on child development are well established, there is less knowledge about their relative impact on children's outcomes [24-26].

In the following we will assess the relative role of family poverty and family instability on the cognitive functioning of young children. Poverty affects the amount and quality of material resources that are available to children, which in the following we will refer to as the poverty hypothesis. In addition there is consistent evidence to suggest that children raised in stable two-parent families do better than those who experience multiple transitions in family structure, which has been referred to as the instability hypothesis [25 27]. Because family break-up and the experience of poverty often co-occur [45], it is important to assess their combined as well as separate effects on children's outcomes. Evidence from previous research on the relationship between poverty, family structure and children's academic attainment has produced conflicting findings, with some arguing that poverty may explain much of the effect of family structure on children's educational achievement [28-31], while others have argued that family structure operates independently of family economic status in influencing children's outcomes [16 28 32 33]. Differences in findings might be due to variations in the ages of the children studied, differences in assessments, or different operationalisations of family structure. In addition, most previous studies have focused on poverty and family structure as states and have not taken into account continuity and change in family circumstances.

An alternative explanation for the association between poverty, family instability and children's cognitive functioning is that all of these factors might be associated with each other due to their association with prior characteristics of the parent (such as mother's age and education) [25 31]. According to the selection hypothesis [25] parents' own characteristics may a.) affect their ability to maintain a stable income or a stable and committed partnership, and b.) impact on characteristics of their children, either through the environment in the home, through genetic transmission, or more likely the combination of both. We will thus control for the role of parental characteristics in our analysis. In addition, housing conditions have been identified as a potential risk factor shaping the cognitive attainment of young children [34-37] , for example due to overcrowding or lack of personal space. We thus assess the role of environmental influences on cognitive development by controlling for indicators of living conditions in our analysis.

Using a large nationally representative sample, the aim of this study is to disentangle the sometimes conflicting conclusions of previous studies by addressing the following questions: First, does persistent family poverty undermine children's cognitive functioning? Second, does family instability depress levels of cognitive functioning in children? Third, if both poverty and family instability affect cognitive functioning, which effect is larger? Fourth, can associations between poverty, family instability and cognitive functioning be explained through prior characteristics of the parent and/or current housing conditions. This study focuses on cognitive functioning at age 5, due to its proximity to school entry, and the crucial role of early cognitive functioning on later achievement and health [38]. All analyses control for characteristics of the child to take into account early individual difference factors, some likely to reflect biologically-based influences, which have been shown in past studies to be associated with cognitive development [21 39-42]. This study will be one of the first to assess the relative effects of persisting poverty and family status transitions on children's cognitive functioning at age 5 years in a general population sample.

## Methods

### *Sample*

The study draws on data collected for the Millennium Cohort Study (MCS), a survey of 18,819 babies born between September 2000 and January 2002 into 18553 families living

in the UK [43]. The 1st sweep of the Millennium Cohort Study was carried out during 2001 and 2002 when most babies were 9-months old. The sample design allowed for disproportionate representation of families living in areas of child poverty. Due to disproportionate sampling, special weights have to be applied in analyzing the data [44].

Data were collected from parents via personal interview and self-completion questionnaires. In 2006, at age 5, 15,246 families took part in the survey and for 14,682 children we have complete data on the cognitive assessments. The following analyses are based on 8,874 children and their mothers for whom we have complete data on all measures. In comparison to the original sample, the analytic sample contains relatively more socially privileged and better educated mothers, and slightly more girls. Children in the analytic sample also had slightly higher cognitive test scores than children for whom we have no information on family income or family status at the three measurement points (mean=51.8 (SE=.18) *vs* 48.8 (.32) for the picture vocabulary subtest and (mean=50.7 (SE=.20) *vs* 49.4 (.23) for the pattern construction subtest).

### *Measures*

*Family poverty*

We used equivalised net household income (taking into account household size and composition) as our indicator of family poverty [45 46], identifying families with less than 60% of the national median income at each of the three measurement points. The dichotomised information was dummy-coded into a categorical variable with 9 levels (Table 1). The categorical dummy variable provides information about both the timing and the duration of income poverty.

*Family Transitions*

The family transitions variable is derived from information about mothers' relationship status (married, cohabiting, single) at the three different measurement points. The 27 possible combinations were dummy-coded into a categorical variable with 8 levels, reflecting the most common transition patterns (Table 2). The categorical dummy variable provides information on stability and change in family structure during the first five years of the child's life.

*Cognitive ability*

At age 5 each child was directly assessed by specially trained interviewers using the British Ability Scales Second Edition (BAS II) , a reliable measure of cognitive functioning with good external validity [47 48]. Here we focus on two of the subscales: naming vocabulary and pattern construction, capturing core aspects of verbal and nonverbal skills. Age-related starting points, decision points, and alternative stopping points were used to ensure that the motivation and self-esteem of the child were protected, that the testing focused on the most suitable items for the child, and that the assessment time was kept to a minimum [47]. Test scores were T-standardized to a mean of 50 and a standard deviation of 10.

*Family demographics*

- Mother's age at birth of child (below age 20, 20-29; 30-39; 40+)
- Parental education: mother's or father's level of education, whichever was highest (None through post graduate degree level)

*Housing conditions at age 5 of the child*

- Home ownership (yes/no)
- Crowding (rooms/people in household)

*Control variables:*

- Child gender (0=male, 1=female)
- Child age at assessment (continuous, in months)
- Child birth weight (continuous, in kg)
- Child's ethnicity (White, Mixed, Indian, Pakistani or Bangladeshi, Black, Other)
- Delay in gross- and fine motor development at 9 months was assessed by parental reports using statements adapted from the Denver Developmental Screening test [49]. Delay in the developmental milestones is defined by the infant not reaching a milestone that 90% of infants in that age group can pass, e.g. only 88% of infants can move around the floor at 8 months but 92% can do this by 9 months [50 51]. So an 8 month old baby is not

delayed if s/he cannot move around, but a 9 month or older infant who cannot move around the floor is identified as delayed on this milestone.

*Analyses*

To test the associations between poverty, family transitions, and cognitive ability we ran a series of regression models for naming vocabulary and pattern construction separately. Because cognitive ability was assessed on a continuous and normally distributed scale we used ordinary least squares (OLS) regression.

**Results**

Table 1 shows the prevalence of poverty experienced between age 9 months and 5 years as well as the associated means and 95% confidence intervals for children's cognitive ability scores. The majority of families (62.1 per cent) were identified as not being poor at any of the three assessments, although about 13 per cent of families experienced persisting poverty. There appears to be a poverty gradient in children's cognitive test scores, with those exposed to persistent poverty scoring about 5 to 7 points less in the naming vocabulary test than those who never experienced poverty. Verbal abilities appear to be more strongly affected by poverty than nonverbal skills.

Insert Table 1

Table 2 shows the prevalence of different family transitions and associated levels of cognitive ability. The majority of parents were stably married (56.6 per cent), and about a $10^{th}$ were either continuously cohabiting with the same partner (12.7 per cent) or continuously single (7.8 per cent). Just under a quarter of mothers who cohabited when their child was aged 9 months were married 4/5 years later (usually to the biological father). We also find that about 10 per cent of the single mothers had entered marriage by 2006. We furthermore find significant minorities of mothers who either had exited a relationship, or experienced one or more other family transitions in the first five years of their child's life. Children growing up in stable two-parent families show higher levels of cognitive ability than those in stably cohabiting families or those who experienced a change in living

arrangements. Children in stable single parent families score lowest in assessments of both verbal and nonverbal skills.

Insert Table 2

The regression results for naming vocabulary and pattern construction are shown in Tables 3 and 4 respectively. Model 1 is the poverty baseline model including the poverty measure and controlling for child characteristics. Child characteristics on their own explain about 8 per cent of the variance in naming vocabulary and about 7 per cent of the variance in pattern construction, suggesting that child characteristics play a crucial role in shaping cognitive attainment by age 5. Poverty has a significant effect on children's cognitive functioning at age 5 years after controlling for child characteristics. Persisting poverty across the three time points has the greatest negative effect. Model 1 explains about 15 per cent of the variation in naming vocabulary and 10 per cent of pattern construction.

Insert Table 3 and 4

Model 2 is the family instability baseline model including the family transition variable and controlling for child characteristics. Being stably married is the baseline, compared to which each of the other family structures are significant risk factors for reduced levels of children's cognitive functioning at age 5 years, after controlling for child characteristics. Model 2 explains about 12 per cent of the variation in naming vocabulary and 9 per cent of pattern construction.

Model 3 includes both the poverty and family transition variables simultaneously, again controlling for child characteristics. Controls for family transitions had little impact on estimates of the effects of family poverty: all poverty variables remain significantly associated with cognitive functioning at age 5, except for transient experiences of poverty at age 3 only (npn), which showed no significant risk effect on pattern construction. By contrast, controls for income poverty markedly reduced estimates of the effects of family transitions. Only a sub-set of the family transition experiences remain significantly associated with naming vocabulary, in particular stable cohabitation, moving from

cohabitation into marriage, cohabitation to other transitions and stably single, all of which showed a negative association compared to being stably married. For pattern construction, only stable single parent family status continues to show a significant (negative) effect.

Model 4 adds information about maternal age and parental education, including both the poverty and family transition variables, and controlling for child characteristics. After adding the demographic variables the experience of persisting poverty (ppp) remains a significant risk factor for verbal ability (naming vocabulary), as does cumulative (npp and ppn) and intermittent poverty (npn, pnp), as well as the early experience of poverty at age 9 months (pnn). For pattern construction persistent and cumulative poverty also show a significant negative effect. Family structure, by contrast, has no significant association with either verbal or nonverbal cognitive ability in this multivariate model. Model 4 explains about 19 per cent of the variation in naming vocabulary and 11 per cent in pattern construction. It seems that taking into account parental characteristics considerably reduces the poverty effect and the effects of family instability on cognitive functioning at age 5 appear to be attributable to prior parental characteristics.

Model 5 adds the indicators for current housing conditions to the model. In addition and above the influence of family poverty, family instability, parental characteristics, and the child control variables there is a significant association with indicators of housing conditions at age 5 years, in particular overcrowding. Adding indicators of living circumstances reduces the association between poverty and cognitive functioning, although associations between persistent and cumulative poverty, as well as early poverty at age 9 months remain significant in addition and above the effects of the other variables included in the model. Associations between cognitive functioning and indicators for family transitions are non significant in this multivariate model. There are, however significant effects of prior parental characteristics, in particular parental education. Of the child characteristics age, gender, ethnicity and gross motor delay were significantly associated with children's naming vocabulary, and age, gender, ethnicity, birth weight and gross motor delay remained significantly associated with pattern construction. Model 5 explains about 19 per cent of the variation in naming vocabulary and 12 per cent of pattern construction.

**Discussion**

We have used a large, longitudinal data set to establish the relative effects of poverty and family instability on children's cognitive ability in early childhood. The findings suggest a strong and significant negative effect of income poverty on cognitive functioning at age 5 years, whereby the experience of persistent and cumulative poverty, and notably also exposure to hardship during the first year of life have a detrimental effect on cognitive functioning. The findings suggest a significant role of cumulative risk experiences depending on the duration of exposure to poverty, as well as sensitive periods during early life [10 14]. The effect of poverty appears to be slightly stronger on verbal than on nonverbal skills, confirming previous findings [52 53].

Family structure and family instability on the other hand, had no significant association with cognitive ability after controlling for child characteristics, family poverty and family demographics. Our findings are thus consistent with the poverty hypothesis, suggesting that poverty, and in particular the experience of persistent as well as early poverty, undermines children's cognitive functioning [16 28-30]. In addition we also found that some of the effects of poverty, and especially those of family instability were attributable to prior parental attributes, such as mother's age and parental education, suggesting the potential role of selection effects [25 31]. Another factor shaping the association between poverty and cognitive functioning is housing conditions, in particular crowding, which represent a significant risk factor undermining children's cognitive attainment [34-37]. We furthermore find a significant role of child characteristics in shaping cognitive outcomes at age 5, suggesting a possible link to biologically based influences. Future research should disentangle in more detail the processes and mechanisms through which material and social disadvantage is transmitted, and pay special attention to questions regarding the role of poverty experienced during the first year of life, which might be especially detrimental for later functioning.

*Study strengths and limitations*

In interpreting the findings some strengths and limitations of the study have to be considered. First, the longitudinal nature of the present study has inevitably led to some attrition, raising concerns about selection bias. Only 78 per cent of children from the base-line sample completed the cognitive assessments at age 5. Of these, we only have complete data on income poverty and family transitions for 60%. The analytic sample was from

relatively more privileged family backgrounds than the baseline sample, and there were significant differences in levels of children's cognitive functioning at age 5 years. Thus, our findings might underestimate the negative effect of poverty and disadvantage on cognitive functioning. Furthermore, we were only able to explain about a fifth of the variance in children's outcomes, and potential other influences on children's early cognitive skills (such as genetic as well as other influences reflecting more proximal aspects of the child environment) were not assessed in our models and future research has to delineate potential pathways and mediating processes in more detail.

The present study also has some advantages over existing work. First, the sample size resulted in high statistical power, and enabled us to identify heterogeneous family forms, differentiating between stable family arrangements and family transitions. Second, we could identify patterns of persistent poverty, but also take into account the timing of poverty experiences during the first five years in life. Third, we have direct assessment of cognitive capabilities measured at age 5. Fourth, the data are drawn from families who reside throughout the UK which gives our findings a high degree of generalisability.

**Conclusions**

Our findings can help to close some gaps in the research literature, especially regarding the relative effects of family poverty and family instability on cognitive functioning during early childhood. We confirm the devastating negative effect of income poverty on children's early development, and show that family structure effects are spurious after controlling for child characteristics, poverty, parental education and mother's age. We hope that our findings contribute towards resolving previous uncertainties regarding these effects.

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Table 1: Descriptive Statistics: Poverty and cognitive ability (naming vocabulary and pattern construction) at age 5 years

| Poverty Status Across Sweeps | N | % | BAS Naming Vocabulary | | BAS Pattern Construction | |
|---|---|---|---|---|---|---|
| | | | Mean | Confidence Interval | Mean | Confidence Interval |
| **Analytic subsample (N=8,874)** | | | | | | |
| nnn | 5,236 | 62.1 | 53.6 | 53.3 - 54.0 | 51.9 | 51.5 - 52.4 |
| nnp | 461 | 5.3 | 51.7 | 50.6 - 52.7 | 50.7 | 49.8 - 51.7 |
| npn | 390 | 4.3 | 51.2 | 50.2 - 52.2 | 50.7 | 49.6 - 51.8 |
| npp | 376 | 4.1 | 48.6 | 47.7 - 49.5 | 48.3 | 47.2 - 49.4 |
| pnn | 458 | 5.0 | 49.7 | 48.9 - 50.5 | 49.1 | 48.0 - 50.2 |
| pnp | 260 | 2.6 | 48.7 | 47.3 - 50.0 | 47.9 | 46.4 - 49.3 |
| ppn | 346 | 3.5 | 48.7 | 47.7 - 49.7 | 48.5 | 47.3 - 49.7 |
| ppp | 1,347 | 13.1 | 46.5 | 45.8 - 47.1 | 47.0 | 46.3 - 47.7 |
| | | | | | | |
| All | 8,874 | 100.0 | 51.8 | 51.4 - 52.1 | 50.7 | 50.3 - 51.0 |

**Note:** Families are coded as poor (p) or not poor (n) at each of the three measurement points (child ages 9 months, 3 years and 5 years). The coding takes into account both timing and duration of poverty, differentiating families who were poor at all three measurement points (ppp) from those who moved into poverty only at the last measurement point (nnp), those who experienced poverty only at the second measurement point (npn), and so on. The reference category is not being poor at any of the three measurement points (nnn).

Table 2: Descriptive Statistics: Family transitions and cognitive ability (naming vocabulary and pattern construction) at age 5 years

| Family transitions | N | % | BAS Naming Vocabulary | | BAS Pattern Construction | |
|---|---|---|---|---|---|---|
| | | | Mean | Confidence Interval | Mean | Confidence Interval |
| **Analytic subsample (N=8,874)** | | | | | | |
| *Married at Baseline* | | | | | | |
| Stably Married | 5,046 | 56.6 | 53.0 | 52.5 - 53.4 | 51.5 | 51.1 - 52.0 |
| Exit marriage | 495 | 5.9 | 51.0 | 49.9 - 52.0 | 50.3 | 49.3 - 51.3 |
| *Cohabiting at Baseline* | | | | | | |
| Stably Cohabiting | 1,090 | 12.7 | 51.2 | 50.7 - 51.8 | 50.6 | 49.8 - 51.4 |
| Cohabitation to marriage | 489 | 5.7 | 51.9 | 51.1 - 52.7 | 50.9 | 49.9 - 51.9 |
| Cohabitation to other | 517 | 6.2 | 49.9 | 49.0 - 50.8 | 49.0 | 48.1 - 50.0 |
| *Single at Baseline* | | | | | | |
| Stably Single | 746 | 7.8 | 48.0 | 47.2 - 48.8 | 47.2 | 46.3 - 48.0 |
| Single to married | 122 | 1.3 | 48.0 | 46.0 - 50.1 | 48.1 | 46.0 - 50.3 |
| Single to other | 369 | 3.8 | 49.6 | 48.6 - 50.5 | 48.5 | 47.1 - 50.0 |
| | | | | | | |
| All | 8,874 | 100.0 | 51.8 | 51.4 - 52.1 | 50.7 | 50.3 - 51.0 |

**Note:**

The family transitions variable includes categories for stably married, stably cohabiting and stably single parent families, as well as categories indicating separation of parents, marriage of a cohabiting or a single parent, and transitions involving a partner moving in or out of the home. Multiple transitions are included in the 'to other' categories. The reference category is parents being married at all three measurement points. Unlike the coding of the poverty variable, the exact timing of family changes is not accounted for in the categorisation (so that, for example, parental separation includes separations occurring at any time point after wave 1).

Table 3: Regression models predicting BAS Naming Vocabulary (Unstandardized coefficients with standard errors in parentheses)

| | (1) Model1 | | (2) Model2 | | (3) Model3 | | (4) Model4 | | (5) Model5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Poverty Transitions(ref=nnn) | | | | | | | | | | |
| nnp | -2.929*** | (0.830) | | | -2.482** | (0.852) | -1.034 | (0.810) | -0.410 | (0.811) |
| npn | -3.636*** | (0.808) | | | -3.295*** | (0.799) | -1.923* | (0.769) | -1.254 | (0.762) |
| npp | -7.084*** | (0.748) | | | -6.353*** | (0.761) | -4.042*** | (0.699) | -2.872*** | (0.721) |
| pnn | -6.195*** | (0.719) | | | -5.596*** | (0.722) | -4.200*** | (0.686) | -3.541*** | (0.691) |
| pnp | -7.689*** | (1.096) | | | -7.136*** | (1.130) | -4.656*** | (1.153) | -3.448** | (1.152) |
| ppn | -7.604*** | (0.830) | | | -6.833*** | (0.855) | -4.414*** | (0.810) | -3.284*** | (0.835) |
| ppp | -10.314*** | (0.512) | | | -9.507*** | (0.613) | -6.328*** | (0.610) | -4.890*** | (0.664) |
| Relationship Transitions (ref=stably married) | | | | | | | | | | |
| Exit marriage | | | -3.387*** | (0.741) | -1.382 | (0.718) | -0.462 | (0.714) | -1.025 | (0.727) |
| Stably cohabiting | | | -3.379*** | (0.495) | -1.950*** | (0.470) | -0.893 | (0.464) | -0.587 | (0.474) |
| Cohabiting to married | | | -2.333*** | (0.698) | -1.697* | (0.702) | -0.553 | (0.704) | -0.357 | (0.700) |
| Cohabiting to other | | | -5.606*** | (0.738) | -1.777* | (0.785) | -0.007 | (0.768) | -0.521 | (0.780) |
| Stably single | | | -8.000*** | (0.686) | -1.606* | (0.815) | 0.135 | (0.808) | -0.892 | (0.840) |
| Single to married | | | -7.308*** | (1.649) | -2.852 | (1.520) | -1.589 | (1.571) | -1.185 | (1.542) |
| Single to other | | | -6.227*** | (0.851) | -0.779 | (0.875) | 1.022 | (0.877) | 1.118 | (0.868) |
| Maternal age MCS1 (ref=14 to 19) | | | | | | | | | | |
| 20 to 29 | | | | | | | 1.321 | (0.848) | 1.450 | (0.848) |
| 30 to 39 | | | | | | | 2.596** | (0.832) | 2.497** | (0.839) |
| 40+ | | | | | | | 2.202 | (1.144) | 1.889 | (1.139) |
| Highest parental quals (ref=none) | | | | | | | | | | |
| NVQ1 | | | | | | | 2.332* | (1.024) | 2.026* | (1.030) |
| NVQ2 | | | | | | | 3.544*** | (0.881) | 3.246*** | (0.894) |
| NVQ3 | | | | | | | 5.027*** | (0.893) | 4.536*** | (0.911) |
| NVQ4 | | | | | | | 8.206*** | (0.899) | 7.404*** | (0.928) |
| NVQ5 | | | | | | | 8.941*** | (0.990) | 8.037*** | (1.018) |
| Family owned home, MCS 3 | | | | | | | | | 0.891 | (0.516) |
| Crowding index, MCS 3 | | | | | | | | | 2.713*** | (0.363) |
| $R^2$ | 0.155 | | 0.118 | | 0.158 | | 0.187 | | 0.195 | |

**Notes**. All models contain child control variables: age at interview, gender, ethnicity, birth weight, and fine and gross motor delays at 9 month.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Poverty Transitions: The reference category is not being poor at any of the three measurement points (nnn). The coding of this variable differentiates families who moved into poverty only at the last measurement point when the child was aged 5 years (nnp), families who experienced poverty only at

the second measurement point when the child was aged 3 years (npn), who were poor when the child was aged 3 and 5 years (npp), who were poor only at the first measurement point at age 9 months (pnn), and so on.  Being poor at all three measurement points is coded as ppp.

Table 4: Regression models predicting BAS Pattern Construction (Unstandardized coefficients with standard errors in parentheses)

| | (1) Model1 | | (2) Model2 | | (3) Model3 | | (4) Model4 | | (5) Model5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Poverty Transitions (ref=nnn) | | | | | | | | | | |
| nnp | -2.162* | (0.864) | | | -1.813* | (0.889) | -0.832 | (0.896) | -0.209 | (0.881) |
| npn | -2.164* | (0.979) | | | -1.843 | (0.964) | -0.947 | (0.956) | -0.317 | (0.945) |
| npp | -5.817*** | (1.045) | | | -5.060*** | (1.073) | -3.406** | (1.040) | -2.232* | (1.060) |
| pnn | -4.775*** | (0.932) | | | -4.296*** | (0.927) | -3.371*** | (0.912) | -2.744** | (0.909) |
| pnp | -7.204*** | (1.229) | | | -6.400*** | (1.268) | -4.656*** | (1.226) | -3.431** | (1.234) |
| ppn | -6.186*** | (1.143) | | | -5.214*** | (1.159) | -3.314** | (1.145) | -2.175 | (1.135) |
| ppp | -7.823*** | (0.650) | | | -6.603*** | (0.741) | -4.066*** | (0.742) | -2.613*** | (0.750) |
| Relationship Transitions (ref=stably married) | | | | | | | | | | |
| Exit marriage | | | -2.513** | (0.885) | -1.040 | (0.872) | -0.404 | (0.854) | -0.801 | (0.875) |
| Stably cohabiting | | | -1.330* | (0.635) | -0.272 | (0.610) | 0.480 | (0.607) | 0.811 | (0.603) |
| Cohabiting to married | | | -0.946 | (0.848) | -0.473 | (0.835) | 0.284 | (0.855) | 0.472 | (0.853) |
| Cohabiting to other | | | -4.407*** | (0.867) | -1.626 | (0.907) | -0.271 | (0.912) | -0.526 | (0.958) |
| Stably single | | | -7.133*** | (0.835) | -2.538** | (0.930) | -1.163 | (0.900) | -1.843 | (0.964) |
| Single to married | | | -5.658** | (1.785) | -2.334 | (1.726) | -1.433 | (1.710) | -0.971 | (1.692) |
| Single to other | | | -5.257*** | (1.229) | -1.220 | (1.221) | 0.176 | (1.261) | 0.407 | (1.288) |
| Maternal age MCS1 (ref=14 to 19) | | | | | | | | | | |
| 20 to 29 | | | | | | | 0.880 | (1.146) | 0.935 | (1.134) |
| 30 to 39 | | | | | | | 1.954 | (1.156) | 1.768 | (1.153) |
| 40+ | | | | | | | 1.913 | (1.454) | 1.547 | (1.462) |
| Highest parental quals (ref=none) | | | | | | | | | | |
| NVQ1 | | | | | | | 1.182 | (1.123) | 0.892 | (1.121) |
| NVQ2 | | | | | | | 4.328*** | (0.845) | 4.043*** | (0.839) |
| NVQ3 | | | | | | | 5.555*** | (0.914) | 5.072*** | (0.914) |
| NVQ4 | | | | | | | 7.176*** | (0.850) | 6.414*** | (0.846) |
| NVQ5 | | | | | | | 6.948*** | (0.934) | 6.099*** | (0.942) |
| Family owned home, MCS 3 | | | | | | | | | 1.290* | (0.581) |
| Crowding index, MCS 3 | | | | | | | | | 2.294*** | (0.412) |
| $R^2$ | 0.104 | | 0.090 | | 0.105 | | 0.116 | | 0.121 | |

**Notes.** All models contain child control variables: age at interview, gender, ethnicity, birth weight, and fine and gross motor delays at 9 month.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Poverty Transitions: The reference category is not being poor at any of the three measurement points (nnn). The coding of this variable differentiates families who moved into poverty only at the last measurement point when the child was aged 5 years (nnp), families who experienced poverty only at

the second measurement point when the child was aged 3 years (npn), who were poor when the child was aged 3 and 5 years (npp), who were poor only at the first measurement point at age 9 months (pnn), and so on.  Being poor at all three measurement points is coded as ppp.