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Does mothers' employment affect children's development?

Evidence from the children of the British 1970 Birth Cohort and the American NLSY79

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Abstract

Background

The increasing employment of mothers of young children in the UK and the USA is widely believed to affect children adversely. Maternity leave and part-time employment, more common in the UK than the US, are possible offsets.

Methods

This paper analyses the cognitive and behavioural development of school-aged children by maternal employment before the child's first birthday. Data come from the second generation of two cohort studies: the 1970 British Birth Cohort Study (BCS70) and the US 1979 National Longitudinal Study of Youth Child (NLSY79). Both contain several outcomes per child, in some cases several children per mother. The hierarchical structure is tackled by multi-level modelling. Each data set supplies a good array of controls for confounding variables (such as maternal education and ability, family history) which may affect labour market participation.

Results

Similar to other studies, results are mixed and modest. Only two out of five US estimates of maternal employment in the child's first year have a significant (0.05 level) coefficient on child development – negative for reading comprehension, positive for freedom from internalized behaviour problems. None of the estimates were significant for four child outcomes modelled in Britain.

Conclusions

Despite public opinion to the contrary, our study finds little evidence of harm to school-age children from maternal employment during a child's infancy, especially if employment is part-time, and in a context, such as Britain in the 1990s, where several months of maternity leave is the norm.

Keywords

Maternal employment; child outcomes; cognitive development; behavioural adjustment; maternity leave; BCS70 second generation survey; NLSY79 children and young adult survey; intergenerational transmission; full/part-time employment; US-UK comparison.

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Background and Literature Review

Childrearing and paid work, once thought to be mutually exclusive activities, are being increasingly combined in most industrial countries. In recent decades, both the United Kingdom and the United States have witnessed a substantial increase in the labour force participation of mothers with young children. In Britain during the 1970s only about 26 percent of mothers with children under 5 had paid work (Martin and Roberts, 1984). By the turn of the Millennium this figure had risen to 43 percent (figure for UK in 2001, Twomey, 2002). In the United States the number of mothers with children under age six who were in the labour force grew at a similar rate (66 percent) between 1976 and 2000, and among mothers with infants, the growth rate was 78 percent (Downs, 2003). An important question to address is whether maternal employment has costs for children. Here, however, opinion outruns evidence. With regard to public attitudes, concern that maternal employment might have negative consequences for children's development has risen, rather than abated, as mothers' employment becomes more commonplace. Attitude surveys in the UK showed a decrease between 1994 and 2002 in the percentages of both British men (from 52 to 42 percent) and British women (from 51 to 46 percent) who felt that family life would not suffer as a consequence of female employment (Scott, 2008). In the US the drop was larger still as the percentage of Americans giving such a non-traditional response fell from 51 to 38 percent over the same time period.

These figures refer to attitudes only, however. They do not reveal whether the dual responsibilities of employment and mothering are actually undertaken at the expense of child well-being. The report on The Good Childhood Inquiry in the UK concluded that the results of research to date were mixed and that more investigation was needed (Layard and Dunn, 2009, p 21). Press coverage of the Inquiry, however, (and of Scott's (2008) book) presented working mothers as one of the features of modern life that threaten the well being of children. In this paper we offer new longitudinal evidence for both the United Kingdom and the United States.

This comparison is valid as the policy context in the United Kingdom regarding the employment of new mothers contrasts with the one facing American mothers. In the United Kingdom a growing number of mothers have been covered by maternity leave and pay. Statutory rights to maternity leave were introduced in 1975. Provisions for leave became increasingly extensive over subsequent years, with growing numbers of employed pregnant women (particularly those expecting their first child) becoming eligible for seven months protected job leave, and rising numbers receiving from 12 to 16 weeks maternity pay after a birth. Although an increasing proportion of mothers return to the labour market during the first year of a child's life, their labour force re-entry is likely to be after 4-6 months of leave.

In contrast, it was not until after the implementation of the Family and Medical Leave Act of 1993 (FMLA) that mothers in the United States were statutorily entitled to any leave from employment specifically occasioned by a birth. Further, in order to be eligible for up to 12 weeks of *unpaid* leave sanctioned by this Act, employees had to have worked for at least 12 months for a company employing at least fifty workers. American mothers employed during the child's first year are likely to have started back to work within 6-12 weeks of giving birth.

Benefit regimes in the United States, additionally, reinforce early labour market entry for single mothers, whereas in the United Kingdom the income support system reflects the hitherto normative expectation that mothers should stay at home with their babies (Kilkey and Bradshaw, 1999).

In the United Kingdom, just under half of new mothers of children born in 2000-01 were employed by the time the child was nine months old (Dex et al, 2005a) whereas in the United States, one third of mothers were in the labour force before their child was three months old (Berger et al, 2005). Our present study explores whether children in the United States – who are exposed to maternal employment earlier in their infancy on average – show similar patterns of cognitive and behavioural development to their counterparts in the United Kingdom.

Theoretically, there are reasons why one might expect both benefits and negative consequences of maternal employment for later child development. Increased market work clearly provides extra income for the family and there is a vast literature establishing that children who grow up in poverty demonstrate poorer cognitive and socio-emotional outcomes later in life than their counterparts from more prosperous homes (Gregg et al, 2008). Income in the preschool years also appears to have greater impact than income in later periods (Votruba-Drzal, 2006; Duncan et al, 1998). On the other hand, early maternal employment may reduce the quality of mother-child interactions by disrupting the formation of crucial mother-child attachments – as hours spent in other forms of child care increase, or by causing maternal stress (Waldfogel, 2002).

Results from prior studies that have examined the relationship between maternal employment and later child wellbeing in either the United States or the United Kingdom suggest mixed but modest findings. Some studies show positive effects (for example, Moore and Driscoll, 1997). Results from other studies imply that the association between maternal employment in early childhood and subsequent child development differs depending on when work takes place, the nature of maternal employment and the specific child/adolescent outcomes considered (Parcel and Menaghan, 1994; Greenstein, 1995; Barglow, et al, 1998). More recent analyses suggest some negative outcomes of maternal employment, especially when mothers are in the labour force during the child's infancy (Han et al, 2001; Brooks-Gunn et al, 2002; Baum, 2003; James-Burdumy, 2005), or are employed full-time (Ermisch and Francesconi, 2002; Gregg et al, 2005). However, most results are again modest, and many appear to depend additionally on other family characteristics. For example, Wertheimer and colleagues (2008) report that increased work effort among *low-income* families resulting from welfare reform legislation introduced into the United States in 1996 is associated with better child outcomes. Ruhm (2005) also finds benefits to offspring in middle childhood from maternal employment when these children are from relatively disadvantaged backgrounds, but reductions in cognitive test scores among advantaged 10 and 11 year olds when their mothers work. In contrast, Verropoulou and Joshi (2009) find poorer reading levels among children when less educated British mothers work in their child's first year of life.

In this study we extend the literature, taking new evidence from Britain, and comparing it with a parallel American dataset to address the following research questions:

- Does the employment of mothers of infants have adverse effects on children's subsequent development?
- Do the children of the American and British cohorts show different patterns, in view of different policies towards mothers' paid work in a child's early months?
- Do cognitive and behavioural outcomes differ?

The longitudinal data sets we use enable us to rule out reverse causation which may affect cross-sectional evidence, in so far as our child outcomes are measured several years after the mother's employment spell that we focus on. The richness of the data also enables us to control for some of the heterogeneous confounding factors which may mask an underlying impact of employment on child development. However, we do not claim firm evidence on causality. These are observational studies and therefore cannot provide information on counterfactual outcomes – what children might have experienced had working mothers stayed at home, or had mothers who stayed at home gone out to work.

Data and Methods

Data Sources and Attrition

We use data from the second generation of two cohort studies: the British Birth Cohort Study of 1970 (BCS70) and the 1979 American National Longitudinal Study of Youth (NLSY79). The original BCS70

sample consisted of 17185 persons born between April 5th and April 11th, 1970, of whom 8279 were female. Six waves of data have been collected to date on these British women. We use data from the most recent sweep which was carried out in 2004-05 when respondents were ages 34-35, and 5029 interviews were achieved with female members of the cohort, representing 62 per cent of those eligible to respond at that date. For a one-in-two sample of BCS70 cohort members, information was also gathered about all natural and adopted children currently living with them. A total of 2,846 parents (of which 1,725 were mothers) participated in these Parent and Child Interviews, providing information on 5,207 children (Simmonds et al, 2007). We do not consider male cohort members as the BCS70 does not record employment histories for their wives/partners, and the NLSY79 only collects information on children born to their female cohort members.

The NLSY79 is also a longitudinal study. 12,686 respondents were first interviewed in 1979 when they were ages 14-21 of whom 6283 were female. This total included a nationally representative sample plus oversamples of blacks, Hispanics, military personnel and white youth from low socioeconomic backgrounds. NLSY79 respondents have been re-interviewed annually through 1994 and biennially since, although the military and disadvantaged white oversamples were dropped in 1985 and 1990 respectively. Beginning in 1986, in-depth information was collected on and from all children born to NLSY79 women biennially. When these children turn 15 they become Young Adults and are given a different survey containing questions that more closely match those asked of their mothers at similar ages.

In 2002, more than 60 percent of NLSY79 respondents had answered all twenty surveys since 1979 and the average respondent had completed 17.2 interviews (CHRR, 2004). We use data from the 2000 survey round when the response rate for all NLSY79 cohort members still eligible for interview was more than 83 percent. Although attrition is always a problem in longitudinal studies, the NLSY79 has one of the highest retention rates of any longitudinal survey in the US. The retention rate of 83 percent after 21 years also compares favourably with 62 per cent for females in BCS70, although the latter represents 34 years of follow-up. The NLSY79 children also have exceedingly high retention rates.

Selection Bias and Sample Representativeness

Our British sample consists of 2,083 children between the ages of 4 and 16 years when assessed in 2004-05 who were born to a total of 1,235 mothers. 52.5 percent of mothers therefore had more than one child in the sample. As these mothers all belonged to a single birth cohort, they were all the same age when their children were assessed. This means that the age of each child in the second generation sample is inversely related to the age of their mother when she gave birth to them. Children over 10 were all born to mothers under age 25, and, as only children who were at least 4 years old could be assessed, all children in our sample were born before their mothers turned 30. The study design thus has a built-in focus on children of younger mothers. Appendix 1 provides information on the educational attainment and age at first birth of our UK and US sample mothers, along with equivalent information for three other groups of women: all women; all women who had ever borne a child; and all mothers with a first birth prior to 2000 (BCS70) or 1996 (NLSY79). Our BCS70 sample is comprised of relatively young mothers who have low levels of educational attainment when compared to other mothers, and especially when compared to women who were still childless at age 34-5. We know that mothers who delay childbearing into their thirties also have higher attachment to employment both before and after motherhood than their younger counterparts (Dex et al, 2005b; Kneale and Joshi, 2008). This means that any conclusions drawn from this sample of relatively young mothers and their older children may not be generalisable to those who have their children at more mainstream ages. However, these mothers are not uniformly low achievers, and we control for both maternal abilities and attainments as well as for child birth order in our analyses.

The American members of the NLSY79 who were 14-21 when first interviewed in 1979 are a little older than their British counterparts who would have only been 9 years old in 1979. We therefore confine our analyses to mothers aged 14-17 in 1979 (born 1962-65), and take our information from the 2000 wave of data collection when these mothers were 35-38 years old. Not including women in the dropped oversamples as described above, 2225 women ages 14-17 were interviewed in 1979. The percentage of mothers who were successfully interviewed in 2000 is notably higher than that of childless women. Once we further restrict our sample to women with children ages 4-14 in 2000, our total number of American children is 1,413 who were born to 840 mothers. Again about half the mothers (50.1 percent)

have more than one child in the sample. Further, older children born to older women are again underrepresented in our data, although the bias towards older children of younger mothers is less marked than in the British data, given the exclusion of children 15 and older who 'graduate' to become Young Adults. The study sample has a similar age at first birth to all mothers but a higher percentage of women who failed to obtain a high school diploma (Appendix 1).

Outcome measures

Our child outcome measures incorporate dimensions of both cognitive attainment and behaviour. Both the BCS70 and the NLSY79 include measures of reading and maths. In the BCS70, children ages 4-5 and 6-16 are assessed using age appropriate versions of the British Ability Scales (Elliott, 1996, Hill, 2005) for naming vocabulary (ages 4 and 5) reading recognition (age 6+) and maths proficiency. The Children of the NLSY79 are assessed at ages 5-14 using three subtests of the Peabody Individual Achievement Test (PIAT): mathematics, reading recognition and reading comprehension (CHRR, 2006). In each country, mothers were asked to report on their children's behavioural adjustment. Goodman's Strengths and Difficulties Questionnaire (SDQ) (Goodman, 2001) was used in Britain, and the Behavior Problems Index or BPI (Peterson and Zill, 1986) was used in the United States. Although the two behavioural indices differ, evidence suggests that they are comparable. Many items in the BPI are derived from the Achenbach Behavior Problems Checklist (Achenbach and Edelbrock, 1981) and research undertaken by Goodman and Scott (1999) showed that scores from the SDQ and the Achenbach's Behavior Checklist were highly correlated. Both data sets include similar, though not identical, scales measuring externalised and internalised behaviour. The former includes aggression, disobedience, restlessness and impulsivity. A child with internalised problems is one described as often tearful, fearful, anxious or unhappy.

For our NLSY79 sample, we summed the items that make up an existing pair of variables summarising externalised and internalised behaviour (CHRR 2006). In order to facilitate comparison across instruments and the two countries, we convert each child's developmental assessment into a percentage fraction of the highest score it would be possible to achieve on that particular scale/test. This also means that all children's scores are converted into a common metric regardless of how many individual items they are assessed on. For example, mothers with children under age 5 and over age 12 are not asked the full range of BPI items asked of mothers with children between these ages, and our measurement conversion takes these discrepancies into account. Cronbach's alphas measuring the internal consistency of these scales are 0.79 for the internalised and 0.89 for the externalised scores. For BCS70 we took the conduct problems and hyperactivity/ inattention subscales of the SDQ to reflect externalised behaviour, and the emotional problems and peer relations subscales to reflect internalised behaviour. These scales had Cronbach's alphas of 0.81 and 0.73 respectively. Finally, we invert each scale so that all of our child development indicators move in a favourable direction as they increase. This gives a 'non-aggression' score for each country reflecting the absence of externalized behaviour problems, and a 'non-anxiety' score reflecting freedom from anxious or withdrawn behaviour.

We internally standardise all four scores for age by including age and age squared in our regressions. We follow the recommendation of Wiggins and Wale (1996) in this practice rather than use national age norms since our samples are a-typical.

As shown in Table 1, the mean for most of the U.S. cognitive scores is around 50 percent although American children scored less well on average on reading comprehension – a measure for which there is no exact parallel in the BCS70. The mean cognitive scores for the British children are higher than those of the American children, especially the mean "early number concepts" maths test for the relatively small group of British four and five year olds. These results do not mean that one group is scoring less well than the other in an absolute sense, but rather that more children in the British sample have scores that fall closer to the highest attainable score. Standard deviations are also smaller for the British children, again suggesting less variation of scores.

In contrast to most of the cognitive scores being in the middle of the range, behaviour scores are on average closer to 100 percent than 50 percent, as most mothers report few, if any, behaviour problems for their children. Fewer internalizing than externalizing behaviours are reported, and British mothers appear more likely to report behaviour problems on average than do their American counterparts.

Table 1 Child outcome variables: descriptive statistics for both countries

	Mean	Std Dev	*N*
BCS70			
Math Ability Score			
Child aged 4 to 5	0.759	0.098	371
Child aged 6 to 16	0.526	0.155	1,529
Reading Ability Score			
Child aged 4 to 5	0.647	0.081	371
Child aged 6 to 16	0.609	0.174	1,531
External behavioural adjustment	0.762	0.185	1,902
Internal behavioural adjustment	0.844	0.151	1,917
NLSY79			
Math Score	0.482	0.196	1,220
Reading Recognition Score	0.518	0.218	1,223
Reading Comprehension Score	0.464	0.183	1,218
External behavioural adjustment	0.855	0.150	1,299
Internal behavioural adjustment	0.909	0.114	1,327

Maternal Employment

In this paper we focus on mothers' paid work during a child's first year of life as previous research by ourselves and others suggests that the first year is key. Nearly two thirds of the children in both samples had mothers with some paid work during the first year of their lives, but comparison is not straightforward, as we now explain.

Ideally, we would like to distinguish exactly how young each infant had been when their mother returned to, or took up paid work. This is possible to compute from the NLSY79 data, but not in BCS70 where employment histories rely on retrospective reports, mostly at age 30, back to the time their children were born, and questions were not asked specifically about maternity leave. Many employment spells are therefore reported which contain the date of a birth without recording a break. This makes sense when a woman took maternity leave and then returned to her original employer, as her *contract* of employment would not have been interrupted. We have had to conclude that spells of 'employment' which appear to be continuous during the first year of a child's life were almost certainly punctuated by maternity leave, whose exact dates cannot be retrieved. We make the assumption that any British mother who appeared to be employed in the last quarter of her child's first year (months 9-11) was almost certainly actually working in that period, and not on maternity leave, since the statutory entitlement lasted to the 7th month.

Another way in which motherhood and paid work may be rendered more compatible is for mothers to work part-time rather than full-time. In this paper we break our employment measures in months 9-11 following the child's birth into three categories. NLSY79 mothers are classified as working full-time if they report any full-time work during that period (classified as 30 or more hours per week), or part time if the only work they report is less than 30 hours per week. Not working is the third category. As shown in Appendix 2, forty-three percent of children in our American sample had mothers who reported full-time work, 13 percent were employed only part-time, and 44 percent reported no labour force participation during these three months, (although only 36 percent of mothers reported no employment at all during the child's first year). This is similar to the proportion of British children as 35 percent of them had mothers with no employment in the last quarter (and in all likelihood had none during the whole year). Twenty-eight percent of the British sample, had mothers with (exclusively) full-time jobs in the relevant 3 months, and 37 percent had held jobs at least some of which were part-time, As expected, part-time employment appears to be more common among the British mothers (ignoring the different treatment of a few mixed full-time and part-time records in the two datasets).

We cannot tell definitively whether the British mothers who were employed at the end of their child's first year had also been employed outside the home in the early part of the year. However, the prevalence of maternity leave suggests that most were probably not. Among our American mothers, their more detailed work histories show that 83 percent of mothers who were working full-time in the last quarter of a child's first year had been working since the first or second quarter, as were 68 percent of those reporting working part-time only.

Overall, our American sample children have mothers who worked for longer during their infancy, both in terms of hours and (we assume) months. If maternal employment effects on child development are greater when employment is full-time rather than part-time, and when it starts earlier rather than later in the child's life, we would then expect to find a greater impact of maternal employment in the United States than in the United Kingdom.

Additional Control Variables

We include a range of other variables in our analyses to control for moderating, or confounding factors which might affect the interpretation of the outcome variables, or whose omission may bias the measurement of a link between maternal employment and child outcomes (see Appendix 2). In order to detect the full extent of any 'impact', we deliberately do not include (or 'net out') variables which might mediate such a relationship, for example, the level of family income to which the mother's employment may contribute, or the nature of child care arrangements during the time employment separated the mother from the young child.

In both samples the average age of the children is just over 9 years, with a standard deviation of around 3 years. Just under half are girls. We also include an indicator of longstanding health conditions at the time of the child assessments. Such health conditions are more likely to affect the outcome variables at that time than to have been a decisive factor in the mothers' earlier employment behaviour (they are very weakly correlated), although if they had done we could view them also as confounders. These indicators are based on similar but not identical questions in the two surveys hence one cannot be certain whether a higher rate of reported health problems (17 in the BCS70 versus 13 percent in the NLSY79) reflects less healthy children or a more discriminating question wording.

We also include various family demographic measures. The American children have slightly more siblings, as we would expect given that the British mothers are a few years younger. The presence of siblings may impede child development due to competition for parental attention. The presence of older siblings may also have inhibited maternal employment in the index child's first year. Thirty-three percent of the American children were first born compared to 58 percent of the British.

Around two thirds of the children in both samples were living in intact families with both their biological parents at the time of assessment. We assume that both parents were also present during their first year of life, and that the father as well as the mother may have had some input in the child's early development. We do not attempt to infer from partnership history information whether a father-figure was present in the first year of life for all other children. Given national patterns of participation rates within welfare systems, it is less likely that lone mothers of infants in the United Kingdom would have been employed than mothers in two parent families, whereas in the United States the pattern would be the reverse. We additionally control for race/ethnicity in our US analyses. This is not a feature of the British sample, based as it is on women born in Britain in 1970 – a birth cohort containing few members of minority ethnic groups. The percentage of black children who live with a lone mother in our NLSY79 sample is almost double the percentage of white children who do so. This contributes to the higher percentage of children in the NLSY79 overall who live with a lone mother when compared with children in the BCS70.

In many data sets (including these) mother's work is positively associated with child development. This is because other factors, such as a mother's ability or competence are positively associated with both the child outcomes and with maternal employment. It is only when the model is adjusted for these types of spurious relationships that the '*true*' relationship between child outcome and maternal employment emerges as the effect on the child of a mother of given ability taking paid work. The NLSY79 includes a measure of aptitude as measured in 1980 by the Armed Forces Qualifying Test, (AFQT). The BCS70 offers various cognitive tests assessed during the mother's own childhood and in these analyses we use reading and maths scores from the age 10 survey.

We also incorporate a measure of the mother's highest educational level attained by the time their children were assessed. We classify American mothers into four groups where nearly half have attended at least some college and one fifth has graduated. Although both samples contain a high proportion of mothers who had their first child at,or before, age 20 (a measure that we include to allow for antecedent and consequent disadvantages that may attach to very early motherhood), the BCS70 sample appears less well educated. Only one third of these British mothers have qualifications to A level or more, and very few have any tertiary qualifications. The lowest educational category of below O level (30 percent in BCS70) is nearly twice as big as the 'below High School' group in NLSY79 (17 percent), and it might be argued that the UK 'O level' group was also not as well qualified as the US 'High School'. So the BCS70 sample are distinctly low attainers, although reassuringly a little better qualified than the equivalent group of 33 year old mothers in corresponding analyses of the NCDS (Verropoulou and Joshi 2009). We also note, however, that the American educational system is more flexible than the British system in allowing people of all ages to return to school and gain an educational qualification equivalent to a High School Diploma, and to then take college classes at a variety of schools and slowly build college credits towards a degree. It is therefore likely that more of our American mothers have achieved formal educational qualifications in recent years than have their British counterparts.

Methods

In our analyses we include variables that reflect characteristics of the child and of the mother. Our data are therefore structured in a two-level hierarchy where children represent the first level and mothers represent the second. Our methods need to take into account the nested structure of the data otherwise standard errors will be underestimated, and the significance of independent variables overestimated. We therefore use multilevel linear modelling which is a variant of multiple linear regression and allows for the residuals of individual observations to be correlated (Goldstein, 1995). Put another way, this method acknowledges that the cognitive and behavioural development of different children within a family is subject to the same influences. The model applied in this case is a random intercept model i.e. where families differ in terms of their intercept only.

If y_{ij} represents the score of the i^{th} child in the j^{th} family, recorded when the child is of school age, then the following equation describes the association of each score with potential explanatory variables:

$$y_{ij} = \beta_0 + \sum E_{ijt}\beta_t + \sum x_{ij} + \sum Z_j\delta + u_{0j} + e_{0ij}$$

β_0 is the average intercept for all families

E_{ijt} is a vector of variables recording the child's exposure to maternal employment at time t in the preschool ages, here in the first year of the child's life, and β_t is a parameter reflecting the impact of maternal employment at age t on outcome y_{ij}.

x_{ij} are other predictors of the Y outcomes pertaining to the i^{th} child in the j^{th} family, directly and independently influencing the outcome, or confounders indirectly influencing both employment as well as the outcome.

Z_j are other contextual predictors of the y_{ij} outcome pertaining to family j, directly and independently influencing the outcome, or confounders indirectly influencing both employment as well as the outcome.

For each outcome y_{ij} the model contains two random effects: u_{0j} and e_{0ij}; each of these indicates a different source of unexplained variation. The random intercept u_{0j} indicates unexplained differences between families in the average y_{ij} values (controlling for the effects of x_{ij} and Z_j). The random residual e_{0ij} , indicates unexplained variation among the individual children within families.

Linear multilevel models are mixed, containing both fixed and random effects. In this study the models were fitted via maximum restricted likelihood (REML) using STATA 10.0. Fixed effects are analogous to standard regression coefficients and are estimated directly. Random effects are not directly estimated but are summarized according to their estimated variances and covariances. The error distribution of the linear mixed model is assumed to be Gaussian.

Results

Cognitive Scores: Maths

In Table 2 we present our fixed effects results pertaining to two sets of maths scores in the British sample (for those under and over 6 respectively) and the single analysis of maths for all children in the American sample. The first thing to notice is that we find no significant association of either BCS70 maths score or of the PIAT math score with either full-time or part-time maternal employment in the child's first year. Among the other child-related items, age and the presence of limiting health conditions in both samples, and being African American have the expected, generally significant signs. There is no clear tendency for boys to outperform girls at maths, and a tendency for the first born to perform better appears only in the NLSY79. The current family structure terms show a tendency for children living with step fathers to do worse than children living in other types of family structures. Both maternal education and ability are strongly predictive of the child's maths score in the NLSY79. In the BCS70 only the mothers' own maths ability shows any statistically significant association with children's maths scores for the two sets of children, while for the 6-16 year olds there is also a significant relationship with mother having obtained 'O' levels.

Cognitive Scores: Reading

We present estimates for four literacy models in Table 3 as there are two age groups of children in the BCS70 and two different assessments applied to the full age range of children in the NLSY79. We find no association of maternal employment at the end of the first year of the child's life with vocabulary or reading for either of the British age groups, or with reading recognition for American children. There is, however, a well determined negative coefficient of full-time employment on the reading comprehension score: American children whose mothers worked full time in the three months before their first birthday score 1.6 percentage points (or 0.09 of a standard deviation) less on this test than children whose mothers were not employed at this time, and there is more than a 95 percent chance that this estimate exceeds zero.

Other variables included appear similarly related to literacy as they are to maths, although advantages of being first born are evident in both countries. Our measures of maternal education and abilities are also significantly and positively associated with children's literacy, although among BCS70 mothers with children under 6, again, it is only their own maths score at age 10 which predicts their children's naming vocabulary score at any level of statistical significance.

Table 2: BCS70 & NLSY79: Full Model for Maths Scores (Fixed effects)

	BCS70 4-5 years		BCS70 6-16 years		NLSY 4-14years	
	b	z	b	z	B	z
Constant	-0.0577	-0.12	-0.4442	-10.90	-0.7521	-16.60
Mother's Employment (child 9-11 months) (ref: No employment)						
Only full-time	0.0237	1.59	0.0077	1.00		
Some part-time	0.0126	0.93	0.0055	0.85		
Mostly full-time					-0.0135	-1.88
Mostly part-time					-0.0012	-0.12
Other Child Level Variables						
Age	0.0124	0.77	0.0119	19.91	0.0163	22.71
Age squared	-0.0033	-0.25	-0.0033	-14.06	-0.0048	-16.01
Girl	0.0143	1.68	-0.0012	-0.24	-0.0088	-1.46
Birth order	-0.0044	-0.62	-0.0044	-1.01	-0.0103	-2.57
Any younger siblings	0.0063	0.22	-0.0031	-0.52	-0.0044	-0.69
Any illness/limiting condition	-0.0239	-2.16	-0.0331	-4.72	-0.0340	-3.67
Race/ethnicity (ref white)						
Black					-0.0249	-2.51
Hispanic					-0.0141	-1.35
Family status at interview (ref: Intact family)						
lone mother	0.0032	0.28	0.0027	0.37	-0.0081	-0.92
step father	-0.0184	-1.43	-0.0193	-2.45	-0.0240	-2.16
other arrangements					0.0815	3.13
Family Level Variables						
Mother's educational qualifications (US) (ref: less than high school)						
HS Diploma					0.0380	3.48
Some college					0.0384	3.20
College graduate					0.0560	3.78
Mother's AFQT score (US)					0.1097	6.09
Mother's educational attainment (GB)						
(ref: Low-less than 'O' level)						
Mid – 'O' Levels	0.0015	0.11	0.0159	2.28		
High – 'A' Levels or more	-0.0077	-0.36	0.0105	1.32		
Mother's ability tested at age 10 (GB)						
Maths score	0.2053	4.07	0.0669	2.14		
Reading score	0.0328	0.94	0.0306	1.39		
1st birth at 20 or before	0.0030	0.15	-0.0053	-0.58	-0.0073	-0.76
N	367		1524		1219	
Log-restricted likelihood	352.03		1259.73		938.84	
(Null model)	369.07		1284.69		872.54	

Table 3: Model for Literacy Scores, BCS70 & NLSY79 (Fixed effects)

	BCS70 4-5 years Naming Vocabulary		BCS70 6-16 years Reading Recognition		NLSY 4-14 years Reading Recognition		NLSY 4-14 years Reading Comprehension	
	b	z	b	z	B	z	b	z
constant	-0.4159	-0.96	-0.4469	-9.75	-0.6398	-11.67	-0.5711	-11.99
Mother's Employment (child 9-11 months) (ref: No employment)								
Only full-time	0.0073	0.56	0.0027	0.30				
Some part-time	0.0128	1.09	-0.0033	-0.44				
Mostly full-time					-0.0002	-0.01	-0.0166	-2.20
Mostly part-time					-0.0051	-0.42	0.0009	0.08
Other Child Level Variables								
Age	0.0271	1.93	0.0127	19.18	0.0136	15.72	0.0131	17.27
Age squared	-0.0180	-1.59	-0.0035	-13.52	-0.0034	-9.55	-0.0037	-11.59
Girl	0.0075	1.01	0.0093	1.61	0.0077	1.05	0.0088	1.38
Birth order	-0.0227	-3.66	-0.0164	-3.27	-0.0080	-1.63	-0.0108	-2.62
Any younger siblings	-0.0261	-1.10	-0.0007	-0.11	0.0023	0.30	-0.0012	-0.17
Any illness/limiting condition	-0.0085	-0.88	-0.0477	-6.04	-0.0458	-4.07	-0.0180	-1.86
Race/ethnicity (ref white)								
Black					-0.0135	-1.10	-0.0276	-2.71
Hispanic					0.0181	1.39	-0.0008	-0.07
Family status at interview (ref: Intact family)								
lone mother	-0.0006	-0.05	-0.0074	-0.86	-0.0117	-1.07	-0.0076	-0.84
step father	-0.0149	-0.80	-0.0212	-2.31	-0.0386	-2.82	-0.0387	-3.36
other arrangements					0.0554	1.74	0.0001	0.00
Mother Level Variables								
Mother's educational qualifications (US) (ref: less than high school)								
HS Diploma					0.0258	1.90	0.0252	2.25
Some college					0.0442	2.96	0.0344	2.80
College graduate					0.0419	2.28	0.0267	1.76
Mother's AFQT score (US)					0.1207	5.39	0.1104	5.96
Mother's educational attainment (GB) (ref: Low-less than 'O' level)								
Mid – 'O' Levels	0.0100	0.98	0.0198	2.42				
High – 'A' Levels or more	0.0052	0.46	0.0301	3.20				
Mother's ability tested at age 10 (GB)								
Math score	0.1157	2.63	0.0795	2.16				
Reading score	0.0306	1.00	0.0641	2.47				
1st birth at 20 or before	-0.0052	-0.30	-0.0054	-0.51	-0.0065	-0.55	-0.0147	-1.48
N	370		1526		1222		1217	
Log-restricted likelihood	400.98		1077.87		705.90		882.46	
(Null model)	417.36		1067.80		674.42		830.64	

Table 4: BCS70 & NLSY79 Full Model for Behavioural Scores (Fixed effects)

	BCS70 4-16 years Externalised		BCS70 4-16 years Internalised		NLSY 4-14 years Externalised		NLSY 4-14 years Internalised	
	b	z	b	z	b	z	B	z
constant	0.5269	11.19	0.8274	21.35	0.6799	14.38	0.9258	26.86
Mother's Employment (child 9-11 months) (ref: No employment)								
Only full-time	0.0038	0.31	0.0100	0.99				
Some part-time	0.0015	0.14	0.0124	1.42				
Mostly full-time					-0.0009	-0.10	0.0154	2.21
Mostly part-time					0.0033	0.25	0.0004	0.04
Other Child Level Variables								
Age	0.0011	1.74	-0.0004	-0.68	0.0031	4.15	-0.0010	-1.95
Age squared	-0.0003	-1.26	0.00001	0.05	-0.0014	-4.29	0.0008	3.24
Girl	0.0677	8.54	-0.0030	-0.47	0.0161	2.03	-0.0086	-1.52
Birth order	-0.0122	-1.82	-0.0007	-0.12	-0.0011	-0.21	-0.0009	-0.24
Any younger siblings	0.0027	0.27	-0.0073	-0.90	-.0116	-1.38	-0.0088	-1.45
Any illness/limiting condition	-0.0543	-5.10	-0.0660	-7.50	-0.0555	-4.68	-0.0457	-5.29
Race/ethnicity (ref white)								
Black					0.0089	0.69	0.0009	0.09
Hispanic					0.0011	0.08	0.0007	0.06
Family status at interview (ref: Intact family)								
lone mother	-0.0614	-5.26	-0.0432	-4.42	-0.0401	-3.50	-0.0386	-4.30
step father	-0.0551	-4.26	-0.0242	-2.25	-0.0291	-1.98	-0.0175	-1.59
other arrangements					-0.1257	-3.52	-0.0841	-3.15
Family Level Variables								
Mother's educational qualifications (US) (ref: less than high school)								
HS Diploma					0.0247	1.72	0.0050	0.46
Some college					0.0280	1.78	0.0043	0.35
College graduate					0.0469	2.45	0.0152	1.02
Mother's AFQT score (US)					0.0037	0.16	0.0354	1.94
Mother's educational attainment (GB) (ref: Low-less than 'O' level)								
Mid -'O' Levels	0.0242	2.21	0.0144	1.58				
High – 'A' Levels or more	0.0356	2.89	0.0190	1.85				
Mother's ability tested at age 10 (GB)								
Math score	0.0828	1.72	0.1177	2.93				
Reading score	0.0674	1.98	-0.0022	-0.08				
1st birth at 20 or before	-0.0245	-1.68	0.0084	0.69	-0.0051	-0.40	0.0027	0.28
N	1894		1909		1298		1326	
Log-restricted likelihood	573.49		938.45		619.93		1028.44	
(Null model)	523.22		940.16		638.76		1045.35	

Behavioural Adjustment

We present estimates of the fixed part of our behaviour models in Table 4. With respect to maternal employment, once again we find few estimates significantly different from zero. In this case the one exception is a positive term showing *less* internalized problems among the children of the NLSY79 whose mothers had been employed full-time: their (good) behaviour scores are 1.5 percentage points higher than those of children of non-employed mothers. One interpretation, which requires further investigation, is that these children had more early experience of social settings which has helped their behavioural adjustment – but the same does not apply to externalized behaviour, or either measure of behaviour in the UK.

Although, with this one exception, the behaviour models bear little imprint of maternal employment, we note that they are more sensitive than the cognitive models to family structure and child ill-health. Girls are significantly less likely to display externalized problems. Also in contrast to our models of cognitive development, indicators of maternal ability and attainment tend to be poor predictors of internalized behaviour. Perhaps we have yet to find the right 'confounder' to reveal a supposed underlying negative relationship.

The unexplained part of the model

We now turn to a summary of how much of the random variation in the original data remains unexplained by the models we have fitted. Tables 5a and 5b compare the error structure from the models in Tables 3 and 4 (the 'full' models) with the variability present when only child age (and age squared) is controlled, the 'null' model. Table 5a reports the random element in the BCS70 models and Table 5b presents the same information for the NLSY79. As the data are hierarchical, variances of the unexplained element (random effects) are shown both at mother and child levels, as well as correlations for children within families. For both the NLSY79 and the BCS70 data, variability between families, as evidenced by variances at the mother levels, is significant for all outcomes, apart from Maths scores for BCS70 children ages 4-5 years. In contrast, variability between children is not important in the NLSY79 and is only significant in the BCS70 for the Reading scores of children 6-16, the externalised behaviour scores (null model) and the Maths scores for the 4-5 year olds (full model). Variances at the child level do not decrease between the null and full models, which indicates that the addition of explanatory variables does little to explain variability between children.

Variances at the mother level do decrease with the addition of explanatory variables, however. This overall decrease in the variance at the family level indicates that the full model does well in explaining part of family level variability. For the NLSY79 this decrease is more marked in the cognitive than the behavioural scores. In other words, the addition of variables in the full model does a better job of explaining variability between families in cognitive rather than behavioural scores. For the BCS70 the variance decreases more sharply for the cognitive scores of the 4-5 year olds, then for their behavioural scores, while the least explanation is contributed for cognitive outcomes for older children.

Finally, the correlation coefficients at the child level show that the performance of children within a family is correlated. For the NLSY79 data, correlations are more pronounced for internalised behaviour (0.41) and reading recognition (0.36) while for the BCS70 they are more substantial for vocabulary for young children aged 4-5 (0.40) and reading for older children (0.33).

Table 5a: BCS70 Random Effects: Variance (std. errors in parentheses) at Mother and Child Level for the Null and the Full Models

	Maths 4-5	Maths 6-16	Naming Vocab 4-5	Reading 6-16	Externalised Behaviour	Internalised Behaviour
Mother Level	0.0016	0.0023	0.0035	0.0050	0.0075	0.0058
Null Model	(0.021)	(0.004)	(0.011)	(0.004)	(0.006)	(0.005)
Full Model	0.0007	0.0021	0.0019	0.0042	0.0059	0.0047
	(0.034)	(0.004)	(0.021)	(0.004)	(0.006)	(0.005)
Child Level	0.0056	0.0077	0.0020	0.0087	0.0238	0.0146
Null Model	(0.463)	(0.404)	(0.589)	(0.003)	(0.004)	(0.228)
Full Model	0.0059	0.0076	0.0028	0.0084	0.0222	0.0145
	(0.012)	(0.149)	(0.701)	(0.705)	(0.416)	(0.222)
Correlation coef.*	0.106	0.216	0.404	0.333	0.210	0.245

* intra-level 2 unit correlation, (i.e. children within families, full model)

Table 5b: NLSY79 Random Effects: Variance (std. errors in parentheses) at Mother and Child Level for the Null and the Full Models

	Maths	Reading Recognition	Reading Comprehension	Externalised Behaviour	Internalised Behaviour
Mother Level	0.0057	0.0087	0.0055	0.0061	0.0051
Null Model	(0.004)	(0.005)	(0.005)	(0.006)	(0.004)
Full Model	0.0031	0.0057	0.0028	0.0052	0.0045
	(0.004)	(0.005)	(0.005)	(0.007)	(0.004)
Child Level	0.0077	0.0103	0.0087	0.0142	0.0066
Null Model	(0.877)	(0.582)	(0.919)	(0.676)	(0.528)
Full Model	0.0076	0.0103	0.0087	0.0142	0.0065
	(0.188)	(0.811)	(0.235)	(0.784)	(0.592)
Correlation coef.*	0.290	0.356	0.243	0.268	0.409

* intra-level 2 unit correlation, (i.e. children within families, full model)

Discussion

Comparing these British women born in 1970 with their counterparts from the previous national birth cohort, born in 1958, we find a doubling of the first-year maternal employment rate which was only 33 percent among women who were born in 1958 and gave birth between 1973 and 1987 (Verropoulou and Joshi, 2009). This reflects a trend of increasing co-existence of employment and motherhood although it does not demonstrate their compatibility. So we return to our question of whether having an employed mother as an infant has any effect on children's cognitive or behavioural development when they are older. This is a question that continues to elicit considerable debate among academics and in the public arena. The assumption that maternal employment has negative impacts on children appears to underlie the recently reaffirmed fears that family life suffers if mothers go out to work (Scott, 2008). To address this question we assembled longitudinal data from two second generation cohort studies from two separate countries, each with its own regime of maternal labour force patterns, but with fairly comparable samples, child outcomes and predictor variables. To see if cognitive and/or behavioural outcomes of school age children are associated with mothers' employment when their children were babies, we utilised multi-level modelling. Further, because our data are longitudinal and have followed mothers over many years, we are able to include more extensive measures of a mother's abilities, measured at an earlier stage in her life course, than are available in cross-sectional data. Despite the added strengths of our approach, however, the bottom line is that our results still reveal very little association between the paid work by mothers of infants and either cognitive or behavioural outcomes in childhood and adolescence.

For women entitled to maternity leave from an existing job, the timing of post-birth employment is likely to reflect the provisions of maternity leave which vary from woman to woman, employer to employer and, of course, from country to country. As we noted earlier, widespread and guaranteed maternity leave is a much more recent phenomenon in the United States. Given that the children of our sample NLSY79 mothers were born between 1984 and 1996, i.e. many of them were born before the implementation of the 1993 FMLA, there would have been less opportunity for NLSY79 mothers to have been granted a job-protected break of any extended length of time as a result of childbirth. From the NLSY79 data we know that of the 64 percent of mothers in our sample who reported any employment in the first 12 months following the birth of their child, 86 percent reported at least some paid work during the first 6 months, and 77 percent were also employed during the last quarter of their child's first year.

Considering the very modest and mixed results of prior studies in this area, we hypothesised that we would be more likely to find effects of full-time rather than part-time employment, and given the more extensive nature of maternal employment during infancy in the United States than in the United Kingdom, we also hypothesised that any maternal labour force effects would be stronger in our sample of American children. Our results provide support for both of these hypotheses. First, they show very little, if any, discernible impact of part-time maternal employment in this early stage of childhood on either type of outcome later in childhood and early adolescence. They also reveal no association between full-time employment and child development in Britain, although in the United States there is some negative association between full-time maternal employment during infancy on the one hand and reading recognition and, perhaps, maths among children aged 4-14. The estimated 'effect' of employment on this reading score is, however, relatively small – a margin of 1.7 percentage points between having a mother working full-time or not at all, which is less than half the apparent disadvantage associated with having a stepfather.

We had expected more adverse outcomes of mothers working fulltime in the US than the UK due to American mothers returning to work earlier during the infancy period. The evidence within the US sample is not conclusive however. In additional analyses (results not shown here) we looked more closely at the length of time that our American sample mothers who reported working full time during months 9-12 had actually worked during their child's first year of life, and at all returners in each of the four quarters. We did not find, however, that earlier returners had worse child outcomes than later returners, although the coefficients for each group were within each others confidence limits. Our only caveat concerns children whose mothers worked full time during the second or third quarter of their infant's life who tended to fare more poorly in terms of reading comprehension than did children whose mothers reported no work during these months

We were also interested to see if cognitive and behavioural dimensions of development followed the same patterns. Although our few statistically significant estimates of employment 'effects' on cognitive

outcomes were negative, we did find a statistically significant protective association in our American sample of maternal employment and internalizing behaviour problems in the children. Before concluding that maternal employment has beneficial as well as harmful consequences, however, it is worth noting the large amount of variability left unexplained. It may be that day care arrangements are an omitted confounder: if we could distinguish between children who had been in 'good' versus 'inadequate' day care we might be able to turn the positive coefficient into a negative one, but this rather begs the question of how anyone decides what is 'good' daycare (or indeed a good mother!)

Our results also may not be relevant to the experiences of women in birth cohorts other than those we capture in our two data sets, to children born to older women who are not represented in our analyses, to outcomes that we do not analyse here, or to those that we do but when our subjects are older. How maternal employment might impact children born to later cohorts of women remains to be seen, and is likely to depend on the circumstances under which the care of young children and employment can be balanced. However we do note that in the United Kingdom, any negative outcomes associated with early maternal employment are even less discernible among children of the BCS70 than they were among children assessed earlier in both the NCDS and the ALSPAC studies (Verropoulou and Joshi 2009, Gregg et al 2005).

Although maternal employment forms the focus of our paper, some other results bear highlighting. Estimates of the intergenerational transmission of educational advantage are on the whole far more robust than any relationship between maternal employment and child development. However these vary by outcome, age of child, and national context. In the United States, cognitive benefits accrue for children whose mothers have more than a high school education. Higher maternal ability, as measured by the AFQT score, is also beneficial for children's own academic achievement, and is additionally associated with lower anxiety. Results from the United Kingdom are of a similar pattern but are more mixed in strength. British mothers' maths scores are particularly predictive of their offspring's maths scores, especially for children under 6 years. In both countries we find that maternal education levels are less closely associated with children's internalizing behaviour problems, than they are with the kinds of behaviours classified as externalizing or with our cognitive measures.

In this paper we do not delve into the kinds of factors that might mediate, or interact with such relationships as described above. For example, what are the potential pathways through which a mother's education might impact her child's cognitive attainment? How might the involvement of the child's father or grandparents offset a mother's presence elsewhere? How might the type of childcare arrangements chosen by, or available to, working mothers, or the flexibility of employment hours mediate the relationship between maternal employment and children's development? It may be that adaptive behaviour is already addressing the concerns expressed in public attitudes. We also leave the question of how independent are the various dimensions of child development investigated here to future research, when we plan to estimate multivariate hierarchical linear models that allow scores to be nested within children as well as children within families.

Conclusion

Despite recent public concern regarding maternal employment of mothers with young children, especially in the United Kingdom, the bulk of the evidence therefore supports the view that it really doesn't matter much one way or another if mothers are in the labour force when their children are very young, especially if maternal employment is part time.

Of course, 'no evidence of harm' is not quite the same as 'evidence of no harm'. We are unable to prove that children whose mothers did not go out to work would not have suffered if they had – the unobserved counterfactual in an observational study. However, our use of longitudinal data helps us rule out reverse causation, and to search for indicators of possible confounders we have included a wide range of additional child and maternal variables in our analyses to help overcome this problem of spuriousness.

As Barack Obama noted in his 2006 book, social conservatives are still disapproving of mothers working outside the home, but most families have two earners out of necessity. The current economic climate on both sides of the Atlantic does not make it easy for mothers to stay at home with their young children, but the stress associated with an economic necessity for mothers to be in the labour market should not be compounded by unsubstantiated concerns regarding negative effects of maternal

employment on later child development and emotional well-being. Obama argues: 'If we are serious about family values, then we could put policies in place which make juggling work and parenting a little easier." (Obama, 2006, p.342). Policies such as flexible work schedules, parental leave and flexible hours, are, he noted, already further advanced in UK than in the US and these findings support consolidating such measures in both countries. Nothing we have found here suggests an important or inevitable adverse pathway for the two sets of children we studied. Further evidence may yet reveal some negative impact on other or later outcomes, but so far, there is little evidence of harm to these school-age children from maternal employment during a child's infancy, especially if the employment is part-time, and in a context where several months of maternity leave is the norm, as it was already in the UK in the 1990s.

References

Achenbach T M, Edelbrock C S (1983) *Manual for the Child Behavior Checklist and Revised Child Behavior Profile*. University of Vermont, Department of Psychology. Burlington, Vermont

Barglow P, Contreras J, Kavesh L, Vaughn B E (1998) Developmental Follow-up of 6-7 Year Old Children of Mothers Employed During their Infancies. *Child Psychiatry and Human Development* 29 (1):3-20

Baum C (2003) Does Early Maternal Employment Harm Child Development? An Analysis of the Potential Benefits of Leave Taking. *Journal of Labor Economics* 21(2):409-448

Berger L M, Hill J, Waldfogel J (2005) Maternity Leave, Early Maternal Employment and Child Health and Development in the US. *Economic Journal* 115 (501):F20-F47

Brooks-Gunn J, Han W, Waldfogel J (2002) Maternal Employment and Child Outcomes in the First Three Years of Life: The NICHD Study of Early Child Care. *Child Development* 73(4):1052-1072

Center for Human Resource Research (2004) *NLSY79 User's Guide: A Guide to the 1979-2002 National Longitudinal Survey of Youth Data.* Center for Human Resource Research, The Ohio State University, Columbus, OH

Center for Human Resource Research (2006) *NLSY79 Child and Young Adult User's Guide: A Guide to the 1986-2004 Child Data and 1994-2004 Young Adult Data*. Center for Human Resource Research, The Ohio State University, Columbus, OH

Dex S, Hawkes D, Joshi H, Ward K (2005a) Parents' employment and childcare. In: Dex S, Joshi H (eds) *Children of the 21st Century: from birth to nine months.* Policy Press, Bristol 207-236

Dex S, Gustafsson S, Jenkins A, Joshi H, Kenjoh E, Killingsworth M R (2005b) 'Mothers' Changing Labour Supply in Britain, the US, and Sweden' in R Goméz-Salvador, A Lamo, B Petrongolo, M Ward and E Wasmer *Labour Supply and Incentives to Work in Europe*. Edward Elgar: Cheltenham, UK. Northampton, MA, USA. pp 115 – 150.

Downs B (2003) Fertility of American Women: June 2002. *Current Population Reports*, P250-548. U.S. Census Bureau: Washington, D.C.

Duncan G J, Yeung W, Brooks-Gunn J, Smith J R (1998) How Much Does Childhood Poverty Affect the Life Chances of Children? *American Sociological Review* 63:406-423.

Elliott CD (1996). *The British Ability Scales II*. NFER-NELSON Publishing Company, Windsor, Berkshire

Ermisch J, Francesconi M (2002) The effect of parents' employment on children's educational attainment. Working Paper 2002-21, Institute for Social and Economic Research, University of Essex

Goldstein H (1995) *Multilevel Models in Educational and Social Science Research*. 2nd Edition, Edward Arnold, London

Goodman R (2001) Psychometric properties of the Strengths and Difficulties Questionnaire (SDQ) *Journal of the American Academy of Child and Adolescent Psychiatry*, 40 (1337-1345)

Goodman R, Scott S (1999) Comparing the Strengths and Difficulties Questionnaire and the Child Behavior Checklist: Is Small Beautiful? *Journal of Abnormal Child Psychology* 27(1):12-24

Greenstein T(1995) Are the "Most Disadvantaged" Children Truly Disadvantaged by Early Maternal Employment? *Journal of Family Issues* 16(2):149-169

Gregg P, Washbrook E, Propper C, Burgess S (2005) The Effects of a Mother's Return to Work Decision on Child Development in the UK. *The Economic Journal* 115 (501):F49-F80

Gregg P, Propper C, Washbrook E (2008) Understanding the Relationship Between Parental Income and Multiple Child Outcomes: A Decomposition Analysis. The Centre for Market and Public Organisation, Working Paper No. 08/193

Han W, Waldfogel J, Brooks-Gunn J (2001) The Effects of Early Maternal Employment on Later Cognitive and Behavioural Outcomes. *Journal of Marriage and the Family* 63(2):336-354

HillV. (2005) Through the past darkly: A review of the British Ability Scales Second Edition. *Child and Adolescent Mental Health*, 10, 87-98

James-Burdumy S (2005) The Effect of Maternal Labor Force Participation on Child Development. *Journal of Labor Economics* 23(1):177-211

Kilkey M and Bradshaw J (1999) Lone Mothers, Economic Well-Being, and Policies. In D.Sainsbury (ed) *Gender and Welfare State Regimes*, Oxford:Oxford University Press. pp. 147-185(39)

Kneale D and Joshi H (2008) Postponement and childlessness – Evidence from two British cohorts. *Demographic Research*, 19(58), 1935-1968

Layard R and Dunn J (2009) A Good Childhood: Searching for Values in a Competitive Age, London: Penguin

Martin J and Roberts C (1984) *Women and Employment a Lifetime Perspective*. HMSO, London

Moore K A and Driscoll A K (1997). Low-Wage Maternal Employment and Outcomes for Children: A Study. *The Future of Children* 7(1):122-127

Obama B (2006) *The Audacity of Hope: Thoughts on Reclaiming the American Dream*, Cannongate Books, Edinburgh, London, New York, Melbourne

Parcel T L and Menaghan, E G (1994). Early Parental Work, Family Social Capital, and Early Childhood Outcomes. *American Journal of Sociology* 99(4):972-1009

Peterson J L and Zill N (1986) Marital disruption, parent-child relationships, and behavioural problems in children. *Journal of Marriage and the Family* 48(2):295-307

Ruhm C J (2005) Maternal Employment and Adolescent Development. IZA Discussion Paper. 1673, Bonn

Simmonds N, Fuller E, Lessof C and Foudouli V (2007) *1970 British Cohort Study: 2004-5 Survey. Technical Report.* Centre for Longitudinal Studies, Institute of Education, London http://www.cls.ioe.ac.uk/studies.asp?section=00010002000200140003

Scott, J (2008) Changing Gender Role Attitudes. In J Scott, S Dex, and H Joshi (eds) *Women and Employment; Changing Lives and New Challenges*. Edward Elgar, Cheltenham; pp 156-176

Verropoulou G and Joshi H (2009) Does Mothers' Employment Conflict with Child Development? Multilevel Analysis of British Mothers born in 1958 *Journal of Population Economics* Volume 22, Issue3 (2009), Page 665-692

Votruba-Drzal E (2006) Economic Disparities in Middle Childhood Development: Does Income Matter? *Developmental Psychology* 42:1154-1167

Waldfogel J (2002) Child Care, Women's Employment, and Child Outcomes. *Journal of Population Economics* 15:527-548

Wertheimer R, Moore K A, Burkhauser M (2008) The Well-Being of Children in Working Poor and Other Families: 1997 and 2004. *Child Trends Research Brief* 2008-33. Child Trends, Washington DC

Wiggins D W and Wale C (1996) Modelling intergenerational transmission in longitudinal birth cohorts using multilevel methods. *Bulletin de Methodologie Sociologique*, 51:27-41

Appendix 1: Selection into Sub-samples

BCS70 Women in 2004-5:	**All women Interviewed in 2004-5 (CMs)**	**All Biological Mothers**		**All Biological mothers with a first birth before 2000**		**Study Sample** 50% of previous column less cases with missing items, plus a few adoptive mothers	
Educational Attainment	**Mean**	**Mean**	**Std Dev**	**Mean**	**Std Dev**	**Mean**	**Std Dev**
Low – less than 'O' Level	0.232	0.267		0.302		0.295	
Mid – 'O' Levels	0.325	0.354		0.374		0.378	
High – 'A' Levels or more	0.442	0.379		0.324		0.326	
Age at first birth		26.25	4.53	24.66	3.67	24.32	3.48
Sample size	5021	3425		2747		1235	

NLSY79 Women aged 35-38 in 2000:	**All women Interviewed in 2000 (CMs)**	**All Biological Mothers**		**All Biological Mothers** interviewed in 2000 with at least one child 4-15 in household		**Study Sample** (as previous column less non-respondents on child assessments or other items)	
Educational Attainment	**Mean**	**Mean**	**Std Dev**	**Mean**	**Std Dev**	**Mean**	**Std Dev**
Less than High School	0.094	0.104		. 086		0.166	
High School graduate	0.420	0.446		. 448		0.360	
Some College	0.274	0.270		.273		0.267	
College Graduate	0.212	0.179		.192		0.207	
Age at first birth		23.06	5.27	23.28	4.46	23.38	4.32
Sample size	1796	1466		1055		840	

Appendix 2: Descriptive Statistics for explanatory variables in regressions, at two levels in two countries

Child Level Predictors		BCS70		NLYS79	
	N	2083		1413	
		Mean	Std Dev	Mean	Std Dev
Early maternal employment					
Mother's Employment History					
Child aged 9-11 months					
Only full-time employment		0.279			
Some part-time employment		0.366			
Mostly full-time employment				0.431	
Mostly part-time employment				0.134	
No employment		0.355		0.435	
Other Child level Predictors					
Child's age, months		111.24	39.188	114.18	35.420
Child's age, months squared (div by 100)		139.03	95.628	142.90	80.284
Child's sex: female		0.495		0.486	
Child's Birth Order		1.568	0.782	2.139	1.130
Any younger sibling		0.415		0.542	
Any longstanding illness		0.171		0.132	
Child's race					
Hispanic				0.170	
Black				0.270	
Other				0.560	
Family status at interview					
Intact: child lives with both natural parents		0.668		0.622	
Step: child lives with step-father		0.145		0.106	
Lone: mother currently alone		0.187		0.256	
Other arrangement, mother is present				0.016	

Family Level Predictors		BCS70		NLYS79	
	N	1235		840	
		Mean	Std Dev	Mean	Std Dev
Mother's educational attainment					
Low – Less than 'O' Level		0.295			
Mid – 'O' Level		0.378			
High – 'A' Levels or more		0.326			
Below High School				0.166	
High School				0.360	
Some College				0.267	
College Graduate				0.207	
First child born at 20 or earlier		0.215		0.312	
Mother's reading score at age 10 years		0.590	0.206		
Reading score missing		0.259			
Mother's math score at age 10 years		0.599	0.149		
Math score missing		0.259			
Mother's AFQT score				0.436	0.286