

WIDER BENEFITS OF LEARNING RESEARCH REPORT No.22

*Parenting Behaviours and Children's  
Development from Infancy to Early Childhood:  
Changes, Continuities, and Contributions*

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Centre for Research  
on the Wider  
Benefits of Learning



**PARENTING BEHAVIOURS AND  
CHILDREN'S DEVELOPMENT FROM  
INFANCY TO EARLY CHILDHOOD:  
CHANGES, CONTINUITIES, AND  
CONTRIBUTIONS**

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## Executive Summary

### Introduction/Background

There is already a considerable body of research on the relationship between parental behaviour and child development. However, there are many complexities to this relationship which remain only partially addressed, in particular:-

- How it changes over time
- To what extent and how parental behaviour affects contemporaneous child development, compared with development after a period of time
- Whether parenting behaviour is itself affected by and responsive to child development

Using data from the Avon Longitudinal Study of Parents and Children (ALSPAC), we therefore examined how children develop, how parenting behaviours change as children mature from infancy to early childhood, and the relationships between parenting behaviours and children's development. The latter we considered in three dimensions:-

- Concurrent relationships (i.e. effects on child development occurring at the same time as the observed parental behaviour)
- Future relationships (i.e. effects on child development occurring later than the observed parental behaviour)
- Bidirectional relationships (i.e. not only the effect of parenting behaviour on child development, but the reciprocal effects of child development on later parenting behaviour).

This research also investigated whether individual characteristics of socioeconomic status moderated (i.e., strengthen or weaken) these associations. Such information is important in determining the timing and effectiveness of parenting interventions as well as how they may vary according to the economic and educational circumstances of the families themselves.

### Key Findings

#### Socioeconomic Effects on Parenting Behaviour

Mothers with higher levels of education and greater family income interacted more with their children, engaged their children in more outside activities, and provided more stimulation and teaching in the home environment.

#### Parenting Behaviour: Impact on Child Development

Parenting behaviour was related to child developmental outcomes. Controlling for other observed factors we found:-

- The frequency of mother-child interactions was significantly related to higher scores for children's **future<sup>1</sup> fine and gross motor development**
- A more stimulating home environment was significantly related to higher scores on children's **concurrent social and fine and gross motor development.**
- Greater use of outside activities was significantly related to higher scores for children's **concurrent and future social and fine motor development.**

#### Moderating Factors

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<sup>1</sup> Future development here refers to development 12 months after the parental behaviour was measured.

Some of the relationships were altered, or moderated, by socio-economic factors:-

- Maternal education had a particularly marked effect on the relationship between parenting behaviour and child development. In general the effect of parenting was stronger (i.e., more positive) for children of mothers with low levels of education.
- However in home environments where mothers provided more stimulation and teaching, child development on all measures was generally higher, regardless of maternal education level or economic circumstance.

Reverse Effects: Child Development and Its Impact on Parenting Behaviour

Parenting behaviour was found to be responsive to some aspects of child development, but the effects of child development on parenting were much smaller than those of parenting on child development.

Early Development: Relationship to School Attainment

Children's social development, fine motor development, and gross motor development at 42 months significantly related to children's key stage 1 scores in reading, writing, spelling, and mathematics. They explained relatively little of the variance in KS1 scores, however, suggesting that other aspects of cognitive development play a larger role in determining school achievement.

## **Methodology**

The Avon cohort data (ALSPAC) is an ongoing longitudinal study that includes families representing all demographic characteristics. The study includes 12,500 families and children born in the Avon area between 1991 and 1992. For the specific parenting behaviours and children's outcomes examined in this report, there were between 7,000 and 9,000 parents and children studied due to missing data. The researchers examined the sample characteristics of those who dropped out of the study and those who remained, but there was no sample bias. However, there is an under-representation of single parents in the ALSPAC sample and therefore the results for this group should be interpreted with caution.

Once the date of birth of the child was entered on the database, questionnaires were sent out at intervals specific to the child's age. Mothers completed questionnaires for themselves, for the household, and for the child. The following study used multivariate techniques to examine measures related to socioeconomic characteristics, parenting behaviours, and children's development. Socioeconomic characteristics including partner status, maternal education (by level of qualification), family income, and mother's working status were measured when the child was 18 months of age. Parenting behaviours and children's development were measured when the child was 6, 18, 30, and 42 months of age with the exception of mother-child interactions which was obtained at 6, 18, 38, and 42 months of age.

Parenting behaviours measured included:-

- Mother-child interactions. This measured one-to-one interactions such as the frequency with which mothers cuddled with, and read books to, their child
- Outside activities. This measured the extent to which mothers engaged their children in outings such as going to the shops and to the park.

- HOME. A measure of the amount of stimulating toys and objects in the home environment as well as the teaching behaviours of the mother. This was based on a widely used standard measure known as the HOME (Home Observation for Measurement of the Environment) score.

Children's development included measures of social development, measured by both social interaction and socially appropriate behaviour (e.g. using a knife and fork), fine motor development including the ability to use a pencil and to pick up small objects, and gross motor development, including the ability to throw and kick a ball, and climb stairs.

## **Main Findings**

### Parenting Behaviours: Changes Between 6 and 42 months (3½ years)

There were changes in levels of parental engagement with their children across time, with levels of mother-child interactions increasing from 6 to 38 months and then remaining fairly stable from 38 to 42 months. Levels of educational and stimulating behaviours in the home increased between 6 and 30 months before stabilizing from 30 to 42 months. However, the level of outside activities decreased over the same time period, falling markedly between 6 and 18 months before recovering slightly.

In line with other research, we found that mothers with higher education and family income levels reported more interactions with their children, undertook more outside activities with them and provided more stimulating home environments than mothers with less education and lower household income. Patterns also differed for mothers who worked and mothers with partners, both reporting lower levels of outside activities. These differences were evident from infancy to early childhood.

### Children's Development: Changes Between 6 and 42 months (3½ years)

As expected all the development measures showed an increase across time as children matured from infants to young children, although development on all measures stabilized at some point between 30 to 42 months-of-age. This reflects the uneven nature of child development generally, with periods of progress in skill acquisition followed by periods of consolidation.

Socioeconomic characteristics such as income had varying relations with children's development. For the most part, these socioeconomic differences were small and diminished as children approached early childhood.

### The Effects of Parental Behaviour and Engagement on Child Development

The table below summarises the relationships for the sample as a whole. The coefficients show the unit increase in the development outcome for each unit increase in the measure of parental behaviour. Thus, increased parental engagement appears to have positive effects on children's development, but different parenting behaviours had different relations depending on the outcome and time frame examined.

Child Outcome \ Parenting Behaviour	Social	Fine Motor	Gross Motor
Mother-Child Interactions		Positive future effect (0.71)	Positive future effect (0.66)
Outside Activities	Positive concurrent (0.69) and future (0.81) effect	Positive concurrent (0.85) and future effect (1.38)	
Stimulating Home Environment (HOME)	Positive concurrent effect (0.21)	Positive concurrent effect (0.18)	Positive concurrent effect (0.28)

As we can see, the level of mother-child interactions did not have significant relationships with any of the child concurrent development measures but did have an effect on the later development of fine and gross motor skills suggesting that the response to this form of parental engagement manifests itself over time.

In contrast, the home environment had a significant relation with children's concurrent social development, fine motor development, and gross motor development. However there were no significant future associations. This suggests that relation between the home environment and children's development occurs contemporaneously rather than at a later point in time. The effects of this type of parenting behaviour are smaller relative to those for outside activities and mother-child interactions. This is perhaps not surprising, given that we might reasonably expect the provision of a stimulating home environment to benefit thinking and reasoning skills rather than the types of development outcome measured here.

Children whose mothers engaged them in more outside activities had substantially higher levels of both concurrent and future social and fine motor development.

## Moderating Factors

Many of these relationships were altered or moderated by other factors. The table below shows which relationships were affected by different factors.

ME = maternal education level; WS = maternal working status; FI = family income level;

Child Outcome Parenting Behaviour	Social		Fine Motor		Gross motor	
	Concurrent	Later	Concurrent	Later	Concurrent	Later
Mother-child interactions	<b>FI</b>		<b>ME</b>	<b>ME</b>	<b>ME</b> <b>WS</b>	
Outside activities	<b>ME</b> <b>WS</b>	<b>ME</b>	<b>ME</b>	<b>ME</b>		<b>ME</b>
Stimulating home environment (HOME)					<b>WS</b>	

Where cells are shaded, a significant positive relationship exists between parenting behaviour and child outcome for the sample as a whole.

The table clearly shows the importance of the level of maternal education in moderating the relationships between parenting behaviour and child development, many relationships were stronger (i.e., more positive) for children of less qualified mothers, namely:-

- mother child interactions and future fine motor development
- outside activities and social development (both concurrent and future)
- outside activities and fine motor development. (both concurrent and future)
- outside activities and future gross motor development

There were a few instances of moderation that strengthened a negative, concurrent relationship for more advantaged children. Although non-significant for the sample as a whole, the concurrent relationship between mother-child interactions and motor development became more negative for children of higher qualified mothers. In another instance, a positive but non-significant relationship between mother-child interactions and social development became negative with increasing family income. This may be a result of the contemporaneous nature of the analyses, and may be an indication that parenting is responsive to the needs of the child. Parents who have more resources (i.e., more education and more income) may be able to provide more one-to-one interactions with their children if they have more difficulties.

The working status of the mother also had an effect on development, with the relationships between mother-child interactions and gross motor development and between the home environment and gross motor development being stronger for children of non-working mothers. This finding may result from the likelihood that

children whose mothers are working spend more time in environments other than the home due to child care arrangements.

The positive relationships between the provision of a stimulating home environment and the various child development outcomes were constant across socioeconomic indicators (with the exception of working status and gross motor development). This finding suggests that children whose mothers provide more stimulating environments and teaching behaviours in their home also have more positive developmental outcomes, regardless of their family income and education level.

### Reverse Relationships: Effects of Child Development on Parenting Behaviours

In addition to examining the effects of parental behaviour on child development, we also looked at the reciprocal relationship (i.e., the effect of child development on parenting behaviour). Here we found relationships between children's fine motor development and later levels of both mother-child interactions and HOME score. This finding suggests that mothers may respond to children's developing needs and abilities particularly in the area of fine motor development by providing more one-to-one interactions with, and more stimulating home environments for, their child at a later point in time. However, these effects were small.

There was no evidence that children's social development or gross motor development were related to later parenting behaviours and it seems likely therefore that parents respond more contemporaneously to these aspects of children's development.

### Longer Term Effects and Signals

In order to determine the effects of these relationships on academic achievement, we tested whether these measures of children's development were related to later school outcomes. Further analysis showed statistically significant relationships between children's development at 42 months and their school attainment at key stage 1. The amount of variance for each child development indicator, however, was fairly small (between 1 and 3%) suggesting that other aspects of development may play a larger role in determining school achievement.

### **Conclusions and Implications**

This project paints a picture of the complexity of the relationships between parenting behaviour and children's development. In general terms, a more engaged parenting style has benefits for children's development, but different aspects of parenting behaviour have different effects, and while some appear to have immediate impact, (e.g. the provision of a stimulating home environment), the positive effects of others, such as the general level of mother-child interactions, only manifest themselves over a period of time. Therefore, interventions that encourage continuous engagement may prove to be more successful than those that focus on isolated incidents of engaged parenting.

There are important differences in parenting behaviour and its relationship to child development across socio-economic groups. In particular, mothers who have more education provide more interactive parenting both inside and outside of the home than their contemporaries with less education. A good level of education is therefore not only important for the individual, but also for their family and may have

effects across generations. Additionally, where a good level of maternal education is lacking, the effects of parenting style appear more marked, with a strengthening of the relationships between some aspects parental behaviour and several child developmental outcomes. If we consider the mechanisms which might be at work here, we might suppose that higher levels of maternal education signal environments which offer a protective effect. Where this protective effect is absent, parenting behaviour becomes more important. Therefore, interventions which target mothers with less education may be more effective in promoting children's positive development. As our study indicates, such interventions may have both concurrent and long-term relations with children's later development and these associations may even extend to children's key stage 1 scores.

Thus, in conclusion, we suggest that interventions might be most effective when they (1) consider how to target mothers on basis of educational background, which may be a more discriminating indicator than merely income or work status; (2) encourage continuous engaged parenting from infancy to early childhood; and (3) focus on increasing parental engagement early in infancy.

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## 1. Introduction

The parent-child relationship is a dynamic, continuing interaction in which both stable and unstable elements contribute to children's development (e.g., Bell and Chapman, 1986; Belsky, 1984; Sameroff and Chandler, 1975). Rather than being seen as static, parent-child interactions can be viewed as a longitudinal trajectory—a cumulative, sequential pathway in which continuities and/or changes occur in development across time. A number of factors may contribute to changes in trajectories of parenting behaviours and children's development. First, as children mature, parents may modify their parenting behaviours to meet their children's developing needs, giving rise to changes in average parenting behaviours as children mature. Parents may also respond differently to various stages of development, giving rise to changes in relative parenting behaviours. Second, children's characteristics may alter parenting behaviours. For example, children who are more socially responsive may elicit more positive interactions with their parents. Therefore, differences between children may cause differences in relative parenting trajectories across childhood. Third, contextual changes such as the mother's entry into the workforce may affect parenting behaviours and children's development. Finally, changes in parenting behaviours may also be influenced by more static characteristics of the parents themselves such as their educational level.

Nevertheless, few studies have examined how parenting trajectories change as children mature (see Holden and Miller, 1999, for a review). There is also little evidence on how these changes relate to children's developmental trajectories, or how individual characteristics of socioeconomic status (e.g., family income, parental education, and parental occupation) moderate the relation between trajectories of parenting and children's development. The following study investigated trajectories of parenting (i.e., mother-child interactions, engagement in outside activities, and HOME—a measure of stimulation/teaching in the home environment), trajectories of children's development (i.e., social, fine motor, and gross motor development), the relation between trajectories of parenting behaviours and children's concurrent and future development, and how these associations vary according to socioeconomic characteristics.

Parenting behaviours are often assessed at one time point with the assumption that there are enduring, consistent qualities of parenting (e.g., Baumrind, 1989; Darling and Steinberg, 1993). Although there is considerable continuity in parents' child-rearing orientations, parents modify their behaviours in response to their children's developing abilities and needs. For example, mothers of toddlers tend to be more concerned with their child's safety, and therefore, may restrict certain activities to keep their children safe from harm (Gralinski and Kopp, 1993). In their study of children's home environments, Bradley and his colleagues (2001) found that the frequency with which children were exposed to particular actions, objects, and events and conditions in their homes changed markedly from infancy to adolescence (Bradley, Corwyn, McAdoo, and Coll, 2001). Many of these changes were developmentally appropriate. For example, the number of books in the home increased from infancy to middle childhood, whereas reading to children peaked during early childhood. Older children were also more likely to be taken on recreational outings such as museums than younger children. On the other hand, infants were more likely to be kissed and caressed than older children. Such age-related

trends highlight how the contexts of parenting behaviours and children's home environments change throughout childhood.

Whether parents modify their parenting behaviours may also be influenced by their ability to do so. Socioeconomic status (SES) is a particularly important indicator of average parenting abilities and behaviours (Bradley and Corwyn, 2002). Socioeconomic status includes economic characteristics such as household income, parental education, and occupation. Families with higher levels of socioeconomic status tend to have more access to enriching materials and resources both inside and outside of the home that benefit children's development (Bradley et al., 2001; Brooks-Gunn and Duncan, 1997). For example, data from the National Longitudinal Survey of Youth and the National Household Education Survey (Bradley et al., 2001) indicate that children from poor families have fewer recreational and learning materials in the home than children from non-poor families. These data revealed that poor mothers are also less likely than non-poor mothers to communicate effectively with their children and less likely to show both verbal and physical affection toward their children. Parents with more socioeconomic capital also provide their children with more cognitively stimulating experiences and interactions. For example, higher SES parents provide more recreational experiences such as museum and theatre trips, engage their children in more conversations, read more books to them, and teach them more school-related concepts than do lower SES parents (Bradley et al., 2001; Shonkoff and Phillips, 2000). In their review of research on the HOME inventory, Bradley et al. (2001) found that socioeconomic characteristics such as income and parental education were consistently associated with HOME scores, and that these relations were applicable to children from infancy through adolescence.

Substantial research also links socioeconomic status to children's development. Although most of the research has focused on cognitive outcomes, socioeconomic characteristics have been shown to influence a range of children's development. Low SES children, for example, experience lower academic achievement and attainment, poorer health-related outcomes, and more symptoms of psychiatric disturbance and maladaptive social functioning than do high SES children (see Bradley and Corwyn, 2002; Mcloyd, 1998, for reviews). Evidence indicates that the association between SES and many aspects of children's development begins early in life. Numerous studies have documented that characteristics of low SES are related to lower levels of cognitive, language, social, and motor development in infancy and early childhood (e.g., Alexander, Entwisle, and Dauber, 1993; Duncan, Brooks-Gunn, and Klebanov, 1994; Magill-Evans and Harrison, 2001; Melhuish, Sylva, Sammons, Siraj-Blatchford, and Taggart, 1999).

Although the effects of SES on parenting behaviours and children's development have been well-established, disagreement exists whether individual characteristics of SES are tapping into the same underlying phenomenon or whether they have divergent effects (Bradley and Corwyn, 2002). There is evidence that constituent components of SES may each have somewhat different relations to both parenting behaviours and children's outcomes. For example, maternal education may be most strongly related to maternal teaching styles and the purchase of learning materials (Bradley and Corwyn, 2002; Duncan and Brooks-Gunn, 1997). Family income, on the other hand, has been shown to be the strongest predictor of children's academic achievement (White, 1982). Liberatos and her colleagues (1988) have also noted that components of SES may not be highly

related and that each of these characteristics may differentially relate to different child outcomes (Liberatos, Link, and Kelsey, 1988). Although several researchers have discussed the importance of examining the differential effects of individual characteristics of SES (Bradley and Corwyn, 2002; Brooks-Gunn and Duncan, 1997; McLoyd, 1998), few studies (for exceptions see, Bradley and Corwyn, 2003; DeGarmo, Forgatch, and Martinez; 1999) have actually unpacked these effects on parenting behaviours and children's development.

The relationship between parenting behaviours and children's development has been well-documented (e.g., Belsky, 1984). Parent-child interactions and the home environment have consistently shown moderate associations with social and cognitive development in children (e.g., Bradley and Corwyn, 2005; Magill-Evans and Harrison, 2001; Melhuish et al., 1999). However, there is disagreement regarding the extent to which parenting behaviours affect children's trajectories and whether the strength of the relationship varies across different developmental time periods (Bradley et al., 2001). As Scarr and McCartney (1983) have argued, young children are more influenced by their families than older children. Evidence also indicates that the association between the home environment and children's development is strongest in early childhood (Bradley and Corwyn, 2005). There is also some disagreement regarding the direction of effects. Although most studies have focused on how parenting influences children's development (e.g., Magill-Evans and Harrison, 2001; Melhuish et al., 1999), other theorists posit that different characteristics of the child trigger different responses from the environment (Sameroff and Chandler, 1975). In this sense, children who are more social may elicit more one-to-one interactions with their parents. Therefore, it is important to consider the dynamic nature of parenting and children's development.

The relation between parenting behaviours and children's development also varies as a function of socioeconomic characteristics (Bradley and Corwyn, 1999; Brooks-Gunn and Duncan, 1997; McLoyd, 1998). SES has been conceptualized in several studies as a moderator of relationships influencing children's development. Researchers suggest that, for example, supportive parent-child relationships may be more important for the development of children who experience more disadvantages (Garmezy; 1983; Rutter, 1987). In this sense, parenting behaviours may serve to buffer or moderate the negative effects of low SES. However, little is known about which specific characteristics of SES moderate the relation between different types of parenting behaviours and children's development. For example, the home environment may be more important to the development of children whose families have lower income, whereas mothers' one-to-one interactions may be more important for children whose mother are working. On the other hand, these parenting behaviours may have similar relations with children's development, regardless of their socioeconomic characteristics. Certainly, it is important to distinguish these socioeconomic nuances regarding the association between parenting behaviours and children's development in order to create effective prevention programs and to focus home visiting and other forms of support.

## 1.1 Research Questions

Previous research indicates that parenting behaviours and home environments change from infancy to early childhood and that these changes relate to children's development. Evidence also suggests that parenting behaviours are more influential for children's development during the early years of childhood. However, since many studies examine data only at one or two time points and across a limited period, there is less information documenting longitudinal trajectories of parenting behaviours and children's development during this period. Using hierarchical linear modeling (HLM), we examine age-related trends in the trajectories of parenting behaviours and children's development as well as the concurrent relation between them from 6 to 42 months-of-age. In addition to examining contemporaneous relations, we also examine how parenting behaviours relate to children's later development. Although this method gives some assurance regarding directionality, we only examine longitudinal associations and therefore cannot provide arguments of causality. Finally, we test whether children's development relates to parenting behaviours at a later point in time in order to determine whether there are possible bidirectional processes.

Three measures of parenting behaviours were examined including mother-child interactions, outside activities, and a modified version of the HOME score. Mother-child interactions measured one-to-one interactions such as the frequency with which mothers cuddled with, and read books to, their child. Outside activities, on the other hand, measured the extent to which mothers engaged their children in outings such as going to the shops and to the park. The HOME score measured the amount of stimulating toys and objects in the home environment as well as the teaching behaviours of the mother.

Three measures of children's development were also examined, namely social development, fine motor development, and gross motor development. Social development refers to the development of abilities related to interacting with others such as playing peek-a-boo and the development of tasks related to normative social behaviours such as washing and drying hands. Social development is an important marker of children's adjustment as well as a predictor of later development. Fine motor and gross motor development refer to the development of movement abilities. Fine motor development refers to the ability to manipulate small objects such as scribbling with a pencil and fastening buttons, whereas gross motor development refers to the ability to accomplish larger physical tasks such as jumping up and down and throwing a ball. Both fine and gross motor development are related to many aspects of children's development and predictors of later school performance.

This study also examines the moderating effects of socioeconomic characteristics. Few studies have unpacked these effects on trajectories of parenting behaviours and children's development. There is even less information regarding the differential moderating effects of individual socioeconomic characteristics on the relation between parenting behaviours and children's development. However, it is important to understand how different characteristics of SES may operate to either strengthen or weaken the relation between parenting and children's development in order to better understand the role of families in children's lives and development.

In summary, our five main research questions are:

- 1) **How do parenting behaviours change from infancy to early childhood?**
- 2) **How does children's development change from infancy to early childhood?**

- 3) **How are parenting behaviours associated with children's concurrent development from infancy to early childhood?**
- 4) **How do parenting behaviours relate to children's later development from infancy to early childhood?**
- 5) **How does children's development relate to later parenting behaviours from infancy to early childhood?**

For each of these questions, differential patterns with respect to maternal characteristics of socioeconomic status (i.e., marital status, education, household income, and working status) were also examined.

## **2. Method**

### **2.1 Participants**

The Avon cohort data (ALSPAC) is an ongoing longitudinal study of children born to mothers resident in the geographic area of Avon. To be eligible for the study, mothers had to be resident in Avon while pregnant. In addition, their expected date of delivery had to lie between 1st April 1991 and 31st December 1992 inclusive. Mothers who were resident in the area but left shortly after enrolment were omitted from further follow-up. However, those who had completed the questionnaire scheduled for the third trimester of pregnancy before leaving the study area, have been kept in the study, even if they had not delivered at the time of moving.

ALSPAC provides good longitudinal information on a large cohort of children with a tremendous wealth of information on family background, interactions between children and other family members and the cognitive and affective development of children. The ALSPAC data is unique amongst large sample UK longitudinal data-sets in surveying a sample of children year on year. Over 10,000 children are surveyed in 3 school cohorts. The data also has considerable information on parents and parents are also surveyed at regular, short intervals. In particular, there is a considerable body of information about parental engagement with the child, about important life events for parents and children, about health and well-being in the home, about housing and other environmental factors (including social capital within the neighborhood or self-determined community).

### **2.2 Procedure**

Once the date of birth of the child was entered on the database, questionnaires were sent out at intervals specific to the child's age. As the analytic technique requires similar measures across waves, we were able to examine four waves of data in which this requirement was met. Therefore, the following study examines data obtained when the child was 6, 18, 30 (or 38), and 42 months (3½ years).

#### **2.2.1 Measures**

Demographic variables were measured when the children were 18 months of age. Parenting behaviours and children's development were measured when the children were 6, 18, 30, and 42 months of age with the exception of mother-child interactions which was obtained at 6, 18, 38, and 42 months of age.

**Child Gender.** This was a dichotomous variable coded as “0” for female; “1” for male.

**Partner.** This was a dichotomous variable coded as “0” for no partner; “1” for partner.

**Income.** This was a continuous variable of income per week coded as 1 = less than £100, 2 = £100 to £199, 3 = £200 to £299, 4 = £300 to £399, and 5 = greater than £500.

**Mother’s Education.** This was constructed as the mother’s highest level of educational qualifications coded as 1 = CSE/none; 2 = technical qualifications including shorthand, typing, or other skills e.g., hairdressing, apprenticeship, or City and Guilds intermediate technical; 3 = O-Level/GSCE; 4 = A-Level/ Vocational Qualification including state enrolled nurse, state registered nurse, City and Guilds final technical, City and Guilds full technical, or teaching qualification; and 5 = university degree.

**Mother’s Employment.** This was a dichotomous variable indicating whether mothers worked (1) or did not work (0) when their child was 18 months of age.

**Mother-Child Interactions.** This measure was a count of five items regarding whether the mother does the following with their child namely singing, showing picture books, playing with toys, cuddling, and physically playing. If mothers indicated that they interacted with their child on that particular item sometimes or more, then it was coded as yes (1). If mothers indicated that they never interacted with their child on that particular item, then it was coded as no (0).

**Outside Activities.** This measure was a mean of five items regarding whether the mother takes their child to the following outside activities including local shops, department stores, supermarkets, parks, and visits to friends or family (0 = never, 1 = a few times per year, 2 = a few times per month, 3 = once per week, 4 = nearly every day).

**HOME.** Four items were adapted from HOME including “Does your child have cuddly toys, push or pull toys, and co-ordination toys, e.g. set of blocks, shape posting box, stacking cups?”, “About how many books does your child have of her own?”, “Do you try to teach your child?”, and “Do you talk to your baby while you work?”

**Social Development.** Items were adapted from the Denver Developmental Screening Test. Scale includes items such as playing pat-a-cake, helping with household tasks, eating with a spoon and fork, washing and drying her hands, and taking her clothes off with help. Scale is scored as 2 = yes she/he can, 1 = only done 1 or 2 times, and 0 = not started yet. Responses were summed for the total score.

**Fine Motor Development.** Items were adapted from the Denver Developmental Screening Test. Scale includes items such as holding a rattle, focusing her eyes on a small object, picking up a small object, using a pencil, and scribbling. Scale is scored as 2 = yes she/he can, 1 = only done 1 or 2 times, and 0 = not started yet. Responses were summed for the total score.

**Gross Motor Development.** Items were adapted from the Denver Developmental Screening Test. Scale includes items such as kicking a ball, throwing a ball, jumping up and down, and climbing stairs. Scale is scored as 2 = yes she/he can, 1 = only done 1 or 2 times, and 0 = not started yet. Responses were summed for the total score.

## 2.2.2 Analyses

Hierarchical Linear Modeling (HLM) was used to examine the trajectories from infancy to early childhood. HLM 5 is a statistical program that allows the researcher to examine how developmental trajectories change across time according to both linear and non-linear components (Raudenbush, Bryk, Cheon, and Congdon, 2000). The trajectories are characterized by three parameters including the intercept, slope, and curvature. The intercept, estimating the outcome at a specific time, was set for 18 months. It is recommended that the intercept be set at a midpoint in the developmental period being studied. Thus, the intercept represents the average status of the outcome variable at 18 months. The slope parameter, estimating the rate of change in children's development, provides information on the instantaneous linear rate of growth at 18 months. The curvature parameter, estimating changes in the rate of change in children's development over time, characterizes growth patterns that are not linear. HLM also has the advantage of handling missing data in order to maximize estimates of change across time.

Three types of regressions define a three-level HLM of this type. The first is the Level 1 or within-person model, which examines the outcome in relation to the predictors that vary across time. The second type is the Level 2 model which includes the predictor variables that do not vary across time. The third type is the Level 3 model which includes variables that vary across time.

**The Level 1 model.** This study used a growth curve model, which means that a polynomial of degree  $n$  was used to model the outcome variable as a function of time to describe the individual trajectory of change for each student (Bryk and Raudenbush, 1987, 1992):

$$Y_{it} = \beta_{0i} + \beta_{1i}(\text{Age}_{it}-18) + \beta_{2i}(\text{Age}_{it}-18)^2 + e_{it}$$

In this equation, the score of child's  $i$  on the outcome variable  $Y$  at time  $t$  equals both a linear and quadratic function of present age, plus the residual term  $e_{it}$ . The subscript  $i$  on the parameters indicates that these functions are specific for individual  $i$ . The value of 18 has been subtracted from the child's age so that  $\beta_{0i}$  represents the outcome at 18 months,  $\beta_{1i}$  represents the rate of change in the outcome at 18 months, and  $\beta_{2i}$ , estimates changes in the rate of change in the outcome over time, characterizing growth patterns that are not linear. In this equation, the value of 18 has been subtracted from age, so that the intercept represents child  $i$ 's score at 18 months when  $\beta_{1i}$  and  $\beta_{2i}$  are held constant. By "centering" the equation in this manner, parameters that would be otherwise meaningless can be interpreted in relation to the age in the middle of the developmental period being studied (Bryk and Raudenbush, 1992, pp. 25-29).

**Level 2 model.** The coefficients of the Level 1 equation are the outcome variables for the Level 2 model. The Level 2 model consists of predictor variables that do not vary over time as they are either inherently stable characteristics or were measured at one time point.  $\beta_{0i}$ ,  $\beta_{1i}$ , and  $\beta_{2i}$  are the outcome measures for the Level 2 equations:

$$\beta_{0i} = \gamma_{00} + \gamma_{01} \text{Gender}_i + \gamma_{02} \text{Partner}_i + \gamma_{03} \text{Income}_i + \gamma_{04} \text{MumEd}_i + \gamma_{05} \text{MumWork}_i + u_{0i}$$

$$\beta_{1i} = \gamma_{10} + \gamma_{11} \text{Gender}_i + \gamma_{12} \text{Partner}_i + \gamma_{13} \text{Income}_i + \gamma_{14} \text{MumEd}_i + \gamma_{15} \text{MumWork}_i + u_{1i}$$

$$\beta_{2i} = \gamma_{20} + \gamma_{21} \text{Gender}_i + \gamma_{22} \text{Partner}_i + \gamma_{23} \text{Income}_i + \gamma_{24} \text{MumEd}_i + \gamma_{25} \text{MumWork}_i + u_{2i}$$

The set of constant terms for the Level 2 equations defines the growth curve when all of the predictor variables in the model are set to zero. Given the coding of the level 2 variables (described below),  $\gamma_{00}$  was the sample mean at 18 months,  $\gamma_{10}$  was the average

rate of change in the outcome variable at 18 months, and  $\gamma_{20}$  was the degree of curvature averaged across the sample (Bryk and Raudenbush, 1992, pp. 25-29).

**Level 3 model.** To examine concurrent and future relations, the original HLM was modified by adding the time-varying covariate to the Level 1 equation of the baseline model:

$$Y_{it} = \beta_{0i} + \beta_{1i}(\text{Age}_{it} - 18) + \beta_{2i}(\text{Age}_{it} - 18)^2 + \beta_{3i} + e_{it}$$

The time-varying covariate was defined as the variable that was essentially co-varied (i.e., controlled) across time. In the concurrent associations, parenting behaviours (i.e., time-varying covariate) was matched to the corresponding wave of the outcome (i.e., children's development). In other words, the parenting behaviour at 6 months was matched to the child outcome at 6 months and so on. For the future models, the time-varying covariate was matched to the later outcome. In other words, the time-varying covariate at 6 months was matched to the outcome at 18 months and so on.

The individual mean of time-varying covariate was added to the  $X_{it}$  Level 1 intercept to restrict the Level 1 relation to within-individual change. Both the time-varying covariate and the individual mean were grand mean centered, which ensured that adding these variables did not change the meaning of the other coefficients in the model. The predictor variables were also included in  $\beta_{3i}$  to examine how demographic variables moderate these associations:

$$\beta_{3i} = \gamma_{30} + \gamma_{31} \text{Gender}_i + \gamma_{32} \text{Partner}_i + \gamma_{33} \text{Income}_i + \gamma_{34} \text{MumEd}_i + \gamma_{35} \text{MumWork}_i + u_{3i}$$

HLM assumptions including homoskedasticity and normality of residuals were checked. There was no relation between the residuals and predictors; and the distribution was symmetric and unimodal. Significance tests were also conducted to determine whether a linear, rather than quadratic, growth curve model characterized patterns of change, using a multiple-parameter significance test for the regression coefficients of  $B_{2j}$ . This test was significant for all of the variables. Additionally, the variance component of the quadratic element of change was not significant, and therefore, was not included in any of the models.

### 3. Results

Five sets of HLM analyses are presented below corresponding to each of the research questions.

#### 3.1 How do parenting behaviours change from infancy to early childhood?

We consider first the changes in parenting behaviours – the extent to which mothers cuddle and play with their children (mother-child interactions), take them on outings to the shops or park, etc. (outside activities) and have a wide range of books and toys in the home and engage in teaching behaviours with their children (HOME). As shown in Table 1, there were significant changes in parenting behaviours across time, with levels of mother-child interaction increasing from 6 to 38 months and then remaining fairly stable from 38 to 42 months (3½ years), and levels of educational and stimulating behaviour in the home increasing between 6 and 30 months before stabilizing from 30 to 42 months. However, the level of outside activity decreased over the same time period, falling markedly between 6 and 18 months before recovering slightly. This

reflects the uneven nature of child development more generally with periods of progress in the acquisition of particular skills often followed by periods of consolidation.

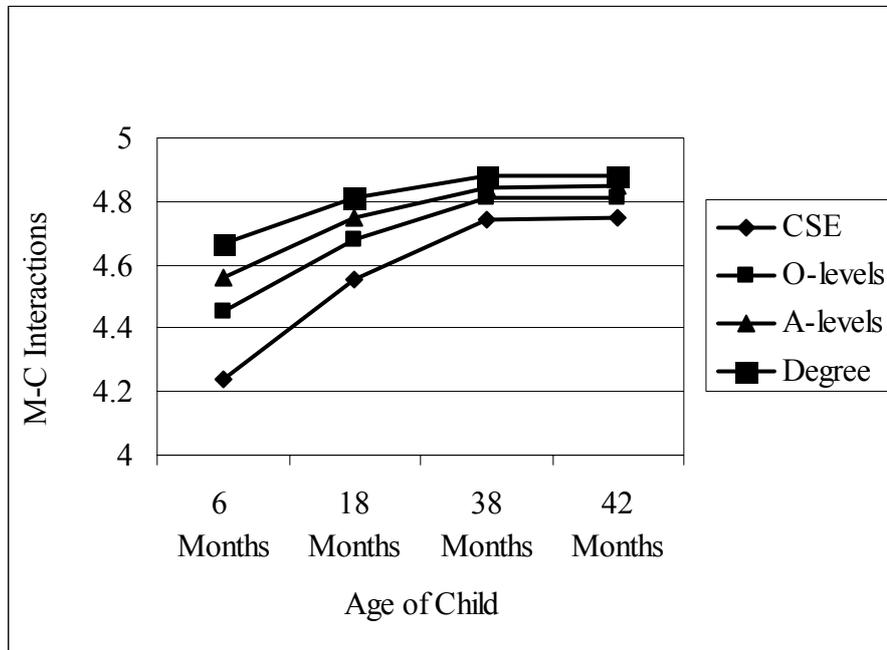
**Table 1: Growth Curve Models for Mother-Child Interactions, Outside Activities, and HOME**

Parenting Behaviour	Mother-Child Interactions		Outside Activities		HOME	
	Coef.	SE	Coef.	SE	Coef.	SE
For Intercept						
Intercept	4.489***	.04	2.195***	.02	6.442***	.17
Gender	-.004	.02	-.006	.01	.061	.06
Partner	-.061	.04	-.087**	.03	.072	.16
Income	.016*	.01	.014**	.00	.126***	.03
Mum Education	.064***	.01	.048**	.00	.211***	.03
Mum Working	-.003	.01	-.027**	.01	.119*	.06
For Linear Slope						
Intercept	.212***	.05	-.296***	.01	2.868***	.17
Gender	-.012	.02	.004	.01	-.192**	.06
Partner	-.082	.05	.020	.01	.067	.16
Income	.004	.01	.001	.00	-.048	.03
Mum Education	-.026*	.01	.005*	.00	-.060*	.03
Mum Working	.025	.02	.007	.00	.015	.06
For Quadratic Slope						
Intercept	-.048***	.01	.183***	.01	-.517***	.04
Gender	.000	.01	-.003	.00	.043**	.02
Partner	-.018	.01	-.007	.01	-.021	.04
Income	-.003	.00	-.003*	.00	.008	.01
Mum Education	.005*	.00	-.007***	.00	.002	.01
Mum Working	-.009*	.00	.004	.00	-.008	.01

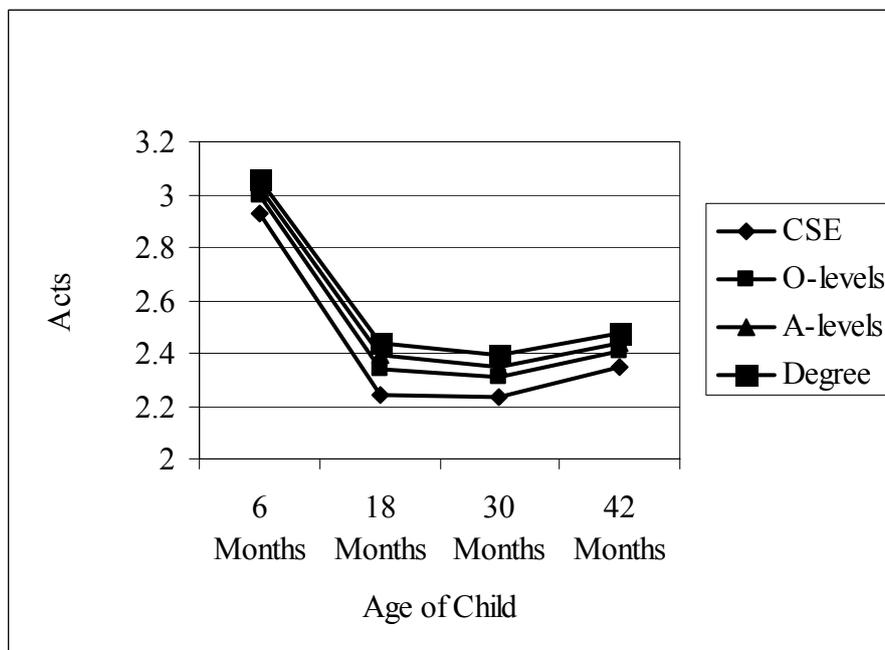
\*\*\*p < .001; \*\*p < .01; \*p < .05

For purposes of comparison, Figures 1 to 3 show parenting behaviours from 6 to 42 months according to maternal educational levels.

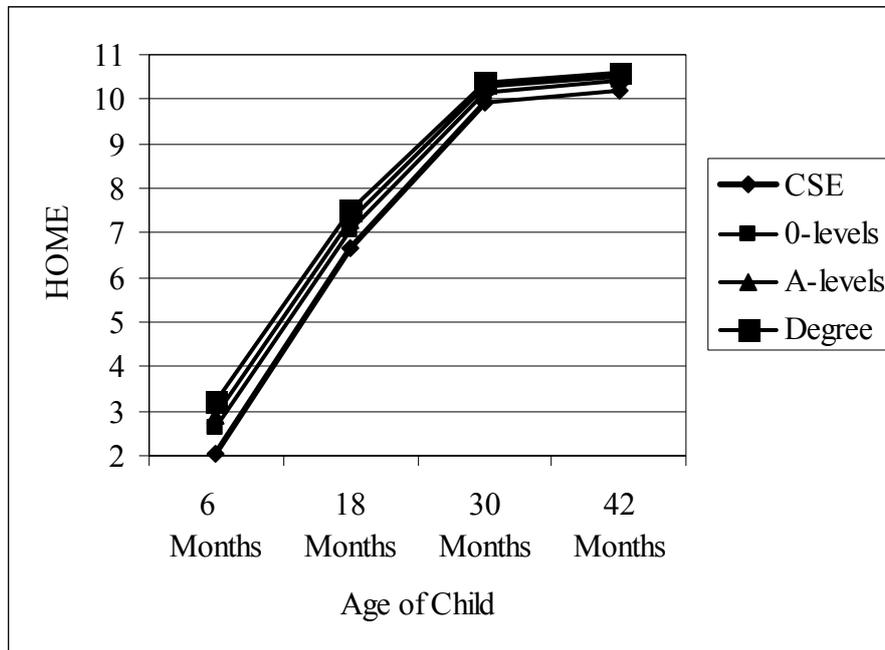
**Figure 1: Mother-Child Interactions from 6 to 42 months**



**Figure 2: Outside Activities from 6 to 42 months**



**Figure 3: HOME from 6 to 42 months**



In line with other research, we found that mothers with higher educational and income levels had higher levels of interaction with their children, undertook more outside activities with them and engaged in more educational and stimulating activities with them in the home. Patterns also differed for mothers who worked and mothers with partners, both reporting lower levels of outside activities.

It was not just static measures which varied across groups, but also the rate of change. The level of maternal education was important here. The increase in mother-child interactions was less for those whose mothers had higher levels of education, decreasing the disparity between children of less and more highly qualified mothers over time. A similar pattern was evident for the HOME measure of educational and stimulating parental behaviour. Conversely, the decrease in outside activities was greater for mothers with lower educational levels, thus increasing the disparity between children of these mothers and those whose mothers were more highly qualified.

### **3.2 How does children's development change from infancy to early childhood?**

We consider here the changes in the three measures of child development used in the analysis: social development – children's social interaction and their use of socially appropriate behaviours (e.g. hand washing); fine motor development – the ability to pick up and manipulate small objects; and gross motor development – measured by children's ability to kick and throw a ball, climb stairs, etc.

As expected all the child development measures showed an increase across time but their profiles differed. As shown in Table 2, social and fine motor development both showed rapid increases between 6 and 30 months before stabilizing between 30 and 42 months. Gross motor development, on the other hand, had a plateau rather earlier, after 18 months and showed a slight decline from 30 to 42 months.

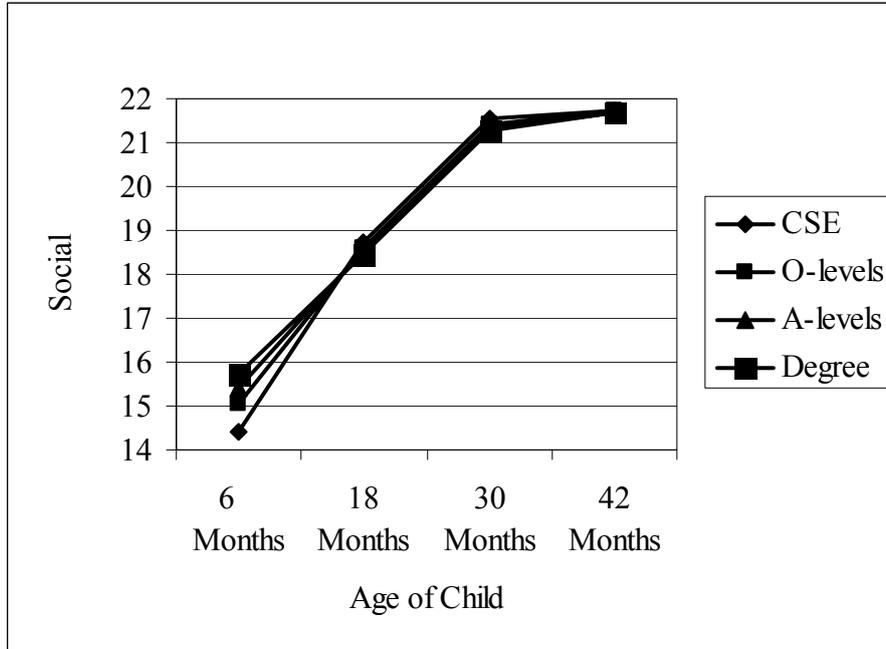
**Table 2: Growth Curve Models for Social Development, Fine Motor Development, and Gross Motor Development**

Children's Development	Social Development		Fine Motor Development		Gross Motor Development	
	Coef.	SE	Coef.	SE	Coef.	SE
For Intercept						
Intercept	18.810***	.23	20.748***	.50	19.912***	.20
Gender	-1.553***	.08	1.063***	.17	.014	.06
Partner	-.195	.22	-.342	.48	-.133	.19
Income	-.130**	.04	-.145	.08	-.062*	.03
Mum Education	-.070*	.03	.230**	.08	-.148***	.03
Mum Working	.212*	.08	.046	.17	.145*	.07
For Linear Slope						
Intercept	2.745***	.13	3.904***	.51	4.629***	.11
Gender	-.746***	.04	1.121***	.16	-.094**	.03
Partner	.085	.13	.418	.49	.204*	.10
Income	.042*	.02	.178*	.08	.018	.02
Mum Education	-.174**	.02	-.103	.08	-.118***	.02
Mum Working	.175**	.05	-.062	.17	.017	.03
For Quadratic Slope						
Intercept	-.639***	.09	-.537***	.12	-2.542***	.07
Gender	.243***	.03	-.377***	.04	-.059*	.02
Partner	.023	.09	-.080	.11	.014	.07
Income	.026	.02	-.029	.02	.015	.01
Mum Education	.109**	.02	.031*	.01	.067***	.01
Mum Working	-.125**	.03	.014	.03	-.049*	.03

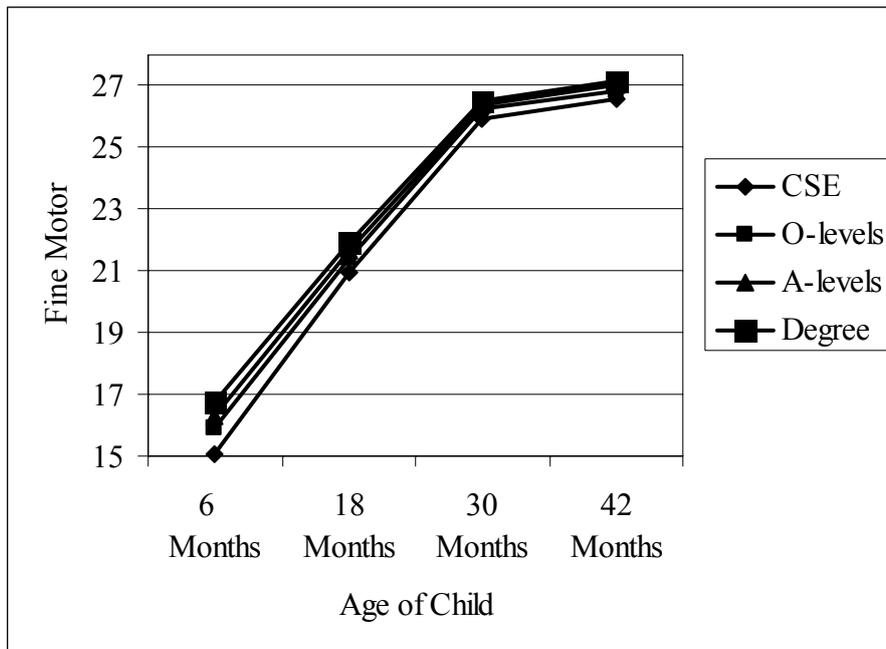
\*\*\*p < .001; \*\*p < .01; \*p < .05

For purposes of comparison, Figures 3 to 6 show trajectories of parenting behaviours according to maternal educational levels.

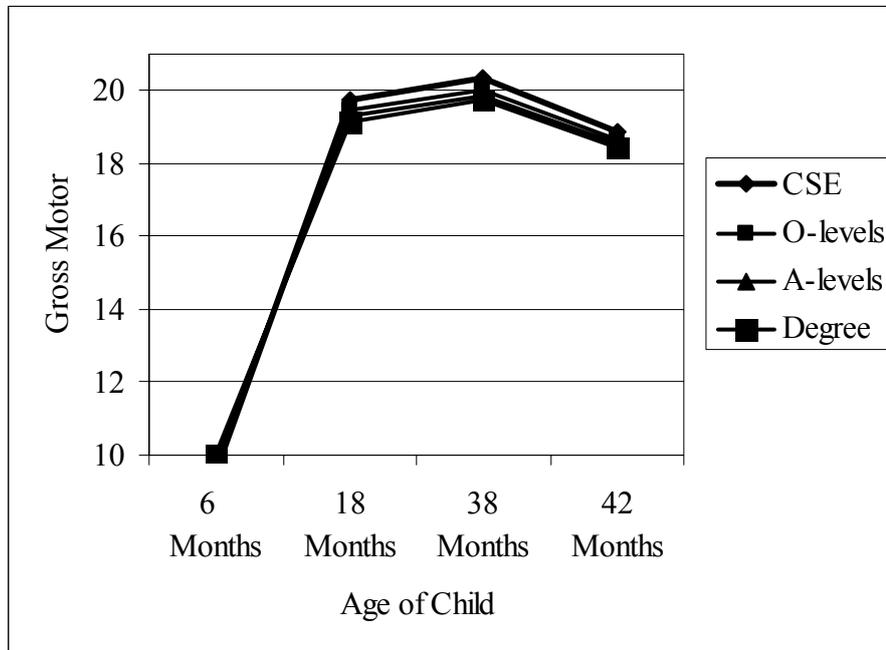
**Figure 4: Social Development from 6 to 42 months**



**Figure 5: Fine Motor Development from 6 to 42 months**



**Figure 6: Gross Motor Development from 6 to 42 months**



The socio-economic factors showing the strongest associations with these development measures and their rates of change were family income, maternal education and the sex of the child. However, the direction of the associations varied according to the outcomes examined. For social development and gross motor development, children whose mothers had higher educational levels and higher incomes had lower scores. For fine motor development, however, children whose mothers had higher educational levels had higher scores. Children of mothers who worked also scored more highly in social development and gross motor development. There were also gender effects. Boys had lower social development, but had higher fine motor development than girls. For the most part, however, these differences were small and merged as children matured into early childhood.

### **3.3 How are parenting behaviours associated with children's development from infancy to early childhood?**

The availability of measures across several time points allowed us to consider both the concurrent and future relationships between parenting behaviours and child development measures. For the concurrent relationships we matched data on parenting behaviour with data on child development at the same point in time – e.g., parenting behaviour measures at 6 months were matched with child development data at 6 months. For the future relationships we matched data on parenting behaviour at a given time point with child development measures 12 months later – e.g., parenting behaviour measures at

6 months were matched with child development measures at 18 months. Tables for concurrent and future relationships presented below include significant models only.

### Concurrent relationships

As shown in Tables 3 to 5, the HOME score of a stimulating home environment was significantly related to all the outcomes, with higher levels being associated with higher levels of development. Outside activities had strong positive relationships with concurrent social and fine motor development. Mother-child interactions did not have significant relationships with any of the concurrent child development measures.

**Table 3: Concurrent Growth Models for Social Development**

Parenting Behaviour	Mother-Child Interactions		Outside Activities		HOME	
	Coef.	SE	Coef.	SE	Coef.	SE
For Time-Varying Covariate						
Intercept	.099	.18	.689*	.34	.205*	.08
Gender	-.201*	.07	-.051	.12	-.016	.03
Partner	.094	.17	-.331	.32	.030	.08
Income	-.091*	.03	-.081	.05	-.029	.02
Mum Education	-.049	.03	-.150**	.05	.026	.01
Mum Working	-.042	.08	.305*	.12	.010	.03

\*\*p<.01; \*p<.05

**Table 4: Concurrent Growth Models for Fine Motor Development**

Parenting Behaviour	Mother-Child Interactions		Outside Activities		HOME	
	Coef.	SE	Coef.	SE	Coef.	SE
For Time-Varying Covariate						
Intercept	-.120	.28	.852**	.38	.180*	.09
Gender	.082	.10	.208	.13	-.032	.03
Partner	.019	.26	-.429	.37	.049	.09
Income	-.066	.04	.015	.06	.010	.01
Mum Education	-.098*	.04	-.225***	.06	-.000	.01
Mum Working	-.056	.10	.141	.14	-.038	.03

\*\*\*p < .001; \*\*p<.01; \*p<.05

**Table 5: Concurrent Growth Models for Gross Motor Development**

Parenting Behaviour	Mother-Child Interactions		HOME	
	Coef.	SE	Coef.	SE
For Time-Varying Covariate				
Intercept	-.145	.17	.276*	.11
Gender	-.002	.06	-.030	.03
Partner	.253	.16	-.029	.10
Income	.004	.03	.009	.02
Mum Education	-.059*	.02	.013	.02
Mum Working	-.143*	.05	-.087*	.03

The strength of these relationships varied according to socio-economic characteristics, in particular, the level of maternal education and working status of the mother. These variations were as follows:

- The positive relationship between outside activity and social development was stronger for both children of mothers with low levels of education and children of mothers who worked.
- The positive relationship between outside activity and fine motor development was stronger for children of mothers with lower educational levels.
- The positive relationship between HOME score and gross motor development was stronger for children of mothers who worked.
- The negative relationship between mother-child interactions and fine motor development was stronger for children of more educated mothers.
- The negative relationship between mother-child interactions and gross motor development was stronger for children of mothers with more education and children of mothers who worked.

In addition, the relationship between mother-child interactions and social development varied with family income moving from a positive relationship to a negative relationship as income levels increased. For example, children whose families earned less than £100 per week had a slight increase in social development, whereas children whose families earned £300 to £399 had a decrease. And, although not statistically significant, mother-child interactions were negatively related to boys' social development (i.e., levels of mother-child interaction were higher for less socially developed children) but positively related to girls' social development.

### **Future relationships**

As with the concurrent measure of social and fine motor development, outside activity levels were positively related to future social and fine motor development and the relationships were again stronger for children whose mothers had lower levels of education (see Tables 6 and 7). Elsewhere, however, the relationships between parenting behaviour and future child development exhibited marked differences from those between parenting behaviour and concurrent child development. The provision of a stimulating home environment (HOME score) had no significant association with the future development outcomes. In contrast, the level of mother-child interaction was positively and significantly related to future levels of both fine and gross motor development (see Tables 7 and 8). As with many of the other relationships we have described, the relations between mother-child interactions and fine motor development and between outside activities and gross motor development were also stronger for children whose mothers had lower levels of education.

**Table 6: Future Growth Curve Models of Parenting Behaviours Relating to Social Development**

Parenting Behaviour	Outside Activities	
	Coef.	SE
For Time-Varying Covariate		
Intercept	.809*	.40
Gender	-.171	.15
Partner	.257	.38
Income	-.118	.08
Mum Education	-.129*	.06
Mum Working	.070	.15

\*p<.05

**Table 7: Future Growth Curve Models of Parenting Behaviours Relating to Fine Motor Development**

Parenting Behaviour	Mother-Child Interactions		Outside Activities	
	Coef.	SE	Coef.	SE
For Time-Varying Covariate				
Intercept	.785*	.30	1.380**	.32
Gender	.356	.25	-.031	.19
Partner	-.355	.46	-.238	.43
Income	-.137	.12	-.050	.10
Mum Education	-.156*	.07	-.226**	.07
Mum Working	-.145	.26	.048	.20

\*\*p<.01; \*p<.05

**Table 8: Future Growth Curve Models of Parenting Behaviours Relating to Gross Motor Development**

Parenting Behaviour	Mother-Child Interactions		Outside Activities	
	Coef.	SE	Coef.	SE
For Time-Varying Covariate				
Intercept	.656*	.31	.451	.35
Gender	.015	.14	-.069	.13
Partner	-.079	.31	.279	.32
Income	-.108	.07	-.097	.07
Mum Education	-.023	.05	-.106*	.05
Mum Working	.141	.14	.153	.13

\*p<.05

### 3.4 How does children’s development relate to future parenting behaviours from infancy to early childhood?

Finally, we address the question of whether children’s own development may influence the behaviour of their parents towards them. To do this we examined how child development outcomes related to future parenting behaviours. Table 9 only includes significant models. As shown, we found relationships between children’s fine motor development and future levels of both mother-child interactions and HOME score. In each case the relative effects were small: mother-child interactions increased by .02 and HOME score by .03 with each unit increase in fine motor development, but the latter relationship was stronger for children of less educated mothers.

**Table 9: Future Growth Curve Models of Fine Motor Development Relating to Parenting Behaviours**

Parenting Behaviour	Mother-Child Interactions		HOME	
	Coef.	SE	Coef.	SE
For Time-Varying Covariate				
Intercept	.021*	.01	.029*	.01
Gender	-.003	.01	-.001	.01
Partner	-.007	.01	-.004	.01
Income	-.001	.01	-.000	.00
Mum Education	-.000	.01	-.001*	.00
Mum Working	-.002	.01	.003	.05

\*p<.05

### 3.5 Additional Analyses: Relations Between Child Development and Later School Achievement

In order to determine the effects of these relationships on academic achievement, we tested whether these measures of children’s development were related to later school outcomes. Using multiple regression analyses, twelve separate models were tested to determine whether children’s social development, fine motor development, and gross motor development scores at 42 months related to reading, writing, spelling and mathematics scores at key stage 1 (see Table 10). These analyses showed significant relationships between children’s development at 42 months and their school attainment at key stage 1, demonstrating that development in the early years can act as a signal for later school success. The amount of variance for each child development indicator, however, was fairly small (between 1 and 3%) suggesting that other aspects of cognitive development may play a larger role in determining school achievement. Fine motor development, in particular, explained the most variance in the school subjects (3%), followed by social development (2%), and gross motor development (1%).

## **4. Discussion**

### **4.1 Trajectories of Parenting Behaviours and Children's Development**

For the most part, parenting behaviours and children's development changed in expected ways from infancy to early childhood. Generally, parenting behaviours increased from infancy to early childhood with the exception of outside activities which decreased during the toddling years. As other researchers have noted (e.g., (Gralinski and Kopp, 1993), mothers of toddlers tend to be more concerned with their child's safety, and therefore, may restrict activities to keep their children safe from harm. Children's development also increased across time as expected but entered a phase of stability as infants approached early childhood. This highlights that development, although continuous, consists of periods of growth and stability throughout childhood.

There were also differences related to the gender of the child. For the HOME measure, there was a greater increase over time reported by mothers of girls than boys. This may result from the greater likelihood of girls engaging in more indoor play than boys which necessitates more toys. For children's development, boys had higher levels of fine and gross motor development, whereas girls had higher levels of social development. Therefore, on average, girls had better social skills, while boys were more skilled with physical tasks. These findings relate more generally to the types of games children play at this stage of development. Boys tend to focus on outdoor physical games, whereas girls tend to engage in imaginary indoor play involving cooperation and negotiation (Lever, 1976).

It is interesting that maternal education and family income was related to increased frequency of parenting behaviours but did not necessarily relate to higher developmental outcomes, particularly in regard to social development and gross motor development in early childhood. This finding suggests that higher socioeconomic characteristics may not uniformly relate to better outcomes for children in every area and at every stage of development, particularly during infancy and the early years of childhood. Rather, socioeconomic characteristics appear to have divergent paths of influence on children's development depending on the outcome and time frame being assessed. Other research supports this conclusion. For example, socioeconomic factors have more pronounced effects on externalizing behaviours (e.g., disobedience, fighting, impulsivity) than internalizing behaviours (e.g., sadness, anxiety, dependence) (see McLoyd, 1998; for a review). The social class differences in externalizing behaviours also increase during the preschool and early school years (see McLoyd, 1998).

### **4.2 Relations between Parenting Behaviours and Children's Development**

The table below summarises the relationships for the sample population as a whole. The coefficients show the unit increase in the development outcome for each unit increase in the measure of parental behaviour.

Child Outcome \ Parenting Behaviour	Social	Fine Motor	Gross Motor
Mother-child interaction		Positive future effect (0.71)	Positive future effect (0.66)
Outside activities	Positive concurrent (0.69) and future (0.81) effect	Positive concurrent (0.85) and future (1.38) effect	
Stimulating home environment (HOME)	Positive concurrent effect (0.21)	Positive concurrent effect (0.18)	Positive concurrent effect (0.28)

Children whose mothers engaged them in more outside activities had higher levels of both concurrent and future social and fine motor development and the increases in child development measures associated with this form of parenting behaviour were generally greater than for other parenting behaviours. The level of mother-child interactions did not have significant relationships with any of the child concurrent development measures for the sample population as a whole but did have an effect on the future development of fine and gross motor skills suggesting that the response to this form of parental engagement manifests itself over time.

In contrast, the home environment had a significant relation with children's concurrent social development, fine motor development, and gross motor development. However, there were no significant future associations. This suggests that relations between the home environment and children's development occur contemporaneously rather than at a later point in time. This finding, and the small effect size relative to that for the other parenting behaviours, contrasts with other research (Sammons et al, 2007) where the home learning environment is consistently found to have strong associations with later attainment. This difference may be due to the type of developmental outcomes measured - we might reasonably expect the provision of a stimulating home environment to benefit thinking and reasoning skills rather than the types of development outcome measured here.

Thus, increased parental engagement appears to have positive effects on children's development, but different parenting behaviours had different relations depending on the outcome and time frame examined.

### 4.3 Moderating Effects of Socioeconomic Characteristics

While the research literature has emphasized the moderating effects of socioeconomic status on the relationship between parenting behaviour and child development, SES is a complex measure and we have little understanding as to what are its most important elements in this respect. The table below shows the moderating influence of different socio-economic measures on the different relationships.

ME = maternal education level; WS = maternal working status; FI = family income level;

Child Outcome Parenting Behaviour	Social		Fine Motor		Gross motor	
	Concurrent	Later	Concurrent	Later	Concurrent	Later
Mother-child interactions	<b>FI</b>		<b>ME</b>	<b>ME</b>	<b>ME</b> <b>WS</b>	
Outside activities	<b>ME</b> <b>WS</b>	<b>ME</b>	<b>ME</b>	<b>ME</b>		<b>ME</b>
Stimulating home environment (HOME)					<b>WS</b>	

Where cells are shaded, a significant positive relationship between the parenting behaviour and the child outcome exists for the sample as a whole.

The importance of maternal education is immediately apparent. The level of maternal education had an effect on the concurrent and future relationships between outside activities and social development and between outside activities and motor development, being stronger (i.e., more positive) for those children whose mothers had lower levels of qualification. The future relationship between mother child interaction and fine motor development was also stronger (i.e., more positive) for the children of less qualified mothers. These findings suggest that mother-child interactions and outside activities are more significant factors in the development of children of less educated mothers. They corroborate studies of resilient children which indicate that parent-child relationships are more important for the development of children who experience more disadvantages (Garmezy; 1983; Rutter, 1987). In this sense, these parenting behaviours serve to protect against the negative effects of low maternal education.

In general, the effect of moderation was to strengthen a positive relationship for children of less educated mothers. However, there were a few instances of moderation that strengthened a negative, concurrent relationship for more advantaged children. Although non-significant for the sample as a whole, the concurrent relationship between mother-child interactions and motor development became more negative for children of higher qualified mothers. In another instance, a positive but non-significant relationship between mother-child interactions and social development became negative with increasing family income. This may be a result of the contemporaneous nature of the

analyses. Parents who have more resources (i.e., more education and more income) may be able to provide more one-to-one interactions with their children if they have more difficulties.

The working status of the mother also had an effect on development, with the relationships between mother-child interaction and gross motor development and between the home environment and gross motor development being stronger for children of non-working mothers. This finding may result from the likelihood that children whose mothers are working spend more time in environments other than the home due to child care arrangements.

The positive relationships between the provision of a stimulating home environment and the various child development outcomes were constant across all the socio-economic variables measured. This finding suggests that children whose mothers provide more stimulating environments and teaching behaviours in their home also have more positive developmental outcomes, regardless of their socioeconomic circumstances.

#### **4.4 Reverse Effects: The Association of Children's Development with Future Parenting Behaviours**

In addition to examining the effects of parental behaviour on child development, we also looked at the reciprocal relationship of the effect of child development on behaviours. Here we found relationships between children's fine motor development and later levels of both mother-child interaction and HOME score. This finding suggests that mothers may respond to children's developing needs and abilities particularly in the area of fine motor development by providing more one-to-one interactions with, and more stimulating home environments for, their child at a later point in time. However, these effects were relatively small compared to the effects of the parenting behaviours on children's development.

There was no evidence that children's social development or gross motor development were related to later parenting behaviours and it seems likely therefore that parents respond more contemporaneously to these aspects of children's development.

Thus, while there is concern from some (Sameroff and MacKenzie, 2003) that research to date fails to give sufficient emphasis to the reciprocal and dynamic relationship between parenting and child development, this study suggests that the influence is predominantly from parent to child and that reverse effects are limited. However, we have only been able to explore the link between child development and *later* parenting behaviour. Our discussions touch on the possibility/likelihood that child development also impacts on contemporaneous parenting behaviour, but experimentally identifying the causal direction and relative strength of the concurrent relationships between parenting behaviour and child development would be impossible in any secondary analysis such as this.

## 4.5 Limitations and Causality

There were a number of variables not included in the analyses that may influence trajectories of parenting behaviours and children's development. For example, Feinstein and Duckworth (2006) have found that other factors which inform mothers' participation in post-16 education such as their aspirations and motivations may underlie differences in their parenting abilities and the attainment of their children. And there are other, non-parental, influences on child development such as the role of pre-school care. We did not examine the role of such mediating variables as part of this study. Rather we focused on the moderating effects of socio-economic variables and their importance as signals of risk. As a result, we cannot say that the associations we observed were necessarily directly causal as other variables not included may have mediated the relations between parenting behaviours and children's development. However, since both outside activities and mother-child interaction related to later children's development, there is reason to suspect that these relations may be causal. That is, even if other variables may mediate their relation, parenting behaviours appear to directly influence children's outcomes at a later point in time.

We need also to remember that items which we measured were self-reports from the mother, rather than standardized observations, and that the measures are hence subject to mothers' perceptions of their own behaviour.

## 4.6 Conclusions

This project paints a picture of the complexity of the relationships between parenting behaviours and children's development. In general terms, a more engaged parenting style has benefits for children's development, but different aspects of parenting have different effects, and while some appear to have immediate impact, (e.g. the provision of a stimulating home environment), the positive effects of others, such as the general level of mother-child interaction, only manifest themselves over a period of time. Therefore, interventions that encourage continuous engagement may prove to be more successful than those that focus on isolated incidents of engaged parenting.

Differences in mother-child interactions according to maternal education were also more prominent in infancy. Therefore, interventions that focus on increasing parental engagement as early in infancy as possible may be more successful in promoting positive child development.

While the positive influence of a stimulating home learning environment was apparent across all socio-economic groups, with regard to the effects of mother-child interactions and outside activities, there were important differences. In particular mothers who have more education provide more interactive parenting both inside and outside of the home than their contemporaries with less education. A good level of education is therefore not only important for the individual, but also for their family and may have an influence across generations. Additionally, where a good level of maternal education is lacking, the effects of parenting style appear more marked, with a strengthening of the relationships between some aspects parental behaviour and several child development outcomes.

The value of this research lies in highlighting the value of socio-economic variables as signals of where support and intervention might best be targeted. Although we examined other indicators of socio-economic status, maternal education was the

single most significant moderator. Therefore, interventions which target mothers with less education rather than other levels of socioeconomic disadvantage may be more effective in promoting children's positive development. As our study indicates, such interventions may have both concurrent and long-term relations with children's later development and these associations may even extend to children's key stage 1 scores.

Thus, in conclusion, we suggest that interventions might be most effective when they (1) consider how to target mothers on basis of educational background, which may be a more discriminating indicator than merely income or work status; (2) encourage continuous engaged parenting from infancy to early childhood; and (3) focus on increasing parental engagement early in infancy.

## 5. References

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**Table 10: Regression Models of Children's Development at 42 months Relating to School Achievement at KS1**

	Reading		Writing		Spelling		Math	
	B(SE)		B(SE)		B(SE)		B(SE)	
Constant	1.06(.18)***		.59(.17)***		-1.13(.25)***		1.11(.18)***	
Social Development	.10(.01)***		.09(.01)***		.13(.01)***		.09(.01)***	
R-Squared	.02		.02		.02		.02	
Constant	.46(.18)**		.12(.17)		-2.39(.25)***		.74(.18)***	
Fine Motor Development	.09(.01)***		.08(.01)***		.14(.01)***		.08(.01)***	
R-Squared	.03		.03		.03		.02	
Constant	1.97(.19)***		1.47(.17)***		.17(.27)		1.88(.18)***	
Gross Motor Development	.05(.01)***		.04(.01)***		.06(.01)***		.05(.01)***	
R-Squared	.01		.01		.01		.01	

# *Parenting Behaviours and Children's Development from Infancy to Early Childhood: Changes, Continuities, and Contributions*

There is already a considerable body of research on the relationship between parental behaviour and child development. However, there are many complexities to this relationship which remain only partially addressed. Therefore, in this report, we examined how children and parenting behaviours change from infancy to early childhood, how parenting influences concurrent and future child development, and whether parenting itself is affected by and responsive to child development. We also investigated whether individual indicators of socioeconomic status moderate (i.e., strengthen or weaken) these associations.

Our results showed that mothers with higher levels of education and greater family income interacted more with their children, engaged their children in more outside activities, and provided more stimulation and teaching in the home environment.

Parenting behaviours were related to both concurrent and later child developmental outcomes. However, different aspects of parenting behaviour had varying effects and, while some had more immediate impact (e.g. the provision of a stimulating home environment), the positive effects of others, such as the general level of mother-child interaction, only manifested themselves over a period of time.

Some of the relationships were also moderated by socioeconomic factors. Maternal education had a particularly marked effect on the relationship between parenting behaviour and child development. In general, the effect of parenting was stronger (i.e., more positive) for children of mothers with low levels of education. However, in home environments where mothers provided more stimulation and teaching, child development on all measures was generally higher, regardless of maternal education level or economic circumstance.

Parenting behaviour was also found to be responsive to some aspects of child development, but the effects of child development on parenting were much smaller than those of parenting on child development.

This project paints a picture of the complexity of the relationships between parenting behaviour and children's development. In general terms, a more engaged parenting style has benefits for children's development. There are also important differences in parenting behaviour and its relationship to child development across socioeconomic groups. Mothers who have more education provide more interactive parenting both inside and outside of the home than their contemporaries with less education. Additionally, where a good level of maternal education is lacking, the effects of parenting style appear more marked, with a strengthening of the relationships between some aspects parental behaviour and several child developmental outcomes.

In conclusion, our findings suggest that interventions might be most effective when they: (1) consider how to target mothers on basis of educational background, which may be a more discriminating indicator than merely income or work status; (2) encourage continuous engaged parenting from infancy to early childhood; and (3) focus on increasing parental engagement early in infancy.

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