Early Parental Time Investments in Children's Human Capital Development: Effects of Time in the First Year on Cognitive and Non-cognitive Outcomes

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Abstract

Recent economic and neurological evidence suggest that early investments in children have a lasting impact on a child's human capital. Based on theories of the neurobiology of attachment, this paper explores the effects of parental time investments in their children during the first year of life. Previous research looking at the effect of early parental employment on children has mainly focused on short-term cognitive measures and has not adequately captured the heterogeneity of the caregivers and children. To address these issues both short and long-term cognitive and non-cognitive outcomes are considered. Also, to control for heterogeneity a household fixed effect is constructed, which yields estimates that offer a lower bound of the true effect of time investments. Using the National Longitudinal Survey Child-Mother file, the results from this approach are fairly consistent with neuropsychological evidence. Overall, they suggest that uninterrupted parental time investments up to one year would offer lasting benefits, but beyond that period is questionable.

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1. Introduction

A growing interest in very young children has been spawned by recent neurological evidence that suggests the social environment significantly affects the physical development of the brain (Lecours 1982). Therefore, it is not surprising that many early intervention programs for preschool children have been linked with lasting impacts (Currie 2000, Karoly et. al. 1998). However, the effects of interventions prior to age 3 are largely unknown, and the role for policy intervention is less clear.

Neuropsychological research on attachment theory has proposed that the interaction between the primary caregiver and infant has a significant and lasting impact on the social and emotional development of the child. More specifically, an uninterrupted relationship with a loving caregiver[1] starting almost immediately after birth and continuing through the first year of life will have permanent effects on the social and emotional development of the child (Schore 1996)[2]. This implies that parents can invest in their children by allocating a larger quantity of quality time to them throughout the entire first year.

The goal of this study is to measure the effects of time investments as implied by neuropsychological evidence on children's cognitive and non-cognitive development. This study differs from previous research in three important ways. First, earlier studies have tended to use the average number of hours or weeks worked in a given period, which implies that investments are substitutable. I measure time investments as the specific time at which separation between the infant and the initial caregiver occurs. This measurement of time is consistent with neuropsychological evidence and does not allow for substitutability of time investments.

A second important contribution of this study is to consider a wide range of both short and long-term cognitive and non-cognitive measures of children's development. Most research has focused on short-term cognitive outcomes, but neuropsychology suggests a permanent impact

[1] The caregiver is not limited to the parent of the child. However, since this theory stresses a continuous and loving role for the caregiver, the parent of the child is most likely to fill this description.

on social and emotional development. Social and emotional skills, or more generally non-cognitive skills, are important components of human capital. They are crucial determinants of an individual's general well-being as well as performance in school or the labor force. For example, the attributes of a child prior to kindergarten that teachers define as the most important for school readiness are health, communication skills, enthusiasm, and the ability to pay attention (Carnegie Foundation 1991). The economic literature has also stressed the importance of non-cognitive outcomes in determining an individual's potential labor force productivity (Heckman 1999).

Despite these two differences, the empirical issues, namely the need to control for the quality of the caregiver and the child's initial endowments, are essentially the same. To address these, I propose a household fixed effect. This approach limits the analysis to measuring the effect of differential inputs across children within a single family on the outcomes of the children. While the use of siblings does not remove all potential biases, I argue that the estimates offer a lower bound of the true effect of time with the child and significantly improve upon other estimation strategies.

Using the National Longitudinal Survey of Youth (NLSY), the results from this approach are fairly consistent with neuropsychological evidence. The results indicate that an uninterrupted time investment by a parent for up to one year leads to lasting effects on social and emotional skills, and little or no effects on cognitive outcomes.

This paper is laid out as follows. Section 2 provides background information. Section 3 describes the theoretical model and policy implications. The empirical strategy is described in section 4. Section 5 describes the data used in the analysis. Section 6 presents results from estimation. A discussion in Section 7 describes the potential biases of the fixed effects estimator and highlights implications for parental leave, followed by a conclusion.

[2] For detailed neuropsychological evidence, see Schore (1994) or Schore (1996).

2. Background

Recently the United States has witnessed a dramatic increase in the labor force participation (LFP) of women, particularly married women with young children. The LFP of women with children under age 18 has risen from under 20 percent to over 70 percent in the last 50 years, and it has risen almost 30 percentage points in the last 20 years for women with children under age 2 (Committee on Ways and Means, 1998).

Largely in response to these trends, there has been a wide range of research looking at the effect of early parental employment on children's cognitive outcomes, with little conclusive results. Some have found positive effects of maternal employment during the first year, but most others have found negative effects. Maternal employment during the second and third years has almost always been linked with positive outcomes. Harvey (1999) provides an excellent overview of earlier research. The wide range of results is due to differences in the measurement of time investments, the age of the child when the dependent variables were measured, sample selections, and control variables used (Harvey 1999).

Despite these differences in approaches, the estimates are difficult to interpret as causal because of the failure to adequately control for the quality of the caregiver and the endowment of the child. Since time inputs by a parent are likely to be correlated with these unobserved factors, estimates of the effect of time in a least squares framework would give biased results. For example, parents with strong labor market skills may choose to spend less time with their children. If labor market skills are positively correlated with home production skills, we would expect estimates that do not control for these skills to underestimate the effect of time investments.[3]

There is one study that attempts to correct for this endogeneity.[4] Blau and Grossberg

[3] Additional potential biases are discussed below.

[4] A recent study by Ruhm (2000) came to my attention as I was preparing this paper. His study appears to have success in dealing with endogeneity, though his paper only focuses on cognitive outcomes and uses average number of hours or weeks worked per year.

(1992) address it by instrumenting for time away from home using an assortment of variables that are assumed to affect the labor supply decision but not the child's outcome. While this is a clear step in the right direction, they reject their IV estimates in favor of least squares, but admit that the instruments could in fact be highly correlated with the regressors and do not rule out heterogeneity entirely.[5] Furthermore, their study only focuses on cognitive outcomes of three- and four-year olds.

Thus, there does not appear to be a study that fully considers neuropsychological evidence or controls for the unobserved characteristics of caregivers and children in measuring the effects of early time investments. A solid theoretical grounding based on neurological evidence on the development of children and economic decisions of the household will provide a more consistent empirical framework for understanding the impact of early parental time investments.

3. Theory

This section outlines a basic theoretical context for analyzing how human capital develops during early childhood according to neuropsychological evidence and how parents choose to invest in their children. The effect of parental leave and other policies on time investments is then discussed.

A. Human Capital Development

A child's human capital in a given period (H_t) is determined by the resources devoted to the child, mainly in the form of time (T_t) and consumption (C_t), the quality of the resources (Q_t), and the existing human capital stock of the child (H_{t-1}) (Leibowitz 1974), according to the following equation

$$H_t = f_t\,(C_t,\, T_t;\, Q_t,\, H_{t-1}) \qquad (1).$$

The amount of resources is chosen by the parent or society, and the quality and human capital

[5] The authors do not provide a detailed explanation for the validity of their instruments and do not report first stage estimates in their paper.

stock determine the efficiency with which the resources affect human capital. Human capital can be viewed as anything that affects future utility and productivity from health outcomes to academic achievement to self-confidence.

I define two main periods in children's human capital development: from birth until approximately year one (the "infancy" period), and from the first year on (the "socializing" period). These periods represent stages in which the nature and choice of inputs vary considerably.

During the infancy period, as highlighted by the neuropsychological findings, the interaction between the primary caregiver and the infant is crucial. With regards to consumption, it is argued that enrichment goods are unnecessary at this stage (Bruer 1999), suggesting the child's nutritional consumption is important and additional income beyond a certain threshold would not improve the child's human capital *ceteris parabis*.[6] However, the type of nutritional consumption is extremely important. For example, the consumption of human milk via breastfeeding for the first 6 months has been linked to better health and neurological development (American Association of Pediatrics 1997).

In the socializing period, time investments change as children explore in their environments and begin to enter school, thus spending less time with their parents. The quality of these environments become more important. It is unclear as to what age enrichment goods become important and thus when family income will play a stronger role.

The measurement of time in the infancy period is an important distinction in this model. It implies time investments will have positive effects *only if the parent remains with the child throughout the entire period*. Furthermore, it allows for a potentially discontinuous relationship between time investments and human capital. Both of these follow from the neuropsychological theory which stresses that a caregiver must spend a continuous amount of time with the child through certain critical periods, and after the critical periods inputs may affect the child differently.

B. Basic Model

A family raising a child faces a trade-off in deciding how to allocate their scarce resources, namely time and money, to the child in each period. To model this decision, I assume the following: a household contains at least one altruistic parent (household head) and one child. If there is a second parent, he or she participates in the labor force in all periods. The care of other children, if they exist, is also determined outside the model. The supply of children and quality of parental care is determined exogenously. Since the focus here is on early time inputs, the household head faces a binary choice over how to allocate his or her time in the first year of a child's life. The household head can participate in the labor market (T_1=0) and purchase child care services or remain home to spend time with the child (T_1=1).[7] For now, I assume the household head then participates in the labor force in the following period (T_2=0). Wages in each period (w_t) are also determined exogenously.

The head of the household chooses T_1, C_1, C_2, and the amount of consumption for him or herself (Z_1 and Z_2) to maximize the following utility function of the family:

$$U(Z_1,Z_2,H_1,H_2).^8 \qquad (2)$$

Equation (2) is maximized subject to the human capital constraint in periods 1 and 2 (H_0 is initial human capital at birth) and the following budget constraint:

$$p_1\cdot(Z_1 + C_1) + m_1\cdot S_1 + p_2\cdot(Z_2 + C_2)/(1 + r) = w_1\cdot(1 - T_1) + A_1 + (w_2 + A_2)/(1 + r) \qquad (3)$$

where p_t is the price of consumption in each period, m_1 is the price of child care services and S_1 is the amount of child care services purchased in period 1, where by definition $S_1 = 1 - T_1$. A_t is

[6] However, Currie and Bhattacharya (2000) find that nutritional deficiencies of youths in the United States are generally insensitive to income, suggesting that many children in the U.S. receive comparable levels of nutrition.
[7] This also implies no distinction between pure leisure and time investments and no choice over the number of hours to work.

other family income in each period, which could be the second parent's income and/or non-labor income.

Solving for the first order equations above, the equilibrium condition is represented by:

$$(w_1 - m_1) \cdot \delta U/\delta Z_1 = \delta H_1/\delta T_1 \cdot (\delta U/\delta H_1 + \delta U/\delta H_2 \cdot \delta H_2/\delta H_1) \quad (4)$$

[9]

This equation gives the basic economic prediction that the parent will choose to invest in the human capital of the child to equate that the marginal costs of the investments with the expected marginal benefits from the investment. The costs to the family from time investments are the foregone income from staying home (the wage less the cost of child care services) weighted by the marginal utility received from consumption. The benefits that accrue to the family are the marginal utility gained from the human capital of the child in the first period plus the marginal utility gained from the human capital of the child in the second period, which is indirectly affected by how first period human capital relates to second period human capital. These benefits are weighted by the effect of time investments on first period human capital.

The following implications come from this model. If labor market and home production skills are positively correlated, that is $w_1(Q_1)$, then it is not possible to sign how quality in home production will affect the time investment decision because quality affects the wage on the left-hand side of (4) and human capital on the right-hand side in the same direction. If, however, they are not correlated, higher labor market skills will have the unambiguous affect of decreasing time investments by increasing the wage. If initial human capital (H_0) is positively correlated with Q_1 because of better prenatal care or genetic transmission of quality or ability, it is not possible to sign the relation between earlier human capital and the amount of time investments.

C. Policy Implications

There are numerous cases in which market forces acting on their own may lead to an

[8] While it is reasonable to think that time may also enter the utility function, I omit it here for simplicity but also consider implications with it in the utility function.

[9] If we include time in the utility function, the equilibrium condition becomes:

$(w_1 - m) \cdot \delta U/\delta Z_1 = \delta H_1/\delta T_1 \cdot (\delta U/\delta H_1 + \delta U/\delta H_2 \cdot \delta H_2/\delta H_1) + \delta U/\delta T_1$.

inefficient allocation of time by parents. Parents may under-invest if they do not fully understand the effects of early investments ($\delta H_1/\delta T_1$, $\delta H_2/\delta H_1$), which is likely because the neuropsychological findings are relatively new.[10] Furthermore, since benefits include H_2 (and future H_t if the model were fully dynamic), meaning returns from the investment are reaped throughout the family and child's life, an understandable shortsightedness may prevent parents from investing optimally.

An insufficient amount of investment may also occur even if families knew the human capital process and were not myopic. Imperfect capital markets may limit the ability to invest optimally. Another market shortcoming occurs if we view children as public goods and believe their actions impose externalities on society, such as good citizenship and responsible behavior, both now and in the future.[11] Since it is difficult to attribute the specific source responsible (as many factors affect children's development), it is hard to imagine a secondary market that can capture this dynamic externality and allow it to be fully internalized.

In addition to the potential market failures, an argument for policy intervention also stems from an equity argument. If early investments have long-lasting effects and lower income families invest less because of liquidity constraints, existing inequality may be further exacerbated. Additionally, many current policies aim at increasing the labor force participation of families with young children, having the simultaneous negative effect of decreasing time investments.

To understand how policies can affect the time allocation decision, we can rearrange equation (4) and interpret it in a reservation wage (w_R) structure:

$$w_1 - m >< \{\delta H_1/\delta T_1 \cdot (\delta U/\delta H_1 + \delta U/\delta H_2 \cdot \delta H_2/\delta H_1)\} \;/\; \delta U/\delta Z_1 = w_R. \qquad (5)$$

If the wage of the parent less the cost of child care services exceeds w_R (also the shadow value of

[10] In fact, segments of the public have been extremely responsive to these neurological findings, as evident by increased purchases of products designed to provide a wide array of stimulus (U.S. News and World Report 1999) despite the fact that these stimuli may have little or no effect on development (Bruer 1999).

time), the parent will work. If, however, it is less than w_R, the parent will stay home. Thus, potential shifts in behavior would occur if we impose exogenous changes to the parameters in (5). For example, if we decrease m, the parent is more likely to work and invest less in the child because her net wage has gone up. Policies such as the Child Care Tax credit, which do just this in an effort to increase LFP, have the additional effect of reducing time investments.[12]

There are two reasonable avenues to increase time investments.[13] An exogenous increase in A_1 will increase z_1 and lower $\delta U/\delta Z_1$ (if utility is concave in Z), thereby increasing w_R and time investments. Second, although I assumed LFP was given in the second period, it may be unreasonable to think this. We may believe that time spent home in period 1 affects the probability of being employed in period 2 and thus the expected wage according to the following equation:

$$E(w_2) = w_2 \cdot [\Pr(T_2 = 0 \mid T_1 = 0) \cdot \Pr(T_1 = 0) + \Pr(T_2 = 0 \mid T_1 = 1) \cdot \Pr(T_1 = 1)] \qquad (6).$$

The reservation wage equation now becomes:

$$w_1 - m >< [\{\delta H_1/\delta T_1 \cdot (\delta U/\delta H_1 + \delta U/\delta H_2 \cdot \delta H_2/\delta H_1)\} / \delta U/\delta Z_1] + \delta E(w_2)/\delta T_1 = w_R. \ (7)$$

If $\Pr(T_2 = 0 \mid T_1 = 0) > \Pr(T_2 = 0 \mid T_1 = 1)$, that is, the probability of being employed in period 2 is greater if employed in period 1, then $\delta E(w_2)/\delta T_1 < 0$. Therefore, protection of future employment to equate the probabilities will increase time investments in two ways. First, by increasing $E(w_2)$ we reduce $\delta U/\delta Z_1$ by the same logic as above. Second, equating the above probabilities will make $\delta E(w_2)/\delta T_1 = 0$, and raise the reservation wage.

These two mechanisms to increase time investments coincide with a paid parental leave policy. Therefore, if parents are under-investing in their children relative to society's preferences or we seek to reduce inequality, offering a parental leave policy that increases other income

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[11] Which is a main reason that countries offer free public education to all children and have compulsory schooling laws.
[12] As with most policies designed to increase wages, EITC will have an ambiguous effect.
[13] While policies that increase m will also lead to increases in time investments, this is likely to be extremely unpopular and would further exacerbate inequality.

available to the family and/or protection of future employment for the parent will unambiguously increase parental time investments.[14]

4. Empirical Strategy

To determine the effects of time investments on children, we can estimate the second period human capital production function by recursively substituting in the human capital functions of the previous period, giving the following equation

$$H_2=f(C_1, T_1, C_2, T_2; Q_1, Q_2, H_0) \quad (8).$$

The main approach taken in the previous literature has been to estimate equation (8) in a least squares (LS) framework. We would obtain unbiased estimates of time using LS if we could observe and measure all of the variables in (8) that are correlated with time. However, quality and initial endowments are difficult to measure and are likely to be correlated with the time investment decision as described above. Therefore, to the extent that quality and endowment are unobserved and thus omitted from (8), LS would yield biased results.

One way to understand the direction of the bias in LS is by interpreting the quality and endowment omission as a self-selection bias. Negative selection occurs if those best at producing children are also the most potentially skilled workers. These parents, by having the greatest opportunity cost of staying home, are more likely to work if they underestimate the potential benefits of time investments, leading to a downward bias of LS estimates. However, the possibility exists that these two are not correlated as they pertain to caring for children. For example, “warmth” and “love”, two extremely desirable traits in caring for children as stressed by the attachment theory, may be completely unrelated to an individual’s productivity in the labor market. Therefore, positive selection and an upward bias of LS estimates will occur if those most able at producing children are more likely to stay with the child. The type of self-selection that occurs would determine the direction of the bias from omitting initial endowment. If negative

[14] As implied by attachment theory, a policy that improves the quality of alternative caregivers, however, will not necessarily improve the child’s outcomes because this is likely to disrupt the continuous

selection is occurring and higher ability parents pass this genetic trait onto their children, then the higher initial endowment of the child will further exacerbate the downward bias introduced by the negative selection. Therefore, it is not possible to assign an overall direction of the bias caused by the omitted variables.

To overcome these limitations, we must make an assumption about the structure of unobserved quality and endowment. If we believe that the quality of home production is constant within a family, then using a household fixed effect will control for these time invariant components of quality. The plausibility of this is reasonable if parental skill as valued by the labor market is constant over time, thereby eliminating the negative selection issue. If skills like “warmth” and “love” are largely instinctual and constant over time, this will eliminate the potential positive selection. Other environmental qualities, such as neighborhoods and schools, will be constant if, as expected, families with young children do not relocate often.

Use of a household fixed effect will also control for initial endowment to the extent that siblings share common genetic components. However, despite maternal inputs during pregnancy that may be measurable if different or constant across siblings if unobserved, environmental factors beyond the control of the mother may affect period one human capital. Children may have a unique resiliency to prenatal inputs, such as alcohol, that can affect early outcomes (Werner 1990). Furthermore, information and laws with respect to alcohol and smoking and pregnancy have evolved rapidly during the past 20 years. Therefore, to control for the variation in initial health, I include the birth weight of the child, which is regarded as the single best indicator of a child’s health, and eliminate children with serious health conditions.

Therefore, I propose to estimate the following equation

$$H_{ij2}= b_0+b_1*T_{ij1}+b_2*T_{ij2}+b_3*C_{ij1}+b_4*C_{ij2}+b_5*H_{ij0}+g_j+e_{ijt} \quad (9)$$

[15]

where T_{ijt} are the time investments from household *j* in child *i* in period t, C_{ijt} is the consumption

relationship with the parent.

[15] This corresponds with a Cobb-Douglas production function with multiplicative efficiency terms.

of child *i* in household *j* in period *t*, H_{ij0} is the initial indicator of health status, b_k is a vector of coefficients, g_j is the household fixed effect, and e_{ijt} is an i.i.d error term.

The household fixed effect assumes that the time allocation choice within a family, after controlling for other time-varying family inputs, is affected by circumstances beyond the choice of the family and do not directly affect the child's human capital. From a neuropsychological perspective, this implies that if a parent forms an attachment with one child, he or she would be able to form an attachment with another child, but factors beyond the model affect the amount of time spent each children.

The vector of coefficients b_1 is the main focus of this analysis. In order for this approach to yield unbiased estimates of b_1, we would need a large sample of siblings with ample variation in time spent with each child. The following section describes the NLSY in more detail and the plausibility of this within family variation. Additionally, we would need $E(e_{ijt} | T_{ij2}, T_{ij3}, C_{ij2}, C_{ij3}, H_{ij1}, g_j) = 0$. Section 7 describes the potential biases that may arise if this condition is not met and provides evidence on the likely importance of the bias. Furthermore, the measurement of time is crucial to obtain estimates that reflect the effect of an uninterrupted time investment and allows for a potentially discontinuous relationship with human capital. Their explicit construction is also described in the data section.

5. Data

The data used for this study is the National Longitudinal Survey of Youth (NLSY). The NLSY has conducted annual interviews of a nationally representative group of females who were between 14 and 22 years old in 1979. Beginning in 1986, children of these women were also assessed, and have been surveyed biannually since then. The NLSY contains a wide range of family background variables and measures of children's development useful for this analysis.

One major weakness of the NLSY is that we only have sufficient data on the time that mothers spent with their children. While there may be reasons to believe mothers and fathers can have different impacts on their children, we are unable to say anything about it in this study.[16] Other limitations of the NLSY are that time diaries are unavailable, information regarding health insurance is limited[17] (which could reflect consumption of medical services), and few measures of child care quality exist.[18] Despite these weaknesses, the NLSY appears to be the most useful data set for conducting such an analysis given its longitudinal nature, the wealth of information, and the large number of siblings available.

After eliminating children serious permanent health conditions,[19] children who did not reside with their mothers during their 1st 3 years, and families with only one child, we are left with a sample of 4829 children born to 1543 mothers. Table 1 displays basic descriptive statistics of children and mothers in the NLSY.

A. Time Investments

As mentioned in the previous section, the construction of time variables is crucial. To capture an uninterrupted time investment from birth until a given age loosely corresponding with critical periods, I construct dummy variables as such:

T_k = 1 if mother did not work *at all* for *y* months or more (10)

= 0 otherwise

where *y* = 0, 6, 12, 18, and 24. This would not include mothers who worked part-time during a given period. Thus, the coefficients in a regression would estimate the marginal effect of an additional uninterrupted (full-time) investment of 6 months. To construct these dummies, I use "number of weeks remained home after birth" for each child, which was an already constructed variable from the work history file.

Previous research has tended to use the average number of weeks or hours worked in a

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[16] However, it is very difficult to get information on father's time with children. For example, in Sweden, despite a liberal parental leave policy, mothers accounted for 93% of total family leave weeks (Peters 1997).

[17] Information is available for children's health insurance biannually from 1986 to 1996 and thus will not necessarily cover all relevant age ranges. Although the mother's insurance status is available in all years, using her response for her child will result in no variance across siblings.

given period, usually separately for during the first year and beyond the first year. This measurement does not specifically capture an uninterrupted investment, as part-time employed mothers are included, and implies time investments are directly substitutable within a given period. For example, a mother who stayed at home for the first 6 months and worked full-time (40 hours/week) for the next 6 months would be assigned the same average number of hours worked as a mother who worked half-time (20 hours/week) for the entire year.

As mentioned earlier, in order to get unbiased estimates of the effect of time we need significant variation in time spent with children within a family and for that variation to be random to the extent that it can not be controlled for. Table 2 provides a glimpse of this. It displays the number of mothers who spent time home in each of the above defined categories from one child to the next. For example, 74 mothers spent 0-6 months home with their first child and 6-12 months home with their second child. In the first panel, there appears to be clumping in the 0-6 month/0-6 month and 24+/24+ cells. However, there appears to be a sufficient number of observations in the off-diagonal (approximately 50%). Additionally, there does not appear to be a clear pattern from one sibling to the next, with 28% of the observations below the diagonal and 23% above it. Similar patterns also emerge in the 2nd and 3rd panels, though there are far fewer observations, as expected.

Other time investment variables of interest include the age of the child and a dummy variable equal to one if the child was ever enrolled in head start or another preschool, which would capture the amount of schooling received, and the number of other children in the household under age 3 at birth, which reflects that time and consumption must be divided between siblings.

B. Consumption, Quality, and Endowment Variables

Income is an important determinant of food sufficiency for children. I construct average

[18] In 1986 and 1988, detailed questions were asked regarding child care for the last four weeks only.
[19] This includes children who are blind, deaf, mentally retarded, or have a brain dysfunction.

household (real) income levels for each child at ages 0-3 and 3-6 from all sources other than the mother, omitting maternal income since it is likely to be endogenous to her participation decision. Averaging over the years smoothes over missing observations for income, a common problem in the NLSY. Since breast feeding is an extremely important component of consumption, I include dummy variables to signify if and how long a mother breast fed her child.

Commonly used measures of quality that also possibly reflect endowment are the mother's Armed Forces Qualifying Test (AFQT) and the education of each parent in the household. Additional quality variables include the absence of a father or presence of grandparent at birth, who can assist in caring for the child and offer emotional support for the mother. Since parental skill may vary with age, I create dummy variables to represent if the mother was age 18 or younger at the birth of her child or 25 or older at birth. Birth order effects are a common issue that arises in sibling studies. I create a dummy variable to represent if the child was a first born. For initial endowment, a dummy variable is created equal to one if the child's birth weight was less than or equal to 5.5 pounds, a widely accepted measure of low birth weight.

Table 3 displays means of the above variables by time category. The most striking finding is mothers with the highest AFQT and education are the least likely to spend much time home. If these skills are correlated with home production, this would possibly support that a negative selection is occurring. Not surprising, the largest household are the mostly likely to have a mother spending time home, reflecting increased child care costs. Staying home longer is also positively associated with the absence of a father. This could be due to easier qualification for government support. Average income during the 1st 3 years does not appear to vary with months spent home. This is surprising given the relations between AFQT and education and time, although many of the mothers spending this time home could be young and still leaving with *their* parents. The more expected pattern for income returns in years 3-6.

C. Human Capital Measures

There is a wide range of child assessments available in the NLSY that can represent human capital development of the child. These measures provide a wide range of potential effects of early time investments, but their precise relationship to eventual adult outcomes is not entirely clear. Currie and Thomas (1999) have found a strong link between early test scores and future labor market outcomes and educational attainment, but such measures are currently unavailable in the NLSY. While neuropsychological evidence suggests that cognitive skills will not be affected directly by early time investments, some of the cognitive tests described below may not be ideal measures of cognition and may also capture non-cognitive development.

One of the most widely used measure of a child's cognitive ability is the Peabody Picture Vocabulary Test (PPVT). This test is age-normed and is intended to measure the verbal intelligence of a child. It was administered to all children over age 3, with a repeat measure taken in 1992. The Peabody Individual Achievement Test Math and Reading Recognition (PIAT-M and PIAT-R, respectively) are also widely used measures of cognitive development. Both are available as age-normed scores and were administered to all children 5 years and older and each subsequent wave if eligible.

The Behavioral Problems Index (BPI) is a measure based on maternal responses designed to reflect the types of childhood behavioral problems for children. It is measured for all children age 4 and over and each subsequent wave if eligible, and offers scores that are normed by age and sex. The Self-Perception Profile for Children (SPPC) is a widely regarded measure of a child's self-esteem both in terms of scholastic competence (SPS) and global self-worth (SPW). It has been found to be highly correlated with teachers' ratings of the child's scholastic competence and self-esteem and is a potentially valuable indicator of psychological well-being (NLYS Handbook 1990). It is a self-reported exam administered to all children over age 8 and each subsequent year the child was eligible. The SPPC only provides a raw score and no national norms.

Information regarding the child's performance in school, such as whether a child has repeated a grade or has been suspended from school, reflects both cognitive and non-cognitive abilities of children, such as the child's scholastic competence as well as self-esteem and behavior. This information was obtained for children over age 10. I create separate dummy variables if the child never repeated a grade or was never suspended from school, equal to one if true and zero otherwise.

Since multiple observations are available for some of the outcomes, I construct dependent variables by averaging over the scores to account for measurement error.[20] Figure 1 displays histograms of the continuously measured outcomes for overall and within family scores, with a corresponding normal curve overlaid. The tests available with normed scores (PPVT, both PIAT, and BPI) follow closely to a normal distribution for both the overall and within family scores, with less outliers for the within family scores. The overall scores for non-normed test (SPS and SPW) appear skewed and truncated. However, the within family scores follow much more closely to a normal distribution.

One of the limitations of a sibling comparison is that outcomes available for the oldest siblings are not necessarily available for younger siblings and thus we cannot compare the impact of time investments on these outcomes. Such potential measures available in the NLSY include receipt of public assistance, high school graduation, criminal behavior, and sexual activity, which may be better representative of children's outcomes and have stronger policy implications. As the sample ages, these variables will become more readily available. [21] However, another methodology that does not rely on siblings could offer this comparison and also add an element of robustness. [22]

6. Estimation

A. Main Results

For each of the dependent variables, the following equations are estimated. The first is a

[20] The NLSY Handbook (1990) discourages averaging across SPPC scores, but does not provide a specific explanation. In light of this and other concerns, I also construct measures within certain age ranges. This is discussed in more detail in “extensions” in section 6.

[21] The NLSY only follows youths up until age 22, but useful information is available up through that age (as described earlier in Data section).

basic least squares estimate of equation (8) with controls commonly used in other studies except for AFQT and education of the mother and father. The next estimate is a full LS model with AFQT and parental education. The final estimation is the fixed effect model of equation (9), where AFQT, parental education, and other time-invariant characteristics of the family are constant. The rationale for estimating in this pattern is if AFQT and education are good measures of quality and endowment, then we would expect simple estimates without them to change considerably when they are added. Then, in the FE estimates where quality and endowment are better controlled for, if we see a further change in the same direction it would suggest that the heterogeneity of children and caregivers is not adequately captured in the full LS model. Tables 4 and 5 show the results for the estimated models for cognitive and non-cognitive outcomes, respectively.

In the basic LS model in column 1 of each panel, estimates for all time categories are often close to zero and rarely precise. It is also not uncommon to see negative results in any of the time categories. In the full model with better quality and endowment measures, there is a strong shift towards more positive estimates for nearly every time category and child outcome, though they are still imprecisely measured. This positive shift indicates that quality and/or endowment are important to control for and are negatively correlated with time investments.

Controlling for unobserved family differences via a household fixed effect changes the estimates considerably. These results are displayed in the 3rd column of each panel. For the PIAT and PPVT scores, we see the positive trend from (1) to (2) continue for 6-12 months home, but the estimates often become less positive for nearly all other time categories, reversing the trend from column (1) to (2). The lack of precise estimates for PIAT is not surprising because the PIAT are designed to measure cognitive abilities and the neuropsychological literature does not suggest an impact on cognitive development. Previous studies have found positive effects on PIAT, but

[22] I attempted various IV strategies for time spent home using changes in EITC legislation and child care credits designed to affect labor supply and county level measures to reflect demand. First stage results from

this could be due to the measurement of time in number of hours or weeks picking up the effects. However, a strong positive effect for PPVT for 6-12 months indicates that this test may not be an ideal measure of cognition and instead reflect social and emotional development.

The results for grade repetition also display positive effects for 6-12 months, and negative effects for year 2, although only 18-24 months is estimated precisely. The results for school suspension go in the opposite direction of repeating a grade, but are also measured imprecisely. The lack of significant estimates for these school measures could be due to little variation in measures within a family. Of the 1700 or so observations used for these 2 measures, less than 33% have variation in outcomes within a family.

The estimates for both self-perception scores are perhaps the strongest results. Strong positive effects exist from 6-12 months home and continue in the same direction from column (1) to (2). However, strong effects that counterbalance this are found in the 12-18 month category. The effects become less prevalent after this. The results for BPI also display a similar pattern, but are not precisely estimated.

In sum, time investments during the 6-12 month period continue to move in the same positive direction as from column (1) to (2), with precise estimates for PPVT, SPS, and SPW. This supports the notion that the full LS model does not adequately capture the unobserved dimensions of quality and endowment. In particular, we can assess the bias from omitting them in this period. Those with the better job opportunities are more likely to work despite the fact that they are the most able caregivers, supporting negative selection and a downward bias of LS estimates.

As hypothesized, we often get estimates that are not statistically different from zero for later time periods. However, a surprising result is the negative effect for time investments during 12-18 or 18-24 months, which is precisely estimated for the self-perception measures. A possible explanation for this finding is that, as the attachment literature emphasized, the role of the

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these approaches were unimpressive.

caregiver changes dramatically to a more "socializing" role after the first major critical period occurs around age 1. It is possible that being in a non-parental environment with other children to socialize with is now more ideal than remaining in a more isolated environment with a parent.

B. Extensions

Time investments may impact children differentially across families. High quality families may have a higher gain from time investments, or they may be more able to place their children in better sources of alternative care. To this extent, I run basic FE models for families where the mother's AFQT score is less than the median score and where her score is at or above median.[23] These results are displayed in columns 1 and 2 of each panel in Table 6.

Although we can not distinguish between the two effects these regressions attempt to identify, the pattern that emerges is that time investments have a larger impact on cognitive skills in high AFQT families, but in the opposite direction for self-confidence measures (although no estimates are significantly different from each other). This pattern indicates that more highly skilled parents may provide a more cognitively stimulating environment than do lower skilled parents, but not necessarily a better social and emotional environment for the child. In terms of alternative sources of care, the larger impact for children with mothers of low AFQT score indicate that their source of care may be of worse quality. However, stratifying by AFQT to control for the potential quality of alternative care does not eliminate the positive effects found in the first year.

Differential impacts may also occur by gender. Biological differences in how boys and girls develop may exist[24], parents may treat siblings of opposite sex differently based on social norms and expectations, or the test measures may include a gender bias. To get a sense of these effects, I run separate regressions by gender, shown in columns 3 and 4 of Table 6. The results

[23] Since little variation was present in the school outcomes in the full sample and this will become more of an issue in a stratified sample, I do not perform these regressions for them.
[24] For example, brain growth spurts begin at approximately X months for girls and Y months for boys (Schore 1994)

indicate that cognitive skills are more likely to be affected for boys while non-cognitive skills are more likely to be affected for girls. While it is not possible to isolate the cause for this pattern, it does suggest that gender differences are prevalent and important to control for.

An additional concern arises with respect to the creation of dependent variables. The age at which an outcome is measured is important in early childhood studies because ‘sleeper effects’ or ‘fade-out’ are often possible. Since multiple measurements are available for some of the outcomes, I construct separate measures within the dependent variable for children when they are less than or equal to 10 and greater than 10.[25] The results from this approach are shown in columns 5 and 6 of Table 6.

The results for PPVT, PIAT Math and SPW are nearly identical across age ranges for time investments during 6-12 months. For PIAT Reading and BPI, the effects diminish with age for this period although not significantly. For SPS, the estimate for 6-12 months increases considerably with age. The negative effects during 12-18 months become more prominent across most scores. These findings imply that ‘fade-out’ does not appear prevalent and long-term effects persist.

The final extension considered is to include part-time investors in the time measurement. I adjust the time dummy variables to include mothers who averaged no more than 20 hours of work per week by using information from the NLSY work history files. The last column of each panel in Table 7 shows the results for the basic FE estimates. For nearly every dependent variable in nearly every period, estimates are attenuated towards zero. While these results are not significantly different, they suggest that the inclusion of part-time mothers lessens positive effects, supporting the full-time investment hypothesis. The decrease in negative effects in year 2 would support that a socializing atmosphere may offer a better environment for the child.

In sum, these extensions support the main results and further lend credence to the

[25] Since information for grade repetition and suspension is only available for children over age 10, I do not create age specific scores

neuropsychological findings. Investment effects from the first year do not appear to fade-out, full-time investment effects from the first year are larger than part-time ones, and no or negative effects persist after year one.

7. Discussion

A. Potential Biases

The fixed effects methodology employed clearly shows the importance of controlling for unobserved heterogeneity of families. In order for the FE estimates to be unbiased, however, we need the error term in (9) to be uncorrelated with time investments. The possibility exists that there are time-varying unobserved factors specific to each child within a family that are correlated with the time investment decision of a parent.

The first potential source of bias could come from changes in parental quality from one child to the next. On one hand, parents may be more enthusiastic with earlier born children, but on the other hand they may improve their parenting skills as they have more children. Previous studies have found support of the former, if any (Kessler 1991, Hauser and Sewell 1986). If this is the case, then we would expect an upward bias if parents spend more time with first born children. However, as shown in equation (5), as child care expenses go up, which would occur as the number of preschool age children in the household increases, time investments should increase. Therefore we would expect a downward bias of FE estimates that do not control for changing quality within a family.[26]

An additional bias would occur if, despite controlling for the birth weight of the child and eliminating those with serious health conditions, early human capital of the siblings differ and parents make their investment decision based on this. There are two possible strategies they can adopt that might bias results. A parent may choose to spend more time with a child with early developmental or health problems in the hopes of equalizing outcomes across siblings. Since

[26] Although I already include a control for first borns, this may not capture all of the birth order effects.

these problems are likely to affect the eventual human capital of the child,[27] this will lead to a downward bias of FE estimates. On the other hand, parents may choose to invest more in the child that displays the greatest potential return, effectively maximizing the sum of their children's human capital and inducing an upward bias of FE estimates.[28] Previous studies have indicated that parents tend to exhibit compensatory behavior towards their children when the children are older (Behrman et al, 1982). If this is true for early time investments also, then a downward bias is more likely.

To get a clearer sense of the presence of these potential biases, I regress the number of months after birth the mother remained away from work on the other regressors in equation (9) that are predetermined at birth. First, I include potential indicators of early development that come from maternal responses to a series of questions on "How my infant usually acts." Since these responses are only available for children less than 1 at the time of interview, responses to these questions are limited. Therefore, I estimate an LS model for the entire sample where these responses are available. The second regression is a fixed effects specification without the early indicators. Table 7 includes a description of these responses and regression results for both models.

The LS results, displayed in the first column, show that mothers spend more time with low birth weight children and less time with first born children. Additionally, the absence of the child's father, presence of a grandparent, and presence of other young children increase the amount of time spent with the child. More highly educated and older mothers spend less time with children, while the presence of a more highly educated spouse is correlated with more maternal time with children. For the early infant scores, mothers spend more time only with infants who display "fearfulness."

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[27] Currie and Hyson (1999) find that differences from initial health shocks, such as low birth weight, persist into adulthood and socio-economic status does little to alleviate this.

[28] A third option would be if parents invest equal amounts in their children. This, however, would not lead to a bias in estimation.

The second column shows fixed effect results for the same equations without the early infant ratings. The same basic patterns emerges for first borns, age of mother at birth (which can now be interpreted as the spacing of births between children), and presence of a grandfather. The absence of a father, the number of children under 3, and low birth weight are now insignificant, which could be due to the lack of variation in these variables across siblings.

Both of these results indicate that mothers are spending less time with the first born child, which supports a downward bias for birth order effects as hypothesized. Mothers are also spending less time with further spaced children, indicating quality that affects time investments is more likely to be constant across siblings. Furthermore, mothers are spending more time with children who display slower developmental abilities or are of low birthweight. Although there are no direct links between early displays of "fearfulness" and human capital development and it may be premature to label this compensatory behavior, it clearly does not support an investment strategy. There does not appear to be a trend by the gender of the child, which alleviates the concern that time investments affect girls and boys differently. Overall, these estimates tend to confirm that the biases introduced by doing a sibling comparison lead to a downward bias, supporting the notion that the fixed effect estimates can be interpreted as lower bounds of the true effect of time investments on human capital.

An additional source of bias could occur if parents compensate towards children that they spend less time with by improving the quality of the time they do spend together. This will unambiguously lead to a downward bias of FE estimates, further supporting the lower bound argument.

B. Implications for Policy Intervention

The effects of time investments and role for policy intervention is important if we believe that parents under-invest in their children. The theory section described ways in which parents may not be investing optimally. Additionally, many current policies may further exacerbate under-investment by endorsing labor force participation of families with young children, such as recent expansions in Earned Income Tax and Child Care credits and reductions in AFDC benefits. Also highlighted in section 3, I showed how extending and funding parental leave is one way to encourage parental time investments.

The results presented here have implications for the debate over parental leave. Benefits exist from uninterrupted investments of up to one year, which is well beyond the currently allowed leave of 12 weeks. However, we need a more thorough analysis of the total cost and benefits associated with parental leave to fully justify the details of potential changes.[29]

7. Conclusion

This paper set out with 3 main objectives: to improve methodological approaches in measuring the effects of time investments, to consider neuropsychological theory in measuring time investments, and to measure its long-term impact on cognitive and non-cognitive outcomes.

The fixed effects estimates offer considerable improvement over previous least squares methodology. Previous approaches do not adequately control for labor market selection of the mother and/or initial endowments of the child. It appears as though mothers who are more able in the work place are more able in children's human capital production. This group could be more likely to be informed when caring for their child, both during and after pregnancy, or they could have a higher potential genetic endowment to pass onto their children. These mothers, however, are spending less time with their children and negative selection appears dominant, implying least squares estimates are downward biased. While the household fixed effect estimator has its limitations, I argue that it offers a lower bound of the true effects of time investments.

The results are fairly consistent with neuropsychological evidence on the development of the brain and the role of attachment. Positive effects are found for mothers investing up to one year of uninterrupted time, which corresponds with a major developmental milestone for an infant: the maturation of the orbitofrontal cortex. Full-time investments tend to display stronger

[29] See Ronsen and Sundstrom (1996), Waldfogel (1998), and Ruhm (1999) for relevant studies on other costs and benefits associated with parental leave.

effects during the first year than when they include part-time investments, supporting the need for an uninterrupted investment as called for by attachment theory. Negative effects are found at some point from time investments in the second year, which may or may not be consistent with attachment theory. Since the caregiver's role changes to more of a socializing one in the second year, one possible explanation is that the socializing environment in a child care setting may offer certain advantages over remaining in a more isolated environment with a parent.

Stronger effects exist for self-confidence measures, and little or no effects exist for cognitive measures. This, too, is consistent with early brain development, which suggests an impact only for non-cognitive outcomes. The importance of improved self-confidence cannot be understated. Self-esteem is widely considered to be one of the most, if not the single most, important characteristic of an individual. Furthermore, there could be additional ways in which children are affected, but other potential outcomes are either unavailable in the NLSY or are difficult to measure in general. However, since consistent effects and patterns are found over a wide range of outcomes, it does represent that parental time investments during the first year has a significant and lasting positive impact on the child's non-cognitive development and there is a potential lifetime (and beyond) for these returns to accrue.

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Histogram Frequencies - No need to print!!!

bpis

Bin	Frequency
68	13
69	0
70	0
72	9
73	5
74	1
75	25
76	12
77	21
79	14
80	13
81	12
82	32
83	42
85	29
86	48
87	49
88	69
89	42
90	68
92	76
93	53
94	114
95	140
96	117
98	110
99	164
100	126
101	171
102	143
103	165
105	157
106	159
107	121
108	203
109	132
111	148
112	133
113	131
114	136
115	113
116	96
118	87
119	70
120	75
121	66
122	65
123	58
125	74
126	43
127	43
128	23
129	29
131	33
132	17
133	27
134	23
135	16
136	19
138	12
139	8
140	15
141	7
142	1
144	2
More	1

bpisw

Bin	Frequency
-36	1
-35	0
-34	0
-33	0
-32	0
-31	0
-30	1
-29	0
-28	0
-27	0
-26	0
-25	1
-24	0
-23	2
-22	3
-21	1
-20	3
-19	7
-18	6
-17	8
-16	13
-15	26
-14	23
-13	23
-12	35
-11	48
-10	57
-9	77
-8	73
-7	109
-6	125
-5	157
-4	181
-3	208
-2	264
-1	259
0	273
0	245
1	273
2	270
3	264
4	220
5	165
6	149
7	129
8	116
9	81
10	77
11	53
12	60
13	30
14	23
15	24
16	13
17	16
18	8
19	3
20	7
21	4
22	2
23	4
24	1
25	0
26	2
27	1
More	2

spw

Bin	Frequency
100	4
103	0
107	0
110	0
113	4
116	1
120	0
123	10
126	0
129	3
133	11
136	6
139	2
142	22
146	7
149	12
152	33
155	9
159	17
162	38
165	27
168	16
172	56
175	21
178	30
181	69
185	25
188	62
191	72
194	35
198	73
201	117
204	51
207	61
211	177
214	71
217	72
220	149
224	59
227	82
230	121
233	28
237	57
More	178

spww

Bin	Frequency
-82	1
-78	0
-75	0
-71	0
-68	2
-64	0
-61	2
-57	3
-53	3
-50	10
-46	10
-43	12
-39	15
-36	15
-32	31
-29	29
-25	33
-22	44
-18	68
-15	86
-11	89
-8	129
-4	166
-1	141
3	175
7	157
10	172
14	95
17	87
21	78
24	53
28	66
31	25
35	21
38	20
42	14
45	8
49	10
52	7
56	4
59	3
63	2
66	1
More	1

sps

Bin	Frequency
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68	0
73	1
77	2
81	9
85	6
89	0
93	19
98	4
102	26
106	9
110	43
114	9
119	17
123	52
127	40
131	59
135	41
140	33
144	94
148	46
152	96
156	51
160	134
165	45
169	59
173	94
177	75
181	109
186	49
190	29
194	120
198	52
202	70
207	46
211	107
215	16
219	28
223	55
227	34
232	35
236	15
More	55

spsw

Bin	Frequency
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-84	2
-80	1
-76	1
-72	1
-68	3
-64	1
-60	8
-56	10
-52	10
-48	15
-44	16
-40	24
-36	40
-32	49
-28	64
-24	60
-20	66
-16	96
-12	102
-8	116
-4	119
0	108
4	158
8	117
12	118
16	102
20	80
24	104
28	45
32	55
36	65
40	24
44	33
48	21
51	22
55	8
59	9
63	8
67	1
71	3
75	0
79	1
More	1

ptrr

Bin	Frequency
65	9
66	0
67	0
68	2
69	5
71	10
72	5
73	5
74	10
75	30
76	8
77	18
78	11
79	30
81	37
82	20
83	34
84	48
85	69
86	46
87	43
88	65
89	70
91	82
92	79
93	78
94	92
95	168
96	97
97	92
98	166
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101	120
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119	35
121	68
122	50
123	37
124	30
125	42
126	24
127	19
128	21
129	12
131	12
132	13
133	4
134	3
More	36

ptrrw

Bin	Frequency
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-27	0
-26	0
-25	3
-24	1
-23	4
-22	4
-21	4
-20	6
-19	10
-18	8
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-16	13
-15	22
-14	20
-13	36
-12	29
-11	52
-10	61
-9	66
-8	93
-7	103
-6	151
-5	151
-4	177
-4	154
-3	209
-2	229
-1	233
0	243
1	231
2	204
3	201
4	206
5	167
6	171
7	137
8	97
9	95
10	86
11	70
12	55
13	38
14	26
15	30
16	18
17	16
18	13
19	8
20	7
20	7
21	4
22	6
23	4
24	1
25	2
26	0
27	0
28	2
29	0
30	0
31	1
32	0
More	1

ptm

Bin	Frequency
65	11
66	0
67	3
68	1
69	14
71	6
72	10
73	7
74	10
75	25
76	11
77	32
78	30
79	27
81	43
82	52
83	48
84	55
85	79
86	72
87	75
88	82
89	89
91	172
92	105
93	103
94	150
95	180
96	146
97	121
98	192
99	129
101	124
102	171
103	145
104	148
105	198
106	93
107	123
108	103
109	118
111	96
112	94
113	75
114	60
115	59
116	54
117	45
118	36
119	32
121	35
122	25
123	20
124	11
125	13
126	8
127	7
128	9
129	5
131	1
132	7
133	0
134	1
More	11

ptmw

Bin	Frequency
-25	1
-24	2
-23	0
-22	6
-21	1
-20	2
-20	4
-19	8
-18	7
-17	11
-16	12
-15	14
-14	20
-13	24
-12	37
-11	45
-10	49
-9	54
-9	64
-8	71
-7	111
-6	139
-5	154
-4	182
-3	195
-2	201
-1	206
0	263
1	262
1	242
2	206
3	189
4	207
5	190
6	150
7	156
8	108
9	74
10	65
11	54
11	51
12	46
13	33
14	25
15	20
16	8
17	9
18	6
19	5
20	4
21	4
21	2
22	2
23	3
24	0
25	2
26	0
27	0
28	0
29	0
30	0
31	0
More	1

ppvt

Bin	Frequency
0	9
2	0
5	0
7	0
9	0
12	1
14	0
16	1
19	0
21	6
23	2
25	2
28	4
30	7
32	12
35	7
37	7
39	10
42	13
44	11
46	12
49	19
51	24
53	27
56	41
58	38
60	59
62	51
65	79
67	104
69	111
72	119
74	178
76	150
79	157
81	193
83	217
86	221
88	195
90	261
93	249
95	210
97	264
99	232
102	192
104	253
106	175
109	137
111	138
113	78
116	91
118	40
120	54
123	31
125	24
127	17
130	17
132	9
134	9
136	5
139	4
141	3
143	0
146	0
148	0
150	0
153	0
More	1

ppvtm

Bin	Frequency
-54	1
-53	0
-51	1
-50	0
-48	0
-46	0
-45	1
-43	1
-42	0
-40	3
-38	5
-37	1
-35	1
-34	4
-32	4
-30	2
-29	3
-27	8
-26	3
-24	12
-22	17
-21	16
-19	23
-18	29
-16	35
-14	51
-13	79
-11	102
-10	138
-8	175
-6	221
-5	265
-3	325
-2	354
0	386
2	386
3	344
5	342
6	262
8	230
10	200
11	143
13	129
14	83
16	48
18	40
19	27
21	20
22	11
24	9
26	11
27	5
29	5
30	4
32	3
34	1
35	1
37	0
38	2
40	5
42	1
43	0
45	0
46	1
48	0
50	0
51	0
More	2

Figure 1. Histograms of Child Outcomes

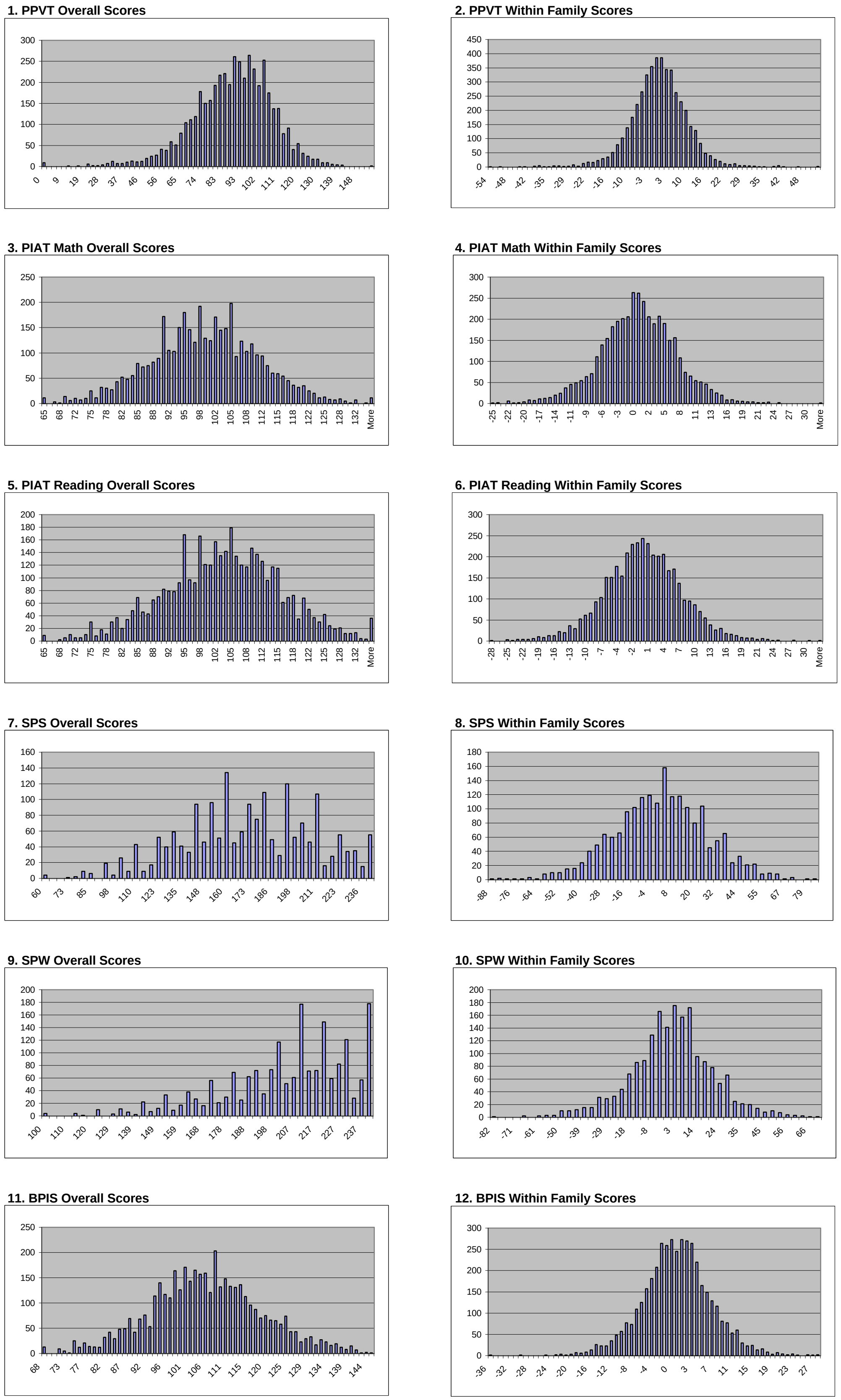

Table 7. Responses to "How my infant ususally acts" and Time Regression Results

Variable	***Obs***	***Mean***	***Std. Dev.***
activity	2199	8,671	3,261
predictibility	2195	12,633	2,410
fearfuness	2360	7,880	3,513
positive affect	2403	12,288	2,990
friendliness	2422	15,663	2,616

Months home after birth of child		
	LS	FE
male	0.252	-0.018
	(0.31)	(0.03)
birthweight <= 5.5 lbs.	2.870	0.243
	(1.63)	(0.17)
first born	-2.836	-2.584
	(2.95)***	(2.35)**
mother >= 25 at	0.270	0.189
birth	(0.16)	(0.15)
father absent at	6.505	0.677
birth	(3.02)***	(0.53)
grandparent present	-1.739	-1.772
at birth	(1.01)	(1.47)
age of mother	-1.079	-1.240
at birth	(8.85)***	(5.52)***
number of sibling <=3	3.299	-0.491
when born	(3.06)***	(0.60)
activity	-0.133	-
	(1.02)	-
predictability	0.044	-
	(0.23)	-
fearfulness	0.260	-
	(1.95)*	-
positive affect	-0.118	-
	(0.76)	-
friendliness	-0.116	-
	(0.60)	-
black	-2.248	-
	(1.96)*	-
hispanic	-0.133	-
	(0.11)	-
AFQT	-0.010	-
	(3.29)***	-
education of mother	-0.695	-
at birth	(3.09)***	-
education of father	0.361	-
at birth	(2.41)**	-
Observations	1884	4829
Number of groups	-	2055
R-squared	0.14	0.78

Note: Absolute value of t-statistics in parentheses
Regressions include a constant

Table 6. Extended Regressions Results

Panel 1: PPVT

	AFQT < median	AFQT >= median	males	females	age<=10	age>10	Including part-time
6-12 mos. home	0.271	2.214	2.858	0.605	1.499	1.465	0.674
	(1.164)	(1.008)**	(1.330)**	(1.527)	(0.857)*	(1.197)	(0.736)
12-18 mos. home	-0.746	-1.017	-2.744	-0.210	-0.926	-1.517	-0.126
	(1.519)	(1.301)	(1.890)	(1.893)	(1.118)	(1.648)	(0.966)
18-24 mos. home	0.972	0.693	2.926	0.830	1.132	1.842	-0.187
	(1.664)	(1.664)	(2.316)	(2.064)	(1.298)	(2.006)	(1.011)
24+ mos. home	-0.732	-1.346	-0.754	-1.608	-1.742	-1.335	-0.227
	(1.396)	(1.616)	(2.186)	(1.860)	(1.196)	(1.794)	(0.881)
Sample size	2263	2318	1325	1455	4523	1652	4581
Number of groups	912	993	599	663	1889	731	1905

Panel 2: PIAT - Math

	AFQT < median	AFQT >= median	males	females	age<=10	age>10	Including part-time
6-12 mos. home	0.467	0.658	1.647	0.720	0.501	0.217	0.056
	(0.969)	(0.860)	(1.143)	(1.190)	(0.678)	(1.041)	(0.659)
12-18 mos. home	-1.650	1.170	-0.225	-0.476	0.314	-0.421	1.078
	(1.212)	(1.187)	(1.594)	(1.614)	(0.879)	(1.384)	(0.795)
18-24 mos. home	1.248	-1.792	-1.881	-0.478	-0.198	1.170	-1.589
	(1.255)	(1.500)	(2.010)	(1.692)	(0.989)	(1.619)	(0.807)**
24+ mos. home	-0.119	1.986	2.041	-0.268	0.303	-0.955	1.244
	(1.034)	(1.405)	(1.720)	(1.452)	(0.884)	(1.398)	(0.711)*
Sample size	1979	2028	1167	1263	3946	1690	4007
Number of groups	808	873	529	581	1660	748	1681

Panel 3: PIAT - Reading

	AFQT < median	AFQT >= median	males	females	age<=10	age>10	Including part-time
6-12 mos. home	-0.117	1.096	1.341	0.880	0.314	0.073	0.818
	(1.042)	(0.835)	(1.175)	(1.298)	(0.665)	(1.152)	(0.673)
12-18 mos. home	0.281	1.160	-1.109	0.549	0.892	-0.187	0.148
	(1.314)	(1.110)	(1.491)	(1.765)	(0.870)	(1.547)	(0.824)
18-24 mos. home	-0.965	-2.067	-1.780	-0.068	-1.159	1.082	-1.096
	(1.333)	(1.319)	(1.956)	(1.706)	(0.950)	(1.732)	(0.814)
24+ mos. home	0.198	1.096	2.254	-2.336	0.403	-1.065	0.280
	(1.139)	(1.278)	(1.865)	(1.486)	(0.877)	(1.386)	(0.733)
Sample size	1976	2024	1167	1261	3933	1684	4000
Number of groups	806	871	529	580	1653	745	1677

Panel 4: SPS

	AFQT < median	AFQT >= median	males	females	age<=10	age>10	Including part-time
6-12 mos. home	7.721	4.606	-1.976	12.297	2.288	9.693	2.435
	(5.640)	(4.722)	(6.716)	(7.337)*	(4.447)	(4.686)**	(3.619)
12-18 mos. home	1.475	-15.431	-22.081	-7.708	-5.367	-19.358	-4.215
	(7.892)	(6.093)**	(8.785)**	(9.266)	(5.895)	(6.268)***	(4.594)
18-24 mos. home	-6.350	11.790	33.672	2.856	4.921	12.908	0.344
	(8.325)	(7.286)	(11.216)***	(9.379)	(7.090)	(7.079)*	(4.716)
24+ mos. home	-1.520	0.702	-14.471	-4.022	3.241	-0.963	1.062
	(6.741)	(6.671)	(10.218)	(8.014)	(6.042)	(6.033)	(3.886)
Sample size	941	947	546	547	1641	1102	1888
Number of groups	405	432	253	261	732	499	837

Panel 5: SPW

	AFQT < median	AFQT >= median	males	females	age<=10	age>10	Including part-time
6-12 mos. home	12.270	8.159	1.820	20.112	4.868	4.692	4.112
	(4.370)***	(3.657)**	(5.112)	(5.169)***	(3.652)	(3.420)	(2.921)
12-18 mos. home	-8.900	-7.623	-13.471	-21.822	-6.129	-9.823	-4.526
	(6.503)	(4.282)*	(7.007)*	(5.880)***	(4.736)	(4.323)**	(3.587)
18-24 mos. home	3.027	-1.423	8.474	7.435	8.853	-0.344	1.086
	(6.506)	(5.922)	(7.632)	(6.174)	(5.346)*	(5.207)	(3.756)
24+ mos. home	-9.885	7.038	-3.855	-0.928	-7.347	5.061	-2.223
	(5.072)*	(5.767)	(6.703)	(6.110)	(4.820)	(5.163)	(3.295)
Sample size	941	947	546	547	1641	1102	1888
Number of groups	405	432	253	261	732	499	837

Panel 6: BPIS

	AFQT < median	AFQT >= median	males	females	age<=10	age>10	Including part-time
6-12 mos. home	0.029	1.102	-0.384	0.857	1.043	-0.294	0.295
	(0.866)	(0.873)	(0.958)	(1.329)	(0.662)	(1.262)	(0.594)
12-18 mos. home	-1.411	-0.642	0.836	0.383	-1.341	0.055	-0.902
	(1.183)	(1.122)	(1.486)	(1.594)	(0.899)	(1.579)	(0.764)
18-24 mos. home	0.342	0.475	-1.948	-0.908	0.702	-1.185	0.583
	(1.206)	(1.246)	(1.568)	(1.678)	(0.972)	(1.966)	(0.768)
24+ mos. home	0.972	-0.386	0.827	2.130	0.255	1.268	0.465
	(0.945)	(1.137)	(1.217)	(1.380)	(0.797)	(1.709)	(0.630)
Sample size	2096	2130	1329	1232	4185	1410	4226
Number of groups	852	913	599	568	1751	636	1765

Note: Robust standard errors in parentheses. All specifications are FE as in columns (3) in tables 4 and 5
*significant at 10%; ** significant at 5% level; *** significant at 1% level

Table 5. Regressions Results for Noncognitive Outcomes

	Panel 1: SPS			Panel 2: SPW			Panel 3: BPIS			Panel 4: Never suspended		
	LS	LS	FE	LS	LS	FE	LS	LS	FE	LS	LS	FE
6-12 mos. home	2.581	3.632	5.861	4.038	4.443	9.463	0.749	0.443	0.573	-0.020	-0.021	-0.027
	(2.661)	(2.609)	(3.601)	(2.014)**	(2.010)**	(2.797)***	(0.647)	(0.645)	(0.614)	(0.030)	(0.030)	(0.037)
12-18 mos. home	-4.452	-4.468	-8.373	-2.119	-2.002	-8.009	-1.089	-1.434	-0.951	0.026	0.026	0.062
	(3.967)	(3.904)	(4.835)*	(2.903)	(2.883)	(3.627)**	(0.906)	(0.899)	(0.813)	(0.043)	(0.043)	(0.051)
18-24 mos. home	2.949	3.781	4.508	-0.892	-0.678	1.569	0.373	0.334	0.345	0.038	0.038	0.035
	(4.882)	(4.813)	(5.461)	(3.435)	(3.431)	(4.275)	(1.033)	(1.027)	(0.867)	(0.049)	(0.049)	(0.065)
24+ mos. home	-1.343	-0.137	-0.198	-1.287	-1.047	-2.635	-0.078	-0.255	0.334	-0.020	-0.018	-0.030
	(3.925)	(3.887)	(4.718)	(2.708)	(2.720)	(3.812)	(0.843)	(0.841)	(0.724)	(0.038)	(0.038)	(0.055)
average non-maternal	0.000	-0.000	-0.000	0.000	0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	-0.000
income 0-3	(0.000)	(0.000)	(0.000)	(0.000)*	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
average non-maternal	0.000	0.000	0.000	0.000	0.000	0.000	-0.000	-0.000	0.000	0.000	0.000	-0.000
income 3-6	(0.000)	(0.000)	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)	(0.000)	(0.000)	(0.000)***	(0.000)***	(0.000)
male	-1.649	-1.910	-2.944	2.477	2.470	3.162	-0.526	-0.497	0.349	-0.124	-0.124	-0.104
	(1.659)	(1.640)	(2.017)	(1.265)*	(1.258)**	(1.621)*	(0.403)	(0.400)	(0.349)	(0.017)***	(0.017)***	(0.021)***
age of child	-0.708	-0.832	-1.287	0.208	0.154	0.169	0.317	0.316	0.857	-0.048	-0.048	-0.063
	(0.508)	(0.511)	(0.692)*	(0.392)	(0.391)	(0.513)	(0.088)***	(0.088)***	(0.093)***	(0.008)***	(0.008)***	(0.010)***
birthweight <= 5.5 lbs.	-2.782	-3.287	1.395	0.111	-0.219	-2.994	0.774	0.719	-0.396	-0.011	-0.010	-0.034
	(3.063)	(3.025)	(4.293)	(2.228)	(2.230)	(3.410)	(0.732)	(0.728)	(0.825)	(0.035)	(0.035)	(0.045)
child breastfed 0-24	2.971	1.269	1.795	1.239	0.487	1.601	-0.215	0.369	-0.638	-0.013	-0.013	0.048
weeks	(2.036)	(2.022)	(3.682)	(1.554)	(1.560)	(2.730)	(0.468)	(0.469)	(0.550)	(0.020)	(0.020)	(0.040)
child breastfed >= 24	5.867	3.037	-2.256	0.978	-0.429	-1.203	-1.681	-0.545	-0.473	0.006	0.007	0.034
weeks	(2.725)**	(2.728)	(5.383)	(2.090)	(2.115)	(4.259)	(0.634)***	(0.644)	(0.817)	(0.027)	(0.028)	(0.051)
attend head start or	0.127	-1.133	0.387	1.911	1.293	1.314	0.403	0.694	0.858	-0.016	-0.015	-0.053
preschool	(1.669)	(1.664)	(2.901)	(1.339)	(1.339)	(2.224)	(0.406)	(0.405)*	(0.430)**	(0.018)	(0.018)	(0.030)*
number of sibling <=3	-2.184	-1.804	-5.182	-3.126	-2.966	-5.224	0.034	0.204	0.530	-0.045	-0.046	-0.017
when born	(1.974)	(1.987)	(2.524)**	(1.491)**	(1.484)**	(1.872)***	(0.444)	(0.440)	(0.423)	(0.021)**	(0.021)**	(0.026)
first born	7.224	6.435	2.081	0.852	0.615	-3.486	-0.998	-0.446	-0.264	0.009	0.008	0.016
	(2.502)***	(2.512)**	(2.947)	(1.918)	(1.911)	(2.175)	(0.558)*	(0.559)	(0.518)	(0.026)	(0.027)	(0.028)
mother <= 18 at	-3.332	-1.215	-	-6.679	-5.671	-	0.671	-0.177	-	-0.066	-0.068	-
birth	(2.465)	(2.550)	-	(1.867)***	(1.915)***	-	(0.678)	(0.696)	-	(0.031)**	(0.032)**	-
mother >= 25 at	7.063	5.445	-	2.252	1.713	-	-3.452	-2.548	-	-0.025	-0.024	-
birth	(2.666)***	(2.680)**	-	(2.087)	(2.089)	-	(0.547)***	(0.553)***	-	(0.024)	(0.024)	-
father absent at	-0.349	6.318	-	-0.293	4.922	-	2.924	-0.600	-	-0.143	-0.113	-
birth	(2.274)	(4.264)	-	(1.826)	(3.364)	-	(0.513)***	(0.934)	-	(0.026)***	(0.049)**	-
grandparent present	-0.214	0.118	-	2.262	2.464	-	-0.715	-0.703	-	0.042	0.042	-
at birth	(2.314)	(2.277)	-	(1.809)	(1.806)	-	(0.570)	(0.568)	-	(0.028)	(0.028)	-
black	2.520	6.094	-	-1.712	-0.703	-	0.247	-0.531	-	-0.140	-0.139	-
	(2.331)	(2.431)**	-	(1.866)	(1.956)	-	(0.542)	(0.588)	-	(0.026)***	(0.027)***	-
hispanic	-10.635	-4.507	-	-4.675	-2.101	-	-0.255	-1.785	-	-0.009	-0.013	-
	(2.212)***	(2.386)*	-	(1.733)***	(1.858)	-	(0.516)	(0.554)***	-	(0.021)	(0.023)	-
AFQT	-	0.033	-	-	0.010	-	-	-0.005	-	-	-0.000	-
	-	(0.005)***	-	-	(0.004)**	-	-	(0.001)***	-	-	(0.000)	-
education of mother	-	0.096	-	-	0.031	-	-	-0.243	-	-	-0.001	-
at birth	-	(0.470)	-	-	(0.337)	-	-	(0.106)**	-	-	(0.005)	-
education of father	-	0.585	-	-	0.563	-	-	-0.312	-	-	0.002	-
at birth	-	(0.346)*	-	-	(0.268)**	-	-	(0.073)***	-	-	(0.004)	-
Sample size	1888			1888			4226			1781		
Number of groups	-	-	837	-	-	837	-	-	1765	-	-	790
R-squared	0.05	0.07	0.55	0.03	0.04	0.53	0.06	0.07	0.76	0.14	0.14	0.61
Adj R-squared	0,04	0,06	0,18	0,02	0,03	0,15	0,05	0,07	0,58	0,13	0,12	0,29

Note: Robust standard errors in parentheses. OLS regressions include controls for missing values of family characterisitcs. All regressions include constant
*significant at 10%; ** significant at 5% level; *** significant at 1% level

Table 4. Regression Results for Cognitive Outcomes

	Panel 1: PPVT			Panel 2: PIAT - Math			Panel 3: PIAT - Reading			Panel 3: Never repeated grade		
	LS	LS	FE	LS	LS	FE	LS	LS	FE	LS	LS	FE
6-12 mos. home	-0.592	0.768	1.233	-0.970	-0.139	0.549	-0.770	0.188	0.523	-0.033	-0.016	0.045
	(0.753)	(0.703)	(0.766)	(0.568)*	(0.535)	(0.643)	(0.590)	(0.561)	(0.657)	(0.034)	(0.033)	(0.044)
12-18 mos. home	-0.966	-0.325	-0.793	-0.053	0.351	0.063	0.503	0.903	0.916	0.034	0.034	-0.022
	(1.021)	(0.961)	(1.009)	(0.774)	(0.727)	(0.843)	(0.805)	(0.769)	(0.855)	(0.046)	(0.045)	(0.055)
18-24 mos. home	0.669	0.902	0.866	-0.599	-0.421	-0.234	-1.419	-1.182	-1.571	-0.130	-0.116	-0.136
	(1.200)	(1.138)	(1.176)	(0.910)	(0.853)	(0.956)	(0.971)	(0.907)	(0.934)*	(0.056)**	(0.055)**	(0.068)**
24+ mos. home	-2.398	-1.347	-1.066	-0.439	0.185	0.489	-0.850	-0.146	0.438	0.016	0.031	0.026
	(1.021)**	(0.963)	(1.057)	(0.760)	(0.714)	(0.837)	(0.825)	(0.763)	(0.851)	(0.048)	(0.047)	(0.058)
average non-maternal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
income 0-3	(0.000)**	(0.000)***	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)***	(0.000)	(0.000)
average non-maternal	0.000	0.000	-0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
income 3-6	(0.000)**	(0.000)**	(0.000)	(0.000)**	(0.000)***	(0.000)*	(0.000)	(0.000)*	(0.000)	(0.000)***	(0.000)**	(0.000)
male	0.144	0.039	-0.165	0.284	0.183	0.331	-2.861	-2.972	-2.652	-0.110	-0.114	-0.086
	(0.459)	(0.433)	(0.435)	(0.336)	(0.317)	(0.358)	(0.372)***	(0.350)***	(0.378)***	(0.021)***	(0.020)***	(0.022)***
age of child	0.695	0.626	0.674	0.197	0.108	0.094	-0.103	-0.202	-0.237	-0.034	-0.033	-0.035
	(0.093)***	(0.090)***	(0.127)***	(0.080)**	(0.077)	(0.111)	(0.090)	(0.086)**	(0.125)*	(0.006)***	(0.006)***	(0.009)***
birthweight <= 5.5 lbs.	-1.108	-0.794	0.528	-1.585	-1.477	-0.585	-2.280	-2.154	-0.763	-0.072	-0.072	-0.044
	(0.925)	(0.873)	(1.002)	(0.628)**	(0.599)**	(0.829)	(0.721)***	(0.681)***	(0.869)	(0.041)*	(0.040)*	(0.051)
child breastfed 0-24	3.246	1.081	-1.051	1.435	0.089	-0.743	1.311	-0.185	-1.000	-0.011	-0.033	-0.027
weeks	(0.547)***	(0.526)**	(0.806)	(0.403)***	(0.377)	(0.626)	(0.440)***	(0.417)	(0.714)	(0.025)	(0.024)	(0.043)
child breastfed >= 24	6.536	2.686	-1.655	3.182	0.658	-1.181	3.415	0.648	-0.650	0.059	0.021	0.063
weeks	(0.733)***	(0.691)***	(1.066)	(0.557)***	(0.527)	(0.849)	(0.598)***	(0.563)	(1.005)	(0.030)*	(0.030)	(0.066)
attend head start or	1.157	0.348	0.872	0.836	0.185	0.190	0.966	0.244	0.249	-0.015	-0.033	0.015
preschool	(0.490)**	(0.462)	(0.576)	(0.351)**	(0.334)	(0.501)	(0.390)**	(0.368)	(0.526)	(0.021)	(0.021)	(0.034)
number of sibling <=3	-1.086	-1.398	-0.429	0.301	0.096	0.115	0.111	-0.080	0.164	-0.040	-0.038	-0.038
when born	(0.546)**	(0.508)***	(0.570)	(0.386)	(0.360)	(0.452)	(0.433)	(0.408)	(0.490)	(0.024)*	(0.023)	(0.031)
first born	4.814	3.180	2.199	2.332	1.436	0.285	4.480	3.514	2.327	0.042	0.022	-0.017
	(0.644)***	(0.620)***	(0.668)***	(0.471)***	(0.453)***	(0.540)	(0.531)***	(0.513)***	(0.610)***	(0.033)	(0.032)	(0.043)
mother <= 18 at	-1.505	0.760	-	-2.231	-0.975	-	-2.154	-0.793	-	-0.111	-0.076	-
birth	(0.875)*	(0.833)	-	(0.572)***	(0.568)*	-	(0.668)***	(0.660)	-	(0.035)***	(0.035)**	-
mother >= 25 at	2.749	0.134	-	2.301	0.639	-	2.511	0.743	-	-0.003	-0.024	-
birth	(0.586)***	(0.564)	-	(0.443)***	(0.431)	-	(0.481)***	(0.467)	-	(0.028)	(0.029)	-
father absent at	-3.731	2.908	-	-1.485	3.658	-	-1.970	3.148	-	-0.089	-0.078	-
birth	(0.621)***	(1.139)**	-	(0.448)***	(0.816)***	-	(0.496)***	(0.905)***	-	(0.030)***	(0.059)	-
grandparent present	-1.899	-1.706	-	-1.230	-1.061	-	-1.688	-1.477	-	0.012	0.015	-
at birth	(0.710)***	(0.669)**	-	(0.475)***	(0.451)**	-	(0.551)***	(0.518)***	-	(0.032)	(0.031)	-
black	-14.130	-9.747	-	-5.722	-2.417	-	-2.338	1.416	-	-0.052	-0.007	-
	(0.618)***	(0.658)***	-	(0.473)***	(0.501)***	-	(0.521)***	(0.536)***	-	(0.029)*	(0.030)	-
hispanic	-14.542	-8.993	-	-5.756	-1.870	-	-3.722	0.593	-	-0.076	0.001	-
	(0.692)***	(0.689)***	-	(0.439)***	(0.454)***	-	(0.489)***	(0.489)	-	(0.028)***	(0.029)	-
AFQT	-	0.026	-	-	0.019	-	-	0.021	-	-	0.000	-
	-	(0.002)***	-	-	(0.001)***	-	-	(0.001)***	-	-	(0.000)***	-
education of mother	-	0.516	-	-	0.121	-	-	0.133	-	-	0.011	-
at birth	-	(0.137)***	-	-	(0.093)	-	-	(0.102)	-	-	(0.006)*	-
education of father	-	0.374	-	-	0.349	-	-	0.320	-	-	-0.001	-
at birth	-	(0.088)***	-	-	(0.065)***	-	-	(0.071)***	-	-	(0.005)	-
Sample size	4581			4007			4000			1662		
Number of groups	-	-	1905	-	-	1681	-	-	1677	-	-	745
R-squared	0.30	0.39	0.78	0.17	0.26	0.67	0.14	0.24	0.68	0.14	0.17	0.64
Adj R-squared	0,30	0,38	0,62	0,16	0,26	0,43	0,13	0,23	0,45	0,13	0,15	0,35

Note: Robust standard errors in parentheses. OLS regressions include controls for missing values of family characterisitcs. All regressions include constant

*significant at 10%; ** significant at 5% level; *** significant at 1% level

Table 3. Summary Statistics by Time Category

Variable	0-6 mos	6-12 mos	12-18 mos	18-24 mos	24+ mos
black	0,26	0,32	0,30	0,33	0,33
	(0,44)	(0,47)	(0,46)	(0,47)	(0,47)
hispanic	0,21	0,19	0,21	0,24	0,24
	(0,41)	(0,39)	(0,41)	(0,43)	(0,43)
male	0,51	0,51	0,53	0,54	0,52
	(0,50)	(0,50)	(0,50)	(0,50)	(0,50)
age of child	10,86	11,81	10,57	11,06	12,46
	(3,80)	(3,90)	(4,35)	(3,76)	(3,36)
number of children in household	2,91	3,00	3,25	3,36	3,41
	(1,00)	(1,04)	(1,29)	(1,38)	(1,34)
child ever attended head start or preschool	0,59	0,55	0,53	0,56	0,54
	(0,49)	(0,50)	(0,50)	(0,50)	(0,50)
number of sibling under age 3 when born	0,34	0,39	0,40	0,52	0,48
	(0,51)	(0,54)	(0,57)	(0,59)	(0,59)
average family income other than mother age 0-3	1912,37	1659,66	2461,09	1882,35	1844,25
	(1530,03)	(1212,09)	(14102,02)	(2178,62)	(8299,01)
average family income other than mother age 3-6	2108,35	1986,52	1291,93	1441,35	1415,56
	(13706,91)	(12943,31)	(1629,64)	(1428,22)	(1399,47)
child not breastfed	0,53	0,55	0,53	0,60	0,62
	(0,50)	(0,50)	(0,50)	(0,49)	(0,49)
child breastfed 0-24 weeks	0,34	0,29	0,28	0,24	0,27
	(0,47)	(0,46)	(0,45)	(0,43)	(0,44)
child breastfed 24 or more weeks	0,13	0,16	0,19	0,16	0,12
	(0,34)	(0,36)	(0,39)	(0,37)	(0,32)
education of mother at birth	12,43	11,76	11,54	11,25	10,81
	(2,31)	(2,10)	(2,62)	(2,73)	(2,66)
education of father at birth	10,42	9,80	9,36	9,13	8,46
	(5,36)	(5,29)	(5,77)	(5,89)	(5,82)
AFQT	665,97	599,23	588,68	569,81	516,86
	(202,93)	(195,14)	(207,01)	(221,16)	(220,52)
father absent from household at birth	0,23	0,29	0,33	0,36	0,41
	(0,42)	(0,46)	(0,47)	(0,48)	(0,49)
grandparent present in household at birth	0,15	0,18	0,16	0,15	0,21
	(0,36)	(0,38)	(0,37)	(0,36)	(0,40)
first born	0,38	0,38	0,33	0,29	0,33
	(0,49)	(0,49)	(0,47)	(0,45)	(0,47)
birth order	1,90	1,93	2,22	2,26	2,15
	(0,90)	(0,97)	(1,22)	(1,14)	(1,13)
age of mother at birth	24,42	23,03	24,30	23,89	22,68
	(3,88)	(3,82)	(4,53)	(3,91)	(3,68)
mother <= 18 at birth	0,06	0,11	0,10	0,09	0,13
	(0,23)	(0,32)	(0,30)	(0,28)	(0,34)
mother >= 25 at birth	0,50	0,33	0,49	0,44	0,30
	(0,50)	(0,47)	(0,50)	(0,50)	(0,46)
birthweight <= 5.5 lbs.	0,06	0,07	0,08	0,09	0,10
	(0,24)	(0,26)	(0,28)	(0,28)	(0,30)
Number of Observations	2081	547	465	332	1404

Note: Standard errors in parenthesis

Table 2. Number of Mothers in Each Time Category by Sibling

Panel 1

1st sib (rows) by 2nd sibling (columns)

time spent home	0-6 mos	6-12 mos	12-18 mos	18-24 mos	24+ mos	Total
0-6 mos	509	74	44	23	80	730
6-12 mos	95	33	23	9	36	196
12-18 mos	60	19	13	14	31	137
18-24 mos	40	15	15	4	18	92
24+ mos	46	45	44	45	198	378
Total	750	186	139	95	363	1533

Panel 2

2nd sib (rows) by 3rd sibling (columns)

time spent home	0-6 mos	6-12 mos	12-18 mos	18-24 mos	24+ mos	Total
0-6 mos	174	23	29	20	35	281
6-12 mos	38	14	4	5	21	82
12-18 mos	18	11	7	3	7	46
18-24 mos	19	6	10	2	8	45
24+ mos	31	22	26	37	102	218
Total	280	76	76	67	173	672

Panel 3

3rd sib (rows) by 4th sibling (columns)

time spent home	0-6 mos	6-12 mos	12-18 mos	18-24 mos	24+ mos	Total
0-6 mos	43	13	4	3	10	73
6-12 mos	9	3	1	2	1	16
12-18 mos	4	3	1	2	4	14
18-24 mos	8	2	7	3	0	20
24+ mos	12	8	15	10	52	97
Total	76	29	28	20	67	220

Table 1. Summary Statistics

Variable	Obs	Mean	Std. Dev.
Background Variables			
black	4829	0,293	0,455
hispanic	4829	0,218	0,413
male	4829	0,514	0,500
age of mother	4829	35,131	2,213
age of child	4829	11,419	3,814
number of children in household	4829	3,128	1,188
Time Variables			
weeks after birth mother remained home	4829	91,374	128,341
percent of weeks worked during year 1	4829	0,601	0,387
percent of weeks worked during years 2 & 3	4829	0,938	0,176
average hours worked per week year 1	2598	24,523	13,469
average hours worked per week beyond years 2 & 3	3354	26,847	13,148
mother stayed home at least 6-12 months	4829	0,569	0,495
mother stayed home at least 12-18 months	4829	0,456	0,498
mother stayed home at least 18-24 months	4829	0,359	0,480
mother stayed home at least 24 months	4829	0,291	0,454
child ever attended head start or preschool	4829	0,563	0,496
number of sibling under age 3 when born	4829	0,403	0,553
Consumption Variables			
average family income other than mother age 0-3	4829	1914,711	6376,868
average family income other than mother age 3-6	4829	1768,654	10048,530
child not breastfed	4829	0,561	0,496
child breastfed 0-24 weeks	4829	0,301	0,459
child breastfed 24 or more weeks	4829	0,138	0,345
Quality and Endowment Variables			
education of mother at birth	4829	11,718	2,551
education of father at birth	4203	9,643	5,611
education of father missing at birth	4829	0,130	0,336
AFQT	4619	601,521	218,075
AFQT missing	4829	0,043	0,204
father absent from household at birth	4829	0,306	0,461
grandparent present in household at birth	4829	0,170	0,376
first born	4829	0,353	0,478
birth order	4829	2,027	1,038
age of mother at birth	4829	23,712	3,961
mother <= 18 at birth	4829	0,091	0,288
mother >= 25 at birth	4829	0,417	0,493
birthweight <= 5.5 lbs.	4829	0,077	0,267
Dependent Variables			
PPVT	4581	88,154	18,599
PIAT - Mathematics	4007	98,890	11,528
PIAT - Reading Recognition	4000	102,773	12,524
Behavioral Problems Index - Same Sex (BPIS)	1781	0,812	0,390
Self-Perception - Scholastic Competence (SPS)	1888	169,781	36,371
Self-Perception - Global Worth (SPW)	1888	203,344	27,630
Never Suspended from School (SUSP)	4226	105,469	13,114
Never Repeated a Grade (RPT)	1662	0,726	0,446