Disparities in Early Learning and Development:
Lessons from the Early Childhood Longitudinal Study – Birth Cohort (ECLS-B)

**Tamara Halle, Nicole Forry, Elizabeth Hair, Kate Perper,
Laura Wandner, Julia Wessel, and Jessica Vick**

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Thomas Schultz
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OVERVIEW

Education and business leaders as well as the public at large have grown increasingly concerned about the achievement disparities that children from at-risk backgrounds manifest at a young age.[1-3] Research has noted that children from low-income families, black and Hispanic children, children from Spanish-speaking homes, and children of mothers with low levels of education on average perform worse on indicators of academic achievement than their more advantaged peers.[1-6] However, much of the research and policy attention has focused on the preschool years (ages 3-5) leading immediately into the transition to kindergarten,[4, 5, 7] or on later elementary school and high school.[8] Research that has explored disparities based on sociodemographic risk factors[i] at earlier ages has indicated that disparities in cognitive development are evident at 24 months of age [9-11], with a few studies documenting developmental disparities based on sociodemographic risk within the first year of life.[6, 12-14] Very little research, however, has used nationally representative data to explore whether disparities are found within the first year of life, and whether disparities are evident across a wider range of developmental outcomes.[ii] Early childhood initiatives that take into account the entire preschool period of 0 to 5 years need a better understanding of the disparities which may be emerging at the very youngest ages in order to address these gaps with effective, targeted interventions for children ages 0 to 3 or the full age range from birth to school entry.

This brief adds to the body of knowledge by using data from a nationally-representative sample of infants born in the year 2001 to examine multiple sociodemographic characteristics that may be associated with developmental disparities at 9 and 24 months of age. We examine developmental outcomes in three domains: cognitive development, general health, and social-emotional development. First, we examine possible disparities in each of these developmental domains associated with family income, comparing infants/toddlers from families at or below 200 percent of the federal poverty threshold to those whose families are above this threshold.[iii] We next assess the prevalence of developmental disparities by race/ethnicity, home language, and mother's educational attainment. Although low socioeconomic status (SES) has been found to account for most of the variance in cognitive scores in previous research,[3] low SES is highly correlated with other demographic characteristics, such as racial/ethnic minority status.[15] Furthermore, previous research has shown the presence of multiple risk factors has significant effects on children's developmental outcomes.[16] In order to further explore the influence of low income and other sociodemographic factors, we examine the overlap in these characteristics

[i] Typical sociodemographic risk factors include low family income, low parental education, single parenthood, and teen parenthood.

[ii] As a notable example of analyses of children's abilities in the age span of 0-3 using national data, see Snyder, T. D. (2008). *Child care quality and early academic skill acquisition among preschoolers*. Paper presented at the Head Start National Research Conference, June 23-25, 2008, Washington, DC.

[iii] The choice to use 200% of the federal poverty level (FPL) as the threshold for "low-income" is justified as families up to 200% FPL tend to experience economic hardships and are eligible for several forms of public assistance (for example, Medicaid and state-supported children's health insurance, SCHIP). This threshold has been used in other work on low-income families (e.g., Chau, M., & Douglas-Hall, A. (2008). *Low Income Children in the United States. National and State Trend Data, 1997-2007.* Available online at: http://www.nccp.org/publications/pdf/text_851.pdf)

within a nationally-representative sample, and determine the effects of cumulative risk for cognitive, health, and social-emotional outcomes.

Four research questions are addressed in this brief:

1. Are there disparities by family income for cognitive development, general health, and social-emotional development emerging as early as 9 months of age for infants? In addition, are there disparities by family income at 24 months of age? If disparities exist, what is the magnitude of the developmental gap?
2. Are there disparities for cognitive development, general health, and social-emotional development at 9 and 24 months based on other demographic characteristics (i.e., race/ethnicity, home language, and maternal education)? If disparities exist, what is the magnitude of the developmental gap?
3. What proportion of infants and toddlers have multiple risk factors, taking into consideration low family income, racial/ethnic minority status, non-English home language, and low maternal education? [iv]
4. What are the disparities for cognitive development, general health, and social-emotional development at 9 and 24 months when children have only low family income as a risk factor versus multiple risk factors (e.g., low income combined with racial/ethnic minority status, non-English home language, and/or low maternal education)? If disparities exist, what is the magnitude of the developmental gap?

To answer the first two research questions as well as the fourth research question, we calculated effect sizes and odds ratios[v] to determine the magnitude of the developmental gap between the most advantaged group of children (i.e., the reference group) and less advantaged groups of children within each demographic category. For example, children in families above 200 percent poverty are the reference group for analyses of disparities by family income, and children whose mother's have a Bachelor's degree or higher are the reference group for analyses of disparities by maternal education. The accepted guidelines for interpreting effect sizes are that effect sizes of .20 or less are considered "small," effects sizes around .50 are considered "medium," and effect sizes of .80 or more are considered "large."[17] However, even small effect sizes can have policy implications. For example, an effect size of .25 or more is considered to be an "educationally meaningful" difference in behavioral science research.[17, 18]

[iv] As mentioned earlier, previous research has found significant effects of cumulative risk on developmental outcomes for young children. In addition to low income, we consider racial/ethnic minority status, non-English home language, and low levels of maternal education as sociodemographic factors that co-occur within individuals and that may collectively affect outcomes across developmental domains in our analyses. While having a native language other than English is not a risk factor in and of itself, this sociodemographic characteristic is of interest given the growth in the population of children of immigrants in recent years. Furthermore, previous research has identified all four demographic characteristics as factors associated with lower achievement compared to peers who do not share these characteristics. Indeed, findings from our first two research questions indicate moderate to large developmental disparities associated with each of these demographic characteristics individually.

[v] We used standardized mean difference (Cohen's *d*) to examine the relation between categorical independent variables and continuous outcome measures, and odds ratios to examine the relationship between categorical independent variables and dichotomous dependent variables.

To answer the third research question, we performed descriptive analyses of the data at 9 and 24 months of age.

The purpose of this brief is to provide a national portrait of children's developmental status at 9 and 24 months of age, looking at a specific cohort to examine possible disparities across a set of childhood social indicators. A social indicator is a measure of a behavior, condition, or status that can be tracked over time, across people, and/or across geographic units.[19] Indicators of well-being can inform society about social conditions and influence current policy discussions.[20] However, one cannot infer causal relationships among the factors presented in an indicators report. That is, one cannot make causal statements about associations found between demographic characteristics of interest and measures of child well-being, nor can one make inferences about underlying causes of the relationship. In the case of this specific report, the report cannot explain the reasons for any identified disparities by each of the demographic characteristics considered. Nevertheless, social indicators can play an important role in aspects of governance, including needs assessment and planning, goal-setting, and accountability.[21]

ABOUT THE DATA SOURCE USED IN THIS BRIEF

The data used for this brief were obtained from the Early Childhood Longitudinal Study – Birth Cohort (ECLS-B), gathered by the National Center for Education Statistics within the U.S. Department of Education. The ECLS-B is a nationally representative longitudinal study of approximately 11,000 children born in 2001. Data for this brief were collected at the 9- and 24-month data wave. Analyses of the 9-month sample were limited to children aged 8-11 months and analyses of the 24-month sample were limited to children aged 22-25 months.[vi]

In order to produce national estimates, person-level weights constructed for the ECLS-B were used for the analyses. The weights account for the probability of sampling the child in a given household, and adjust for the probability of sampling the child from among all eligible children in a given domain.[vii]

Analyses were used to compare characteristics of infants/ toddlers in the sample on indicators of cognitive mastery, general health, and social emotional development. Findings discussed in the brief are statistically significant at the .05 level unless otherwise noted. Additionally, figures contain the following indicators of statistical significance: * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

The developmental measures used in this research brief are described in the Technical Appendix to this report.

[vi] The nine month wave of data for the ECLS-B data was collected when infants were between 6 and 22 months. The sample for this brief was limited to children aged 8-11 months (83% of the full sample) in order to minimize the effect of maturation on children's developmental achievements. Likewise, the twenty-four month data was collected from toddlers when they were between 21 and 39 months. The sample for this brief was limited to children aged 22-25 months (90% of the full sample).

[vii] Additional technical information on the analyses in this brief is available in the Technical Appendix or from the authors.

SAMPLE DEMOGRAPHICS

This research brief is based on a nationally-representative sample of infants born in the United States during the year 2001. As shown in Table 1, approximately half of the sample was at or under 200 percent of the poverty threshold at each time point (51% of 9-month-olds and 46% of 24-month-olds). At 9 months, the majority of infants in the sample are non-Hispanic white (54%); the remaining children are non-Hispanic black (13%), Hispanic (25%), Asian (3%), and American Indian/Alaskan Native (0.5%) and Other (4%). The distribution is similar at 24 months.[viii] The majority of infants in the sample lived in households in which English was the primary language (81%), 14 percent spoke Spanish, and 5 percent spoke another language as their primary home language.[ix] The sample varied with regard to the amount of education their mothers had attained at each time point. For example, at 9 months, 21 percent of infants had mothers with less than a high school degree, 31 percent had mothers with a high school degree, 23 percent had mothers with some college, and 26 percent had mothers with a Bachelor's degree or more. Similar patterns were found for maternal education when children were 24 months of age (see Table 1). About half of infants and toddlers were in parental care (51% of 9-month-olds and 52% of 24-month-olds), though a substantial proportion were in home-based nonparental care (42% of 9-month-olds and 33% of 24-month-olds). Among those in nonparental care, infants were in home-based or center-based care for an average of 30 hours per week and toddlers were in care for an average of 32 hours per week. Disparities by child care arrangements and hours in care are not examined in this brief.

DISPARITIES BY INCOME EMERGE AS EARLY AS 9 MONTHS OF AGE AND GAPS WIDEN BY 24 MONTHS OF AGE

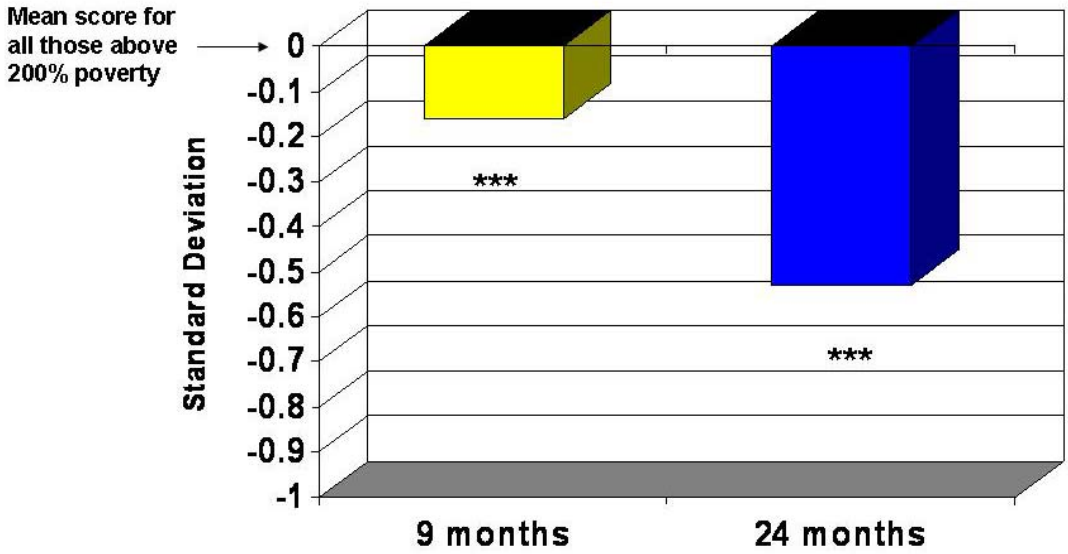
Income Disparities in Cognitive Development at 9 and 24 Months of Age

Income disparities in cognitive outcomes emerge at 9 months and represent small to moderate effects. In many cases, the disparities are more distinct at 24 months, with effect sizes at 24 months tending to be moderate.

Infants and toddlers from lower-income families[x] score lower on cognitive assessments than infants and toddlers from higher-income families. Infants from lower-income families score almost one-fifth of a standard deviation below the mean of their higher-income peers (d = -.16) on the Bayley composite measure of cognitive skills at 9 months of age (see Figure 1). In contrast, the difference between higher- and lower-income toddlers on the Bayley is more than one-half of a standard deviation at 24 months of age, representing a moderate effect size (see Figure 1).

[viii] The majority of toddlers in the 24-month sample are non-Hispanics white (55%); the remaining children are non-Hispanic black (13%), Hispanic (24%), Asian (3%), American Indian/Alaskan Native (0.5%) and Other (4%).
[ix] Information home language was only collected at the nine-month data point.
[x] Lower-income families are those at or below 200 percent poverty. Higher-income families are those over 200 percent poverty.

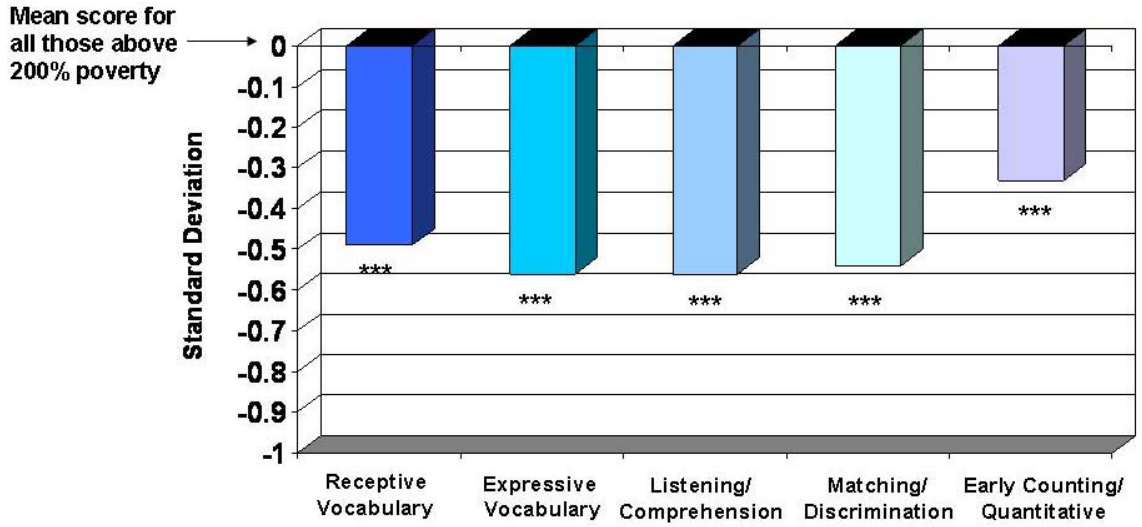
Figure 1: Disparities on the Bayley Cognitive Assessment between Higher- and Lower-income Infants at 9 and 24 Months



Another way of examining the data from the Bayley measure is to look at mastery on specific cognitive and language skills. Developmental disparities by income exist for each of the age-appropriate individual cognitive mastery items assessed at nine months (explores objects, explores purposefully, jabbers expressively, early problem solving, and names objects), with effect sizes that range from one-tenth of a standard deviation to about one-fifth of a standard deviation below the mean of higher-income infants, representing a small effect size (See Table 2).

Disparities by income are more pronounced on the age-appropriate individual cognitive mastery items assessed at 24 months (receptive vocabulary, expressive vocabulary, listening/comprehension, matching/discrimination, early counting/quantitative), with moderate effect sizes ranging from one-third (d = -.33) to over one-half (d = -.56) of a standard deviation below the mean of toddlers in households above 200 percent poverty (see Table 3, Figure 2).

Figure 2: Disparities in Mastery of Language and Cognitive Skills between Higher- and Lower-Income Toddlers at 24 Months



Income Disparities in Health at 9 and 24 Months of Age

Despite the fact that the majority of infants are reported to be in excellent or very good health at 9 and 24 months (89 percent and 88 percent, respectively), disparities in general health status are evident at both time points by family income. A gap between higher- and lower-income children of 5 percentage points at 9 months and 8 percentage points at 24 months is detected. Differences between subgroups are reported below as the odds of being rated in excellent or very good health.[xi]

Infants in lower-income families are less likely than infants in higher-income families to be in excellent or very good health at both 9 and 24 months. The odds of being rated in excellent or very good health by parents are 43 percent less for lower-income versus higher-income infants at 9 months, and 55 percent less for lower-income versus higher-income toddlers at 24 months (see Table 4). Despite these differences in likelihood, the absolute differences in ratings are small; for example, 92 percent of toddlers from higher-income families are in excellent or very good health, compared to 84 percent of toddlers from lower-income families (See Table 5).

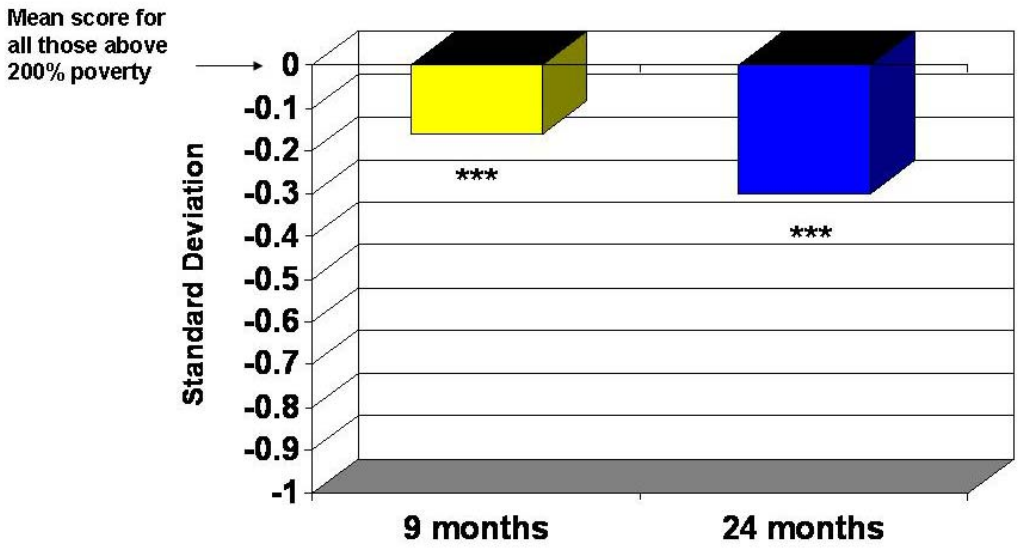
[xi] The health variable was analyzed as a dichotomous variable; thus odds ratios are used for the interpretation of results.

Income Disparities in Social-Emotional Development at 9 and 24 Months of Age

The majority of infants are rated by observers as consistently displaying positive behaviors.[xii] Nevertheless, disparities in behavior ratings are still evident at 9 and 24 months of age by family income. Although the absolute magnitude of these differences is not large, these differences represent small to moderate effect sizes.

Infants from lower-income families have lower positive behavior ratings at 9 and 24 months than infants from higher-income families. There is a small difference by income, close to one-fifth of a standard deviation (*d* = -.16), on positive behavior scores at nine months. However, by 24 months, the disparities are greater, represented by a moderate effect of income on positive behavior scores – about three-tenths of a standard deviation between higher- and lower-income toddlers (*d* = -.30; see Figure 3).

Figure 3: Disparities on the Positive Behavior Index Scores between Higher- and Lower-Income Infants at 9 and 24 Months



Toddlers from lower-income families are also less likely to have a secure attachment to their primary caregiver compared to toddlers from higher-income families. In addition to their scores on the positive behavior index, the odds of having a secure attachment are 44 percent less for toddlers from lower-income families compared to toddlers from higher-income families. Fifty-four percent of low-income toddlers have a secure attachment, compared to 68 percent of higher income toddlers (see Table 5).

[xii] See the Technical Appendix to this report for a description of the positive behavior index measure.

DISPARITIES BY RACE/ETHNICITY, HOME LANGUAGE, AND MATERNAL EDUCATION ALSO EMERGE AS EARLY AS 9 MONTHS OF AGE AND GROW LARGER BY 24 MONTHS OF AGE

Similar patterns of disparity are found when looking at differences by race/ethnicity, home language, and mother's education. In general, when compared to the more advantaged reference group (e.g., white, non-Hispanic children; children with English as their home language; and children whose mothers had a Bachelor's degree or more), the less advantaged groups score lower on cognitive measures, are rated less often by parents to be in excellent or very good health, and have lower positive behavior scores. The effect sizes tend to be small at 9 months, but moderate to large at 24 months.

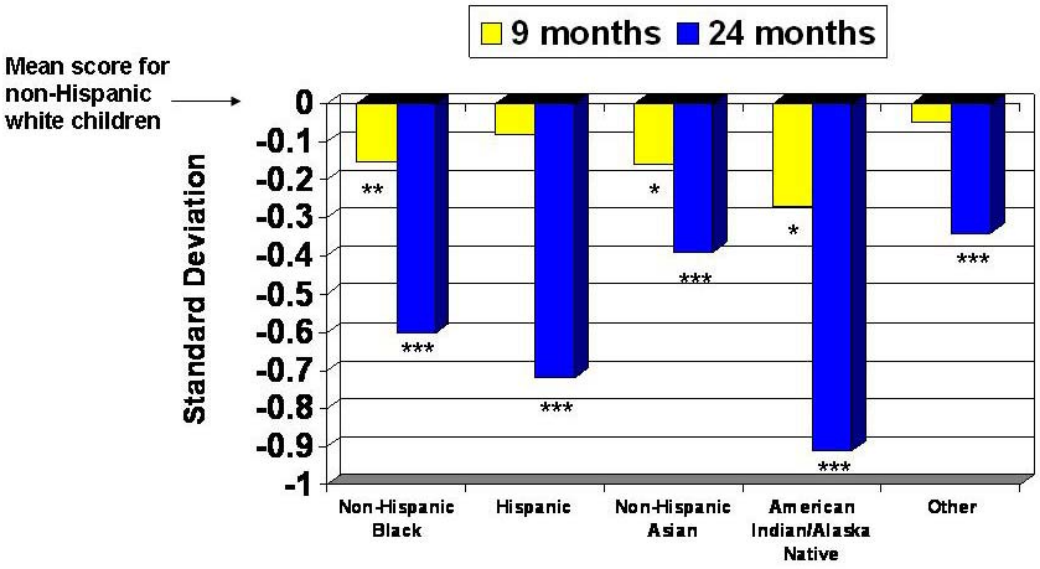
Disparities in Cognitive Development at 9 and 24 Months of Age by Race/Ethnicity, Home Language, and Mother's Education

Disparities are evident in cognitive development as measured by the composite Bayley score at 9 and 24 months by race/ethnicity, home language, and mother's education. As was seen earlier with disparities based on family income, the effects at 9 months are small, but the effects at 24 months are moderate to large.

Though the effects are small to moderate among 9-month-olds, white infants score higher on measures of cognitive development than non-Hispanic black, Asian, and American Indian/Alaskan Native infants at 9 months. Specifically, at 9 months of age, black, Asian, and American Indian/Alaskan Native infants have scores between one-tenth and one-quarter of a standard deviation below the mean of their white peers, representing small effect sizes (d = -.15 to -.27; see Figure 4).

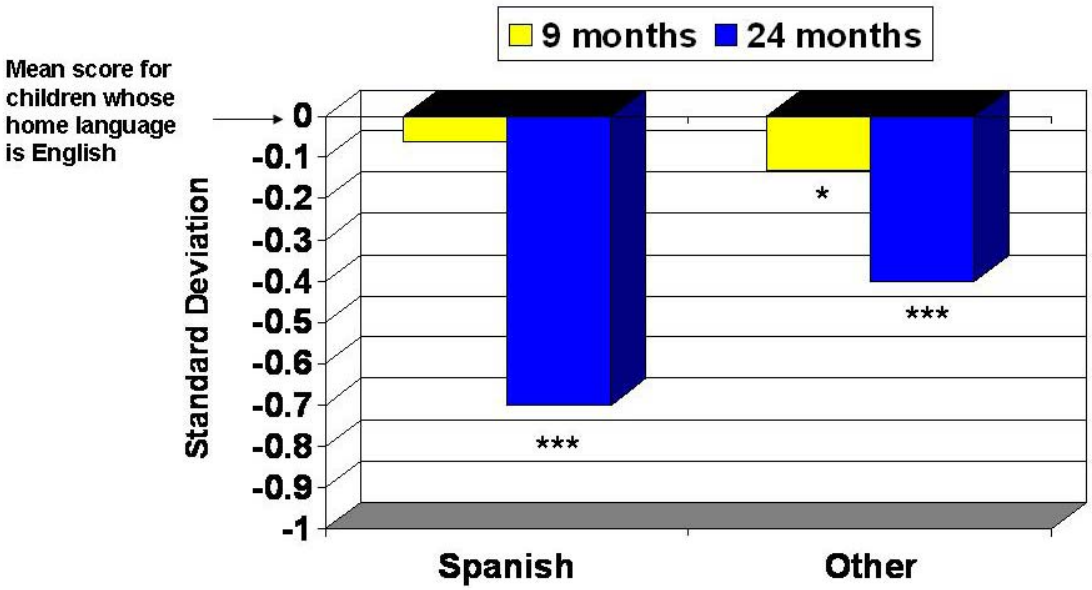
Disparities by race/ethnicity are more pronounced among 24 month olds, with toddlers from racial/ethnic minority backgrounds scoring lower than their white peers on the cognitive assessment. Large effect sizes are seen in all comparisons of the scores for the measures of cognitive development between white and non-white toddlers: American Indian and Alaskan Natives are almost one full standard deviation lower than whites (d = -.91), Hispanics are about three-quarters of a standard deviation lower than whites (d = -.72), blacks are almost two-thirds of a standard deviation lower than whites (d = -.60) and Asians are two-fifths of a standard deviation lower than whites (d = -.40).

Figure 4: Disparities on the Bayley Cognitive Assessment at 9 and 24 Months by Race/Ethnicity



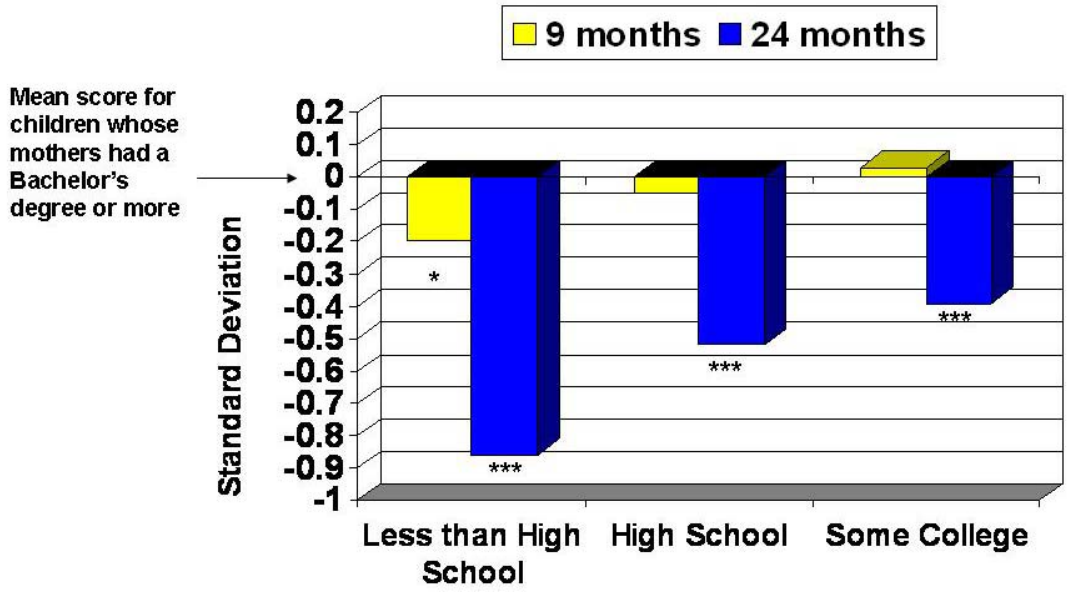
Language minority children are behind their English-speaking peers on cognitive outcomes, with small effects at 9 months and moderate to large effects at 24 months. Although the effect size is small and not a statistically significant disparity, infants whose home language is Spanish score lower on the composite measure of cognitive development at 9 months than infants whose home language is English (d = -.06). However, by 24 months, Spanish-speaking toddlers score seven-tenths of a standard deviation lower (d = -.70) on the Bayley cognitive assessment than their English-speaking peers. Likewise, infants whose home language is neither English nor Spanish (i.e., those whose home language is coded as "Other") score lower on the composite measure of cognitive development at 9 months than infants whose home language is English. This statistically significant disparity has a small effect size (d = -.13). However, by 24 months, the gap between English-speaking toddlers and those speaking a home language other than Spanish or English is two-fifths of a standard deviation (d = -.40). These 24-month estimates represent moderate to large effects of home language on cognitive outcomes (see Figure 5).

Figure 5. Disparities on the Bayley Cognitive Assessment by Home Language at 9 and 24 Months



Infants and toddlers whose mothers have less than a high school degree score lower on the cognitive assessment than infants and toddlers whose mothers have a Bachelor's degree or higher. A comparison of average cognitive scores for infants whose mothers have less than a high school degree and those whose mothers have a Bachelor's degree or more differ by one-fifth of a standard deviation (*d* = -.20), representing a small effect size (see Figure 6). Infants whose mothers have at least a high school degree do not differ significantly from those whose mothers have a Bachelor's degree or higher. Among toddlers, cognitive development improves as their mothers' education status rises. Toddlers whose mothers have less than a college degree demonstrate poorer cognitive outcomes than those whose mothers have a Bachelor's degree or higher. The largest achievement gap exists between toddlers whose mothers have less than a high school education and those whose mothers have a Bachelor's degree or higher (*d* = -.82) (see Figure 6).

Figure 6. Disparities on the Bayley Cognitive Assessment at 9 and 24 Months, by Mother's Education



Disparities in Health at 9 and 24 Months of Age by Race/Ethnicity, Home Language, and Mother's Education

Disparities in health outcomes are found by race/ethnicity, home language and mother's education at both time points. For example, compared to white infants at 9 months of age, the odds of being in excellent or very good health are 25 percent less likely for blacks, 47 percent less likely for Hispanics, and 40 percent less likely for Asians.[xiii] At 24 months of age, the odds of being rated in excellent or very good health are 44 percent less likely for blacks, 61 percent less likely for Hispanics, and 48 percent less likely for Asians, compared to their white peers. Children whose home language is Spanish are less likely than children who spoke English at home to be rated in excellent or very good health at both 9 and 24 months of age (the odds are 55 percent less likely at 9 months and 60 percent less likely at 24 months). Finally, the odds of being rated in excellent or very good health are significantly less for children whose mothers had a high school degree or less compared to children whose mothers had a Bachelor's degree or more. Odds range from 47 percent to 60 percent less likely at 9 months of age, and 42 percent to 69 percent less likely at 24 months of age. (See Tables 4 and 5 for proportions of children in each group rated in excellent or very good health.)

[xiii] Note that American Indian/Alaskan Native children are less likely to be in excellent or very good health as compared to white children; however, the difference is not statistically significant due to large standard errors.

Disparities in Social-Emotional Development at 9 and 24 Months of Age by Race/Ethnicity, Home Language, and Mother's Education

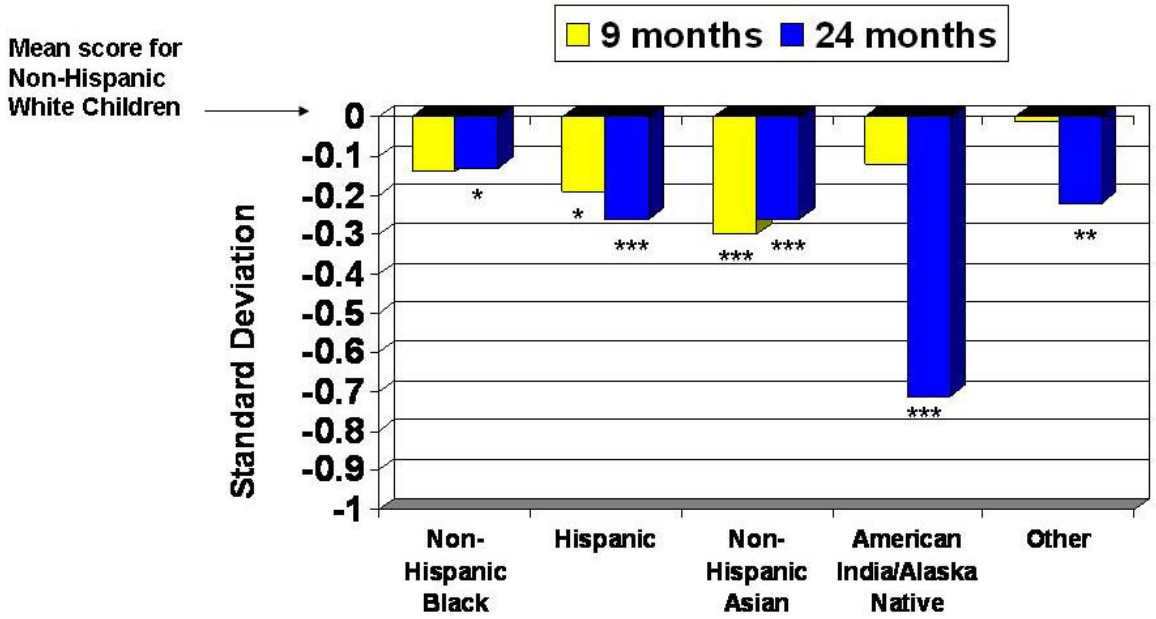
Disparities are found in social-emotional indicators (i.e., positive behaviors and secure attachment) at both 9 and 24 months by race/ethnicity, home language, and mother's education.

Positive Behaviors

Hispanic and Asian infants at 9 months score lower than their white peers on the positive behavior index. Moderate effect sizes are found at 9 months when comparing the average positive behavior scores of white and Hispanic infants (approximately one-fifth of a standard deviation) and the average positive behavior scores of white and Asian infants (approximately one-third of a standard deviation).

Toddlers from racial/ethnic minority groups had lower behavior ratings compared to white toddlers at 24 months. The largest racial/ethnic disparity is between white and American Indian/Alaskan Native toddlers at 24 months. American Indian and Alaskan Native toddlers score approximately three-quarters of a standard deviation below white toddlers (d = -.71) on the positive behavior index. The remaining racial/ethnic disparities are in the moderate range of effect sizes, ranging from less than one-fifth to one-quarter of a standard deviation below their white peers on social-emotional outcomes (see Figure 7).

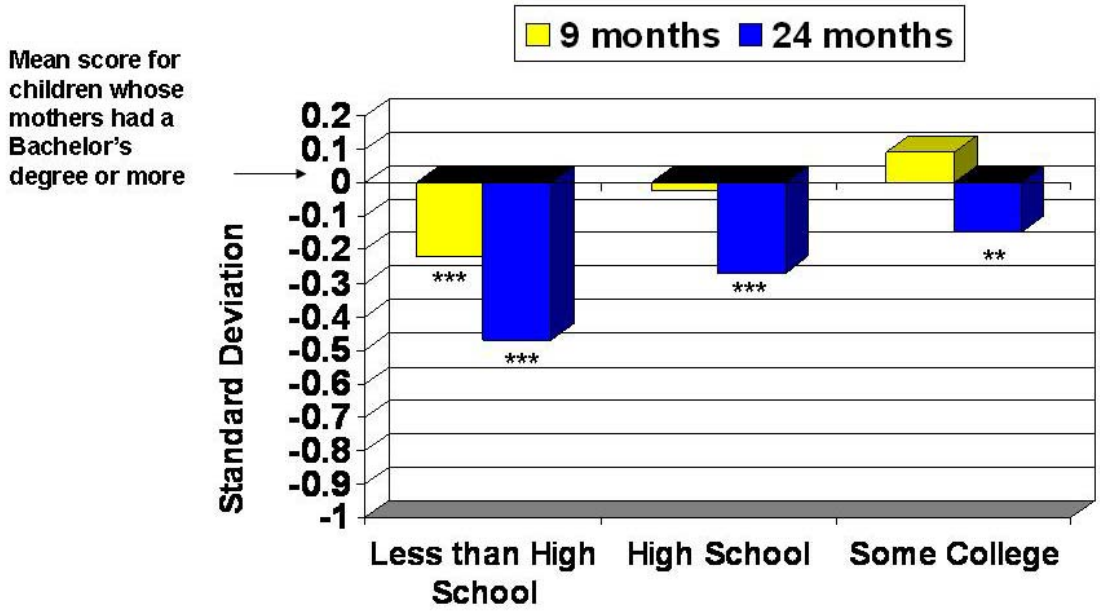
Figure 7. Disparities in Positive Behavior Index Scores at 9 and 24 Months, by Race/Ethnicity



Infants and toddlers from non-English-speaking homes have lower positive behavior ratings than infants and toddlers from English-speaking homes. At 9 months, infants from Spanish-speaking homes score one-fifth of a standard deviation lower on the positive behavior index than infants from English-speaking homes. Infants from homes where neither English nor Spanish is spoken score one-quarter of a standard deviation lower on the positive behavior index than infants from English-speaking homes (see Table 4). These differences represent moderate effects of home language on positive behaviors. Similarly, at 24 months, language minority toddlers score about one-quarter of a standard deviation lower than English-speaking toddlers on the positive behavior index (see Table 5).

Infants whose mothers have less than a high school degree score significantly lower on the positive behavior index than infants whose mothers have a Bachelor's degree or higher. This disparity becomes more pronounced at 24 months. At 9 months, infants whose mothers have less than a high school degree score about one-quarter of a standard deviation below infants whose mothers have a Bachelor's degree or higher on the positive behavior index. At 24 months, disparities in positive behavior ratings between toddlers whose mothers had a Bachelor's and toddlers whose mothers had less education are significant across all maternal education categories, though the largest disparity is found between toddlers whose mothers have less than a high school degree and those who have a Bachelor's degree or higher. This comparison yields a difference of almost one-half (d = -.47) of a standard deviation on the positive behavior index (see Figure 8).

Figure 8. Disparities in Positive Behavior Index Scores at 9 and 24 Months, by Mother's Education



Secure Attachment

Black, Hispanic, and American Indian/Alaskan Native children are less likely to have a secure attachment to their primary caregiver when compared to their white peers. The odds of being in a secure attachment are 45 percent less likely for blacks, 32 percent less likely for Hispanics, and 63 percent less likely for American Indian/Alaskan Natives compared to non-Hispanic white toddlers (see Table 5 for proportions of toddlers with a secure attachment in each group).

Toddlers from Spanish-speaking homes are less likely to be classified as having a secure attachment to their primary caregiver compared to toddlers from English-speaking homes. Specifically, the odds of having a secure attachment are 22 percent less likely for Spanish-speaking toddlers compared to English-speaking toddlers.

Toddlers whose mothers have a Bachelor's degree or higher are more likely to have a secure attachment to their primary caregiver compared to toddlers whose mothers have less education. The odds of having a secure attachment are 54 percent less likely for toddlers whose mothers have less than a high school degree, compared to toddlers whose mothers have a Bachelor's degree or higher. Similarly, the odds of having a secure attachment are 47 percent less likely for toddlers whose mothers have a high school degree, and 30 percent less likely for toddlers whose mothers have some college or an Associate's or vocational degree, compared to toddlers whose mothers have a Bachelor's degree or more.

NEARLY HALF OF ALL INFANTS ARE BELOW 200% OF POVERTY AT 9 AND 24 MONTHS OF AGE, AND MANY HAVE MULTIPLE RISK FACTORS

As noted earlier, at 9 months of age, 51 percent of infants live in households with incomes at or below 200 percent of the poverty threshold. At 24 months of age, 46 percent of infants live in households at or below 200 percent of poverty.

Figure 9 shows the proportion of infants living at or below 200 percent of poverty who share one or more additional risk factor. As this figure shows, 11 percent of infants have low income as their only risk factor, 34 percent have low income plus one additional risk factor (either racial/ethnic minority status, low maternal education,[xiv] or non-English home language[xv]), 32 percent have low income plus two additional risk factors, and 23 percent have all four risk factors. A similar pattern is found for children at 24 months of age: 12 percent of infants have low income as their only risk factor, 34 percent have low income plus one additional risk factor,

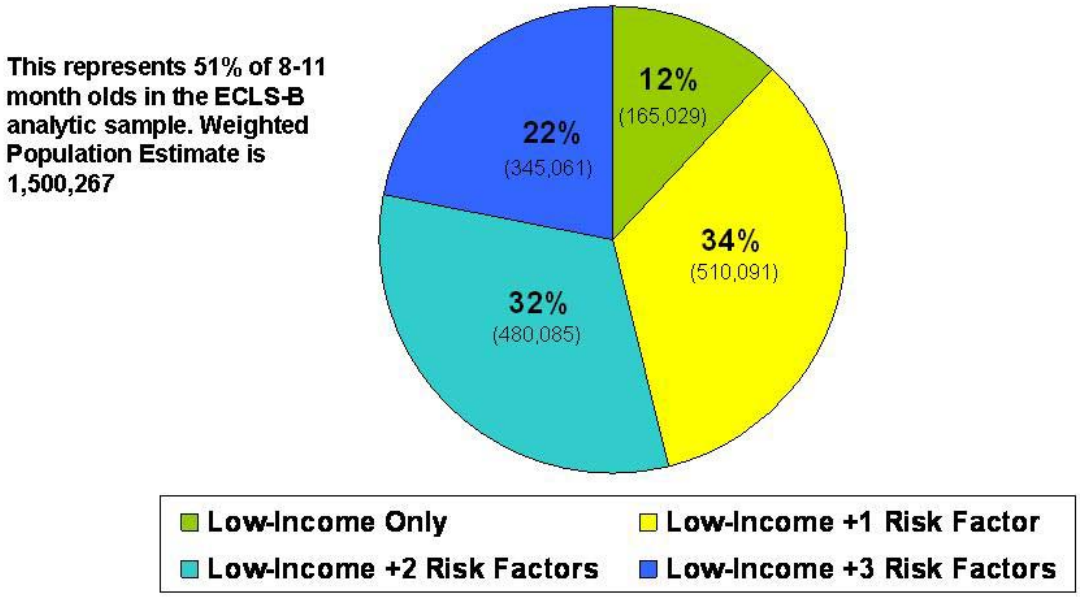
[xiv] Low maternal education is defined as a high school degree or less.

[xv] As noted earlier, having a non-English home language is not in and of itself a risk factor, but previous research and findings in this report show that children whose home language is not English tend to have poorer outcomes than children whose home language is English. They are also a growing segment of the early childhood population of interest to educators and policymakers. Therefore, this demographic characteristic was included for study in this report.

32 percent have low-income plus two additional risk factors, and 22 percent have all four risk factors.

Of the 34 percent of low-income children at 9 months with an additional risk factor, 73.5 percent (that is, 25% of the 34% of low-income infants with one additional risk factor) both live in a low-income household and have a mother with low educational attainment. Of the 32 percent of low-income infants with two additional risk factors, 87.5 percent (i.e., 28% of the 32% of low-income infants with two additional risk factors) are living in a low-income household, have a mother with low educational attainment, and are of racial/ethnic minority status. Thus, low income and low maternal education are the most commonly experienced risk factors among the four examined in this brief. This pattern holds true for the 24 month data as well.

Figure 9. Percentage of Infants Living At or Below 200% Poverty with Cumulative Risk Factors



(Weighted population estimates are in parentheses above.)

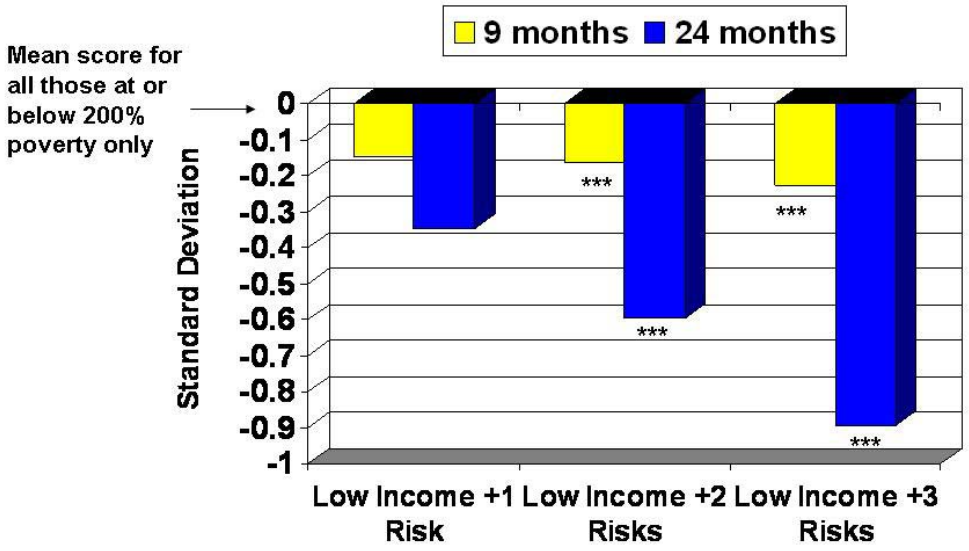
AMONG LOW-INCOME CHILDREN, HAVING TWO OR THREE ADDITIONAL RISK FACTORS INCREASES THE GAP IN DISPARITIES COMPARED TO LOW INCOME ALONE

For each of the developmental outcomes, when analyzing cumulative risk, we find that effect sizes grow larger with the number of risk factors at both time points (See Table 6). Having one additional risk factor in addition to low income does not decrease the likelihood of positive outcomes, but having two or three additional risk factors significantly increases the gap in

disparities. In addition, for cognitive outcomes, we find a similar pattern as was noted earlier: effects of cumulative risk emerge at 9 months but grow larger at 24 months.

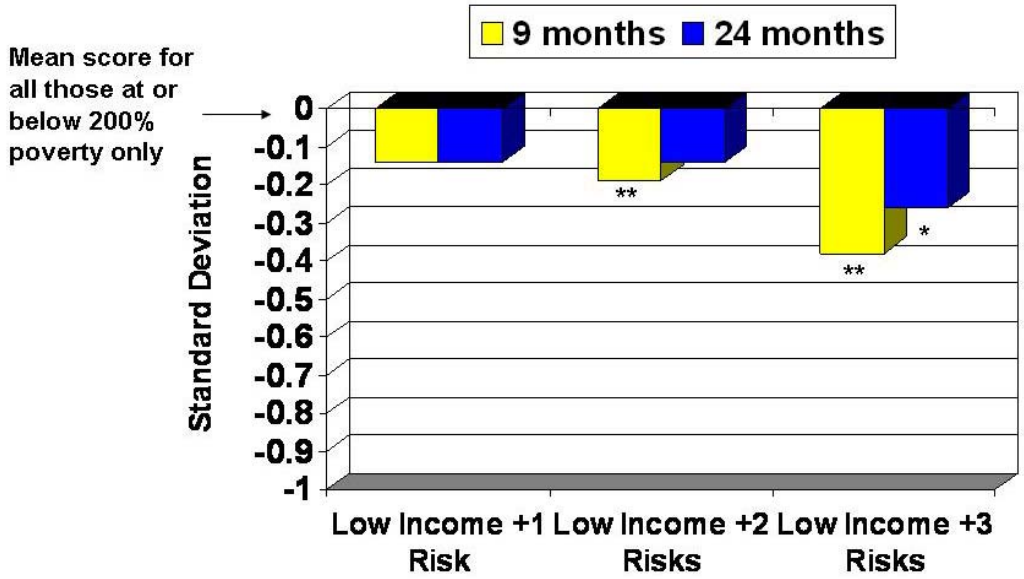
At 9 months, the effect size is small (*d*= - .19) when comparing the Bayley scores of infants with low income as their only risk factor to infants with three additional risk factors. At 24 months of age, however, the difference between low income alone and low income plus two additional risk factors reaches a moderate effect size for cognitive outcomes (*d* = -.39). The effect size becomes quite large when comparing toddlers with low income as their only risk factor and toddlers with three additional risk factors (*d* = -.72; see Figure 10).

Figure 10. Disparities on the Bayley Cognitive Assessment Among Those At or Below 200% Poverty at 9 and 24 Months, by Cumulative Risk



For behavioral outcomes at 9 and 24 months, differences increase according to the number of risk factors in the child's family (see Figure 11). Specifically, 9-month-old infants with all four risk factors scored about four-tenths of a standard deviation lower on the positive behavior index than infants with low income as the only risk factor (*d* = -.38), which represents a moderate effect. At 24 months, low income plus three additional risk factors reaches a level of one-quarter of a standard deviation below children with only low income as a risk factor (*d* = -.26).

Figure 11. Disparities in Positive Behavior Index Scores at 9 and 24 Months among Those at or Below 200% Poverty, by Cumulative Risk



Compared to toddlers who have low income as the only risk factor, toddlers with any additional risk factors have about 50 percent lower odds of having a secure attachment to their primary caregiver at 24 months of age.

In addition, the odds of being rated in excellent or very good health are reduced among children with multiple risk factors at both 9 and 24 months. Compared to infants with low income as the only risk factor, the odds of being rated in excellent or very good health are 41 percent lower for 9-month-olds with low income and two additional risk factors, and 63 percent lower for those with low income and three additional risk factors. Similarly, compared to 24-month-olds with low income as their only risk factor, the odds of being rated in excellent or very good health are 49 percent lower for toddlers with low income and two additional risk factors, and 68 percent lower for those with low income and three additional risk factors.

CONCLUSIONS AND POLICY IMPLICATIONS

Analyses of a nationally-representative sample of children born in the year 2001 reveal that as early as 9 months of age, statistically significant developmental disparities are identified for children based on four demographic characteristics: low income, racial/ethnic minority status, non-English home language, and low maternal education. Disparities based on these sociodemographic characteristics emerge across multiple domains of development, including cognitive development, social-emotional development, and general health. Furthermore, disparities between children with and without a demographic risk factor become more prominent by 24 months of age. Low family income and low maternal education are the two most prevalent risk factors at both 9 and 24 months. Finally, analyses indicate that the more risk factors a child has, the wider the disparities across outcomes at both 9 and 24 months.

Key Findings:

- Disparities in child outcomes are evident at 9 months and grow larger by 24 months of age
- These disparities exist across cognitive, social, behavioral, and health outcomes
- The most consistent and prominent risk factors are low income and low maternal education
- The more risk factors a child has, the wider the disparities

Early disparities in cognitive development based on poverty status has been well documented in the literature at 24 months of age.[22] It has been thought that such disparities may not be detected much before language emerges, around 15-18 months of age.[10, 11] However, a few previous studies conducted in the United States and elsewhere have found sociodemographic disparities in development within the first year of life.[12-14] For example, a recent study conducted with over 1,000 infants born in the Nord-Trondelag County in Norway between August 1990 and July 1991 found that "double risk" signified by a combination of biological and sociodemographic risk factors when children were 7 months of age correlated highly with developmental problems at age 4.[14] Another study conducted in Montreal found that infants in high- and moderate-risk groups (based on mother's marital status, age, and income) had lower mental scores on the Bayley than low-risk infants.[13] Finally, a study conducted in a large metropolitan area in the United States found differences in 6-month-old infants' overall development scores between infants from middle/high income households and those in low-income households.[12]

Thus, while many other studies have noted sociodemographic disparities by 24 months of age, few have documented it within the first year of life, and this study is one of the first to do so using a nationally-representative sample of contemporary infants in the United States. It should be kept in mind that this is a descriptive report of social indicators of well-being among a national cohort of infants, and as such, bivariate analyses were conducted. Further exploration of the relationships among these sociodemographic factors and other, contextual factors, such as early childhood program participation and cognitive stimulation in the home, using multivariate analyses could help determine the complex patterns of influence of these factors in the early and continued development of children in the earliest years of life.

Racial and ethnic gaps in school readiness and later achievement have been a focus for many researchers.[5, 7, 23, 24] However, an examination of the distribution of sociodemographic risk factors noted in this report indicate that low income and low maternal education are the more common risk factors for young children. Often race/ethnicity is confounded with these other two primary risk factors. Multivariate analyses would need to confirm that low income and low maternal education are the more likely predictors of disparities in outcomes at 9 and 24 months than racial/ethnic minority status. Analyses by Fryer and Levitt[24] with the same data set corroborate the findings presented here. They conclude that race is not a reason for disparities in cognitive outcomes at 9 months of age; what differences exist are explained by other factors, such as the child's age, home environment, or SES.

As noted several times earlier in this report, having a home language other than English should not be considered a risk factor in and of itself. Dual-language learning in the early years has many benefits. Being a fluent speaker of more than one language opens up opportunities that are not available to monolinguals, especially in the increasingly global economy; and the easiest time to learn a second language is during the early years of life. In addition, maintaining one's home language in addition to a second language helps to support cultural identity and boost both self-concept and metalinguistic abilities.[25-27]

Nevertheless, young DLL children also merit the focus of educators and policy makers because they tend to lag behind monolinguals in academic tasks.[27] U.S. children whose first language is not English are at greater risk than native English-speaking children for physical, socio-emotional and learning problems.[28-32] Dual language learners are also likely to have multiple sociodemographic risk factors. Of non-native English speakers, Latino children are the most likely to live in poverty *and* have the least educated parents. [33-35]

Of course, there are additional demographic risk factors that children may have, such as being a child of a teen mother or living in a single parent household. Future research should investigate the influence of having additional risk factors on outcomes for infants and toddlers.

There are several important implications for policy makers, educators, and program providers that can be derived from these findings. First, in order to effectively address the achievement gaps that present themselves at kindergarten entry, it will be important to intervene during the first three years of life or from birth to school entry so that disparities do not have a chance to persist and widen. Second, there are multiple policy and programmatic interventions available to decision makers seeking to address the health and developmental gaps of low-income infants and toddlers. A framework of state early childhood policies developed by the National Center for Children in Poverty as part of its *Improving the Odds for Young Children* project outlines a range of policy choices and presents research on how selected public programs can support the healthy development and school readiness of young children.[36]

Many of the examples from the framework pertain to the findings presented in this brief, such as policies aimed at improving low-income children's health and nutrition by increasing access to services provided under Medicaid, the State Children's Health Insurance Program and the Women, Infants and Children's Supplemental Nutrition Program. Policies that exempt single parents on TANF from work requirements until the youngest child reaches the age of one can serve to foster the bond between a child and parent. In addition, income-related barriers to services can be addressed by providing parents with economic supports such as raising the income eligibility limit for child care subsidies and limiting copayments for child care subsidies. Also, allowing low-income parents enrolled in higher education to qualify for child care subsidies can promote maternal education and lead to higher earnings.

Finally, the demographic information on our sample noted in Table 1 of this report indicates that about half of children at both 9 and 24 months of age are in some form of nonparental care, and that most of those in nonparental care are in home-based settings during the early years of life. There is a vast body of research that demonstrates the potential of both home-based and center-based interventions for young children and their families, as well as a combination of the two approaches, in addressing gaps in educational achievement of low-income infants and toddlers

before they reach school age. The following examples highlight several high-quality, effective approaches.

As an example of a home-based approach, the Nurse-Family Partnership model provided first-time teen mothers with home visits from a public health nurse who provided important information on prenatal care, child development and family planning. Home visits began during pregnancy and continued through the child's second birthday. Experimental evaluations of this model indicate positive outcomes in the form of increased spacing between births, reduction in child abuse, increases in child health, and better academic and social outcomes for both parent and child.[37] This study suggests that intensive and comprehensive home-based interventions starting before birth and continuing into toddlerhood can have long-term benefits for at-risk families.

There are several examples of a center-based approach for infants and toddlers, including the Carolina Abecedarian Project. In the mid to late 1970's, this project was administered to 57 children who were predominantly African American and living with a single mother who had less than a high school degree. The intervention started by age 3 months, and children in the treatment group received center-based child care for 6 to 8 hours per day, 5 days per week through kindergarten entry at age 5.[38] Some services, such as nutritional supplements, social work services and medical care, were provided to control group families in order to ensure that those were not the factors accounting for different outcomes between the two groups.[39] An experimental evaluation found positive and lasting effects of this center-based intervention on children's IQ, reading, and math scores; differences in IQ were first detected at 18 months of age and differences in reading and math were detected first in early elementary school. [40] Furthermore, children who participated in the intervention were less likely to have been retained in a grade or have been placed in special education, and were more likely to be enrolled in or have graduated from college, than children in the control group. [40, 41] These findings suggest that sustained, high-quality center-based interventions starting in infancy and continuing to school entry can produce long-term positive impacts.

Models that combine home-based and center-based approaches also show particular potential. One example is the Infant Health and Development Program (IHDP), which targeted families with infants who were born prematurely (born after 37 or fewer weeks gestation) and at low birthweight (2500 grams or less). Between birth and the age of 3, participating children and their families received home visits and service referrals, the children were enrolled at a child development center and received developmental assessments, and parents participated in group meetings. An experimental evaluation showed that IHDP had positively impacted cognitive and motor skills in child participants, particularly those from the most at-risk families and those who had been born at the "heavier" side of the low birthweight range. Furthermore, the evaluation found that receipt of 350 days of center-based care was a critical threshold associated with sustained effects.[42]

Early Head Start provides supports for low-income infants and their families in center-based settings, home-based visits, and a mixed approach that combines center- and home-based supports (either providing center-based supports to some families and home-based supports to others, or a mixture of the two to all families). Recent evaluations of Early Head Start suggest that offering comprehensive services to infants and their families can result in improved

outcomes for infants and toddlers. Specifically, results of the national Early Head Start Research and Evaluation Project indicate that Early Head Start has a significant, modest, positive impact on child cognitive ability, child aggressive behavior, maternal supportiveness, and the home environment. Furthermore, these positive impacts do not diminish over time; the effects are approximately the same size from the time Early Head Start service provision ends at age 3, through age 5.[43, 44] Children who participated in Early Head Start and went on to formal child care programs after age 3 had improved early literacy skills without the increase in aggressive behaviors found in some studies to be associated with time in formal programs.[45] Other analyses of the Early Head Start evaluation data suggest that full implementation of the performance standards using a mixed approach is associated with the largest impacts on child outcomes. [46]

Based on these collective findings, it appears that high-quality and intensive interventions provided both at home and in center-based settings would provide optimal and sustained gains for children if provided continuously throughout the early childhood period from birth through age 5 to at-risk children and their families. Early Head Start and Head Start could continue to be used as national laboratories to examine how quality early care and education experiences for children from low-income households could help to narrow the achievement gap. However, it should be kept in mind that it may be difficult to affect large gains for children with three or more risk factors, even with the provision of comprehensive and intensive interventions.

Given that maternal education is also noted as a prevalent risk factor, parental engagement in early childhood interventions is also important. Early intervention services during infancy that provide support for children as well as their other family members have the potential for positive effects on parent outcomes. For example, the IHDP study mentioned above had a positive impact on maternal employment, but mainly among mothers with a high school degree or less.[47]

We know from other analyses of the ECLS-B data that low-income families and families whose home language is not English are more likely to use home-based child care than center-based care for their 9-month-old and 24-month-old children.[48, 49] It is therefore important, in addition to working with parents and in center-based settings, to focus on curriculum development and professional development for home-based providers to improve the quality of care received by infants and toddlers. Indeed, recent analyses using the ECLS-B indicate that high-quality, non-parental care (both home-based and center-based) has the potential to moderate the effects of demographic risk factors on child outcomes at 24 months.[6]

In conclusion, this report highlights the importance of starting early to address disparities in children's development that emerge in infancy. Early childhood initiatives should address the multiple supports children need to achieve healthy development and should address the full age range of birth to five in order to support all children arriving at school on a strong footing.

Key Implications:

- **Start Early** – Meaningful differences are being detected as early as 9 and 24 months; this speaks to the need to intervene early in children's lives to address the gaps in development. In particular, research suggests that interventions should be high-quality, comprehensive and continuous for children ages 0 to 3 as well as ages 3 to 5.
- **Target Low-income Children** – As income is the most prevalent risk factor at 9 and 24 months, children in low-income households should be the main targets of early interventions aimed at improving children's health and well-being.
- **Engage and Support Parents** – Given that maternal education is also noted as a prevalent risk factor, early childhood interventions should include a parental education component. A promising avenue is to promote the education of parents of infants and toddlers about issues related to early childhood development. In addition, interventions that support parents in their own educational attainment and/or income self-sufficiency are also pertinent.
- **Improve the Quality of Early Care Settings** – Research indicates that (1) most infants and toddlers, especially those who are from low-income households, are cared for in home-based settings; and (2) high-quality early care and education has the potential to moderate the effects of demographic risk factors for young children. In particular, it is important to ensure a safe, supportive and stimulating environment for young children. Two promising ways to address the quality of early care environments would be to focus on curriculum development and professional development within both home-based and center-based settings that serve infants and toddlers.

References

1. Hart, B., & Risley, T. (2003). The early catastrophe: The 30 million word gap by 3. *American Educator, 27*(1), 4-9.
2. Jencks, C., & Phillips, M. (1998). The black-white test score gap: An Introduction. In C. Jencks and M. Phillips (Eds.), *The black-white test score gap.* Washington DC: Brookings Institution Press.
3. Lee, V., & Burkham, D. (2002). Inequality at the starting gate: Social background differences in achievement as children begin school. Washington, DC: Economic Policy Institute.
4. Chernoff, J.J., Flanagan, K.D., et al. (2007). Preschool: First findings from the third follow-up of the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B). (NCES 2008-025). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.
5. Rouse, C., Brooks-Gunn, J., & McLanahan, S. (2005). School readiness: Closing racial and ethnic gaps. Introducing the issue. *The Future of Children, 15*(1), 5-13.

6. Snyder, T. (2008). Child care quality and early academic skill acquisition among preschoolers., *Paper presented at the Head Start National Research Conference, June 23-25, 2008, Washington, DC.*
7. Brooks-Gunn, J., Rouse, C., & McLanahan, S. (2007). Racial and ethnic gaps in school readiness. In R. Pianta, M. Cox, and K. Snow (Eds.), *School Readiness and the Transition to Kindergarten*. Baltimore, MD: Paul H. Brookes.
8. Bloom, H., Hill, C., et al. (In Press.). Performance trajectories and performance gaps as achievement effect-size benchmarks for educational interventions. *Journal of Research on Educational Effectiveness*.
9. Brooks-Gunn, J., & Duncan, G. (1997). The effects of poverty on children. *The Future of Children, 7*(2).
10. McCall, R. (1979). The development of intellectual functioning in infancy and the prediction of later I.Q. In J.D. Osofsky (Ed.), *Handbook of Infant Development* (pp. 707-741). New York: Wiley.
11. Golden, M., & Birns, B. (1976). Social class and infant intelligence. In M. Lewis (Ed.), *Origins of Intelligence* (pp. 299-352). New York: Plenum.
12. Parks, P., & Bradley, R. (1991). The interaction of home environment features and their relation to infant competence. *Infant Mental Health Journal, 12*(1).
13. Pomerleau, A., Scuccimarri, C., & Malcuit, G. (2004). Mother-infant behavioral interactions in teenage and adult mothers during the first six months postpartum: Relations with infant development. *Infant Mental Health Journal, 24*(5), 495-509.
14. Rostad, A., Nyberg, P., & Sivberg, B. (2008). Predicting development deficiences at the age of four based on data from the first seven months of life. *Infant Mental Health Journal, 29*(6), 588-608.
15. Duncan, G.J., & Magnuson, K.A. (2005). Can family socioeconomic resources account for racial and ethnic test score gaps? . *The Future of Children, 15*(1), 35-45.
16. Sameroff, A., & Fiese, B. (2000). The development ecology of early intervention. In J. Shonkoff and S. Meisels (Eds.), *Handbook of Early Intervention*. Cambridge, MA: Cambridge University Press.
17. Cohen, J. (1988). *Statistic power analysis for behavioral sciences, Second Edition*. Hillsdale, NY: Lawrence Earlbaum.
18. Tallmadge, G.K. (1977). *The Joint Dissemination Review Panel IDEABOOK.*
19. Child Trends. (1999). Children and welfare reform: A guide to evaluating the effects of state welfare policies on children. Washington, DC.
20. Corbett, T. (1997). Foreward. In R. Hauser, B. Brown, and W. Prosser (Eds.), *Indicators of children's well-being*. New York, NY: Russell Sage Foundation.
21. Brown, B., & Corbett, T. (2003). Social indicators of public policy in the age of devolution. In R. Weissber, et al. (Eds.), *Trends in the well-being of children and youth*. Washington, DC: Child Welfare Leage of America Press.
22. Smith, J., Brooks-Gunn, J., & Klebanov, P. (1997). The consequences of living in poverty for children's cognitive and verbal ability and early school achievement. In G. Duncan and J. Brooks-Gunn (Eds.), *Consequences of growing up poor.* New York: Russell Sage Foundation.
23. Haskins, R., & Rouse, C. (Spring 2005). Closing achievement gaps: Future of Children Policy Brief.

24. Fryer, R., & Levitt, S. (In review). Testing for racial differences in the mental ability of young children.
25. Snow, C., Burns, M., & Griffin, P. (Eds.). (1998). *Preventing reading difficulties in young children*. Washington, DC: National Academy Press.
26. Capps, R., Fix, M., et al. (2005). The new demography of America's schools: Immigration and the No Child Left Behind Act. Washington, DC: The Urban Institute.
27. Vandivere, S., Pitzer, L., et al. (2004). Indicators of early school success and child well-being. , *Cross Currents Brief No. 3, Publication #2004-24*. Washington, DC: Child Trends.
28. Tabors, P., & Snow, C. (2002). Young bilingual children and early literacy development. In S. Neuman and D. Dickinson (Eds.), *Handbook of Early Literacy Research* (pp. 159-178). New York, NY: The Guilford Press.
29. Bialystok, E. (2001). *Bilingualism in development: Language, literacy & cognition*. Cambridge: Cambridge University Press.
30. Dinan, K. (2006). *Young children in immigrant families: The role of Philanthropy. Sharing knowledge, creating services, and building supportive policies*. New York, NY: National Center for Children in Poverty
31. West, J., Denton, K., & Germino-Hausken, E. (2000). America's Kindergarteners., *Working Paper No. 2000-070*. Washington, DC: National Center for Education Statistics.
32. National Reading Panel. (2000). Teaching children to read: An evidence-based assessment of the scientific research literature on reading an its implications for reading instruction. Washington, DC: National Institute for Literacy.
33. Federal Interagency Forum on Child and Family Statistics. (2008). America's Children in Brief: Key National Indicators of Children's Well-Being.
34. Espinosa. (2006). English-language learners as they enter school (DRAFT). Columbia, MO.: University of Missouri.
35. Committee on the Prevention of Reading Difficulites in Young Children. (1998). Preventing reading difficulties in young children. In N.R. Council (Ed.). Washington, DC: National Academy of Sciences.
36. National Center for Children in Poverty. (2007). Improving the odds for young children.
37. Olds, D., Eckenrode, J., et al. (1997). Long-term effects of home visitation on maternal life course and child abuse and neglect: 15-year follow-up of a randomized trial. *Journal of the American Medical Association, 278*, 637-643.
38. Horacek, H.J., Ramey, C.T., et al. (1987). Predicting school failure and assessing early intervention with high-risk children. *The American Academy of Child and Adolescent Psychiatry, 26*(5), 758-763.
39. Ramey, C.T., & Campbell, F.A. (1991). Poverty, early childhood education and academic competence: The Abecedarian experiment. In A. Huston (Ed.), *Children in Poverty: Child Development and Public Policy*. Cambridge, MA: Cambridge University Press.
40. Frank Porter Graham Child Development Center. (1999). Early learning, later success: The Abecedarian Study [Electronic Version] from http://www.fpg.unc.edu/~abc/embargoed/executive_summary.htm.
41. Campbell, F., & Ramey, C. (1995). Cognitive and school outcomes for high-risk African-American students at middle adolescence: Positive effects of early intervention. *American Educational Research Journal, 32*(4), 734-772.

42. Hill, J., Brooks-Gunn, J., & Waldfogel, J. (2003). Sustained effects of high participation in an early intervention for low-birth-weight premature infants. *Developmental Psychology, 39*, 730-744.
43. Martin, A., Gardner, M., et al. (2008). Early Head Start Impacts Over Time and by Level of Participation.: Mathematica Policy Research, MPR Reference No. 6260-520.
44. Love, J., Kisker, E., et al. (2005). The effectiveness of Early Head Start for 3-year-old children and their parents: Lessons for policy and programs. *Developmental Psychology, 41*(6), 885-901.
45. (April 2006). Preliminary findings from the Early Head Start Prekindergarten Follow-Up Study. Retrieved on December 24, 2008: http://www.acf.hhs.gov/programs/opre/ehs/ehs_resrch/reports/prekindergarten_followup/prekindergarten_followup.pdf: Administration for Children and Families Research to Practice Brief.
46. U.S. Department of Health and Human Services Administration for Children and Families. (2002). Making a difference in the lives of infants and toddlers and their families: The impacts of Early Head Start. Volume 1: Technical Report: Retrieved electronically on December 24, 2008 from the Mathematica website: http://www.mathematica-mpr.com/publications/pdfs/ehsfinalvol1.pdf.
47. Brooks-Gunn, J., McCormick, M., et al. (1994). The effects of early education intervention on maternal employment, public assistance, and health insurance: The Infant Health and Development Program. *American Journal of Public Health, 84*, 924-931.
48. Halle, T., Forry, N., et al. (2009). Executive Summary: Associations between provider training and education and other quality indicators in low-income children's primary care arrangements at 24 months. Washington, DC: Child Trends and Office of Planning Research and Evaluation.
49. Halle, T., Nuenning, M., et al. (2008). Primary childcare arrangements of US infants: Patterns of utilization by poverty status, family structure, maternal work status, and maternal work schedule: Prepared for OPRE.

Table 1. Weighted proportion of infants and toddlers in each demographic group by income status

	Infants (8-11 months)				Toddlers (22-25 months)			
	Full Sample	Higher Income (≤ 200% FPL)	Lower Income (> 200% FPL)		Full Sample	Higher Income (≤ 200% FPL)	Lower Income (> 200% FPL)	
Race/ethnicity								
Non-Hispanic White	54%	73%	37%	***	55%	72%	36%	***
Non-Hispanic Black	13%	6%	20%	***	13%	7%	21%	***
Hispanic	25%	14%	36%	***	24%	14%	35%	***
Non-Hispanic Asian	3%	3%	2%	***	3%	3%	2%	***
American Indian/Alaskan Native	0.4%	0.1%	0.6%	***	0.5%	0.2%	0.8%	***
Other	4%	3%	5%		4%	4%	5%	
Home Language								
English	81%	90%	73%	***	82%	90%	74%	***
Spanish	14%	5%	23%	***	13%	5%	22%	***
Other	5%	5%	4%		5%	5%	4%	
Mother's Education								
Less than High School	21%	4%	36%	***	17%	4%	33%	***
High School	31%	21%	41%	***	30%	21%	41%	***
Some College/Associates/Vocational	23%	28%	18%	***	27%	31%	22%	***
Bachelor's or More	26%	48%	5%	***	26%	44%	4%	***
Primary Care Arrangement								
Parental care	51%	46%	56%	***	52%	46%	58%	***
Non-parental home-based care	42%	46%	38%	***	33%	35%	30%	**
Non-parental center-based care	7%	9%	6%	**	15%	19%	12%	***
Hours a week spent in non-parental care	30.38	30.25	30.54		32.10	31.87	32.44	
Unweighted N =	7,400	3,500	3,900		7,200	3,400	3,800	

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$ Significance levels reflect t-tests comparing higher and lower income infants/toddlers. Estimates were weighted by W1C0 (9 months) and W2C0 (24 months). Unweighted Ns were rounded to the nearest 50.
SOURCE: Child Trends' analyses of U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), 9 and 24 month data.

Table 2. Differences in Bayley Proficiency Probability Scores (9 months)

	Explores Objects				Explores Purposefully				Jabbers expressively				Early Problem Solving				Names Objects			
	Mean		SD	Effect Size (*d*)	Mean		SD	Effect Size (*d*)	Mean		SD	Effect Size (*d*)	Mean		SD	Effect Size (*d*)	Mean		SD	Effect Size (*d*)
Whole Sample	0.99				0.83				0.30				0.04				0.01			
Higher Income	0.99		0.034		0.85		0.168		0.31		0.185		0.04		0.056		0.01		0.016	
Lower Income	0.98	**	0.044	-0.10	0.82	***	0.194	-0.16	0.28	***	0.180	-0.16	0.03	***	0.049	-0.13	0.01	***	0.013	-0.10
Race/Ethnicity																				
Non-Hispanic White	0.99		0.026		0.84		0.154		0.31		0.166		0.04		0.050		0.01		0.014	
Non-Hispanic Black	0.98	***	0.062	-0.27	0.81	***	0.218	-0.20	0.28	**	0.197	-0.14	0.03	*	0.053	-0.10	0.01	*	0.015	-0.14
Hispanic	0.98	*	0.041	-0.15	0.83		0.169	-0.07	0.29		0.160	-0.07	0.04		0.042	-0.08	0.01	*	0.010	-0.14
Non-Hispanic Asian	0.99		0.060	-0.04	0.84		0.343	-0.04	0.29		0.343	-0.12	0.03	**	0.088	-0.14	0.01	**	0.021	-0.14
American Indian/ Alaskan Native	0.98		0.074	-0.15	0.81		0.468	-0.21	0.28		0.450	-0.16	0.04		0.134	-0.08	0.01		0.035	-0.07
Other	0.99		0.056	-0.07	0.83		0.258	-0.08	0.29		0.258	-0.07	0.04		0.087	-0.04	0.01		0.034	0.00
Home Language																				
English	0.99		0.035		0.84		0.175		0.30		0.180		0.04		0.053	-0.02	0.01		0.015	
Spanish	0.98		0.041	-0.09	0.82		0.170	-0.09	0.29		0.156	-0.04	0.04		0.042	-0.08	0.01		0.010	0.00
Other	0.98		0.095	-0.09	0.83		0.289	-0.05	0.29		0.275	-0.07	0.03		0.069		0.01	*	0.015	-0.07
Mother's Education																				
Less than High School	0.98	**	0.044		0.81	***	0.197	-0.21	0.27	***	0.165	-0.24	0.03	***	0.042	-0.17	0.00	**	0.012	-0.17
High School	0.98	**	0.047	-0.17	0.83		0.185	-0.06	0.30		0.185	-0.04	0.04		0.054	0.00	0.01		0.016	0.00
Some College/ Associates/Vocational	0.99		0.034	-0.14	0.84		0.171	-0.01	0.31		0.188	0.02	0.04		0.059	0.06	0.01		0.017	0.08
Bachelor's or More	0.99		0.029	-0.03	0.84		0.178		0.31		0.191		0.04		0.054		0.01		0.014	
Unweighted N =	7,400				7,400				7,400				7,400				7,400			

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$ Estimates were weighted by W1C0. Population was limited to infants aged 8-11 months. Unweighted Ns are rounded to the nearest 50.
SOURCE: Child Trends' analyses of U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), 9 month data.

Table 3. Differences in Bayley Proficiency Probability Scores (24 months)

	Receptive Vocabulary				Expressive Vocabulary				Listening/Comprehension				Matching/Discrimination				Early Counting/Quantitative			
	Mean		SD	Effect Size (*d*)	Mean		SD	Effect Size (*d*)	Mean		SD	Effect Size (*d*)	Mean		SD	Effect Size (*d*)	Mean		SD	Effect Size (*d*)
Whole Sample	0.84		0.195		0.63		0.269		0.36		0.215		0.31		0.203		0.04		0.077	
Higher Income	0.88		0.173		0.70		0.254		0.41		0.215		0.36		0.210		0.05		0.091	
Lower Income	0.79	***	0.210	-0.49	0.55	***	0.266	-0.56	0.29	***	0.197	-0.56	0.25	***	0.177	-0.54	0.02	***	0.053	-0.33
Race/Ethnicity																				
Non-Hispanic White	0.88		0.148		0.70		0.224		0.41		0.191		0.36		0.186		0.05		0.186	
Non-Hispanic Black	0.79	***	0.235	-0.64	0.55	***	0.288	-0.67	0.29	***	0.213	-0.63	0.25	***	0.192	-0.60	0.02	***	0.192	-0.15
Hispanic	0.77	***	0.192	-0.73	0.52	***	0.236	-0.79	0.27	***	0.172	-0.74	0.23	***	0.152	-0.70	0.02	***	0.152	-0.17
Non-Hispanic Asian	0.83	***	0.428	-0.32	0.61	***	0.542	-0.38	0.35	***	0.419	-0.36	0.30	***	0.391	-0.34	0.03	***	0.391	-0.09
Non-Hispanic American Indian	0.73	**	0.609	-1.03	0.48	***	0.656	-0.96	0.25	***	0.448	-0.88	0.21	***	0.387	-0.82	0.01	***	0.387	-0.19
Other	0.84	***	0.274	-0.30	0.62	***	0.374	-0.34	0.35	***	0.290	-0.34	0.30	***	0.270	-0.33	0.03	***	0.270	-0.11
Home Language																				
English	0.86		0.183		0.66		0.260		0.38		0.213		0.33		0.203		0.04		0.203	
Spanish	0.74	***	0.178	-0.66	0.47	***	0.205	-0.75	0.23	***	0.143	-0.72	0.19	***	0.122	-0.68	0.01	***	0.122	-0.15
Other	0.80	***	0.338	-0.34	0.56	***	0.397	-0.37	0.31	***	0.294	-0.36	0.26	***	0.269	-0.36	0.02	***	0.269	-0.09
Mother's Education																				
Less than High School	0.76	***	0.203	-0.85	0.50	***	0.244	-0.95	0.25	***	0.173	-0.90	0.21	***	0.149	-0.84	0.01	***	0.149	-0.23
High School	0.82	***	0.197	-0.48	0.60	***	0.260	-0.56	0.33	***	0.201	-0.55	0.28	***	0.185	-0.53	0.03	***	0.185	-0.16
Some College/ Associates/ Vocational	0.85	***	0.188	-0.33	0.64	***	0.263	-0.39	0.37	***	0.209	-0.39	0.32	***	0.196	-0.38	0.03	***	0.196	-0.13
Bachelor's or More	0.90		0.167		0.74		0.254		0.46		0.227		0.40		0.227		0.06		0.227	
N =	7,200				7,200				7,200				7,200				7,200			

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$ Estimates were weighted by W2C0. Population was limited to toddlers aged 22-25 months. Unweighted Ns were rounded to the nearest 50.
SOURCE: Child Trends' analyses of U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), 24 month data.

Table 4. Differences in School Readiness Outcomes (9 months)

	Cognitive (Bayley)				Health				Positive Behavior Index	
	Mean		Standard Deviation	Effect Size (*d*)	Mean		Standard Deviation	Effect Size (OR)	Standard Deviation	Effect Size (*d*)
Whole Sample	49.60		9.27		88.88%		0.31		4.50	
Higher Income	50.37		9.52		91.68%		0.26		4.20	
Lower Income	48.87	***	8.93	-0.16	86.21%	***	0.34	0.57	4.77	-0.16
Race/Ethnicity										
Non-Hispanic White	50.01		8.37		91.05%		0.25		3.90	
Non-Hispanic Black	48.78	**	10.24	-0.15	88.42%	*	0.45	0.75	4.98	-0.14
Hispanic	49.33		8.05	-0.08	84.47%	***	0.32	0.53	4.22	-0.19
Non-Hispanic Asian	48.70	*	16.20	-0.16	85.98%	***	0.69	0.60	9.16	-0.30
American Indian/ Alaskan Native	47.73	*	20.69	-0.27	86.80%		0.79	0.65	11.19	-0.12
Other	49.56		12.50	-0.05	90.25%		0.40	0.91	5.71	-0.01
Home Language										
English	49.73		9.11		90.27%		0.28		4.31	
Spanish	49.19		7.96	-0.06	80.83%	***	0.32	0.45	4.20	-0.21
Other	48.57	*	13.76	-0.13	89.16%		0.48	0.89	7.43	-0.24
Mother's Education										
Less than High School	47.98	***	8.30	-0.20	83.95%	***	0.35	0.40	4.66	-0.22
High School	49.60		9.08	-0.05	87.31%	***	0.32	0.53	4.63	-0.02
Some College/Associates/ Vocational	50.44		9.02	0.03	91.06%		0.27	0.78	4.24	0.09
Bachelor's or More	50.13		10.54		92.85%		0.26		4.31	
Unweighted N =	7,350				7,400				7,350	

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$ Estimates were weighted by W1C0. Population was limited to infants aged 8-11 months. Unweighted Ns are rounded to the nearest 50.
SOURCE: Child Trends' analyses of U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), 9 month data.

Table 5. Differences in School Readiness Outcomes (24 months)

	Cognitive (Bayley)				Health				Positive Behavior Index				Proportion of Children with a Secure Attachment			
	Mean		Standard Deviation	Effect Size (*d*)	Mean		Standard Deviation	Effect Size (OR)	Mean		Standard Deviation	Effect Size (*d*)	Mean		Standard Deviation	Effect Size (OR)
Whole Sample	50.45		9.744		0.88		0.312		25.09		5.256		61.34%		0.477	
Higher Income	52.83		9.64		0.92		0.26		25.79		5.061		67.63%		0.46	
Lower Income	47.70	***	9.14	-0.53	0.84	***	0.36	0.45	24.28	***	5.363	-0.30	54.11%	***	0.49	0.56
Race/Ethnicity																
Non-Hispanic White	52.85		8.47		0.92		0.24		25.56		4.584		66.06%		0.42	
Non-Hispanic Black	47.78	***	10.05	-0.60	0.86	***	0.36	0.56	24.95	*	5.780	-0.13	51.50%	***	0.52	0.55
Hispanic	46.75	***	8.09	-0.72	0.82	***	0.34	0.39	24.34	***	4.813	-0.26	56.78%	***	0.44	0.68
Non-Hispanic Asian	49.54	***	20.01	-0.39	0.85	***	0.67	0.52	24.35	***	9.994	-0.26	60.82%		0.93	0.80
Non-Hispanic American Indian	45.15	***	22.62	-0.91	0.86		0.81	0.54	22.32	***	13.949	-0.71	41.62%	***	1.14	0.37
Other	49.98	***	12.93	-0.34	0.92		0.37	1.08	24.55	**	7.327	-0.22	60.60%		0.67	0.79
Home Language																
English	51.50	***	9.53		0.90		0.29		25.30		5.158		62.31%		0.47	
Spanish	44.82	***	6.94	-0.70	0.78	***	0.33	0.40	24.05	***	4.482	-0.24	56.43%	*	0.40	0.78
Other	47.70	***	14.42	-0.40	0.86	*	0.51	0.65	24.27	*	7.839	-0.20	58.17%		0.72	0.84
Mother's Education																
Less than High School	45.92	***	8.23	-0.86	0.80	***	0.38	0.31	23.76	***	4.997	-0.47	53.04%	***	0.47	0.46
High School	49.31	***	9.17	-0.52	0.88	***	0.31	0.58	24.74	***	5.297	-0.27	56.58%	***	0.48	0.53
Some College/ Associates /Vocational	50.66	***	9.33	-0.39	0.90		0.29	0.72	25.35	**	5.171	-0.15	62.91%	***	0.47	0.70
Bachelor's or More	54.65		10.20		0.93		0.27		26.11		5.192		70.92%		0.47	
N =	7,200				7200.00				7,100				7,050			

* p ≤ .05, ** p ≤ .01, *** p ≤ .001 Estimates were weighted by W2C0. Population was limited to toddlers aged 22-25 months. Unweighted Ns were rounded to the nearest 50.
SOURCE: Child Trends' analyses of U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), 24 month data.

Table 6.
Differences in School Readiness Outcomes Between Lower-Income Infants with No Additional Risk Factors and Those with Additional Risk Factors (9 months)

			Cognitive (Bayley)		Health		Positive Behavior Index	
	Proportion of Infants (8-11 months)	Proportion of Infants Living at ≤ 200% FPL (8-11 months)	Effect Size (*d*)		Effect Size (OR)		Effect Size (*d*)	
Low-income only	5%	12%						
Low-income + 1 risk	17%	34%	-0.09		0.73		-0.14	
Low-income + 2 risks	16%	32%	-0.11		0.59		-0.19	*
Low-income + 3 risks	12%	23%	-0.19	***	0.37	***	-0.38	**

Differences in School Readiness Outcomes Between Lower-Income Toddlers with No Additional Risk Factors and Those with Additional Risk Factors (24 months)

			Cognitive (Bayley)		Health		Positive Behavior Index	
	Proportion of Toddlers (22-25 months)	Proportion of Toddlers Living at ≤ 200% FPL (22-25 months)	Effect Size (*d*)		Effect Size (OR)		Effect Size (*d*)	
Low-income only	6%	11%						
Low-income + 1 risk	16%	34%	-0.11		0.75		-0.14	
Low-income + 2 risks	15%	32%	-0.39	***	0.51	*	-0.14	
Low-income + 3 risks	10%	22%	-0.72	***	0.32	***	-0.26	*

* p ≤ .05, ** p ≤ .01, *** p ≤ .001 Significance levels reflect differences between lower-income children without additional risk factors and low-income children with additional risk factors. Estimates were weighted by W1C0 (9 months) and W2C0 (24 months).*SOURCE:* Child Trends' analyses of U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), 9 and 24 month data.

Technical Appendix

Survey Methodology

The Early Childhood Longitudinal Study- Birth Cohort (ECLS-B) is a nationally representative sample of approximately 11,000 children born in 2001. This study is fielded by the National Center for Education Statistics within the U.S. Department of Education. The ECLS-B is a longitudinal study, with data collection when children are 9 months, 24 months, 48 months, and upon Kindergarten entry.[1] The ECLS-B provides rich information on child and family characteristics, children's early care and education experiences, and child outcomes at multiple time points. It uses multiple methods and data sources to gather information, including direct assessments of the target child, videotapes and audiotapes of interactions, interviews with parents and child care providers, self-administered questionnaires for parents and providers, and observations of the child care environment.

Sample Design

The data used for this brief were collected at the 9- and 24-month data waves. Analyses of the 9-month sample were limited to children aged 8-11 months and analyses of the 24-month sample were limited to children aged 22-25 months.[i]

Person-Level Weights

In order to produce national estimates, person-level weights constructed for the ECLS-B were used for the analyses. The weights account for the probability of sampling the child in a given household, and adjust for the probability of sampling the child from among all eligible children in a given domain. In this brief, the W1C0 and W2C0 weights were used for the 9- and 24-month analyses, respectively. These weight variables are appropriate for cross-sectional analyses of ECLS-B data that include child assessment outcomes.

Analyses

For this research brief, we performed descriptive statistics and conducted t-tests to examine the developmental gaps between children with certain demographic characteristics of interest. Demographic characteristics studied in this brief are: household income, maternal education, race/ethnicity, and home language. In our analyses, the most advantaged group of children (i.e., the reference group) were compared to less advantaged groups of children on indicators of cognitive mastery, general health, and social emotional development. For example, children in families above 200 percent poverty are the reference group for analyses of disparities by family income, and children whose mother's have a Bachelor's degree or higher are the reference group for analyses of disparities by maternal education. We then calculated effect sizes and odds ratios[ii] to determine the magnitude of the gap. The accepted guidelines for interpreting effect sizes are that effect sizes of

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[i] The nine month wave of data for the ECLS-B data was collected when infants were between 6 and 22 months. The sample for this brief was limited to children aged 8-11 months (83% of the full sample) in order to minimize the effect of maturation on children's developmental achievements. Likewise, the twenty-four month data was collected from toddlers when they were between 21 and 39 months. The sample for this brief was limited to children aged 22-25 months (90% of the full sample).

[ii] We used standardized mean difference (Cohen's *d*) to examine the relation between categorical independent variables and continuous outcome measures, and odds ratios to examine the relationship between categorical independent variables and dichotomous dependent variables.

.20 or less are considered "small," effects sizes around .50 are considered "medium," and effect sizes of .80 or more are considered "large."[2] However, even small effect sizes can have policy implications. For example, an effect size of .25 or more is considered to be an "educationally meaningful" difference in behavioral science research.[2, 3]

Analyses were used to compare characteristics of infants/ toddlers in the sample on indicators of cognitive mastery, general health, and social emotional development. Findings discussed in the brief are statistically significant at the .05 level unless otherwise noted. Additionally, figures contain the following indicators of statistical significance: * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Measures

Our analyses compared infants/toddles with varying demographic characteristics on indicators of cognitive mastery, general health, and social-emotional development. The measures for each of these developmental domains as well as demographic factors are summarized below. See table for at the end of this Technical Appendix for the variable names.

Cognitive Development

***Bayley Short Form Mental Scores*:** Child cognitive development outcomes are measured using the Bayley Short Form-Research Edition (BSF-R) mental scale, which was adapted from the Bayley Scales of Infant Development II (BSID-II). The BSID is a widely used measure that assesses children's developmental status. In terms of psychometric properties, the BSID has demonstrated a high degree of reliability using tests of internal reliability, test-retest stability, and interrater agreement.[4] Though the BSID is believed to have a high degree of construct validity, its concurrent validity varies depending upon which measure it is being compared to[5]. The predictive validity of the BSID varies depending upon the age of the child being assessed. The BSID administered when children are 14 and 24 months of age yields mixed evidence of strong correlations with other measures of mental development available for use with very young children.[5] Furthermore, previous research has not found the BSID at 9 months to be strongly predictive of later cognitive outcomes for children.[6] However, there is strong support for the reliability of the BSID-II and reasonably good support for construct and concurrent validity. [4, 5] This variation in predictive validity is likely due to the closer alignment between assessed skills and later cognitive achievement in older children. For example, the BSID assessment for 9 month olds consists primarily of motor and self-regulation skills; whereas the BSID assessment of 24 month olds primarily focuses on language-based, quantitative, and problem solving skills.

The BSF-R adaptation of the BSID, used in the assessment of children in the ECLS-B study, includes a subset of assessment skills chosen based on their psychometric properties, coverage of constructs, ease of administration, and objectivity of scoring.[5] The BSF-R mental scale has a theoretical reliability of .98.[7] Differential testing and item functioning for the BSF-R were assessed for various subgroups, including by race and socioeconomic status. This testing revealed minimal statistical bias, represented by minute to small effects, among racial/ethnic minority groups and children with a low socioeconomic status.[7] Children whose home language was not English were assessed in their home language. The assessor (or an interpreter in the case of less common languages) gave verbal instructions in the child's language and BSF-R items were scored according to what the child said in that language. If an interpreter was necessary, the language items were scored on the basis of what the child said as reported by the interpreter.

The mental BSF-R scores are created through a direct assessment of the child's proficiency performing age-appropriate skills. At 9 months, the assessed skills are: explores objects (ex. picks up cube, plays with string, manipulates bell), explores purposefully (ex. retains two or three cubes for three seconds, rings bell purposely), jabbers expressively (ex. jabbers expressively, responds to spoken request), early problem solving (ex. uses rod to attain toy, puts beads in box), and names objects (ex. uses two different words appropriately, uses words to make wants known, names one objects). At 24 months, the child's proficiency at receptive vocabulary (ex. points to pictures, points to doll's body parts), expressive vocabulary (ex. combines words and gestures, names objects, names pictures), listening and comprehension (ex. attends to story, displays verbal comprehension), matching and discrimination (ex. matches pictures, matches three colors, discriminates pictures), and early counting or quantitative skills (ex. understands concept of one, counts, compares masses) is assessed. In administering the tests, children were presented with objects and verbal instructions. The assessor often modeled the desired response and then observed and recorded the child's behavior. The assessor then recorded the child's behavior as either receiving credit or not receiving credit on each of the assessed skills.

The skills measured at each time point are intended to capture a continuum of development. For instance, most 9 month olds are expected to be proficient in exploring objects, whereas only those who are developmentally advanced will be able to name objects. Among 24 month olds, proficiency in receptive vocabulary skills is broadly expected, whereas early counting or quantitative skills will only be demonstrated by developmentally advanced 24 month olds. On the basis of their performance on the core items, some children received a supplementary set of basal or ceiling items.

We present information from the BSF-R in two ways:

- **Bayley Short Form Mental T-score:** The t-score, a standardized score, measures a child's mental ability relative to other children of the same age group. The BSF-R Mental T-scores have a mean of 50 and a standard deviation of 10. A T-score that exceeds 50 implies that the child's performance level is higher than the average level for children of the same age group and the average t-score for a subgroup of children can be used to determine whether that subgroup is above or below the average level of performance for children their age.

- **Proficiency Probabilities:** To better understand which sets of assessed skills children have mastered, we include the proficiency levels of 9 and 24 month old children on each of the age appropriate skills listed above. Proficiency probabilities represent the proportion of children who have mastered a specific skill or ability within a developmental domain. Scores range from 0.0 to 1.0 with the mean score representing the proportion of children in a group who have reached or surpassed a given milestone. The proficiency levels represent certain milestones in children's mental development across the 9-month and 2-year time period.

Health

The measure of child health was derived from parents' ratings of their child's overall health status. Parents were asked to rate their child's general health status as either excellent, very good, good, fair, or poor. This study reports the percentage of children with excellent or very good health. This parental-report measure of global child health has been used in the National Health Interview

Survey (NHIS) and the National Household Education Survey (NHES).[8] As the health measure is dichotomous, odds ratios are used as an alternative for effect sizes in Tables 4 and 5.

Social-emotional Development

Positive Behavior Index (9 and 24 months)

The Positive Behavior Index is based on a subset of questions from the full Behavior Rating Scale (BRS) in the Bayley Scales of Infant Development, Second Edition (BSID-II). Items include displaying positive affect (e.g., smiling and laughing), displaying negative affect (e.g., crying and fussing), showing interest in materials, paying attention to tasks, adapting to changes in materials, displaying social engagement, and control of movements. These items were selected because they are representative of four key behaviors: attention and arousal, motor quality, orientation and engagement, and emotional regulation for children at both 9 and 24 months. For each item, the assessor observed the child's behavior during the BSF-R and scored him/her on a 5-point scale that incorporated both intensity and frequency of the target behavior. A higher score indicates more intense, heightened, or prolonged displays of the behavior, with the negative affect item being reverse-coded. A combination of these items results in a scale of 7 to 35 with higher scores indicating more positive behaviors.

Secure Attachment (TAS-45)

The Toddler Attachment Sort – 45 (TAS-45) is a measure of children's security of attachment, measured at 24 months, which was developed from the Attachment Q-Sort (AQS).[9] In the AQS, an assessor evaluates a child's interactions with his or her mother during a stressful situation and organizes each child behavior on a scale from "highly characteristic" to "highly uncharacteristic". The TAS-45 is an adapted, shortened version of the AQS, designed for the ECLS-B. For the TAS-45, ECLS-B assessors did not limit data collection to mother-child interactions but rather the interaction between the child and the parent or primary care-giver who gave the interview and was in attendance for the child assessments. An observer classified each child into one of four attachment styles: disorganized, avoidant, ambivalent, or securely attached. This classification was then used to create a dichotomous variable separating children with a secure attachment from children with all other attachment styles (i.e. disorganized, avoidant, or ambivalent type). Among the full nationally representative ECLS-B sample, 61 percent of children were rated as securely attached. This figure is similar to estimates of secure attachment in normal samples of infants.[10] As the attachment measure is dichotomous, odds ratios are used as an alternative for effect sizes in Table 5.

Demographic Factors

We compared children across several demographic factors including household income, race/ethnicity, home language and maternal education.

Income

We compared children in low-income families (less than 200% of the federal poverty line) to children in higher-income families (200% of the federal poverty line or above). Income information was based on the parent survey. Poverty threshold information was taken from the ECLS-B 9-Month User's Guide.[11]

Race/ethnicity
We compared white children to racial/ethnic minority children, specifically non-Hispanic blacks, Hispanics, non-Hispanic Asian, American Indian/Alaskan Native, and "other" race/ethnicity.

Home Language
We compared children whose home language is English to those who spoke Spanish and to those who spoke neither English nor Spanish at home.

Maternal Education
We compared children whose mother had received a Bachelor's degree or higher to those children whose mother had less than a high school education, a high school diploma/GED, and some college or more.

Variables Names

ECLS-B variables used - 9 months	
Developmental outcomes	
Bayley cognitive assessment t-score	X1RMTLT
Explores objects	X1MTL_A
Explores purposively	X1MTL_B
Jabbers expressively	X1MTL_C
Early problem solving	X1MTL_D
Names objects	X1MTL_E
Health	P1CHEALT
Positive Behavior Index	R1POSAFF, R1NEGAFF, R1ADAPT, R1INTRST, R1ATNTSK, R1SOCIAL, R1CNTLMV
Demographic factors	
Income	P1HHINCY, X1INCOME (where P1HHINCY is missing), X1HTOTAL
Race/ethnicity	X1CHRACE
Home language	X1LANGST, P1PRMLNG, P1LANG01-PR1LANG23 (where P1PRMLNG is missing)
Mother's education	X1MOMED
ECLS-B variables used - 24 months	
Developmental outcomes	
Bayley cognitive assessment t-score	X2MTLTSC
Receptive vocabulary	X2MTL_F
Expressive vocabulary	X2MTL_G
Listening/comprehension	X2MTL_H
Matching/discrimination	X2MTL_I
Early counting/quantitative	X2MTL_J
Health	P2CHEALT
Positive Behavior Index	R2POSAFF, R2NEGAFF, R2ADAPT, R2INTRST, R2ATNTSK, R2SOCIAL, R2CNTLMV
Secure Attachment	X2TASCLS
Demographic factors	
Income	P2HHINCY, X2INCOME (where P2HHINCY is missing) , X2HTOTAL
Race/ethnicity	X2CHRACE
Home language	X1LANGST, P1PRMLNG, P1LANG01-PR1LANG23 (where P1PRMLNG is missing)
Mother's education	X2MOMED

References

1. National Center for Education Statistics. (2006). Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), User's manual for the ECLS-B longitudinal 9-month--2-year data file and electronic codebook.
2. Cohen, J. (1988). *Statistic power analysis for behavioral sciences, Second Edition*. Hillsdale, NY: Lawrence Earlbaum.
3. Tallmadge, G.K. (1977). *The Joint Dissemination Review Panel IDEABOOK.*
4. Bayley, N. (1993). Bayley Scales of Infant Development, Second Edition: Manual. San Antonio, TX: The Psychological Corporation.
5. Berry, D., Bridges, L., & Zaslow, M. (2004). Early Childhood Measures Compendium. Washington, DC: Child Trends.
6. Horner, T. (1980). Test-retest and home-clinic characteristics of the Bayley Scales of Infant Development in nine- and fifteen-month old infants. *Child Development, 51*, 751-758.
7. Andreassen, C., & Fletcher, P. (2007). Early Childhood Longitudinal Study- Birth Cohort (ECLS-B) Psychometric Report for 2-Year Data Collection (NCES 2007-084). Washington, DC: National Center for Education Statistics, Institute for Education Sciences, US Department of Education.
8. Child Trends and SRI International. (2002). First Five California: Child, Family, and Community Indicators Book: Available online at: http://www.ccfc.ca.gov/evaluation/PDF/Resources/Child_Family_and_CommunityIndicators.pdf.
9. Waters, E., & Deane, K. (1985). Defining and assessing individual differences in attachment relationships: Q-methodology and organization of behavior in infants and early childhood. . In I. Bretherton and E. Waters (Eds.), *Growing points in attachment theory and research. Monographs of the Society for Research in Child Development, Nos 1-2* (Vol. 50, pp. 41-65).
10. Ainsworth, M., Blehar, M., et al. (1897). *Patterns of Attachment: A Psychological Study of the Strange Situation*. Hillsdale, NJ: Earlbaum.
11. National Center for Education Statistics. (2004). User's Manual for the ECLS-B Nine-Month Restricted-Use Data File and Electronic Code Book: U.S. Department of Education, Institute of Education Sciences, NCES 2004-092.