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Is it too late baby? pinpointing the emergence of a black-white test score gap in infancy

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IS IT TOO LATE BABY?
PINPOINTING THE EMERGENCE OF A BLACK-WHITE TEST SCORE GAP IN INFANCY

by

Phyllis Love Farley Rippeyoung

An Abstract

Of a thesis submitted in partial fulfillment
of the requirements for the Doctor of
Philosophy degree in Sociology
in the Graduate College of
The University of Iowa

May 2006

Thesis Supervisor: Assistant Professor Mary Noonan

ABSTRACT

Racial inequality in educational and occupational attainment has been shown to be related to racial inequality in test scores and cognitive skills. Most research and policy attention has been given to the ability of schools to equalize test scores. I argue that a major reason why researchers have been unable to explain why schools have not closed the gap is because by the time children begin school it may be too late. Cognitive skills develop from infancy and as such, it should be unsurprising that by the time children are five years old the differences across groups are firmly established. Thus, this research attempts to uncover where the racial test-score gap begins by examining infants.

I perform a series of analyses using ordinary least squares regression (OLS) and structural equation modeling (SEM) using the first wave of the Early Childhood Longitudinal Study—Birth cohort (ECLS-B). I utilize the mother's race, rather than the child's race, in the analyses because looking at the mother's race makes the most logical sense since the mother's race is more likely than the child's to determine household income, marital status, mother's education, parenting styles, and so on.

I demonstrate that there is little to no raw gap in cognitive skills between the infants of White and Black mothers in the United States. However, through SEM I find that when one controls for social, human, and financial capital, and for differences in health and type of childcare, the infants of African American mothers would actually do better than the infants of White mothers because of their precocious motor development. I find no support for genetics and childcare and only limited support for financial and human capital as mediators of the gap. However, there is support for family social capital and low birth weight as key mediators of the small Black-White test score gap in infancy.

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Iowa City, Iowa

CERTIFICATE OF APPROVAL

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PH.D. THESIS

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This is to certify that the Ph.D. thesis of

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has been approved by the Examining Committee
for the thesis requirement for the Doctor of Philosophy
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David Bills

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Jennifer Glass

_____
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To my boys

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ABSTRACT

Racial inequality in educational and occupational attainment has been shown to be related to racial inequality in test scores and cognitive skills. Most research and policy attention has been given to the ability of schools to equalize test scores. I argue that a major reason why researchers have been unable to explain why schools have not closed the gap is because by the time children begin school it may be too late. Cognitive skills develop from infancy and as such, it should be unsurprising that by the time children are five years old the differences across groups are firmly established. Thus, this research attempts to uncover where the racial test-score gap begins by examining infants.

I perform a series of analyses using ordinary least squares regression (OLS) and structural equation modeling (SEM) using the first wave of the Early Childhood Longitudinal Survey—Birth cohort (ECLS-B). I utilize the mother's race, rather than the child's race, in the analyses because looking at the mother's race makes the most logical sense since the mother's race is more likely than the child's to determine household income, marital status, mother's education, parenting styles, and so on.

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capital and low birth weight as key mediators of the small Black-White test score gap in infancy.

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CHAPTER 1

INTRODUCTION

Whites[1] score higher than Blacks on tests of cognitive skills, such as IQ tests and the SAT. This disparity is important because racial inequality in test scores and cognitive skills has been shown to be related to racial inequality in educational and occupational attainment (Farkas 2004, Jencks and Phillips 1998). Dating back to the 1954 Brown vs. the Board of Education decision to desegregate schools, solutions to this problem have often revolved around education as the key to emancipation from structural disadvantage. Although it is undeniable that the initiatives advanced since the 1950s have reduced racial inequality, a test score gap persists. I argue that a major reason why researchers have been unable to explain why schools cannot fully close the gap is because by the time children begin school it may be too late. Cognitive and motor skills develop from infancy and as such, it should be unsurprising that by the time children are five years old, the differences across groups are firmly established. Thus, research needs to uncover when the racial test score gap begins by examining very young children—infants.

Social scientists have proffered a number of explanations to explain why Blacks tend to score lower than Whites. These arguments point the finger at racial biases in the tests, and at racial difference in children's genetic makeup, in their peers, in their parents, in their teachers and in their schools. Generally, each argument appears to explain at least part of the gap in cognitive skills and educational attainment. In my dissertation, I aim to bring together this wide ranging literature to the earliest age yet assessed in

[1] In this study, I use the terms race and ethnicity as well as Black and African American or White and European American interchangeably as a rhetorical device for the purposes of brevity or to avoid too much repetition. The usage of various terms used should not be viewed as support of the idea that one's race is a biological construction. Rather, I view race and ethnicity as social constructions that have come to reflect group cultural differences (Helms, Jernigan, and Mascher 2005).

national data. By using the Early Childhood Longitudinal Survey-Birth (ECLS-B) cohort data I analyze whether there is a racial gap in cognitive skills in infants, as measured by the Bayley Short Form—Research Edition assessment (NCES 2002)[2] and what factors explain it. My analysis shows that there is a marginally statistically significant gap in cognitive skills across races, with infants of White mothers scoring about 8/10ths of a point higher than Blacks, which translates into about an 8/100ths of a standard deviation difference. Though small, I believe understanding the causes of this gap are important because with an awareness of the gap's etiology we can prevent rather than make-up for the gap. For instance, parents who play and interact with their children frequently in infancy are increasingly likely to do so with their children as they age. If society does not implement programs to help less interactive parents learn to better engage with their children, then children with highly interactive parents will increase their skills exponentially and those with less interactive parents will fall farther and farther behind. Thus, by attempting to understand the causes of this gap at the earliest age possible, I believe we can shed light onto problems that become magnified as the children age.

This dissertation will first outline and describe the relevant literature on childhood cognitive development and the main explanations for the Black-White test score gap across the life course including test bias, genetics, peers, financial capital, human capital, social capital (including family structure, parenting, social ties and social engagement, and mother's work status), health and low birth weight, and schools and childcare. This review of the literature will lead to a series of hypotheses of the effects of each of these concepts and to my overarching conclusion that children's birth weight and their families' social capital are the key causes of the Black-White test score gap in infancy.

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[2] The Bayley is the most commonly used assessment of infant development (Black and Matula 2000).

The results of this dissertation show that were African Americans given the same health, income, education, and social resources as European Americans, the children of Black mothers would outperform their peers with White mothers on cognitive tests. Although the gap and the amount of explained variation are small, this research suggests that Blacks and Whites start out basically the same, and if given the same resources, infants of Black mothers would do slightly better in tests of cognitive skills. Furthermore, I find that the primary reasons why there are differences in cognitive ability across races is due to differences in the health of the children and in their family social capital, especially family structure, social ties, and parenting. Additionally, I also assess the role of childcare in mediating the family environment and conclude that despite the fact that childcare seems to do no harm to children's cognitive ability, the family is the most important arena for infant cognitive development. Whereas childcare does not appear to narrow racial disparities in cognitive skills among infants, greater support for mothers, both pre- and post-natally, may be a viable solution.

This research contributes to the literature in a number of respects. First, as I believe that parenting is a central determinant of the racial gap, I look at the race of the infants' mothers. Most research has examined only the race of the child, but if parenting is what truly matters researchers should be looking at the parents' race. Although there is not a substantial proportion of interracial families, in these data approximately 8% of the mothers have a child of a different race, theoretically, examining the mother's race makes the most sense, since the mother's race is more likely to be associated with household income, educational levels, and other mediators of the cognitive skills gap than would the child's race.

The second contribution to the literature made by this dissertation is my assessment of genetic arguments. I compare differences among Black, White, and Black-White biracial infants to indirectly assess genetic arguments. If the argument that genes drive the Black-White test score gap are correct, then those infants with half-Black and

half-White genes should do worse than 100% White infants and better than 100% Black infants, especially controlling on the environment. If differences remain, this could indicate that there are unmeasured environmental influences, but if there are no differences across these races, this would lend support to those who say the gap is caused by group differences in environments not in genes.

The third contribution made by this research is that, based on my review of the literature, I believe that I am the first to conduct a comprehensive analysis of the Black-White test score gap on a nationally representative sample of infants. In their research on the effects of poverty on young children's cognitive skills, Smith, Brooks-Gunn, and Klebanov (1997) report mean differences in test scores by race among one year olds, but they use data that was not nationally representative and they did not perform any type of regression analysis. As discussed above, I believe it crucial that we begin looking at the racial gap in cognitive skills among very young infants, and in the future, more research should be directed at the prenatal period to fully understand these life-long stratification processes. There is no doubt that mothers' prenatal care, nutrition, and lifestyle can have an impact on children's outcomes, but how this influences racial stratification processes over the life course is not fully understood. Further, by looking at infants, one can disregard a number of factors that are important to control for when examining the racial gap in test scores among adolescents or adults. For instance, theories about test-anxiety inducing "stereotype threat" or school tracking do not make sense when discussing babies since babies are highly unlikely to understand the consequences of test "failure" nor are they old enough to be in school. As such, by looking at babies, some confounding factors can be ignored.

Fourth, because of the immense variety of data collected in ECLS-B used in the analyses I am also able to control on a wide number of factors that are typically not available in smaller data sets. The ECLS-B data include measures of income, education, parenting knowledge, health, parenting behaviors, social ties, social engagement, and

child care. Having such a wide variety of measures is useful in order to assess the true effects of each indicator, as many of them are correlated with one another. For instance, I am able to assess if income truly matters to the test-score gap or if number of siblings—which is related to income—is what really matters.

Fifth, this study adds to the literature by looking not only at what resources African American families may lack compared to White families, but what beneficial characteristics they possess. In particular, past research has shown that African American babies surpass their White peers in their motor skills and I am interested in what impact that motor advantage may have on the Black-White test score gap. Although the cognitive skills gap is problematic in terms of academic achievement, perhaps there are other realms of achievement that researchers have not adequately explored that provide alternative venues for success in Black communities. For example, the precocity of Black infants' motor skills may lead them to greater success in more physically focused activities, such as sports.

Sixth, this research adds to prior research through the use of complex statistical methods including ordinary least squares (OLS) linear regression and structural equation modeling (SEM) using nationally representative data. OLS regression will allow me to assess the relative influence of various factors. SEM allows me to assess indirect effects of important predictor variables and this technique also allows me to use latent variables which minimize measurement error making for more accurate assessments. Further, by using nationally representative data, the results can be generalized to the American population and are not linked only to certain subpopulations.

Seventh, I end this dissertation with policy recommendations based on the findings of this research. Overall, the dissertation benefits from being grounded in both empirical and theoretical research, as well as offering nationally representative statistical findings with direct policy implications. This information is necessary so that policy makers can most effectively address long-term social problems associated with racial and

economic inequality. By providing babies and parents with help, the potential racial gap in cognitive scores can hopefully be nipped in the bud before the problem becomes exponentially magnified.

My hope is that this research will not be construed as "blaming the victim," but rather will be a means to further tighten the tourniquet on the scourge that is racism in the United States. I do not view racial categories as anything more than a social construction, based on a history of racism (Smedley and Smedley 2005), but because of the significance given to these categories and because of the treatment of people (either positive or negative) based on this particular classification system, race matters. I believe that one day it won't matter quite so much; I believe this in part because of the findings of this dissertation. As quoted by Martin (1973), Dr. S. L. Washburn made a point at his presidential address to the American Anthropological Association that I find amazing is not repeated more often:

> I am sometimes surprised to hear it stated that if Negroes were given an equal opportunity, their I.Q. would be the same as Whites. If one looks at the degree of social discrimination against Negroes and their lack of education, and also takes into account the tremendous overlapping between the observed I.Q.'s of both, one can make an equally good case that, given a comparable chance to that of the White, their I.Q.'s might be higher (565).

This quote reflects the findings of these analyses. Although I find that the reason for African American babies doing better has less to do with their ability as babies to overcome obstacles, as surmised by Washburn's presidential address, and more to do with unexplained precocious motor development, these results indicate that there is hope for a reduction in the Black-White test score gap at this young age and beyond. Because the cognitive race gap is so small in infancy, I am optimistic that the gap can be reduced and removed if society supports parents of young children through various programs, instead of waiting until it is too late.

I strongly believe that most parents, regardless of race, *want* the best for their children (Combs-Orme et al. 2003); I do not think that some people are inherently

"better" parents than others out of an innate knowledge-base. But I do believe that some families have more resources than others, and this makes it easier for them to spend time relaxing with a child on their laps reading a story or spending an afternoon in the park. I also know from personal experience that parenting is hard; children are incredibly demanding of parents' resources—financially, emotionally, and spiritually. Even the most Zen-like mothers need help from time to time in dealing with their children. In order to reduce racial inequality, our society needs to actively challenge the fallacy that parenting is easy, as well as the sexist corollary that mothering, in particular, comes naturally to women.

CHAPTER 2

REVIEW OF THE LITERATURE

Despite desegregation, school bussing initiatives, Head Start, and affirmative action, African Americans consistently have demonstrated lower test scores than Whites on IQ, vocabulary, math, reading, and college entrance tests (Jencks and Phillips 1998). The gap has been shown to exist since James Coleman surveyed the state of educational inequality in the United States in the seminal Coleman Report (Coleman, et al. 1966) and, ever since, researchers have been tracking it to try to understand the causes of it (Chubb and Loveless 2002).

Chubb and Loveless (2002) state the case starkly when they write: "The average Black or Hispanic student, in elementary, middle, or high school, currently achieves at about the same level as the average White student in the lowest quartile of White achievement" (1). In their review of the literature on intelligence, Neisser et al. (1996) found that Blacks typically score one standard deviation below Whites on IQ tests.[3] They found the gap to be narrowing somewhat over time because of Black gains. However, they found that a gap of 13 points in younger children and 10 points in older children remains.

According to the National Assessment of Educational Progress (Donahue, Daane, and Grigg 2003), in 2003 only thirteen percent of African American fourth and eighth graders scored above "proficiency" levels for reading skills compared with 41 percent of White fourth and eighth graders. Additionally, only 40 percent of Black fourth graders and 54 percent of Black eighth graders scored at a "basic" level for reading compared with 75 percent of White fourth graders and 83 percent of White eighth graders. Gaps

[3] Most standard intelligence tests are normed to have a mean of 100 with a standard deviation of 15.

are similar in mathematics with ten percent of Black fourth graders and seven percent of Black eighth graders scoring at the proficient level or above on math skills compared with 43 percent of White fourth graders and 37 percent of White eighth graders. Also, for basic skills, Blacks lag behind Whites at 54 percent and 39 percent of fourth and eighth graders, respectively, scoring at the basic skills level compared with White's 87 percent and 80 percent for fourth and eighth graders, respectively.

Using the Infant Health and Development Program (IHDP) data on low-birth weight five year olds, Brooks-Gunn, Klebanov, and Duncan (1996) also found that the African American children in their sample score one standard deviation below European Americans on the Wechsler Preschool and Primary Scale of Intelligence. In the most recent study using the most recently available data, the Early Childhood Longitudinal Survey—Kindergarten (ECLS-K) cohort, Fryer and Levitt (2004) found that at Kindergarten entry the gap has shrunk somewhat; but there is still a raw Black-White test score gap of six-tenths of a standard deviation in math skills and four-tenths of a standard deviation in reading skills between Blacks and Whites.

The race gap in scores has been shown at earlier ages as well. For example, using the National Longitudinal Survey of Youth Child Data (1986-1994), Jencks and Phillips (1998) looked at Black and White three and four year olds scores on the Peabody Picture Vocabulary Test-Revised (PPVT-R). They showed that Whites had a median score of 52 whereas Blacks scored a median of 40, more than a full standard deviation lower than Whites. In an analysis examining the effect of poverty on young children's cognitive skills, Smith, Brooks-Gunn, and Klebanov (1997) controlled on race and found that there was a Black White test score gap of between three to six points at age two on the Bayley Scale of Infant Development, controlling on a variety of factors such as birth weight, mother's education, family structure, and poverty, using the IHDP data. From these studies, there seems to be evidence that the gap increases as the children age, but that there is nonetheless a gap that has yet to be fully explained as early as age two.

Why is This Important?

Understanding the causes of a cognitive skills gap between Whites and Blacks is important because the gap has consequences for long-term stratification processes. A serious result of this gap is that it influences racial inequality generally and has been linked to long-term discrepancies between Blacks and Whites in occupational and income attainment (Farkas 2003a, Farkas 2004, Farkas, England, Vicknair, and Kilbourne 1997, Kerckhoff, Raudenbush, and Glennie 2001). There is some debate as to the *relative* importance of cognitive skills, educational credentials, and employer discrimination in determining the extent of the wage gap between Blacks and Whites, but there is clear evidence that cognitive skills play some role (Bowles, Gintis, and Osborne 2001, Maume, Cancio, and Evans 1996).

For instance, using the National Adult Literacy Survey (NALS), Kerckhoff et al. (2001) assess the relative importance of education and cognitive skills on occupational and earnings attainment. The NALS is a multi-item assessment of multiple skills that aims to measure cognitive skills. As they write:

> It is based on items measuring the respondents' ability to understand and interpret prose statements, to derive significant information from complex published documents (charts, graphs, maps, and tables), and to choose appropriate types of quantitative operations and carry them out. (3)

Though called a "literacy" test, the authors insist that it is more broadly conceived and is a good test of general cognitive skills. The authors assessed the role of race/ethnicity, family background (including respondents' parents education), and native language on the NALS, as well as on educational attainment, occupational status, and earnings. The authors found that educational attainment explains more of a person's occupational and income attainment than cognitive skills do, although cognitive skills also make a significant and unique contribution to income and occupation. However, the difference between African Americans' and Whites' income and occupational attainment can be fully explained by cognitive skills and not by educational attainment. Thus,

according to their findings, African Americans' lower financial earnings and lower status jobs are a function of lower cognitive skills, not of lower educational attainment.

Similarly, Farkas, et al. (1997) found that cognitive skills play a significant role in the occupational and earnings attainment of African Americans and Mexican Americans relative to European Americans. Using the 1991 National Longitudinal Survey of Youth (NLSY), the authors ran six separate regression models by race and gender to assess the effect of the respondents' cognitive skills on the cognitive skills requirements and wages of jobs. Their measure of cognitive skills is the Armed Forces Qualification Test (AFQT) which is a series of tests assessing word knowledge, paragraph comprehension, arithmetic reasoning, and math knowledge. They found that cognitive skills did not explain gender differences in occupational and wage attainment but they did explain a large portion of racial occupational and wage inequality. They also argue that the differences in cognitive skills between Blacks and Whites explains more of the Black-White wage gap, than does employer discrimination, and differences in education and in cultural capital between each group. As a result, the authors stress the importance of focusing policy on increasing the cognitive skills of African Americans and Mexican Americans, as a means to remedying racial inequality in the marketplace.

From this past research we see that cognitive skills have long term consequences on stratification processes. Economic inequality also has serious impacts on other social problems. Criminality has been shown to be linked to those who are employed sporadically and in "secondary sector" jobs (Crutchfield and Pitchford 1997). "Secondary sector" jobs derive their labels from the dual economy literature and indicate jobs that require low levels of skill, tend to have little upward mobility, and are often characterized by a revolving door of employees with little organizational commitment. Since lower cognitive skills are linked to jobs that require lower skills, which is typical of "secondary sector" jobs, the impact of low cognitive skills has far reaching implications. These implications also reach out to the health of individuals. Poor health has been

shown to be related to lower education, unemployment, and less satisfying work (Ross and Wu 1995), all of which are related to cognitive skills.

Why Look at Babies?

Voluminous research has documented the existence of a racial gap in cognitive skills in young children and has shown that family background and socioeconomic status can explain a large portion of the gap. However, until now, researchers have not had access to nationally representative data on children younger than three years old. In their analysis of how the Black-White test score gap changes over the course of schooling, Phillips, Crouse, and Ralph (1998) write "our results imply that we could eliminate at least half, and probably more, of the Black-White test score gap at the end of the twelfth grade by eliminating the differences that exist before children enter first grade" (257). I believe that if we can establish an age at which the gap begins, we could begin to implement policies to prevent the gap, rather than simply try to remedy an already existing one. The earlier that our society can nip the problem in the bud, the better chance we have at reducing racial inequality in academic achievement, and occupational and income attainment, and the social problems that come coupled with inequality such as crime, health disparities, and urban unrest. In this dissertation, I look at nine-month old infants to see if a racial gap in mental and motor scores exists in infancy and, if so why.

Recently, scholars have begun to realize that by the time students are in high school much of the structural disadvantage has become so pervasive in the lives of Black students that the chance to overcome these barriers seems to have passed (Alexander, Entwisle, and Horsey 1997, Lee and Burkham 2002). In order to address this, scholars have begun to look at "kindergarten readiness," or the degree to which a child is prepared to enter kindergarten. For instance, using the Early Childhood Longitudinal Survey—Kindergarten Cohort, Lee and Burkham (2002) argue that even by the time children begin

school it may be too late for schools to eliminate the cognitive skills gap associated with poverty and race.

Others argue that the lifelong test score and achievement gap between Blacks and Whites can be traced to the early learning years, even before children go to kindergarten (Farkas 2004). Interested in documenting the time at which a class-based achievement gaps begin, Hart and Risley (1995) conducted a ground breaking analysis of one to three year olds that linked economic class to cognitive skill development based on language acquisition from parental interactions. They conducted an in-depth observational analysis of 42 families and found that parents on welfare interacted and spoke with their children less than working class parents, who did so less than professional parents. This discrepancy in early interactions led to increasing discrepancies in vocabulary development as the children got to the preschool age, which laid the groundwork for lifelong cognitive discrepancies across classes. Thus, they argue that it is the earlier stages of development, in infancy and toddler-hood, where interventions are most needed for heading off lifelong gaps in IQ scores and other cognitive assessments. Hart and Risley (1995) strongly argue that there was no racial gap in cognitive development, but only in socioeconomic groups. However, their sample size does not allow for much racial variation across classes; in fact, most of the African Americans were in the lowest economic sector in their study.

In a follow up study, Farkas and Beron (2004) attempted to assess the validity of the Hart and Risley (1995) study by using a large nationally representative sample from the Children of the National Longitudinal Survey of Youth between the ages of three and thirteen years of age. They found that by the age of three a gap in the complexity of children's vocabularies was clear between Blacks and Whites. They further found that this gap stopped growing (at least until age 13) once children started kindergarten, suggesting that school initiatives do have an impact on racial disparities in learning, but that the gap becomes set before the children begin school.

Although the Farkas and Beron (2004) study is informative, further research in this area is necessary. In particular, since their study contradicts the Hart and Risley (1995) results, we need further evidence of whether or not there truly is a racial gap in early child development. Further, if Farkas and Beron are correct that there is a racial gap in development at the age of three, this begs the question: when exactly does the gap begin? Does it start at birth with differences in what babies hear, with babbling around six to twelve months, with word usage around a year and a half, or with the beginning of word combinations around two years?

What Do Babies Do on Average?

In order to contextualize an analysis looking at babies, it is important to understand what infants are developmentally capable of around the age of the sampled infants—10 months. By the time infants have reached 10 months, they have already learned a huge amount that will aid them in life. By this point in their cognitive development, most infants should be familiar with the concept of causality, they should be aware that they can learn new behaviors by watching others, they should be able to differentiate between accidental and intentional acts, and they should be able to represent numbers (Shonkoff and Phillips 2000).

Research has not found that there are "sensitive periods" in infant cognitive development, such as there are with language acquisition. Cognitive development appears to be quite elastic and new learning has been shown to be possible by people of any age. Shonkoff and Phillips (2000) point out, however, that there may be sensitive periods that research cannot assess. This is because research cannot ethically compare children who have been entirely denied cognitively stimulating activities with those who have not, to assess whether or not the timing at which a child engages in certain activities matters. When assessing sensitive periods with language acquisition, one can compare native and non-native speakers to discover if the age at which a person learns a language influences

one's capacity to speak like a native. In rare cases, severely neglected children who have received minimal cognitively stimulating activities could be examined, but the extreme maltreatment confounds any relationship between the timing of the inputs and capacity for learning. Furthermore, even these children typically gain cognitive skills as do those who were never deprived. Overall, research supports the idea that almost all infants go through a somewhat standard progression of learning that can have variation in rates of learning based on environmental and genetic differences (Shonkoff and Phillips 2000).

Causes of this Gap

Up until recently, most sociological research on the Black-White test score gap has looked at older children and high school students. Recently, researchers have begun to look at younger children, as young as two or three. There have been a number of explanations for the Black-White test score gap among all these age groups including test bias (Jencks 1998, Maume, Cancio, and Evans 1996), genetics (Dickens 2005, Herrnstein and Murray 1994, Nisbett 1998, Rowe 2005, Rowe and Cleveland 1996, Rowe, Vazsonyi, Flannery 1994,), test anxiety due to status or a fear of stereotypes (Lovaglia, et al. 1998, Steele and Aronson 1998), oppositional culture and academic disengagement (Cook and Ludwig 1998, Ogbu 2003), human capital (Mayer 1997a, Parks and Smeriglio 1986, Smith, Brooks-Gunn, and Klebanov 1997, Stevens 1984), health (Currie 2005, Reichman 2005), financial capital and poverty (Brooks-Gunn, Duncan, Maritato 1997, Brooks-Gunn, Klebanov, Duncan 1996, Mayer 1997a, 1997b, 2002, Peters and Mullis 1997), family background and parenting practices (Peters and Mullis 1997, Phillips et al. 1998), social ties and social engagement (Putnam 2000, Wong 1998), family structure (McLanahan 1997), and schools and childcare (Coleman 1966, Ferguson 1998, Jencks and Phillips 1998, Kozol 1991, Lee and Burkham 2002, Massey et al. 2002). I discuss each of these possible explanations in more detail below.

Test Bias

Test bias has been pointed to as an explanation for why Blacks score lower on these tests than Whites do. Proponents of this theory argue that tests that claim to measure intelligence or academic skills objectively, are developed out of cultural biases that favor Whites. Maume, Cancio, and Evans (1996) argue strongly that the Armed Forces Qualification Test (AFQT), which is frequently used as a measure of intellectual ability and is included in the National Longitudinal Study of Youth, is class biased and measures skills differently for Blacks and Whites.

However, Farkas's (2004) reply to this line of arguing is that perhaps cognitive skills tests are biased toward White culture, but it is White culture within which people earn a living. Thus, although it may be unfair that these tests tap into concepts more familiar in White culture than Black culture, the concepts are nonetheless required for economic success in our society. Social life generally is biased against Black culture in favor of White culture, and these tests are an accurate measure of the skills needed to be successful in this unfairly privileged culture.

Additionally, Jencks (1998) points out that to say that Blacks score lower on the tests does not mean that Blacks are innately inferior to Whites. Tests that privilege "White" abilities over "Black" abilities do not preclude the possibility that Blacks would score higher than Whites on tests assessing "Black" skills. Neither test would mean that either group is inherently better than the other. However, he also points out that research has not shown a significant amount of cultural bias in the questions of aptitude tests, nor is there a difference in the gap between verbal and nonverbal tests, which would represent less culturally infused test items. In their review of the literature, Rowe, Vazsonyi, and Flannery (1994) also found that the only evidence of racial bias in testing is small. Neisser et al. (1996) also found that there is little evidence for test bias as a probable explanation for the Black-White gap in IQ.

The assessment used here, the Bayley Scale of Infant Development—Research edition, is a nonverbal test with no culturally infused language, which would reduce the possibility of there being a systematic cultural test bias against the non-White babies studied in this analysis. However, interviewer effects may bias the results of the test. Perhaps White interviewers would look for higher cognitive skills in White babies than Black babies based on preexisting stereotypes they hold. However, if this were fully true, one would likely expect that Asian babies would be scored at least as highly as or more highly than Whites on the Bayley based on preexisting stereotypes that Asians and Asian Americans are higher achieving than Whites (e.g. Chubb and Loveless 2002 show that Asian Americans score higher on standardized tests in schools than any other race). However, my analyses show that children of Asian mothers score statistically significantly lower on the Bayley than both Whites and Blacks. This provides a comfortable amount of evidence against the possibility of interviewer bias in this analysis. Further discussion of sensitivity analyses for interviewer bias are discussed in the Appendix. The results of the sensitivity analyses provide additional support that these data are not a result of race-biased interviewers.

Genetics

A controversial explanation in the mid-1990s had to do with the genetically inferior intelligence of African Americans, most notably expounded upon in the bestseller *The Bell Curve* (Herrnstein and Murray 1994). Although most social and natural scientists have concluded that such arguments are logically and empirically untenable (Fischer et al. 1996, Jencks and Phillips 1998, Phillips et al. 1998), the popularity of the arguments requires their discussion.

Arguments about a genetic component to racial differences in cognitive skills or intelligence are often viewed as pessimistic or racist, because genetic differences are sometimes seen as fixed, and therefore irremediable, or else because genetic differences

imply some kind of inherent flaw or general inferiority on the part of the person with the lower score. Dickens (2005) argues strongly against the idea that genetic arguments should be viewed as necessarily pessimistic. For instance, Dickens states that there are all kinds of human differences written into our DNA that are nonetheless open to change; hair color, propensity to heart disease, or diabetes are all genetically determined in part, yet environmental influences can change them. As he writes:

> Suppose that the entire Black-White gap in school readiness were genetic in origin, but that a shot could be given to Black babies at birth to offset completely the effects of the genetic difference. Would anyone care about the genetic component of the racial gap? If it is possible to remedy or ameliorate the Black-White difference, the only question is how much it would cost and whether society is willing to pay the price…. Some argue that a genetic cause for Black-White differences would lessen the moral imperative for removing them, but as the example of the shot illustrates, this is not the case. It would be hard to argue that the fact that the differences were genetic rather than environmental in origin would make it any less of an imperative for society to be sure that every Black child got the shot. Some would say that the cause is beyond the child's control would make it more important (57).

Neisser et al. (1996) concur that heritable traits do not mean unchanging traits. Rowe (2005) agrees that genetic arguments can be viewed as simply another explanation for the gap and that to fully understand the gap, certain explanations should not be rejected out of hand simply because they are assumed to have negative repercussions. Rowe (2005) uses this as one justification to support his arguments that there exist gene-based differences between Black and White IQ scores. Dickens (2005) nonetheless argues that despite his willingness to consider genetic arguments without a fear of them leading to racist policies, the theories have failed to hold up to empirical scrutiny.

Others, however, posit that any genetic arguments such as these inherently justify racism because racial categorization emerged out of racist ideology. This is because genetic arguments are based on a belief in verifiable genetic differences between people of different races (Cooper 2005, Dickens 2005, Smedley and Smedley 2005). This belief proffers that races can be clearly grouped into specific categories based on their

biological characteristics, similar to how people are categorized by sex. Contentions such as these, however, do not recognize that race is a historical and social construction based somewhat randomly on visible differences between groups. According to Smedley and Smedley (2005), human cultures did not recognize racial differences until the 19th century. Although *ethnic* differences based on location and/or culture were recognized prior to then, people were not categorized based on "racial" physical characteristics until scientists began using the term race; a term once relatively innocuous and synonymous with type, group or breed. The term race and the classification of races was then introduced to justify slavery and other racist ideologies, by classifying certain groups of people as less human than Whites. The most salient racial categories have been White and Black. A difficulty in maintaining racial classifications in the United States emerged when people began to intermarry and have multiracial children. To prevent this, anti-miscegenation laws were implemented to avoid interracial marriage and the "one-drop rule" was put in place, meaning that anyone with one drop of African blood would be counted as Black. All of these laws and rules had no relationship to science, but were instead created to justify racist policies (Smedley and Smedley 2005).

Thus, according to this critique, all research that looks at racial differences is inherently flawed because the groups under study are not natural groups. Nonetheless, because of the treatment of different groups and the effect of racism, the socially constructed grouping of people by arbitrary physical characteristics continues to have social implications. One could look only at social explanations for the social conditions of socially constructed racial groups but some argue that despite a tainted history and the intermixing of racial groups, there is still potential for genetic explanations for differences in the average intelligence levels of different racial groups.

For example, David C. Rowe has made extensive arguments as to the importance of biological racial differences. He notes that despite the fact that the human genome project has demonstrated that Blacks and Whites share 99.9% of the same DNA, that .1%

allows room for some racial differences beyond skin color. He points to the fact that people and chimpanzees have only a 1-2% difference in DNA, yet there are large and obvious differences between these two species. Additionally, he stresses that the human genome project has demonstrated that human beings loosely cluster into five main races that are also commonly known social categories: African, Caucasians, Pacific Islanders, East Asians, and Native Americans.

However, as Bonham, Warshauer-Baker, and Collins (2005) point out, these classifications only apply to people whose ancestors derive from the same geographical region and there are many people who do not fit into this typology. Thus, locating races in the human genome project may be elusive and it is important to recognize the social relevance of race. As Cooper (2005) argues, racial categories are far too fluid in reality and do not fit into proper biological taxonomic rules. To say that there is a natural biological category of different races requires that the characteristics of each group be clear. Rowe (2005) himself acknowledges the fuzziness inherent in racial classifications, but fails to acknowledge that as a major problem. Citing Darwin, Cooper (2005) points out that one cannot create biological categories if one does not know how to define the boundaries of those categories.

Further, the physical characteristics used to define racial groups only matter when given social significance. One could cluster people into an infinite number of groups—such as birthplace, height, or family name—and find an infinite number of differences between these socially constructed groups, but this does not mean that these are biologically determined groupings, akin to animal subspecies (Cooper 2005).

This is reminiscent of the blue-eye, green-eye experiment detailed in the documentary *A Class Divided* (Peters 1985), where third grade teacher Jane Elliot randomly assigned students to high and low status groups based on their eye color. She demonstrated that within half of a class day, students in low status groups performed more poorly on class quizzes than those in the high status groups on vocabulary tests,

despite the fact that the students' *genetic* difference (eye color) was socially irrelevant the previous day.

Genetic arguments have been chipped away at on these theoretical grounds and by empirical findings as well. Martin (1972) points out that "Black students at the Windsor Hills School, which is 98 percent Black, have the highest average I.Q. scores in Los Angeles. These students rank among the top 5 percent of the city's schools in standardized reading tests. Most of the students attending Windsor Hills School are from upper middle-class families in which one or both parents are professionals" (568-9). Thus, if genetics were at play, it would not be possible for Blacks to score higher to such a large extent. Proponents of genetic arguments could argue that these students represent only the high tail end of the African American distribution. However, this example is one of many other arguments that refute the claims to a genetic root of group level intellectual differences across races.

Nisbett (1998) reviews the main ways in which heritability has been assessed to address racial differences in IQ. He shows that there is only limited evidence supporting genetic arguments and even the findings most supportive of genetic arguments have serious flaws. He states that there are five main ways of measuring heritability through research designs: (1) skin color assessments, (2) blood group indicators (3) reported White ancestry, (4) children born to American soldiers in postwar Germany, and (5) mixed-race children. Skin color assessments assume that the lighter the skin, the more European the ancestry. Thus, Blacks with the darkest skin should have IQs lower than Blacks with lighter skin. Studies have shown that there is a correlation of at most 0.15 between IQ and skin color and these studies fail to take into account differences in skin tone among native Africans with no European lineage. The second type of research approach, blood group indicator tests, examine the amount of European typed blood indicators to try to get at the degree of "Whiteness" within people. These tests have found even lower correlations between this measure and IQ, around -.02 to .05. The third

method, reported White ancestry studies, involve asking Blacks about their ancestry, and have produced little connection between race and IQ differences.

The fourth type of study was conducted by Klaus Eyferth (as cited by Dickens 2005). He conducted research in Germany on children who were fathered by Black and White American GIs after World War II and born to White, German women. Thus, some of the children were biracial and some were White. What he found was that there were almost no differences between the children's cognitive scores. However, he points out that some of these studies could be challenged on the basis that the African American parents could be members of an intellectual elite, not representative of the population at large. Dickens (2005) cites multiple other studies looking at children in orphanages or multiracial homes that provide evidence as to the importance of the environment over genetics in determining race differences in cognitive ability.

The fifth type of study examines mixed race families. According to Nisbett (1998), this research has looked at differences within mixed race families to see if children with a Black mother do worse than children with a Black father or vice versa. If genetics do indeed matter, then whether the Black parent is the mother or the father should not influence children's IQ. However, if parenting is what leads to the lower IQ, and assuming that mothers have a larger influence on children than fathers, having a Black mother should influence the child's IQ more than having a Black father.

Willerman, Naylor, and Myriantopoulous (1974) employed a similar approach by looking at interracial children and examining whether or not there were differences in having a White or Black mother. They found that on the Stanford-Binet IQ among four year olds, that infants with a White mother score 9 points higher. However, on the Bayley scale among eight month olds, infants of Black mothers scored slightly higher. From their analysis, they concluded that there was greater support for environmental than genetic causes.

Twin studies are another method sometimes used to separate genetic influence from environmental influence. For example, some studies have looked at how identical twins' IQs differ after being separated at birth. These studies have been generally dismissed due to very small samples, and typically have examined class rather than race differences (Schiff et al. 1978). A similar line of research that uses much larger samples is Elsie Moore's (1986) analysis of differences between Black children adopted into middle-class White homes and Black children adopted into middle-class Black homes. Moore found that the family environment had a large effect on the children's scores; that is, the children reared in Black homes had lower cognitive scores, on average, than the children reared in White homes. Because she held the economic class of the household and the child's race constant, she argues that family environment has a significant effect on cognitive scores. Although this does not negate the possibility of a genetic effect because she only looked at African American children, it does provide evidence for family environment, which shall be discussed in more detail below.

The most damning evidence, however, to genetic arguments is in the work of James R. Flynn (1980, 1987), and is dubbed the "Flynn Effect." Looking at changes in a wide-range of IQ scores in many countries over the last 50 years he has shown that IQ scores have been steadily increasing over time. As Dickens (2005) summarizes:

> The score gains have been documented even between a large group of fathers and sons taking the same test only decades apart, making it impossible that the gains are due to changes in genes. Clearly environmental changes can cause huge leaps in measured cognitive ability. Although it might not seem plausible that the average Black environment today is below the 5th percentile of the White distribution of environments, it is certainly plausible that the average Black environment in the United States today is as deprived as the average White environment of thirty to fifty years ago—the time it took for cognitive ability to rise by an amount equal to the Black-White gap in many countries. These gains in measured cognitive ability over time point to a problem in the argument that high heritability estimates for cognitive ability preclude large environmental effects (61).

Thus, what Flynn has demonstrated is that changes in IQ scores have happened more rapidly than could have occurred due to genetic shifts or natural selection. Further, his findings indicate that the average environment of Blacks today is likely typical of the average environment of Whites thirty to fifty years ago when Whites had IQs similar to Blacks today. Thus, it is likely that family resources and family environment provide better explanations for the race-based test score gap than do genes.

The study that has shown the most support for genetic arguments is Scarr and Weinberg's Minnesota Twin Studies (Nisbett 1998, Scarr and Weinberg 1978). They collected data on children who were adopted in Minnesota and data on both their birth and adoptive parents. They found that there were higher correlations between birth parents' IQ and child's IQ than between the child's and adoptive parents' IQs (1978). Because of this they concluded that family environment must have less to do with children's IQ than genetics do. They also found that the Black children had lower IQ scores than the biracial children who scored lower than the White children. Results from the Minnesota Twin Studies provided the main evidence for Herrnstein and Murray's (1994) genetic argument.

There are two main problems with the Minnesota Twin Studies. First, they assume that the child's "environment" begins after birth, but pre-natal environment is also likely to have an impact on a child's cognitive skills. For example, prenatal health care practices may have a large effect on a child's birth weight and other aspects of child health (Reichman 2005) and this in turn could influence the child's IQ. Second, Nisbett (1998) points out that the Black children were adopted at a later age, on average, than the White children, and their natural mothers had less education than the average Black women for the region. Furthermore, the White children were placed into "higher quality" families in terms of social class and education compared to the Black children.

Despite the failure of research to show overwhelmingly compelling support for a genetic explanation for the Black-White test score gap, when looking at "intelligence"

more generally there is an undeniable genetic, non-race related, component (Dickens 2005, Neisser et al 1996, Bouchard et al. 1990, Loehlin 1989). Psychologists have demonstrated that a great deal of what explains individual IQ scores are the genes one inherits from one's parents; what they call the heritability of intelligence noted as h^2. However, environmental influences are also a major factor in the creation of intelligence; environmental influences are noted as $1- h^2$. Both h^2 and $1-h^2$ are highly interrelated, for example as Neisser et al. (1996) point out, the size of any individual's vocabulary is almost entirely determined by one's genetics even though every word learned is heard within a certain environment. Thus, in an environment where a child is exposed to every possible word, the child with a genetic predisposition to a higher vocabulary will pick up more words than the child with a genetic predisposition to a poorer language capacity. Research by Dickens (2005) and Dickens and Flynn (2001) have also shown that, by late adolescence, h^2 —the biological contribution to intelligence—is around 75%.

Nonetheless, Dickens and Flynn (2001) argue that although this high heritability may account for *within*-group differences, environmental causes better explain *between*-group differences. In Dickens' 2005 article, he uses an example of a child endowed with great genetic potential for playing basketball. If the child injures a leg, and is then benched, gets out of shape, and then becomes bitter upon returning to the game, he may never live up to his potential. As such, one's genetic predisposition becomes irrelevant to the power of the environment in shaping that child's sports skills. He argues a similar process may be at play when it comes to cognitive skills. Although one's parents' genes may predispose a child to the potential for intellectual greatness, how much the parent reads to the child, or helps the child with homework would matter as much as the parents' genes do, if not more.

However, because there are so many potential environmental influences and because some of them can be transitory, any one environmental influence can rarely explain much of the variance in cognitive skills, despite the fact that if it were possible to

assess, environmental influences taken together would explain much of it. Dickens argues that environmental influences, when taken together, have a multiplicative effect on group differences in scores. Thus, to explain racial group differences, Dickens argues that if, for example, Blacks were worse off than Whites on 65% of the relevant environmental influences for predicting IQ, Blacks would actually score 90% lower because the environmental effects would work in concert to disadvantage the disadvantaged (64).

In summary, although there remain some proponents of genetic arguments, most research has not been probative. The only consistently clear evidence is that genetics are highly influential determinants of individual intelligence scores within groups (e.g. children's IQ scores are highly related to their parents' IQ scores). This has been used to explain group differences, but has not been supported for the most part. In general, most research positing genetic explanations for a Black-White skills gap have fallen short because of an inability to define racial categories in biological terms and a failure to acknowledge the social construction of race. Furthermore, studies on multiracial families and children in orphanages point to a greater importance of parenting than genetics, and the Flynn Effect study has shown that IQ scores have shifted more rapidly over the last 50 years than genetics alone would allow and that the environment of Blacks today is typical of the environment of Whites 30 to 50 years ago when the average IQ of Whites was similar to the average IQ of Blacks today.

Stereotype Threat and the Burden of Acting White

Another theory that has been proposed for explaining the Black-White test score gap among school-aged children has to do with how children want to be perceived. Two main theories are "stereotype threat" and "oppositional culture." The former has received more empirical support than the latter, so I begin there.

"Stereotype threat" was developed by Claude M. Steel to explain why African American students underperform on tests. Stereotype threat refers to the idea that African Americans are fearful of being associated with stereotypes associated with their race, which causes "psychic distress" (403), particularly for those who are high achieving (Steele and Aronson 1998). As they write:

> When a negative stereotype about one's group becomes relevant to the situation that one is in, it signals the risk of being judged or treated stereotypically, or of doing something that would inadvertently confirm the stereotype. Whether this predicament affects behavior depends not on whether one has internalized the stereotype as self-doubt, but on whether one cares about the domain in which the stereotype applies (403).

Because African Americans have been shown to have lower test scores on average, high achieving individuals will be afraid of being grouped with a lower scoring average and fear that their success is not truly deserved or that others will view it as such. This creates so much internal anxiety that on a test of academic achievement, a topic for which this person's identity is invested in, s/he will end up underperforming. Steele and Aronson (1998) tested this idea in a series of experiments and found support for this idea. They found that even just asking subjects (who were comprised of undergraduate students at Stanford University) their race prior to a test made African American students do worse than on tests where their race was not asked. Overall, they conclude that "stereotype threat seems to exert its influence by reducing efficiency… and may also increase test anxiety for Blacks" (423).

Lovaglia et al. (1998) performed a study to test an idea similar to stereotype threat based on status characteristics theory. This theory argues that there are certain expectations that come with different statuses. A status is an aspect of one's identity, such as one's gender, race, class, height, age, or occupation. Those with high status are expected to perform well on tests and those with low statuses are expected to perform poorly on tests. When individuals of high status perform poorly or individuals of low status perform well, they violate our assumptions of who they are supposed to be and as a

result they can be socially penalized for it. High achieving low status individuals are seen as "uppity" and low achieving high status individuals are seen as not living up to their potential. Because of the possible sanctions, Lovaglia et al. (1998) argue that those of low status make a rational calculation to perform poorly on tests when a high performance would violate their status and potentially lead to a sanction.

To assess this, the authors performed a series of experiments in which subjects were randomly assigned to either a high-status or low-status condition. They invented the idea that being right or left-handed was related to success on the Raven Progressive Matrices, a test of mental ability, and then communicated this "fact" to the students before they completed the test. They also told the subjects that they would be rewarded or penalized depending on their status and on how well they performed. Their results showed that high status individuals performed better than low status individuals, with a difference of half a standard deviation controlling on differences in mental ability as measured by grade point average and ACT scores.

Whereas "stereotype threat" arguments have found support through experimental analyses, the theory of an oppositional culture has found less support in empirical studies. The oppositional culture argument was developed by the anthropologist John U. Ogbu (Fordham and Ogbu 1986, Ogbu 1991). He and his colleague Signithia Fordham found in their ethnographic work that Black high school students try to avoid the "burden of acting White." In a simplified version of their argument, they posit that Blacks are penalized for doing well in school by being told that they are "acting White" or taunted with the slur "Oreo" (like the cookie: black on the outside, white on the inside). The stigma of being perceived as trying to be White is particularly harsh for African Americans, because as a group Blacks were forced into North America and are what he dubs an "involuntary minority," so there is little affinity in the Black community for trying to be like one's enslaver. Thus, Black students underperform to avoid a negative social sanction and as a result come to value education less than Whites.

This argument has received a great deal of attention in both the academic and popular press (Ainsworth-Darnell and Downey 1998, Cook and Ludwig 1998) but has not been supported with large nationally representative data that compares Blacks with Whites and rich with poor students. For example, Arroyo and Zigler (1995) found that all high achieving students, whether African or European American, have a hard time balancing peer acceptance with academic achievement. Furthermore, using the National Educational Longitudinal Survey (NELS), Cook and Ludwig (1998) found that Black and White students perform roughly the same in high school net of family background (measured as mother's education, family income, and whether the student had an absent father). They argue that *all* students can be penalized for high achievement by being labeled "nerds" or "geeks" and that there are benefits associated with high achievement that negate the "burden of acting White" or like a nerd. In a response to this study, Ferguson (1998) maintains that the salience of Blacks being called "Oreos" may be stronger than that of a White student being called a nerd. He argues that there is still room for discussion as to whether or not negative sanctions are stronger for Blacks compared to Whites, or whether or not sanctions have worse repercussions for Blacks versus Whites.

In the same year as the Cook and Ludwig (1998) study, Ainsworth-Darnell and Downey (1998) published their analysis of "oppositional culture" hypothesis using the same NELS data, and they find partial support for it. More specifically, they find that Black students value education and see it as a source of success as much as Whites do. However, this attitude does not fit with their behavior in that Blacks put less effort into their work, spend less time on homework, are more disruptive in classes, and get in trouble more often than Whites. Thus, this supports the oppositional culture hypothesis that Blacks underperform, although, they *value* education as much as Whites. Furthermore, they found that in predominantly Black schools, Black males who are high academic achievers consider themselves more popular than Black males who are low

academic achievers. This also provides evidence against the oppositional culture hypothesis because it shows that academic success does not necessarily lead to social ostracism.

Additionally, Tyson (2002) performed an ethnographic study into the oppositional culture hypothesis looking at younger, elementary aged students. Her sample included middle- and high-income Black students, thus her study is not generalizable to students of all ages and class backgrounds. Nevertheless, her results lend credence to critiques of Ogbu's findings for not being representative of all African American students. Students in her sample tended to be highly motivated and achievement oriented. The negative attitudes she encountered were found among those experiencing academic failure. She states that this is developmentally typical of young children and not racially determined. She argues that this may help explain adolescents negative attitudes as well, that if an older child experiences failure, s/he may experience negative emotions that s/he would want to minimize by dismissing the importance of school. Thus, low achieving students may be dismissing the importance of school because of their own embarrassment of underachievement rather than because of concrete attacks by peers. However, as stated above, there is little empirical evidence that African Americans value education less than Whites do.

In summary, the oppositional culture hypothesis contends that Blacks underperform in school to avoid being considered "White". However, empirical studies have failed to provide much support for this argument, although many continue to believe that the lack of evidence comes from inadequate data that is not able to pick up on the nuances of Black adolescent cultural norms (Farkas, Lleras, and Maczuga 2002).

Both the "stereotype threat" and "oppositional culture" lines of research indicate that perhaps one cause of the Black-White test score gap may be due to an either conscious or unconscious "throwing" of tests by Blacks to avoid negative sanctions (by having stereotypes confirmed or by being made fun of by one's peers). Because of the

history of discrimination and brutality against Blacks in the United States, there is reason to believe that African Americans may be more averse to school success associated with White culture, as Ogbu posits (1991, 2003).

I argue, however, that this explanation is somewhat less compelling for younger children and especially babies, the focus of the current study. First, Tyson (2002) demonstrates that young children in elementary school have generally been shown to be eager to learn and like to show off what they are good at. Second, because babies are arguably too young to understand the subtleties of their status and racial differences and the potential negative sanctions they may or may not receive for scoring highly on a test of infant development, these explanations for a race gap in test scores are not relevant to this analysis.

Financial Capital and Poverty

The most commonly considered cause of the Black-White test score gap is economic inequality. There is a huge gap between Blacks and Whites in terms of their average and median incomes. According to U.S. Census, Current Population Survey (CPS) data, in 2003 Non-Hispanic Whites had a median income of $47,777 compared with Blacks median income of $29,645 (Cleveland 2005). Not only do African Americans have lower incomes and assets, but they are also far more likely to live in poverty and to live in poor neighborhoods (Brooks-Gunn, Duncan, Maritato 1997, Brooks-Gunn, Klebanov, and Duncan 1996). Brooks-Gunn, et al. (1996) note that:

> Three times as many Black (and Hispanic) children as White children live in families below the official U.S. poverty line….Persistent poverty (in this analysis defined as family income below the poverty line for 5-6 years of the 6-year period) was a characteristic of 40% of Black but only 5% of White children…. Using the [Panel Study of Income Dynamics] sample of young children again…. About 57% of the Black children lived in poor neighborhoods… as compared with 7.5% of the White children (397).

Because of these huge gaps between Blacks and Whites in their financial capital (including income, assets, poverty status, and location in poor neighborhoods), many have surmised that the cognitive skills gap between the groups is really a class rather than a racial issue (Brooks-Gunn, et al. 1996, Guo 1998, Guo and Harris 2000, Smith, et al. 1997). For instance, Brooks-Gunn, et al. (1996) find that 52% of the Black-White cognitive skills gap can be explained by poverty. Using data from the Infant Health and Development Program (IHDP), they examine the intelligence of 483 low birth weight premature children assessed at age 5 using the Wechsler Preschool and Primary Scale of Intelligence. They find that the Black children score one standard deviation lower than the White children but when controlling on family and economic status, the gap is cut in half.[4] This is a compelling finding—that income can explain over half of the race gap—however, as they note, their sample involves only children who began life at a health disadvantage and thus may not be representative of all children. Perhaps living in poverty is harder on children who were born prematurely. In this sense, income might matter more to IQ for non-healthy babies compared to babies born healthy. Or, relatedly, if poverty hurts premature low birth weight infants more than other babies, those who are most hurt die before reaching the age of five, so only the most resilient survive making the effect of income seem less important than it actually is. However, Smith, et al. (1997) compared the IHDP to the nationally representative Children of the National Longitudinal Survey of Youth data and found no significant interactions between income and birth weight.

In a similar study, Smith, et al. (1997) provide a somewhat more comprehensive analysis by examining the role of income and poverty on a number of achievement and

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[4] When family structure and maternal characteristics are included, the gap is further reduced. When maternal parenting behavior is included the difference between Blacks and Whites in their cognitive skills is non-significant. Parenting practices will be discussed more fully in a subsequent section.

intelligence tests, using both the IHDP and the Children of the National Longitudinal Survey of Youth (C-NLSY). Both data sets offer certain advantages. The IHDP provides more detailed IQ and home environment assessments compared to the C-NLSY. But the C-NLSY provides a nationally representative sample and the IHDP does not. Together, they provide a compelling picture about the relationship between poverty and cognitive skills. Although they do not examine race specifically or discuss the findings of race in much detail, they do control for race in their models. Additionally, they provide the mean scores on the tests of one-year old infants by race, which is the only analysis with children this young on a large sample that I have found. Two limitations exist in this sub-analysis of the one-year olds, however. Because it is exploratory in nature, they only report mean differences by race. Second, the results they do discuss are from the IHDP data which are not nationally representative of all children.

Smith et al. (1997) find that when looking at mean differences on a variety of intelligence, achievement, and verbal ability tests used (the Bayley Scales which are used in this analysis, the Stanford-Binet IQ test, the Peabody Picture Vocabulary Test-Revised, Peabody Individual Achievement Test and the Wechsler Preschool and Primary Scale of Intelligence), poverty (measured by income to needs and the duration of poverty) has a consistent negative effect on children's cognitive achievement. Timing of poverty does not seem to matter, although the age range of the sample used in their main analyses is rather small (two to seven years old). However, in their exploratory analysis of the one-year olds, they did find that the effect of income is either very small or nonexistent. They also found that the two to seven year olds who were "very poor" scored seven to twelve points lower than "near poor" children. They interpret this to mean that increasing incomes to near poor levels among the very poor could have a dramatic impact on children's cognitive scores.

However, others argue that increasing income may not have such clear-cut effects on children's cognitive scores. For example, Mayer (2002) argues that boosting the poor

to at least the level of the near poor would make a dramatic difference *only* if the *average* poor income was increased up to the *average* near poor income. This is an important, but often overlooked, point because the difference in the actual dollar amounts of the two interpretations can be quite large. For instance, say, hypothetically, the average income of the poor is $50 with a range of $1-$99 and the average income of the near poor is $200 with a range of $100-$300. The Smith et al. (1997) interpretation suggests that if all poor people had their incomes boosted to $100 they would do as well as the near poor. But Mayer (2002) argues that this is incorrect, because the "near poor income effect" is based on the *average* income of the near poor, the hypothetical $200. Thus, the poor would *all* need to have their incomes boosted to $200 or at least an average of $200. Without increasing the incomes to the average near poor income, the dramatic boost in cognitive scores is unlikely to occur. Mayer notes that to increase average poor incomes to average near poor incomes is much more expensive. This is not to critique the Smith, et al. (1997) finding, but to caution in the interpretation of findings.

In contrast to those who find a small influence of income on cognitive skills, Smith et al. (1997) find that the influence of poverty is more important than family structure, as measured by female headship, divorce, and change in the number of parents a child lives with. However, because this is in contrast to other research finding a clear impact of family structure to children's outcomes (see e.g. McLanahan 1997), they posit that this may be due to the age of the children in their study. Perhaps income matters more than family structure at these early ages but family structure takes on greater salience as children age. In summary, based on their reported findings, Smith et al. (1997) argue that raising family incomes to near poor levels, increasing mothers' educational levels, and implementing policies that encourage parents to read more to their children will raise children's cognitive scores overall.

Smith et al.'s (1997) comprehensive and compelling analysis of the effect of poverty on children's cognitive and verbal achievement scores lends a great deal of

weight to the relevance of poverty and income to achievement. However, the authors do not discuss the effect of race on cognitive scores. This was not the intent of their analysis, so I do not offer this as a critique of their study, per se. Their results show, however, that being Black has a consistent negative effect on all the cognitive scores, with the exception of the Peabody Individual Achievement Test. And their regression results suggest that the negative Black coefficient could not be fully explained by the variables included in their models. Although the race coefficient decreased when measures of income were included, in most models the change was rather small. For instance, using the NLSY data of three and four year olds' scores on the Peabody Picture Vocabulary Test-Revised (PPVT-R), mean scores for Whites are 94.2 and mean scores for Blacks is 74.4, a 19.8 point difference (overall the PPVT-R has a mean of 100 and a standard deviation of 15). Including the average income-to-needs ratio reduces the race effect by just over one point, controlling on child's age, gender, mother's education, and low birth weight. Including household income and family structure reduces the race effect by less than two points, net of gender, mother's education, low birth weight and family structure. This means that income can only explain between 1/15 and 2/15 of a standard deviation in the race gap, hardly a huge impact (these models also include controls for a number of other important variables). Similar results emerge when the other assessments are utilized.

Susan Mayer (2002, 1997a, 1997b) not only questions the ability of income and poverty to explain the Black-White gap, but also to predict cognitive scores among young children generally. She makes the somewhat controversial argument that though important, the "true effect" of income on many child outcomes is overstated, and in terms of cognitive skills specifically, she argues that income appears to have little effect on children's outcomes in the United States. The "true effect of income," is how much the addition of each dollar influences children's outcomes, net of health, family characteristics, and other sometimes omitted variables from conventional methods, which

conflate these factors with income. She acknowledges that if children are not provided with the bare necessities of life, they will not thrive, but that current federal and state programs such as food stamps, housing subsidies, childcare credits, government income transfers and the like, do provide children with the bare minimum necessary to survive. In fact, she notes that compared with the non-poor, poor children do live in worse housing conditions, have worse health, and spend less money on food, but she finds that they have adequate housing, have as much access to medical help outside of emergency rooms as non-poor (controlling on health problems), and they spend more money on food than deemed the minimum necessary by the USDA. She stresses that subsidies should not be reduced or eliminated, because without them the poor might not have what is necessary for survival.

Mayer goes on to state that what distinguishes rich parents from poor parents is far more complicated than simply a difference in income. As she writes:

> Poor parents differ from rich parents in many ways besides their income. For instance, low-income parents usually have less education and worse health, and they are less likely to be married. Such differences could also explain most of the disparities in rich and poor children's life chances (8).

Thus, though it may be that poverty is associated with many of the familial attributes related to lower achieving children, income per se will not solve disparities in children's achievement. In fact, she finds "that for most outcomes the true effect of parental income is consistently smaller than estimates based on conventional methods." This is important in terms of finding solutions, because if dollars do not matter but parenting, for example, does, increasing the incomes of the poor is going to have less of an effect than changing parenting practices.

A main reason why the effect of income tends to be overestimated in many analyses is because researchers often use poverty as a measure of income instead of raw income. Poverty is a function of both family income and family *size* and is therefore not a true measure of income. Because both income and family size are independently

related to children's outcomes, by conflating the two concepts, one may overestimate the impact of income with a "poverty" measure because it is also measuring the impact of family size.

Secondly, as discussed above in terms of cognitive skills, Mayer critiques studies that do not incorporate measures of parent's or mother's cognitive skills on children's cognitive scores. She argues that by incorporating mother's cognitive skills, one can control for the genetic makeup of the mother that would be associated with her income and her child's cognitive ability. In her review of the literature, she found that studies that control on mother's cognitive skills find a much smaller effect of income than studies that do not.

Although I believe this is a valid critique, it is also true that a *mother's* cognitive ability is not only a measure of genetics; it too is likely related in part to her family environment as well as her mother's genes. Thus if a mother was raised in a poor family, her cognitive skills could be depressed because of low family income, as well as genetic predisposition. Thus, controlling for mother's cognitive ability in studies predicting children's cognitive ability could lessen the impact of current poverty status because the mother's IQ taps her family of origin's poverty status and this is likely correlated to her family's current poverty status. As discussed above, true genetic controls are quite difficult to come up with, and so controlling on mother's IQ may not simply represent a genetic trait given to the child but an environmentally altered and genetically-linked score.

Thirdly, Mayer argues that results that show a positive, statistically significant relationship between income and cognitive skills are more likely to be published. Relatedly, she argues that due to personal or professional agendas researchers may also discount findings that do not support a positive significant relationship between income and poor outcomes for children. Because of this, there may be many unpublished studies that could not be included in her review of the literature that would support her

contention that income per se is less important than other correlated factors. However this is generally conjecture on her part, since there is no way of knowing this for certain.

Mayer (1997a) also analyzes the NLSY data and the Panel Study of Income Dynamics (PSID) data in order to try to estimate the "true" effect of income. Overall, she finds that parental characteristics and behaviors matter far more than income. Specifically, she writes that:

> [P]arental characteristics correlated with income have a greater influence on children's behavior problems, PIAT reading scores, teenage childbearing, dropping out of high school, single motherhood, and male idleness than previous researchers realized…. Doubling parental income is likely to raise young children's PPVT and PIAT math scores a very small amount. It is unlikely to increase children's PIAT reading scores or reduce their behavior problems much (92-3).

Further she posits that parenting behaviors, activities such as reading to one's child or taking them to museums are highly related to children's success, but the amount of money a parent has is unrelated to how much they perform those activities. Rather, when a parent is not depressed and when a parent actually enjoys reading to his or her child, that parent will engage in the kinds of parenting behaviors that lead to better outcomes. In terms of the effect income has on the gap between Black and White achievement, she argues that income can explain part of that gap, but that after controlling for other factors correlated with income the gap in cognitive skills, among other outcomes, remains large.

Thus, although less money could exacerbate disparities in cognitive skills and academic achievement, more money alone will not decrease disparities. Mayer argues vehemently that public policies need to refocus on supporting parents in their difficult task of raising children and help them to raise children who embody the values and skills required by employers, such as "social adjustment, skills, enthusiasm, dependability, and hard work" (15). However, she stresses that this is difficult since the less than adequate

parenting may be due to parental addiction, depression, or poor health and there is not one simple solution to solve the problem.

Blau (1999a) also finds that income matters more when measured as "permanent" income rather than "transitory" income, but that overall family background matters more than income in terms of children's cognitive test scores. Duncan and Magnuson (2005) come to a similar policy conclusion as well in their review of the literature. They argue that SES is important in increasing scores; in fact they find that SES can account for about half of a standard deviation in test scores, although their most cited SES measure is a composite including education and parental occupational prestige, which does not provide a "true income effect." Nonetheless, they also recognize that simply providing money to poor families has not done enough in the past to raise achievement scores and that it would be more politically feasible and efficient to target children's cognitive skills and health directly.

Additionally, there seems to be a semantic difference among those who claim that poverty is important. Guo and Harris (2000), for instance, argue that poverty matters because of its associated problems with parental cognitive stimulation, parenting style, physical environment, child's ill health at birth, and ill health in childhood. Thus, although claiming that poverty matters, they make an argument quite similar to Mayer's (1997) that the correlated aspects of poverty matter rather than actual dollar amounts.

Similarly, Conger et al. (2002) conducted a path analysis of 422 two-caregiver African American families with a 10-11 year old child. They did find that low family per capita income and negative financial events lead to economic pressure, which leads to primary and secondary caregiver depressed mood, which leads to caregiver relationship conflict and withdrawal, which leads to low nurturant-involved parenting, and finally to poorer child adjustment (as measured by school behaviors, persistence in difficult tasks, and positive affect). Thus, income was not *directly* linked to the behaviors important to

school achievement, as Mayer posits, but there was an *indirect* effect due to the increase in family stress from a lack of financial resources.

Human Capital

Human capital theory was most fully developed by the economist Gary S. Becker (1964) to explain why women earn less money than men do. He defined human capital as the resources a person brings to a job, specifically job experience, skills, education, and mobility (or the facility with which a person can relocate for a job). He argued that men invest more in their human capital than women do because their primary role within the family is that of breadwinner; women invest less in their human capital than do men because their primary role within the family is to care for their spouse and children. Because of this differential investment in human capital, men earn more money than women in the labor force.

Human capital is also used to explain why some parents might have children with greater cognitive skills than others. In the family context, high human capital is generally measured with parents' education. The argument is that a parent with greater education would be more likely to be familiar with theories of child development, or at least be more likely to come into contact with child development literature and understand it. Additionally, Smith, et al. (1997) argue that

> Mother's education is sometimes considered a proxy for the amount of learning provided to the child, the literacy environment of the home, the parental engagement in the school, and the belief in the importance of schooling and learning (that is, aspects of human capital) (135).

Thus, a mother who has been successful in school is more likely to feel positively toward school and encourage her child to work hard at it than a mother who had a negative experience with school. This latter mother might be more likely to encourage other nonacademic skills in her child or she might convey a negative image of school to her child. In an analysis using the Children of the NLSY, Smith, et al. (1997) found a

unique contribution of mother's education, net of income, on children's cognitive attainment, measured a variety of ways. Susan Mayer (1997a) also finds that parental education has a consistently positive effect on children's outcomes.

Others have argued that more important than the mother's education, per se, is her knowledge of child development specifically. Stevens (1984) in particular conducted an experiment on 243 Black and White mothers of infants and found that controlling on income and education, mothers with a higher knowledge base of infant development scored higher on a test of parenting skills. However, he also acknowledges that 80% of the variance in his models was not accounted for and thus other parental characteristics, besides income, education, or child development knowledge may better explain parenting skill.

Parks and Smeriglio (1986) also found a correlation between parenting knowledge, parenting behaviors, and infant development among women with low socioeconomic status, but found no relationship between parenting knowledge and behaviors among middle and upper SES mothers. However, all the women in the analytic sample tended to have a high knowledge base of infant development, likely because all subjects were recruited from two hospitals where they were likely to receive parenting information. There is likely more variation in infant development knowledge in the population at large. As such, the results of their study are not generalizable.

In summary, parental human capital, as measured by parents' or mother's education, can help children in a number of ways. For one, parents who are highly educated are more likely to encourage their children to excel in school, because of the positive experiences they had in school. As well, parents who are more educated may be more likely to have a greater understanding of child development, and this would increase their engagement in parenting practices that lead to higher cognitive stimulation and development on the part of the children.

However, although parental education is important for cognitive development of children generally, it may not be as useful in explaining the Black-White test score gap. Whereas in the past Whites tended to be much more highly educated than Blacks, according to Phillips et al. (1998), rates of educational attainment between Blacks and Whites have been converging since 1970. In fact, in the Children of the NLSY sample, the median level of education for both Blacks and Whites is 12 years. However, as they point out, Whites tend to go to better schools which can make each extra year of school more valuable for Whites than Blacks. Additionally, Blacks and Whites may learn different things in school. Teachers can treat students of different races differently and this might influence how much a person learns in school. If Whites are in more favorable learning environments than Blacks, their education might be worth more in terms of their children's cognitive scores. Although Phillips et al. (1998) found that parents' education does seem to decrease the Black-White test score gap in five and six-year olds' cognitive and vocabulary test scores, a sizeable gap remains.

Social Capital

Although human capital seems to be important, at least to some degree, the reason why it does not fully explain the gap may be because human capital is only as useful as the parents' ability to share it with his or her child, as Coleman (1988) argues. If a parent does not share his or her knowledge and income with the child, the knowledge and income are not going to help the child. Thus, he argues that one must consider social capital as the mechanism that leads to a child's later creation of human capital.

Social capital in general refers to the characteristics of the relationships among individuals (Coleman 1988) or, in other words, the social resources a person has that are valuable in a variety of situations. Within families, social capital—as it relates to

educational attainment—works in two main ways.[5] First, social capital works within families to increase the exchange of parental resources to children. Coleman (1998) applies the social capital framework to parenting to argue that it is through the social connections and interactions parents have with their children that allows parents to share their human and cultural capital. Thus, for instance, within a two-parent household, parents have a greater opportunity to talk with their children, to read with their children, or to work on homework together compared to parents in a one-parent household. The second way that a parent's social capital can influence a child's cognitive skills has to do with social ties or the connections a family has with the rest of society. I discuss each of these in more detail below.

Home Environment/Parenting Behaviors

The first way that social capital matters is more generally referred to as "parenting." Overall, parenting is the way a parent interacts with his/her child and the way that a parent provides a certain kind of home for that child. Specifically, Combs-Orme at al. (2003) define "context-based parenting," as "*parenting behaviors that, given a child's age, developmental needs, and special circumstances, are optimal for promoting the child's healthy growth and development*" (440, italics are theirs). This type of parenting is considered best for child growth because it takes into account individual circumstances and meets the various needs children have including their need for food, clothing, safety, health care, interaction with parents and others, outside experiences, toys, physical affection, responsiveness, structure, routine, rituals, and consistent behavioral expectations. On the opposite end of the parenting spectrum is any

[5] Portes (1998) also points to the role of social capital within families as an important form of social control. This however is more relevant to studies of criminology than intellectual development, although arguably, educational attainment is related to social control. Nonetheless, this function of social capital is considered tangential to this dissertation.

kind of neglectful or abusive parenting that can seriously impair a child's socio-emotional, cognitive, and physical development. Most parents aim to perform the former and avoid the latter (Combs-Orme et al. 2003), and the amount of success depends on a number of social factors.

According to Combs-Orme et al. (2003), developing children's cognitive skills, requires that their basic physical sustenance needs be met. For instance, a malnourished child does not have the nutritional resources to grow adequately. However, much research has also shown that the key to cognitive growth is stimulation. Most important is that parents talk to their children. Through "direct talking" to the child, imitation of child sounds, asking questions, story telling, or reading of books, parents develop their child's language ability. Additionally, interactions that specifically teach children colors, numbers, or to read also improve children's school readiness and increase their cognitive development. Further, parents can increase children's skills through helping them master repetition-styled games (such as "peek-a-boo" or "roll the ball"). Combs-Orme et al. (2003) also stress that interaction with places and people outside the home are important. This could include trips to museums, the public library, or a park. Finally, toys can provide necessary stimulation to children by helping them learn about the world through their senses.

Parenting behaviors explain a significant portion of both the economic and racial gap in cognitive skills. The Home Observation for Measures of the Environment (HOME) is the most commonly used measure of parenting. It includes both assessments by a highly trained interviewer and self-reports by parents on a variety of parenting concepts, including learning experiences and cognitively stimulating activities inside and outside the home, punishment, maternal warmth, and physical environment (Phillips et al. 1998). A large set of studies has found racial and economic differences on this assessment (Mayer 1997a, Parks and Smeriglio 1986, Phillips et al. 1998, Smith, et al. 1997, Stevens 1984, and Waldfogel, et al. 2002).

In their review of the literature, Brooks-Gunn and Markman (2005) state that, after controlling for parenting measures, the Black-White test score gap narrows substantially because parenting behaviors have been strongly linked with children's cognitive development and because both African Americans and Hispanics tend to score lower on the assessments of parenting that have been linked to high cognitive ability. The parenting arenas they discuss are nurturance, discipline, teaching, language, materials, monitoring, and management. Research has shown that parents who are more loving and nurturing, discipline in a way that is authoritative rather than authoritarian (i.e. firm but not harsh), teach the child, speak frequently with the child, provide stimulating toys and other material objects, monitor the child's activities, and manage the child's activities and doctor's appointments, have children who are higher achievers academically and financially. African American parents score lower on these measures compared to European Americans, and this accounts for between three to nine points on an IQ test with a mean of 100 and a standard deviation of 15. With a general racial gap of six to twelve points, the parenting explanation is rather significant.

Brooks-Gunn and Markman (2005) also note, however, that there may be a racial bias in terms of what parenting measures capture. For instance, they note that parenting behaviors that build motor skills are more highly emphasized in West African cultures which makes for higher motor scores among West Africans than Americans and few studies look at the effect this has on intelligence or on school readiness. I discuss this in more detail below.

Brooks-Gunn and Markman (2005) conducted a study to test whether Black mothers are, on average, more authoritarian or more authoritative compared with White mothers. Their results vary as a function of the mothers' age, education, and income. Black mothers who are young and poorly educated do tend to be more authoritarian than authoritative. However, older more highly educated Black mothers tend to exhibit both

authoritative and authoritarian behaviors, what the authors dubbed "tough love." This parenting style was linked to higher IQ and vocabulary scores among children.

Similarly, Mandara and Murray (2002) employed a cluster analytic method to uncover three types of African American families using a small sample of 111 African American adolescents and their families. They found that African American parenting styles (of at least the parents of adolescents) cluster into "cohesive-authoritative," "conflictive-authoritarian," and "defensive-neglectful" types. Cohesive-authoritative types are parents who are emotionally and financially supportive and have children who are generally academically successful. "Conflictive-authoritarian" types are similar to the "tough love" type discussed above and have children who do well academically but tend to be more defiant of their parents as a rejection of their parents' tight control of their behavior. Defensive-neglectful types are parents who have little authority over their children, have chaotic home environments and have children with low self-esteem. The "conflictive-authoritarian" type is more common to African Americans than other racial groups and has been shown to have more positive outcomes for African Americans than for similar European Americans, according to the authors. This research shows that there seem to be somewhat unique parenting styles to African American parents; however, most of this research has been conducted on families of preadolescents and adolescents.

One exception to this general finding is the result of an observational analysis of 62 African American families with three to four-month-old infants conducted by Roopnarine et al. (2005). In this study, the authors assessed class differences in parenting style. They found that low SES parents (as measured by federal guidelines for living in poverty) were no more "disorganized" or less sensitive as caregivers than were middle SES ($35,000-$55,000/year), and upper SES (>$80,000) parents. The lower income parents were as likely to provide positive comfort and social activities as the other parents. However, they did find that the upper SES parents "used more verbal strategies (wheedling) when soothing and displaying affection and held infants when stationary

more than mothers in the other two groups. Mothers and fathers in lower SES families carried their infants around more than their counterparts in the other two groups" (730). Thus, they find few differences across classes of African American parents, but did find a greater verbal acuity among the more affluent parents. Their analysis looked only at African American parents and did not contrast their findings with European Americans to assess if there were parenting differences between Whites and Blacks. Nonetheless, their analysis does find that there are class differences in verbal activities. Since verbal interaction is linked with cognitive scores and African Americans are disproportionately located in the lower SES, this class based difference may disproportionately affect African American parents and appear to be a race based difference. However, as African American parents are not contrasted with European American parents in the analysis there is no way of knowing if they would have found some class differences between races.

A possible explanation for why there are racially driven differences in parenting has to do with cultural differences. Cultural arguments based on the early "culture of poverty" arguments of the 1960s have not found much empirical support (Roach and Gursslin 1967). Proponents of this perspective posited that the poor lived in a culture that provided them with values that were counterproductive to getting out of poverty. The poor were said not to value those activities that would facilitate their exit out of poverty, such as going to college or delaying gratification (Roach and Gursslin 1967).

However, Swidler (1986) reconceptualizes culture to argue that culture is more of an "orienting tool kit" than a set of values from which actors act rationally. She argues that our culture determines our actions because it provides us not only with values, but with orienting strategies for how to approach life. These orienting strategies then interact with our structural conditions to shape how we make decisions. For example, if an individual is destitute she may value education and supporting herself, but due to lack of resources and the poverty around her, she may think that her best life choices will be

similar to those of the people around her. If she does not know anyone who went to college, going to college will not seem like a viable option out of poverty.

This is similar to Bourdieu's (1977) notion of a "habitus." A habitus is one's framework for both interpreting others and for deciding how to behave. It is through our habitus that we learn who we are, how to read others' cultural cues and how to act. The family environment is a key area where we learn our habitus and where cultural strategies can impact what kinds of parenting techniques different groups may emphasize. For instance, if within one cultural group, athleticism is known to lead to greater success, parents may stress physical activity for their children, whereas within another group, if success is determined by college degrees, these parents may spend more time reading to their children. In other words, one's culture may provide an orienting strategy for how parents approach child rearing.

Additionally, because of the precocious motor development of African American infants (Freedman and DeBoer 1979), one could conjecture that there is a cultural emphasis among many Blacks on inculcating physical over academic strength. There is some research that supports a unique focus on basketball skills among Black high school students (Eitle and Eitle 2002), although as discussed above, most research that examines whether or not Blacks value education differently than Whites ("oppositional culture" arguments) finds that Blacks do in fact value education as much as Whites do but that African Americans are less likely to do some of the things that lead to academic success (Ainsworth-Darnell and Downey 1998, Downey and Ainsworth-Darnell 2002). This research would indicate that there is unlikely to be a difference in values between races, but rather a difference in strategies, as Swidler (1986) proposes.

These "strategies" may differ by class within the Black community. Additionally, perhaps more affluent African Americans have more in common with more affluent European Americans but the most disadvantaged and socially isolated poor African Americans, who make up a disproportionate percentage of African Americans, have

unique orienting strategies for parenting. Additionally, as Brooks-Gunn and Markman (2005) note, all parents engage in most activities that lead to positive child development; most parents read and sing to children, take them on walks, and play with them sometimes, but the differences come in which activities parents stress over others to varying degrees.[6]

Family Structure

Another major difference between Blacks and Whites that may be related to children's cognitive outcomes is family structure. African American children are far more likely than European Americans to grow up with a never-married mother. According to Lee and Burkham (2002), using data from the ECLS-Kindergarten cohort 53.7% of African American children live in single parent households at the start of kindergarten compared with 15% of European Americans. If parental marital status is strongly associated with children's cognitive skills, then this could help explain the Black-White cognitive skills gap.

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[6] I believe it important to stress that many of these culturally derived differences in strategies were socially constructed through the oppression of Blacks by Whites. Whites have pushed Blacks to the fringes of society through slavery and through forced residential segregation (Massey and Denton 1998). As Massey and Denton spell out clearly in their book *American Apartheid,* by making it nearly impossible for Blacks to obtain mortgages at reasonable interest rates (that are offered to Whites of lower financial standing), by realtors colluding to differentially show homes to Blacks and Whites according to the racial composition of neighborhoods, and by Whites fleeing neighborhoods that were beginning to seem "too Black," Whites have perpetuated segregation in the United States long after the ending of *de jure* desegregation. I argue that this has likely contributed to a lack of "cross cultural" interaction between Blacks and Whites that may lead to different parenting styles. Additionally, living in a society which has put one at a distinct disadvantage is also likely to increase levels of social isolation, stress and depression which make the already difficult task of parenting all the more arduous.

McLanahan (1997) reviews twelve major studies which examine the role of family structure on a number of child outcomes and she concludes that there is a clear association between growing up in a never-married or divorced household and children's educational attainment and behavioral and psychological problems. However, although there appears to be a clear direct link between family structure and educational attainment, McLanahan argues the link between family structure and cognitive skills may have more to do with income, but because it is correlated with family structure may appear to be a family structure effect. Most research shows that family structure matters, with children from married intact families having the highest scores on cognitive tests; but the effect of marital status typically no longer matters after controlling for income (MacLanahan 1997). One exception is a study by Smith, et al. (1997), which found that family structure still matters for predicting cognitive skills, even after controlling for income. This study used the Infant Health and Development Program (IHDP) data (which looks only at low birth weight premature babies). Overall past research seems to suggest that income may be a better predictor than family structure of children's cognitive skills.

A similar line of argument about family structure has to do with the number of siblings, rather than number of parents. Lee and Burkham (2002) discuss this in terms of "resource diminution" (32), which "would suggest that parents' ability to provide their young children with time and attention is diminished by their need to care for other children in the household" (32). They found that Black kindergarteners were more than one and a half times as likely as Whites to have two or more younger siblings (13.8% and 8.4%, respectively). They did not link this directly to cognitive skills, but this does show another major difference in the family structures of Black and White children.

Guo and VanWey (1999) provide a more thorough analysis of the effect of sibship size on intellectual development using fixed-effects models with the NLSY-Children data. They assessed three main theories to explain why having more siblings

would decrease intellectual development in children: (1) the confluence model, (2) the resource dilution model, and (3) the sibship size as spurious effect model. The confluence model posits that as the number of siblings increases, the intellectual caliber of the child's home decreases because there is an increased ratio of children to adults. Thus, intellectual conversations and activities become increasingly geared to a younger audience. Guo and VanWey (1999) find little support for this model.

The resource dilution model argues that as the number of siblings increases family resources for intellectual activities, trips to museums, time for interactions, etc. are reduced because of the added burden of each additional child. Much research does find support for this model. Guo and VanWey (1999) argue however, that the reason for this may be due to a spurious relationship between sibship size and cognitive skills. Because this model is typically assessed using cross-sectional data, genetic and other family values or attitudes cannot be adequately controlled. Guo and VanWey (1999) employ a fixed-effects model, which controls for unchanging aspects of families over time, such as a propensity to read to children or genetically heritable attributes associated with the desire for more children. They find that increasing the number of siblings, per se, does not necessarily impede the cognitive development of children. Thus, limiting the number of children will not improve the scores of children whose parents engage in cognitively stimulating activities. Rather, there is something about families who limit the number of children that tend to do things that make for more intellectual children. They also note, however, that despite the fact that sibship size may not be causally related to intellectual development, it is still useful to control for it in assessments of children's cognitive development as it is highly correlated with hard to control family attributes that are also correlated with intellectual skills in children, such as parenting behaviors, home environment, or discipline styles.

Social Ties and Social Engagement

Coleman (1988) and others have also discussed social capital in terms of the social ties that families have to community resources and other families. This element of social capital was originally discussed in terms of the personal ties between people that might help a person find information related to a job (Granovetter 1973, Portes 1998), and emerged as a sociological response to the human capital explanations for occupational and income inequality. Whereas *human* capital proponents stressed the primacy of education and experience to occupational attainment, *social* capital theorists argued that getting a job was as much a function of *who* one knew as *what* one knew (Smith-Lovin and McPherson 1993). Thus, a person with better connections to hiring managers is more likely to find out what an employer is looking for and will be more likely to hear about jobs before they are advertised, whereas someone without good connections will have less information about upcoming opportunities. Within the family context, this form of social capital works by creating external connections between family members and friends, acquaintances, and other relatives in order to find out about parenting, childcare opportunities, financial services, or any number of other arenas in which families might need aid. Parents could also receive the actual services through social networks as well—such as knowing teenagers through one's church who enjoy babysitting.

For instance, Bubolz (2001) theorizes that social capital within families can teach children ideas of trust and reciprocity and exchange and how to work with other networks of people outside the immediate family. Wong (1998) conducted an analysis on the effects of human, financial, cultural, and social capital on educational attainment in socialist Czechoslovakia. He measured social ties as parents' participation in the Communist party. He found that these social ties were somewhat useful in understanding the stratification processes in that country because parents were able to use their personal connections to help their children get into more academically focused secondary schools

and were therefore able to obtain higher education. However, he found that this social capital was less important to children's educational attainment than the family's human, financial, and cultural capital.

A related concept to social ties is social engagement, or the degree to which a person is involved in one's community. Although little research exists that connects social engagement to cognitive skills on the individual-level, Putnam (2000) found on the aggregate-level that American states with high levels of social engagement have lower rates of negative outcomes for children, such as low birth weight, infant mortality rates and high school dropout rates. Additionally, children in states with high social engagement watch less TV and have better schools. Results also showed that social engagement is positively related to educational attainment across class and net of people's aspirations for educational attainment. Thus, he writes "at Harvard as well as in Harlem, social connectedness boosts educational attainment" (306). Although his analysis was at the macro-level in terms of academic achievement, I speculate that increased social engagement would increase a mother's social ties and social supports, which would, in turn, boost her child's cognitive skills. The more involved a parent is in the community, the more potential supports or resources s/he has in order to better parent the child.

The effect this has on the racial test score gap among children is unclear. For any antecedent to matter in the Black-White test score gap, Whites need to have more of the beneficial factor than Blacks and the factor needs to affect cognitive scores. For example, African Americans are more likely to attend church (Hunt and Hunt 2001), which is a measure of social engagement and thus may improve cognitive development. In this case, controlling on social engagement (i.e. church attendance) may *increase* the unexplained race gap in cognitive scores.

Overall, social ties are generally seen to bring better access to information, but the direct relationship between family social ties and children's cognitive scores is not

altogether clear. Additionally, whether or not Blacks and Whites differ on their amount of social ties and, especially, social engagement is not definitively understood.

Mother's Work Schedule

Another explanation for why some mothers' engage in fewer of the parenting behaviors that are linked with children's cognitive development has to do with their employment behavior. Understanding the causes of parenting differences may be important if parenting is at the heart of the racial gap, particularly in terms of policy remedies. Coleman (1988) argued that children of working mothers have lower levels of social capital because the mothers are not at home as much to engage with their children as mothers who do not work outside the home. Though there is an appealing logic to this argument, the empirical evidence on whether mother's paid employment is detrimental to children's cognitive development is mixed.

Whereas Coleman's (1988) argument relates only to time constraints of working mothers, Waldfogel et al. (2002) expands the possible theoretical mechanisms linking mother's work behavior and child development by assessing four hypotheses: (1) stress and fatigue due to working may make for a less nurturing home environment, (2) working mothers may be less likely to breastfeed—and breastfeeding has a positive effect on children's development, (3) non-maternal childcare may be damaging to the children, and (4) unobserved differences between working mothers and nonworking mothers may be the explanation for the relationship. The first and second explanations are most akin to Coleman's argument. Using Ordinary Least Squares regression and family fixed-effects models on the NLSY-Children data, they found that maternal employment in the first year of a child's life has some negative effects on non-Hispanic White children's development, but not on Hispanic or African American children, and the effects for the White children are small. However, poor White children were affected more negatively by maternal employment than more affluent White children which may indicate that the

maternal employment effect is due to poorer home environment and childcare arrangements. In terms of the four theoretical links between maternal employment and children's outcomes, they found some support for the home environment and childcare links, but not for the breastfeeding link. Additionally, their fixed-effects models, used to control for unobserved differences, were no different from their OLS models, which suggests that any unobserved differences between working mothers and non-working mothers do little to explain the impact of maternal employment on children's development. However, since maternal employment affects poor White families the most, it would seem that there are factors related to employment and class rather than employment per se that are having a negative impact on children's cognitive development.

Parcel and Menaghan (1994) find a similar result in their study examining early maternal employment and child cognitive development. They found that there is little effect of maternal employment for children whose mothers work in routinized jobs (as measured by a 19-item based scale measuring "occupational complexity" item taken from the Dictionary of Occupational Titles). But that for mothers who work in complex jobs (from the same "occupational complexity" scale), their children do benefit from increased cognitive stimulation when their employed mothers take time off of work. With respect to hours worked, they found that children of part time mothers had better cognitive development compared to children of full time mothers and children of non-working mothers. Overall, they find that parental interaction with children is important but that maternal employment has a small overall effect on child development.

Health and Low Birth Weight

Another factor that has been linked to cognitive skills among young children is the child's birth weight and their overall health. Health and birth weight have been implicated as a cause of a Black-White test score gap mainly because of great disparities

between Blacks and Whites in their physical well-being. Specifically, compared with European American children, African American children are somewhat more likely to suffer from asthma, more likely to be anemic, almost twice as likely to have dental caries (cavities), and more than twice as likely to have confirmed high lead levels in their blood. In general, disadvantaged children are far less likely to be treated for medical problems (Currie 2005). Additionally, Black women are twice as likely as White women to give birth to a low birth weight infant (Reichman 2005).

As Currie (2005) points out, in order for chronic medical problems to cause an aggregate level racial disparity in test scores, not only would the medical problems need to affect the scores, but there would need to be both a racial disparity in the incidence of the problem and a large enough number of people affected by the health problem to influence overall averages. Currie estimates that combined health problems can explain approximately one-quarter of the racial gap in cognitive skills among school-aged children, but that any one condition (such as anemia, ADHD, asthma, etc.) is unlikely to affect the gap to a large degree on its own. In her examination of the impacts of poverty on children's health outcomes, Mayer (1997a) also found that poor children are more likely than affluent children to be sick, but are as likely to receive medical attention. Despite the fact that each individual health problem is unlikely to narrow the test score gap by much alone, as Currie (2005) argues, each element is likely to narrow it somewhat and the combined effect may be important to the narrowing.

Low birth weight, in particular, does seem to play a small, though distinct, role in the Black-White test score gap. According to Reichman (2005), over the last twenty years, though infant mortality rates have declined, rates of low birth weight have remained constant. Further, infant mortality rates and low birth weight are much higher among African Americans than among Whites, as she summarizes: "Black babies continue to be twice as likely as White babies to be low birth weight" (107). Thus, African American babies are clearly at a disadvantage in terms of birth weight.

However, birth weight itself has not been shown to explain a large part of the variance in cognitive skills. Reichman (2005) argues that, at most, birth weight can explain three to four percent of the racial gap in IQ scores among school aged children. Further, in a longitudinal analysis using the National Longitudinal Survey of Youth—Child Data (NLSY—CD), Boardman, et al. (2002) found that birth weight had greater effects on younger than older children. Specifically, birth weight had modest effects on young children's (age six) math and reading scores and weak effects on older children's (age fourteen) scores. More important than birth weight to cognitive development, they found were race/ethnicity, maternal education, gender, home environment, unmarried status, and young maternal age, and these were more important at age fourteen than at age six. As they summarize, "although the health of children at birth is surely important for their long-term development, children's social experiences are clearly prominent predictors of long-term well-being" (365).

Solutions to the disproportionately lower birth weights among Black infants, requires a greater understanding of the causes of the disparity. Reichman (2005) stresses that low-birth weight is best remedied by addressing women's health generally. Although the causes of low birth weight are not fully understood, there is clear evidence that maternal behaviors prior to conception and at the early stages of fetal development have a role in infant outcomes. In particular, smoking cessation shows the strongest promise as at least a partial remedy to low birth weight (Reichman 2005). Giscombé and Lobel (2005) concur that the causes of a gap in low birth weight between Blacks and Whites has not been definitively discovered. They stress, however, that the most compelling evidence points to Black women experiencing increased stress from confronting racism on a daily basis, increased cardiovascular reactivity (which is also attributable to stress and/or racism), and greater rates of urogenital infections, particularly bacterial vaginosis (due to stress and differences in hygienic practices, especially a much higher rate of regular vaginal douching by African Americans than European Americans).

Each of these also increases the risk of preterm labor which increases the likelihood of low birth weight (Giscombé and Lobel 2005).

Thus, although health seems to be important to overall child outcomes, the role it plays in explaining the Black-White test score gap is not entirely clear, especially among older children. Additionally, remedies to the racial gap in health care are not clear. Based on evidence in the United Kingdom and Canada, Currie (2005) argues that increasing enrollment in Medicaid or other health insurance programs would not necessarily improve health outcomes for the poor. Instead, she argues that there needs to be more health interventions incorporated into programs such as Head Start that provide preventative wellness information and services to disadvantaged children and their families.

School Effects

Some have argued that schools can serve as a "backup" to good parenting. That is, if parents are not teaching children enough at home, the schools can make up for it. Or, inversely, others have argued that good quality schools are not a solution to racial inequality in educational attainment, but the lack of them in predominately Black neighborhoods are a cause of it. Proponents of this school of thought, argue that poor educational attainment is not the problem of children's genetics, their parents, or their peers, but with their teachers and their schools (e.g. Kozol 1991). They argue that White children are disproportionately located in schools that have smaller class sizes, better resources, and are taught by teachers who do not discriminate against them. Overall, research supports the notion that Blacks, Hispanics, and the poor are in lower quality schools (Lee and Burkham 2002), and that they face racism and classism (Farkas 2003b), however, the effect school quality has on children's cognitive skills and academic success does not seem as strong as the effect parents have on children's cognitive skills and academic success.

The literature on the role of schools on cognitive scores shows that Blacks and Whites are located in segregated schools (Frankenberg and Lee 2002) where "Black" schools have lower resources (Coleman 1966, Farkas 2003b, Grissmer, Flanagan, and Williamson 1997, Hanushek 1996, Lee and Burkam 2002). When in schools together Blacks tend to be tracked into lower performing groups, although this may be due to lower skills at entry (Farkas 2003b). Although schools seem to reduce inequality along class lines, they may increase it along race lines, specifically between Blacks and Whites (Downey, von Hippel, and Broh 2004, Fryer and Levitt 2004). What is abundantly clear is that where students start in school in terms of their ability will have a major impact on where they end up (Downey, Von Hippel, and Broh 2004, Farkas 2003b). This finding again supports the importance of looking at racial differences in infants cognitive scores.

Further, teacher bias and student tracking cannot explain a racial test score gap in infancy. Although one could make the case (on arguably shaky ground) that, at the preschool level, toddlers and preschoolers begin to internalize a sense of inferiority from racially biased teachers, this seems hardly plausible at the infant level. Infants are not cognitively developed enough to understand racism and internalize it. Thus, by looking at infants, I inherently control for effects of schooling on children's cognitive scores.

Preschool and Childcare

However, there is another form of "schooling" that infants do participate in: childcare. This is an arena that has been increasingly examined as children are ever more likely to be in the care of someone other than their mother. According to Capizzano and Adams (2003), 73% of children younger than 5 with employed mothers are regularly in childcare. The type of childcare received by poor children and affluent children is quite distinct. "Forty-six percent of higher-income three- and four-year olds are in center-based care compared with 36% of low-income children."(1) Low-income children are more likely than high-income children to be in relative care (Capizzano and Adams

2003). Relative care has been shown to be less beneficial to children's cognitive development compared to center care. Additionally, the National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network (1997) found that poor children who receive childcare subsidies and affluent children are more likely to be in quality care than near poor or poor children who do not receive childcare subsidies (NICHD 1997). Because African Americans are disproportionately located among the poor and near poor (Mayer 1997a), inadequate childcare could be a culprit in the Black-White test score gap.

It is difficult to estimate the causal link between childcare and children's' cognitive development. The best analyses involve experimental designs in which children are randomly placed in high quality childcare or not. Most such studies have involved low income families and have consistently found that childcare centers with high quality instruction and a focus on building cognitive skills increase the school readiness of these children. Correlational studies that statistically control for family background and family SES have also found consistently positive relationships between childcare centers and children's cognitive development, and the effects are largest for children from the most disadvantaged homes (Magnuson and Waldfogel 2005, Shonkoff and Phillips 2000). Childcare centers tend to be better than other forms of childcare (such as relative care, non-relative in-home care, or care in another person's home) because the teachers have higher educational credentials (Magnuson and Waldfogel 2005), which help them to be more sensitive to individual children's needs (Loeb et al. 2004), and which increases the likelihood that they will talk with the children, and in turn increase their linguistic capacities.

Another study looking at the connection between type of childcare and cognitive development was conducted by Loeb et al. (2004). The researchers performed a longitudinal analysis of low-income children (12-42 months old) whose mothers were being required to work due to welfare reform (i.e., the Temporary Assistance to Needy

Families (TANF) policy). Looking at this population is particularly important, they argue, since there has been an increased demand for childcare among the newly employed, who tend to have greater financial constraints limiting their childcare choices. They looked at the effects of the type and characteristics of childcare arrangements on children's cognitive growth. They found that children in high quality care, as measured by caretaker sensitivity and responsiveness, showed greater cognitive growth. Additionally, when these caretakers had education beyond the high school level, the children showed stronger social development. No cognitive differences were found between children not in care and those in care within a caregiver's home, although, children in care within a caregiver's home were found to have more behavioral problems than children who were cared for exclusively by their mothers.

Although racial differences are not the focus of their study, Loeb et al. (2004) control on race in their analysis, as well as childcare characteristics, child's age, mother's intelligence, educational attainment, and mental health. They find that, compared with White children, African American children are significantly less ready for school (as measured by the Bracken Subscales), have lower level book mechanics and mother-assessed cognition, and are more likely to have social problems. However, there were not statistically significant differences between African American and European American children on the FACES assessment (which deals with reading comprehension), story comprehension, book familiarity, aggressive behavior, destructive behavior, or other problems. Since only full models with all variables were shown (rather than a series of models with each set of variables entered separately or a path model), one can not determine how the childcare measures affected the impact of race, specifically. Additionally, their analysis cannot be viewed as nationally representative, as it only includes three sites (two in California and one in Florida) with a sample of 451 welfare-to-work single mother headed families.

Part of the problem in understanding the connection between type of childcare and cognitive development has to do with how "quality of care" is measured. Sensitive measures of center quality, such as those used by Loeb et al. (2004), are not usually available in most studies. Typically when determining licensing and subsidies for childcare centers, governments do not use the harder to measure items such as caregiver sensitivity or interaction style which would require the use of skilled assessors. Instead, they often use easier (and cheaper) to calculate items such as class or group size, staff-child ratio, or child educator training. These items have been shown to be linked to positive cognitive development in a number of smaller studies, according to Blau (1999b). However, in his analysis looking at three to five year olds using the National Longitudinal Survey of Youth, Blau (1999b) found that these items are *not* in fact related to child development. He found that the effects of smaller classes do matter to a small degree but that low child-to-teacher ratios do not matter when it comes to children's cognitive development. As he writes, "assistant teachers do not actually do very much" (814). Further, in contrast to other studies, he also found no differences across economic classes. He argues that his divergent findings are due to his better controls for parental background and family life, which could lead to selection bias in other studies. In other words, parents who place their children in high quality childcare centers are also more likely to engage in parenting practices that promote child development. Thus, the apparent "childcare center effect" is actually a "parenting effect."

The NICHD Early Child Care Research Network (2000) found similar results in their study using the NICHD Study of Early Child Care, which is a large, but not nationally representative, data set. They assessed children at six months, 15 months, 24 months, and 36 months, which makes their findings more relevant to the age of the children in the current analysis. They also found that childcare quality as measured by caregiver sensitivity and caregiver-child interactions made for higher cognitive and academic achievement for the children, but that more "objective" measures such as child-

teacher ratios had little import. Additionally, they found that there is little difference between children in advantaged homes with no childcare and children in advantaged homes who attend childcare. They also found that although childcare does not diminish the positive effects of an advantaged home, it also cannot compensate for a disadvantaged background. Thus, quality childcare can help improve cognitive skills in children but the effects are modest. In a similar study, the NICHD Early Child Care Research Network (1998) found that there were few developmental differences between children in childcare and children receiving exclusive maternal care.

The modest effect of childcare, net of family background, is one reason why some argue that childcare is not the panacea for the Black-White test score gap (Magnuson and Waldfogel 2005). Additionally, childcare may not narrow the Black-White test score gap if childcare is beneficial, because past research shows that African American children are more likely than White children to be in childcare and/or attend preschool (Magnuson and Waldfogel 2005). If both of these conditions hold, instead of narrowing the cognitive race gap, the inclusion of childcare in models predicting cognitive outcomes would exacerbate the race gap. However, the modest effect on a large number of African American children could also mean that if African American children were not in childcare as much as they presently are, the racial gap in cognitive skills might be larger. Thus, because of the general findings that childcare improves children's school readiness, few would argue that childcare is completely ineffective in reducing racial inequality (Magnuson and Waldfogel 2005).

Additionally, research has clearly demonstrated that White children tend to be in higher quality childcare than African American children (Magnuson and Waldfogel 2005). African American children are far more likely to be in Head Start, and Head Start has been shown to be of modest quality. Head Start is a federal program that funds local organizations to provide preschool education and health, nutrition and family-services to three- to four-year-olds living in poverty (Magnuson and Waldfogel 2005). As

Magnuson and Waldfogel (2005) note "only one-third of Head Start teachers hold four-year college degrees, and experts worry that low pay and low levels of provider education constrain program quality" (172). Some disagree that all Head Start programs are ineffective (Love, et al. 2005, Wilen 2003, Zero to Three 2005). In their policy brief, the Zero to Three Policy Center (2005) argues that *Early* Head Start is highly effective. Early Head Start is a more recent initiative to address children between the ages of one and 36 months. In their analysis of a large-scale study of Early Head Start, they found that the program increases cognitive and language development, positive parent-child interactions, and children's engagement in play, as well as helping parents to become more involved and self-sufficient, and these findings were particularly strong for fathers (compared to mothers) and for African Americans (compared to Whites and other races). Magnuson and Waldfogel (2005) argue that despite the fact that they believe that Head Start could be improved, without it many African Americans would likely be in lower quality care due to the expense of center care. Because of this, Head Start has likely been a positive factor in equalizing rates of early childhood education for Blacks and Whites.

They also point out, though, that better programs could potentially do more to narrow the Black-White test score gap. Examples of "better" programs would be preschools located in public schools (because of high teacher quality) or programs such as the Carolina Abecedarian Project and the Infant Health and Development Program, which not only address children's school readiness but also provide healthcare and parenting resources. Little research has examined the effect various childcare programs would have in reducing the Black-White test score or school readiness gaps, but Magnuson and Waldfogel (2005) estimate that improving childcare quality for African Americans could reduce the school readiness gap by about 20% for African Americans. However, as they note, if universal preschools were made available, there would be little change in the gap as White children would presumably receive some benefit. However, whereas Blau (1999b) disputes this, Loeb et al. (2004) and others (Shonkoff and Phillips

2000) have argued that quality childcare has greater effects on disadvantaged children, who are disproportionately Black.

In summary, there is not a clear consensus on the effect of childcare on children's development in general, and there is less clarity on its role in the Black-White test score gap. There is agreement that the more caretakers are sensitive to the needs of children and interact with them regularly, regardless of whether the caretaker is the mother or another adult, children do better. Other measures of childcare quality, such as teacher-child ratio or "class" size, are less clearly linked to child development outcomes. Additionally, due to the large number of African American children in childcare, simply increasing Black children's enrollment in non-parental care, without attention to quality, will do little to change the Black-White test score gap. However, if quality of care in childcare centers is increased for African American children, the gap may be somewhat reduced.

Motor Skills

Thus far, all research points to the possibility that Black children are disadvantaged relative to Whites in almost all antecedents to cognitive skills, with the possible exceptions of social engagement and childcare type. However, in infancy, there is one trait that Black children outperform their White counterparts on: motor skills. According to Kilbride, Robbins, and Kilbride (1970), on a revised version of the Bayley Scales of Infant Development (from 1965), African American infants score about the same as White infants at one month of age (6.39 and 6.34 points respectively) but approximately two (non standardized) points higher than European Americans by nine months (38.95 and 37.13 points respectively). While there is some empirical evidence that Blacks develop their motor skills more quickly than do Whites, there are many stereotypical arguments about the superior physical capacities of Blacks over Whites. For example, comedian Chris Rock in his *Chris Rock: Never Scared* show jokes:

> Black people dominate sports in the United States. 20% of the population and 90% of the final four. We own this shit. Basketball, baseball, football, golf, tennis, and as soon as they make a heated hockey rink we'll take that shit too (Gallen 2004).

Despite these stereotypes, or perhaps because of them, anthropologists have found support for the idea that African children have more advanced motor skills than African American children, and these children have better motor skills than European American children. Freedman and DeBoer (1979) find from their review of the literature that there has been a great deal of evidence that infants descended from sub-Saharan Africa display "better head control and better visual pursuit at birth, and…reach such major motor mileposts as sitting, standing, and walking sooner than do white infants" (584).

Research in the 1960s and 1970s examined cross cultural differences in motor skills between African and American cultures and differences within the United States between Navajo, African Americans, and European Americans (Freedman and DeBoer 1979, Hudson 1966, Kilbride and Kilbride 1974, Kilbride, Robbins, and Kilbride 1970). Although the evidence for the differences between each racial or cultural group were mixed, in most studies, European Americans lagged behind the other groups in terms of motor development. Additionally, the Bayley Scales of Infant Development have consistently shown higher motor skills scores for Black babies than White babies (Freedman and DeBoer 1979, Kilbride and Kilbride 1974).

Research has yet to discover *why* exactly African Americans have higher motor skills than Whites, but is believed by some to be due to the ways in which babies are physically handled during infancy, genetics, or mother-infant attachment differences (Hudson 1966, Kilbride, Robbins and Kilbride 1970). Kilbride, Robbins, and Kilbride (1970) conjecture that it may be due to mothers not supporting their infants heads and backs when picked up or placed down. In terms of differences between American and African infants, mothers carrying their babies on their backs may increase neck muscle strength, and allow them to sit upright at an earlier age, thereby beginning an earlier

trajectory for motor development. Although, they also allow for a genetic component to be the cause, but cannot assess that in their study.

In their analysis of motor development in general, Abbot and Bartlett (2001) found that there is a relationship between equipment use (e.g. high chairs, exersaucers, play pens, etc.) and motor skills; children who used more equipment were slower to develop motor skills. Although, as they note, because their study is cross-sectional they cannot assess the direction of the relationship; it could be that slower to develop infants are more likely to spend more time sitting in a highchair, for example, because they cannot walk around like some of their peers. However, if White families are more likely to have more equipment in their homes, which, based on differences in economic resources is a possibility, and if the equipment does in fact impede motor development, it could be that Black infants develop motor skills at a faster rate because of their differences in equipment use rates.

According to Freedman and DeBoer (1979) much of the research on racial differences in motor development ended out of researchers' fears of being labeled racist, which has led to a dearth of research on the subject[7]. These fears aside, if African American infants have higher motor skills, controlling on all other previously discussed impediments to their success, African American infants should potentially score *higher* than Whites on cognitive skills tests because of the high correlation between motor and cognitive skills (Clearfield 2004, Vasta, Haith, and Miller 1995). According to Jean Piaget, arguably one of the most important theorists of child development, infants' cognitive development is inextricably intertwined with their motor development. He calls the period from birth to age two the "sensorimotor" stage, because during this time

[7] Although, among psychologists, motor skills in general have been ignored compared with the interest in cognitive skills according to Rosenbaum (2005); he calls motor skills the "Cinderella of Psychology" since they are so neglected and in need of some empirical attention.

children are learning and developing through their senses (Vasta, Haith, and Miller 1995).

Infants go through a sequence of six sub-stages of development that correspond with their increasing motor skills. In all of the stages, as the ability to move around increases, a child can learn more.[8] If a child can see an object and wants to touch it, she will learn more about the object if she can move to touch it than if she can only experience the object with her eyes.

This has been further supported with more recent developmental psychology research that has demonstrated that early motor development is highly correlated with cognitive ability. In an experiment looking at the ability of infants to find a hidden object (considered a cognitive skill), Clearfield (2004) found that those who were more experienced crawlers or walkers were better able to find the object. Thus, advanced motor skills provided advanced cognitive skills as well, because a child who can physically move about and reach objects are better able to reason where lost or hidden objects are, because they can physically find them. Additionally, children deprived of opportunities to use their motor skills have been shown to be developmentally delayed, such as children in orphanages in Eastern Europe who are confined to cribs for much of the day and denied the opportunity to explore (Shonkoff and Phillips 2000).

Because of the connection between motor and cognitive skills, there have been attempts to create "perceptual-motor training programs" for disadvantaged children to help with their academic readiness (Fisher and Turner 1972). Fisher and Turner argue that a short-coming of Piaget's theory was that the sensorimotor period ends at age two. They stress that between the ages of two to seven, motor development continues to be important. Employing an experimental research design, they randomly assigned

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[8] There is less evidence that the cognitive-motor skill link works in the opposite direction; intelligence does not seem to be a prerequisite for movement (Rosenbaum 2005).

economically disadvantaged African-American children to either an experimental room with special motor skill development and cognitive activities or to a control room with only cognitive activities. The researchers assessed the children both pre- and post-test on a number of intelligence and development assessments. They found that there was a significant difference between the two groups only on the Metropolitan Readiness Test, which they view as evidence that focusing on motor skills can aid in school readiness. Although their results did not demonstrate an increase in IQ from motor skills training, they did demonstrate that motor skills are linked to academic achievement. Thus, improved motor skills may not directly improve intelligence, but they might foster behaviors that increase school skills, such as attention to detail, self-control, or frustration toleration. Additionally, the correlation between motor and cognitive skills may fall somewhere between their theory and that of Piaget; perhaps motor skills persist in importance beyond the age of two as they argue, but are not as important as other cognitive activities as Piaget theorized.

In terms of the long term effects of motor skills on cognitive development, Murray, et al. (2006) find that there is an assumption among psychologists that the age at which infants reach certain developmental milestones does not have an impact on later cognitive skills, but that this assumption has not been tested. In their analysis using a random sample of adults (aged 33-35) who were members of the Northern Finland 1966 Birth Cohort sample, they found that within the population of normally developed adults, those who learned to stand earlier, performed better on one of their tests of cognitive function—categorization—controlling for gender, social class, and maternal education. They argue that "faster maturation of basic neural circuits involved in infant motor function may lead to a consequent more favourable development of the more complex cortical-subcortical circuits involved in higher cognitive processes later in life" (27). Thus, the brain mapping that occurs with motor development may aid cognitive brain

mapping as well. However, they did not find that motor skills were related to visuo-spatial/working memory, visual object learning and memory, or verbal learning.

Other research does not agree that motor skills are central to all cognitive development in infancy. Specifically, in terms of language development some research has found that infants engage in conceptual mapping of language that is crucial to language development and separate from sensorimotor schemas (Mandler 1994, Kuhl 2000). Although Piaget believed that most development occurs through trial-and-error experiences related to one's senses, Mandler (1994) argues that there is much brain development that goes on without a child touching anything. This has been further shown through research on children who are deprived of some of their senses, such as blind or deaf children, but are still able to learn and think as well as other children (Shonkoff and Phillips 2000). However, although motor development may not be central to cognitive or language development, research does support the notion that motor and cognitive skills are at least correlated in infancy and there may be different domains of cognitive skills that are more or less related to motor skills.

In summary, African Americans have been shown to have higher motor skills than White children and motor skills have been shown to be linked with cognitive development. However, little research has examined the role of motor skills on cognitive development in terms of the Black-White test score gap. If African American infants have higher motor skills (and this precocity is not due entirely to the already included measures), having a Black mother will have a positive impact on cognitive scores, but when controlling on motor skills the benefits of them will statistically go away.

Hypotheses

In summary, the causes of the Black-White test score gap are highly complex. The main arguments for the gap include racial differences in: genetics, test bias, financial capital, human capital, mother's work behavior, family structure and size, social ties,

social engagement, parenting, health and low birth weight, and schools and childcare. Motor skills have not been examined in previous research of the Black-White test score gap. Table 2.1 summarizes the main arguments and findings.

Based on this review of the literature, there is evidence that the Black-White test score gap is driven by racial differences in financial, human, and social capital, and in health and low birth weight and child care. In order to assess the relative merits of each argument, I test the following hypotheses:

1) Genes—If genes are what drive the Black-White test score gap, then Black-White biracial infants will score higher than Black infants and lower than White infants, net of all environmental controls.
2) Financial Capital—Financial capital is correlated with many antecedents of high cognitive skills. Assuming that African American have less financial capital than European American families, financial capital will mediate the race effect.
3) Human Capital—Human capital (measured with mother's education, mother's knowledge of infant development, and whether mother has read a book or magazine on parenting) will have a statistically significant positive impact on infants' cognitive skills because mothers with more human capital will know more about good parenting practices. Assuming that African American mothers have lower human capital, human capital will mediate the race effect.
4) Social Capital—Social capital will affect infants' cognitive scores through a variety of mechanisms.
    a) Parenting—The more a mother interacts with her infant, the higher the infant's cognitive skills. Assuming that African American parents engage in fewer cognitively stimulating activities than White parents, parenting will mediate the race effect.
    b) Family Structure and Size—Infants from families with fewer adults and more siblings will have lower cognitive skills. Assuming that African Americans

infants have more siblings and are more likely to be in single parent families than White infants, family size and structure will mediate the race effect.

c) Social Ties—As parental social ties increase, infant's cognitive scores will increase. Assuming that African Americans have fewer social ties than Whites, social ties will mediate the race effect.

d) Social Engagement—As parental community engagement increases, infant's cognitive scores will increase. Assuming that African Americans have equivalent social engagement to Whites, community engagement will not mediate the race effect.

e) Mother's Work Time—Based on Coleman's (1988) theory, infants with stay at home mothers (mothers who do not work outside the home and who are not looking for work outside the home) will have higher cognitive scores, compared to infants with working mothers. Assuming that African American mothers are less likely to be stay at home mothers compared to White mothers, maternal work status will mediate the race effect.

5) Health and Low Birth Weight—Poor health and low birth weight will have a modest but direct negative influence on cognitive skills due to the delaying effect they have on development. Assuming that African American infants have poorer health and lower birth weights than White infants, health and low birth weight will mediate the race effect.

6) Childcare—Being in childcare will have modest but positive effects on cognitive scores. Assuming that the proportion of Black children in childcare is the same as the proportion of White children in childcare, childcare will not mediate the race effect.

7) Motor Skills—As motor skills increase, cognitive skills will increase. Assuming that Black infants have better motor skills than White infants, controlling for motor skills will increase the race effect (i.e. make the effect of being Black more negative).

8) All of the Above—In a model controlling for all of these resources, aside from motor skills, the Black-White test score gap will be reduced to a statistical zero (i.e., the effect of being Black will be zero). If hypothesis 7 is supported, the effect of being Black will be positive before motor skills are included. After incorporating motor skills, the effect of being Black will be reduced because the benefit that African Americans receive from having superior motor skills will be eliminated.

Table 2.1. Main Theories Proposed to Explain the Black-White Test Score Gap

Theory	Supported?	Author
Test Bias	Yes	Maume, Cancio, and Evans (1996)
	No	Farkas (2004), Jencks (1998), Neisser et al. (1996), Rowe, Vazsonyi, and Flannery (1994),
Genetics	Yes	Herrnstein and Murray (1994), Rowe (2005), Scarr and Weinberg (1978)
	No	Cooper (2005), Dickens (2005), Dickens and Flynn (2001), Fisher et al. (1996), Flynn (1987), Martin (1973), Nisbett (1998)
Stereotype Threat and Status Characteristics Theory	Yes	Steel and Aronson (1998) Lovaglia et al. (1998)
Oppositional Culture and the Burden of Acting White	Yes	Ainsworth-Darnell and Downey (1998) (with partial support), Ferguson (1998), Fordham and Ogbu (1986), Ogbu (1991)
	No	Ainsworth-Darnell and Downey (1998) (with partial support), Cook and Ludwig (1998), Tyson (2002)
Financial Capital and Poverty	Yes	Brooks-Gunn, et al. (1997), Brooks-Gunn, et al. (1996), Guo (1998), Guo and Harris (2000)
	No	Blau (1999a), Duncan and Magnuson (2005), Mayer (2002, 1997a, 1997b)
Human Capital	Yes	Mayer (1997a), Smith, et al. (1997)
Health and Low Birth weight	Yes	Reichman (2005) (but a small effect)
Home Environment and Parenting	Yes	Combs-Orme (2003), Mayer (1997a, 1997b), Parks and Smeriglio (1986), Phillips et al. (1998), Smith, et al. (1997), Stevens (1984), Waldfogel, et al. (2002)
Mother's Work Schedule	Yes	Parcel and Meaghan's (1994) (small effect)
	No	Waldfogel et al. (2002) (some small effects on some subgroups, but not overall),

Table 2.1—continued

Theory	Supported?	Author
Marital disruption	No	McLanahan (1997) (divorce and never married mattered to academic achievement, but not to cognitive skills when controlling on income)
Siblings	Yes	Lee and Burkham (2002)
	No	Guo and VanWey (1999) (although this is due to unmeasured differences between families, thus a positive effect of number of siblings usually occurs)
Social Ties and Social Supports	Yes	Bubolz (2001), Wong (1998)
School Effects	Yes	Downey, et al. (2004), Ferguson (1998), Grissmer, et al. (1997),
	No	Coleman (1966), Hanushek (1996)
Preschool and Childcare increase cognitive skills	Yes	Loeb (2004), Magnuson and Waldfogel (2005), Shonkoff and Phillips (2000), Childcare has small effects and mainly for disadvantaged children, little support for it helping children from cognitively stimulating homes. Wilen 2003, Zero to Three 2005 find strong support for Head Start and other early childcare on cognitive skills and school readiness
	No	Blau (1999b)—based on commonly used but inadequate measures of childcare.
Motor Skills		Unexamined in the literature as it relates to the Black-White test score gap. Motor skills in general have been shown to be related to cognitive skills in general (Clearfield 2004, Murray et al. 2006, Vasta, et al. 1995) and Black infants have been shown to have higher motor skills than white infants (Freedman and DeBoer 1979, Kilbride and Kilbride 1974, Kilbride, et al. 1970)

CHAPTER 3

DATA AND MEASURES

Data

This project will use the Early Childhood Longitudinal Study—Birth Cohort to assess racial differences in infant development. The data are a nationally representative sample of 10,688 children born in the year 2001. The sample is diverse in both racial/ethnic background and socioeconomic status which makes it ideal for my study. The survey is a multifaceted compilation of interviews and surveys of parents and other care providers. While the data are longitudinal, only the first wave (assessments when the babies were around 10 months old) is currently available and therefore, my analysis will be limited to the parent survey and birth certificate data on the babies at the first wave. I use the restricted-use data because they are more detailed than the public-use data, particularly in terms of the birth weight and income variables. In the future, I hope to perform analyses utilizing the longitudinal component of the data. These data are rich not only in the diversity of subjects but in the questions asked; there are multiple indicators for all my main variables of interest.

The sampling design was a complex stratified sample design. Infants were selected via birth registration from the National Center for Health Statistics. Researchers initiated contact with a letter detailing the study and some free gifts for the families to serve as incentives for participation. The field interviewers then went to the families' homes in person to conduct the assessments and surveys, or to set up a time to do so. The research staff also went through a series of tracking stages to find as many of the families as possible. The original sample included 14,000 births. Children were excluded from the sample if they were born to mothers less than 15 years of age and if they died or were

adopted before the 9-month assessment[9] (NCES 2004). After these exclusions, the sample included 10,688 infants.

The sample was selected by strata in order to ensure a representative sample that could also allow for analyses by specific races, by low birth weight, and by plurality. The racial and ethnic categories in the sampling strata are: American Indian, Chinese, other Asian or Pacific Islander, Hispanic, Black (non-Hispanic), and White (non-Hispanic). The birth certificate data does not list the child's race, and so sampling was determined by parents' race/ethnicity. According to the ECLS-B codebook, for sampling purposes, a hierarchical rule was used to assign race to the child as follows:

> 1. If the mother or father was reported as American Indian, then the child was classified as American Indian;
>
> 2. Otherwise, if the mother and father were reported as Chinese, then the child was classified as Chinese;
>
> 3. Otherwise, if the mother was reported as Chinese or Asian/Pacific Islander or the father was reported as Chinese or Asian/Pacific Islander, then the child was classified as Other Asian/Pacific Islander;
>
> 4. Otherwise, if the mother was reported as Hispanic, then the child was classified as Hispanic;
>
> 5. Otherwise, if the mother was reported as Black, non-Hispanic, then the child was classified as Black, non-Hispanic;
>
> 6. Otherwise, if the father was reported as Hispanic, then the child was classified as Hispanic;
>
> 7. Otherwise, if the father was reported as Black, non-Hispanic, then the child was classified as Black, non-Hispanic;
>
> 8. Otherwise, if the mother was reported as White, non-Hispanic or the father was reported as White, non-Hispanic, then the child was classified as White, non-Hispanic;

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[9] The first wave of the study was intended to assess infants at 9 months of age and is therefore referred to as the 9-Month assessment. However, in reality, the average age of the sampled infants ended up being approximately 10 months old.

9. All remaining cases (both mother's and father's race/ethnicity was reported as missing): the child was classified as Other Asian/Pacific Islander. (section 4.1.1; NCES 2004)

Each parent's race was based on his/her report of his/her race on the child's birth certificate reports, or on the mother's report if the father was absent. In the end, the possible races for the children and their parents were White (non-Hispanic), Black (non-Hispanic), Hispanic, Asian, Pacific Islander, Native American, and multiracial.

The data are weighted, "to adjust for disproportionate sampling, survey nonresponse, and noncoverage of the target population when analyzing complex survey data" (section 4.1.1, NCES 2004). In the analyses, I use the child weights which are weighted to include the children who completed the Bayley Assessment. Furthermore, in the STATA and Mplus software packages, I use the Taylor Series linearization method that adjusts the data based on the stratum and first stage unit. In so doing, the data are nationally representative (by use of the weights), but problems associated with increased sample sizes from using the weights are minimized. Without the readjustment, the weights would inflate the sample size thereby decreasing the standard errors, which would lead to a higher likelihood of committing a type I error, or rejecting the null hypothesis when it should be accepted. Thus, the estimates calculated in these analyses are both nationally representative and conservative in their likelihood of finding statistical significance.

The data were first collected in 2001 by a team of trained interviewers with basic knowledge of child development. The interviewers were required to do in-home training as well as in-person training in order to be prepared for the lengthy interview of the parents and assessment of the children. Extensive training was provided to ensure the accuracy of the surveyors in their ability to assess the infant's development, including how to establish rapport with the babies and how to "read the gaze" on a baby's face. Interviewers also were required to be formally certified, which involved multiple quizzes and tests on the administration of the test, in order to carry out their jobs. There were

additional follow-up procedures implemented to ensure that interviewers were accurately carrying out the assessments without bias (NCES 2004). Refer to the Appendix for additional discussion of possible assessor effects.

All attempts were made to interview the mother of the child. However, in certain circumstances, someone other than the birth mother completed the survey, including fathers, grandmothers, cousins, or others. Birth mothers accounted for 98.6% of the primary respondents, and only they were used in these analyses.

Measures

Dependent Variable

My dependent variable is the standardized T-scores for the cognitive skills assessment from the Bayley Short Form—Research Edition (BSF-R), a widely utilized measure of infant development. The BSF-R is drawn from the Bayley Scale of Infant Development-II (BSID-II), which is the most widely used and known measure of infant cognitive development. The Bayley scale is based on an understanding of infant intelligence as being comprised of both a motor and a cognitive component (Bayley 1969, Zelazo, Zelazo, and Kolb 1972a, 1972b), and as such has separate subscales scores for cognitive and motor abilities. Each is based on a series of assessments that have been shown to factor into these single scores.

The assessments differ depending on the age of the infant, since children at older ages would be expected to perform at a higher level than younger children. A fourteen month old child would naturally perform higher on a test of cognitive skills than an eight month old, and the t-scores adjust for this age difference. This adjustment is important since the infants in the sample average 10.5 months with a standard deviation of 1.9 months and range in age from 6.2 to 22.3 months.

Standardized scores of the BSID-II are similar to other standardized IQ tests, such as the Wechsler or Stanford Binet, with a mean of zero and a standard deviation of 15.

The BSID-II, though more comprehensive than the BSF-R, was shown through pilot tests to be too burdensome for field interviewers, which led to the creation of the shorter "research edition" for the ECLS-B. These standardized scores have a mean of 50 and a standard deviation of 10. Because standardized scores are best for making comparisons across groups and are typically used in other research, I will be using the standardized scores in these analyses[10] (NCES 2004). The items used for the composite scores are listed below (as cited in NCES 2004):

> BSF-R Mental Scale Proficiencies:
>
> Explores objects. This proficiency can be characterized as the ability to explore objects, for example, reaching for and holding objects, manipulating objects like a cup or a string, and banging objects in play. The child may have no specific purpose or goal except to play or discover. (6 items)
>
> Explores purposefully. This proficiency refers to children's purposeful exploration of objects, that is, the child now touches and works with the objects for a reason. For example, the child may explore a bell to understand the source of the sound, engage in means-end behavior such as using a string to obtain an object, hold multiple blocks at one time together, or look at the pictures in a book. (5 items)
>
> Babbles. This proficiency assesses communication through diverse nonverbal sounds and gestures, for example, vowel and vowel-consonant sounds, gesturing for an object, babbling, and jabbering. (4 items)
>
> Early problem solving. This proficiency can be characterized as engaging in early problem solving types of reasoning, for example, using a tool to retrieve an out-of-reach toy, locating a hidden toy, or knowing how to use a pencil to make marks on paper. (4 items)
>
> Uses words. This proficiency measures communication using words, both receptive (knowing an object by its name) and expressive (saying the name of an object) communication. (4 items)

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[10] I also perform a number of sensitivity analyses comparing the R^2 measures in models using scale scores versus standardized scores. This allows me to understand just how important age is in explaining cognitive scores. These models are discussed further in Chapter 7.

Independent Variables

Controls

The main independent variable of importance to this study is race, the measurement of which is detailed above. In this analysis, I measure the *mother's race* instead of the child's race because I view parenting as at the root of the gap, the mother's race is more likely to be linked to her parenting than her child's race. White child/mother is the omitted category, as Whites are the largest racial category. I include dummy indicators for all other races so that the effect of "being Black" can be compared with that of "being White." For Chapter 4 "Assessing Genetic Influences", *child's race* is measured differently, in that I code the child's race based on the race of the mother and the race of the father (rather than based on the mothers' report of the child's race). This is done in order to assess which children are Black-White biracial, but this method loses a significant number of cases as discussed in that chapter and is therefore used only in that analysis.

I also include a number of other demographic controls. *Gender* (1= female, 0 = male) is an important control variables because girls have been shown to score higher on the Bayley than boys (Dezoete, MacArthur, and Tuck 2003). Because of differences in rates of the concentration of poverty and residential segregation, both of which are highly related to race in the United States (Massey and Denton 1993), I control on *regional location* and *urbanicity/rurality* of the child's residence. Region is measured with a set of dummy variables for Northeast, Midwest, and West, with the South as the excluded category and urbanicity/rurality is measured with an indicator for whether the respondent lives in a rural, suburban, or urban area (urban area is the omitted category). I also control on *mother's age*. Mother's age may be important for children's cognitive development because young mothers may be less mature (and therefore do not handle the stresses of parenting as well, or are less informed about good parenting), although other

research has shown that older mothers are more likely than younger mothers to have poor obstetric care and to consume alcohol while pregnant (McCarthy and Hardy 1993).

Financial Capital

In order to assess financial capital, I recode a categorical measure of family income into continuous values (using the midpoint of each category) and then log the values.[11] According to Mayer (1997a), in analyses of income, one must log income rather than using raw dollar amounts, because each additional dollar a person earns will have a relative impact on their overall earnings depending on how much they start with. For instance, a $1,000 per year salary raise would double the income of a person who makes $1,000, but a $1,000 per year salary raise would increase the income of a $100,000 per year earner by 1%. By logging income, one transforms income into a proportional measure of income, so that each additional logged dollar has the same proportional impact on overall earnings. In order to address this issue, my measure of *family income* is a logged value.[12]

Human Capital

Typically, human capital is measured using either highest level of education in the family (mother's or father's) or mother's education. Because I believe that mother's parenting, not father's parenting, affects the cognitive skills of the child, I use mother's education as a measure of human capital. I measure this with an interval variable created from a nominal variable; thus, mothers who completed Grade 8 or lower received an 8,

[11] More precisely, I added one to each value and then logged them because values of zero cannot be logged.

[12] Initially, I also had measures of assets including a value of the family home and number of assets, however, these were too collinear with income. Because much more research has examined income than assets in terms of cognitive skills, I felt it important to assess the veracity of these arguments with these new data. However, future analyses would warrant an examination into the relative value of assets and income.

mother's who completed less than high school were given a 10.5, mothers who have a high school diploma received a 12, mother's who completed a vocational degree or some college were given a value of 14, those who received a Bachelor's Degree received a 16, those who had some graduate school received a 17, those with a Master's Degree received an 18, and finally, mother's with a Ph.D. or terminal degree (M.D., J.D., and so on) received a value of 21.

As discussed earlier, there is some debate as to why parental education matters for children's cognitive development. Some argue that more educated parents will have more knowledge about infant development, whereas others argue that more educated parents will be more likely to read parenting materials. I include two additional measures of mothers' human capital to assess these arguments.

To assess the mothers' knowledge of infant development, the mothers were asked a series of questions that had a right and a wrong answer. These items are used to assess mothers' knowledge of infant development in general, and are not to be read as questions about her individual child's development. Most of the items were a true or false question (do they agree or disagree), which if answered correctly were given a follow up question. They were given one point for each question (or follow-up question) answered correctly. The highest possible score was eleven points. All the items are listed in Table 3.1.

Finally, in order to assess the idea that mothers with more education have children with better outcomes because they are more likely to read about child development, I include a dummy variable of whether or not the *mother has ever read a book or magazine related to parenting or babies* for help with rearing her child. These measures of human capital should provide insight into a number of different hypotheses related to the effect of human capital on the Black-White test score gap.

Social Capital

Social capital is a broad concept that includes a number of sub-constructs. In my analyses the main general items are parenting, family structure, social ties and social engagement, and mother's work status. I discuss each of the measures for each of these concepts below.

Parenting

I include measures of parenting which come from the short form of the Home Observation for Measurement of the Environment (HOME) scale and from the Early Head Start Research and Evaluation Project. The *HOME* scale is the most commonly used assessment of the home environment and parenting in the literature on the Black-White test score gap. Due to issues of missing data, only the mother's responses are incorporated into this analysis (father's responses and assessor observations are not included). The specific parenting items are listed below in Table 3.2.

The SEM analysis indicated that the parenting items did not form one latent construct, but rather they formed two latent variables, one included items from the HOME assessment and seem to be more representative of "cognitive" activities and the other included items from the Early Head Start Research and Evaluation Project and seemed to get at "motor" activities. The "errands" measure was not driven by either of these latent variables and was therefore included independent of the "motor" and "cognitive" latent constructs. The "motor" and "cognitive" activities did form a second-order latent variable, which were driven by the "parenting" concept. In other words, there was not one latent variable that drove a number of observed measures (as occurs with a first-order latent variable), instead there was a latent variable "parenting," which drove two other latent variables "motor activities" and "cognitive activities," which each drove a number of observed variables. In the OLS models, the "errands" item is included

as a unique dummy variable, and the other items are standardized and summed to equal a "parenting" measure.

Family Structure

Family structure is measured with two items. One is a measure for the *number of siblings*, which ranges from zero to nine. The other is a measure of *marital status*, which is measured with three dummy variables for never married, ever married (which includes divorced, widowed, or separated), or currently married (the omitted category.)[13] In the SEM, series of dummy variables cannot be included as mediators. As such, I measure marital status as those who are currently married, and never married or previously married are the omitted categories.

Social Ties and Social Engagement

This form of social capital is measured with four different variables—one to assess social ties and three to assess social engagement. *Social ties* is measured by asking respondents who they would "ask for help or advice about the care of their child" and then were provided with a list of 20 people (plus the option to say no one) including: current spouse or partner, former spouse or partner, mother or father, mother or father in law, grandmother or grandfather, spouse's grandmother or grandfather, sister or brother, aunt/uncle or cousin, baby's other parent, friend or neighbor, counselor/Minister/ Rabbi/other clergy, members of church or other organization, coworkers, grown child, nurse, family doctor, staff at clinics, social worker, childcare provider, other. I created a variable equal to the number of people who could help with the child, excluding if they

[13] In former analyses I also incorporated a measure of the number of adults over the age of 18 in order to assess the number of adults in the home who could potentially provide the children with financial, emotional, or linguistic resources. However, I decided not to include it in these analyses since the measure does not tell us whether the adults in the household actually provide help to the mother, and this measure was collinear with the "social ties" measure.

replied with "social worker," since having a social worker involved in the family life would most likely be indicative of family problems rather than social ties. Thus, a person with the highest possible score of 19 would have a great deal of social ties to help with the child and a person with the lowest possible score of 0 would have no one to help with the child.

Social engagement is measured with three variables. The first is the amount that the mother (and spouse) had socialized with friends and neighbors since the baby was born (0=never, 1=less than once a month, 2=about once or twice a month, 3=about once a week, 4=several times a week). The second is how often the respondent had attended religious services in the past year (0=never, 1=about once or twice, 2=several times during the year, 3=about once or twice a month, 4=nearly every week or more). The final measure of social engagement is a dummy variable indicating whether or not the respondent participates "in any ongoing community service activity, for example, volunteering at a school, coaching a sports team, or working with a church or neighborhood association" (NCES 2004) (1=yes, 0=no).

Mother's Work Status

Mother's work status is included to assess Coleman's (1986) contention that mother's employment limits social capital by reducing the number of hours available for the mother to interact with her children. As such *mother's employment* in the main analyses will be measured with a series of dummy variables including: (1) mother works full time, (2) mother works part time, (3) mother is looking for work, and (4) mother not working (omitted category). In the sub-analyses looking only at children in childcare, I switched the omitted category to be mother works full time, as this is the largest group among this subpopulation. Because series of dummy variables cannot be included as mediators in SEM, I measure work status as "stay at home mother" and omit the other three categories of working (or looking for work) mothers.

Health

Health is measured using two different items to get at the babies' health. First, newborn health is assessed with *birth weight* measured in grams[14] and comes from the children's birth certificate records. Secondly, I include a measure of "ease of soothing the baby" or *baby's fussiness level*. This comes from the Infant Toddler Symptom Checklist which is a list of behaviors reported by parents that can indicate regulatory disorders that make the babies more demanding by having more sleep, feeding, or mood problems or by being more unpredictably fussy. According to the NCES (2004), "[p]resumably, such problems may be manifestations of an underlying sensory-integrative disorder (e.g., balance problems, poor motor planning, hypersensitivity to touch), attention deficit, or behavior problem that may emerge later, in the preschool years." The items used in this assessment are listed in Table 3.3 below, from Table 3-9 in the ECLS-B manual (NCES 2004).

These variables were recoded (from a scale of zero to three) to a scale ranging from a possible low of one (never or not at all) to a high of four (most times). Because one of the items was on a scale from one to six, I standardized the scores so that they would all be in the same metric. They were then summed to give a general "fussiness" score, ranging from a possible (though unlikely) score of zero to a high of 33.

Childcare

I examine the impact of childcare in the main analyses, as well as in a sub-analysis that examines various aspects of childcare for only those children who participate in childcare. In the OLS analyses, *childcare type* is measured with a series of dummy variables indicating whether the child is cared for (1) in a childcare center, (2) by

[14] For the structural equation models, birth weight is divided by 100 to aid in convergence.

a non-relative at the child's home (nanny care), (3) by a non-relative away from the home (in-home childcare), (3) by a non-relative in varying locations, (4) by a relative at the child's home, (5) by a relative away from the home, or (6) by a variety of caretakers. Infants not in childcare is the omitted category. Due to limitations with series of dummy variables as mediators in SEM analyses, in this model, children in *childcare* are compared with children not in childcare.

In the sub-analyses, *childcare type* is measured as in the OLS models, although since children not in childcare are not examined, children in a childcare center is the omitted category for the full model, as it is the category most commonly viewed as positive for cognitive development. I also rotate the omitted category for individual analyses in order to get a complete understanding of the variations between the types of care. Additionally, the *number of hours a child spends in childcare per week*, the *age at which the child began* childcare and a measure of the *adult to child ratio* for all childcare types are incorporated to get at the quality of child care.

Motor Skills

The final measure included in the models predicting cognitive scores is the children's Bayley Scores of Infant Development—Research edition *motor skills scores*. Motor skills are included due to the consistent finding that African Americans are precocious in their motor development relative to Whites, and because motor skills have been shown to have a positive relationship with cognitive skills. This measure assesses the fine and gross motor skills of the child. The items included in the assessment are listed below (as cited by NCES (2004)):

BSF-R Motor Scale Proficiencies:

Eye-hand coordination. This proficiency refers to children's ability to use visual tracking to guide hand movements to pick up a small object. This is a fine motor skill. (4 items)

Sitting. This proficiency reflects children's ability to maintain control of the muscles used in sitting with and without support. (6 items)

Pre-walking. This proficiency measures children's ability to engage in various pre-walking types of mobility, with and without support, such as shifting weight from one foot to another, making alternating stepping movements, or walking when holding onto furniture. (6 items)

Independent walking. This proficiency measures children's ability to walk and stand independently, without help from others or from holding onto anything. (5 items)

Balance. This proficiency refers to children's ability to maintain balance when changing position, for example, when squatting, shifting weight from side to side while standing, or standing on one foot. (4 items)

Table 3.1. Correct Responses for Knowledge of Infant Development Items

Description	Correct answer
1.) All infants need the same amount of sleep.	(2) disagree (1 point)
2.) A young brother or sister may start wetting the bed or thumb sucking when a new baby arrives in the family?	(1) agree (1 point)
3.) A child thinks he is speaking correctly even when he says words and sentences in an unusual or different way, like "I goed to town" or "What the dollie have?"	(1) agree (1 point)
4.) Children learn all of their language by copying what they have heard adults say.	(2) disagree (1 point)
5.) (a) A one-year-old knows right from wrong. (b) Would a child be younger or older than one year when she first knows right from wrong? Or are you not sure?	(a2) disagree (b2) older (1 point)
6.) (a) A baby will begin to respond to her name at ten months. (b) Would a child be younger or older than ten months when she first responds to her name? Or are you not sure?	(a2) disagree (b1) younger (1 point)
7.) (a) Most infants are ready to be toilet trained by one year of age. (b) Would most infants be younger or older than one year when they are ready to be toilet trained? Or are you not sure?	(a2) disagree (b2) older (1 point)
8.) (a) A baby of 12 months can remember toys he has watched being hidden. (b) Would a baby be younger or older than 12 months when he first remembers toys he has watched being hidden? Or are you not sure?	(a1) agree (1 point)
9.) (a) One-year-olds often cooperate and share when they play together. (b) Would children be younger or older than one year when they often cooperate and share when they play together?	(a2) disagree (b2) older (1 point)
10.) (a) A baby is about seven months old before she can reach for and grab things. (b) Would a baby be younger or older than seven months before she can reach for and grab things? Or are you not sure?	(a2) disagree (b1) younger (1 point)
11.) (a) A baby usually says his first real word by six months of age. (b) Would a baby be younger or older than six months when he says his first real word? Or are you not sure?	(2) disagree (2) older (1 point)

Table 3.2. Parenting Measures and Range of Values

Variable label (description)	Range of values (after recoding them)
In a typical week, how often do you take your child on errands?	(0) Not at all (1) Once or twice (2) 3-6 times (3) Every day
Cognitive Parenting Activities (from the HOME)	
In a typical week, how often do you read books to your child?	(0) Not at all (1) Once or twice (2) 3-6 times (3) Every day
In a typical week, how often do you tell your child stories?	(0) Not at all (1) Once or twice (2) 3-6 times (3) Every day
In a typical week, how often you sing songs to your child?	(0) Not at all (1) Once or twice (2) 3-6 times (3) Every day
Physical Parenting Activities (from the Early Head Start Research and Evaluation Project)	
In the past month, how often did you play peek-a-boo with your child?	(0) Not at all (1) rarely (2) a few times a month (3) a few times a week (4) about once a day (5) more than once a day
In the past month, how often did you do things like tickle, blow on baby's belly, or move arms and legs around in a playful way?	(0) Not at all (1) rarely (2) a few times a month (3) a few times a week (4) about once a day (5) more than once a day
In the past month, how often did you take your child outside for a walk or to play in the yard, a park, or a playground?	(0) Not at all (1) rarely (2) a few times a month (3) a few times a week (4) about once a day (5) more than once a day

Table 3.3. Infant/Toddler Symptom Checklist Items

Variable Label (Description)	Range Of Values
Is Fussy Or Irritable	(1) Never (2)Used To Be (3)Sometimes (4)Most Times
Goes From Whimper To Crying	(1) Never (2)Used To Be (3)Sometimes (4)Most Times
Demands Attention And Company	(1) Never (2)Used To Be (3)Sometimes (4)Most Times
Wakes Up Three Or More Times	(1) Never (2)Used To Be (3)Sometimes (4)Most Times
Needs Help To Fall Asleep	(1) Never (2)Used To Be (3)Sometimes (4)Most Times
Startled By Loud Sounds	(1) Never (2)Used To Be (3)Sometimes (4)Most Times
Cries For Food Or Toys	(1) Never (2)Used To Be (3)Sometimes (4)Most Times
Difficulty To Raise On Average.	(1) Not At All Difficult (2)Not Very Difficult (3)About Average (4)Somewhat Difficult (5)Very Difficult

CHAPTER 4

GENETIC ARGUMENTS

In this chapter, I assess whether a measure of genetic intelligence is an important factor in the racial gap in infants' cognitive scores. As discussed above, assessing genetic arguments is quite difficult. Many factors that are deemed genetic can arguably be attributed to one's environment and vice versa. For instance, studies that look at the IQ of birth mothers, relative to adoptive mothers, have found that the children who were adopted had lower IQs that were more in line with their birth mothers than their adoptive mothers (Scarr and Weinberg 1978). While some take this to be a strong indicator of the power of genes over the environment, others have argued that the lower IQs have more to do with the prenatal care of the birth mothers than their IQs. In their popular press book, *Freakonomics*, Levitt and Dubner (2005) make the somewhat odious analogy to the differences in how we treat our cars depending on if we own it or are renting it. Typically we treat the one we are keeping better than the one we are renting. Thus, they argue that adopted children are likely less well cared for in utero by birth mothers who know they will be giving their children up for adoption.

Susan Mayer (1997a) argues that any study of IQ should incorporate a measure of the child's mother's IQ to control for genetic effects. Again, however, this may be a measure of environmental effects as well. If the child's mother has a low IQ and grew up in a terrible environment, the child is likely to also grow up with a low IQ and in a terrible environment. Further, if environment really does account for the racial differences in the test scores, then the mother's terrible environment likely also depressed her IQ. Nonetheless, despite this caveat, I would concede that having a measure of mother's IQ is at least an excellent proxy of one's genetic predisposition toward intelligence.

Unfortunately, the ECLS-B data do not provide a measure of the mother's IQ or other cognitive skills. Thus, I was not able to incorporate this into my analyses. Instead, the best way to assess the genetic argument with the available data is to assess whether or not there are differences between the children who are Black, White, and Black-White biracial. If we assume that the White children have all "White" genes, and the Black children have all "Black" genes, then the Black-White biracial children should have 50% Black and 50% White genes. If the proposition that genes play a significant part in the test score gap is valid, then the White infants should outperform the Black-White biracial infants, who should outperform the Black infants. Thus, the analysis in this chapter will assess my first hypothesis:

1) Genes—If genes are what drive the Black-White test score gap, then Black-White biracial infants will score higher than Black infants and lower than White infants, net of all environmental controls.

In order to measure child's race in this analysis, race of both biological parents was needed. Unfortunately, the ECLS-B only collected information on father's race if the father was currently living with the child. As a result, I had to exclude approximately 20% of the cases because of missing data on father's race[15]. I also only included the cases in which the residential mother and father were biologically related to the infant. After list-wise deletion was performed, the sample size was reduced to 7,845 infants (73% of the larger analytic sample), which could potentially make this sample less

[15] I also attempted to recode the data using the parents' races listed on the birth certificates in order to minimize missing data. However, 17% of the father's race was missing and due to differences between states in what they report on birth certificates, some states were fully missing which made the weighting structure not work properly. As such, I felt that the additional 3% missing with proper weights was preferable.

representative than the original sample, if the omitted cases are not missing at random and represent certain groups of people (e.g. younger/older, rich/poor, Black/White, and so on).

Additionally, race was recoded for these models by combining all infants who were not either Black, White, or Black-White biracial into an "other" category. As a result, there are infants who may have one Black or one White parent and a parent of another race who are placed in the "other" category. Based on this coding schema only 88 of the 7,845 cases (1%) are Black-White biracial.

To test the hypothesis that White infants will score higher than Black-White biracial infants, who will score higher than Black infants, I ran a series of three OLS regression models. The first model regresses cognitive skills on race, the second model regresses cognitive skills on race and the set of control variables, and the third model regresses cognitive skills with the entire set of predictor variables outlined in the previous chapter. I also ran a Wald Test for all three models to determine if the differences between the Black coefficient and the Black-White coefficient were statistically significantly different from one another.

The results of these analyses are shown in Table 4.1. Only the race coefficients are presented, but *Model 2* includes the demographic controls, and *Model 3* includes all of the independent variables, except for motor skills. The results show that there are no differences between Black and White infants and no differences between Black-White biracial and White infants. Additionally, the Wald test shows there are no statistically significant differences between the Black and Black-White coefficients. From this, I can conclude that there is no support for the argument that there are genetically driven racial differences in the cognitive skills of infants.

Although, I do not find support for genetic arguments, there are some caveats to this analysis. Knowing if these data are truly nationally representative is not certain because 27% of the cases are missing and 20% of those missing are all in a specific

subpopulation—those without a resident father. Additionally, since a large number of African American mothers are unmarried, there is likely a disproportionate number of nonresident fathers who are also Black. Thus, because of the number of missing cases, and cases that are not missing at random, these results may be a misrepresentation of reality. Additionally, even if these data are representative, research has shown that heritability estimates for IQ increase with age (Shonkoff and Phillips 2000), so this does not preclude the possibility that the race gap does have a genetic component that emerges at later ages. Nonetheless, despite these caveats, this analysis indicates that should I find a Black-White test score gap in infancy (as described in subsequent chapters), the gap is driven more by environmental influences than by genetic ones, and genetic measures are not an important omitted variable in my analyses.

Table 4.1. OLS Regressions Assessing the Genetic Influence on Cognitive Scores

	Model 1 Race Only	*Model 2* Race and Demographic Controls	*Model 3* Race and All Independent Variables (except for Motor Skills)
Black Child [a]	-0.737	-0.767	0.543
	(0.530)	(0.498)	(0.533)
Biracial Child [a]	-0.962	-0.939	-0.356
	(1.014)	(1.027)	(0.954)
Other Race Child [a]	-1.570**	-1.356**	-0.117
	(0.399)	(0.392)	(0.407)
Constant	50.860**	50.809**	43.666**
	(0.284)	(0.792)	(2.085)
R-squared	0.010	0.010	0.050
Wald Test			
F (1, 90) =	0.040	0.020	0.630
Prob > F	0.850	0.884	0.430

Standard errors in parentheses

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

N=7866

[a] Omitted category is White child

CHAPTER 5

EFFECT OF MOTHER'S RACE ON COGNITIVE SKILLS SCORES

Because the role of genetics in influencing the Black-White test score gap has been effectively ruled out, this chapter will focus on environmental explanations for the gap by analyzing hypotheses two through fifteen. That is, I will assess the influence of financial capital, human capital, social capital (parenting, family structure, social ties and social engagement, and mother working outside the home), health and low birth weight, and childcare on cognitive skills.

Whereas almost all prior research has examined the race of the child, if we are interested in environmentally driven influences on infant's cognitive skills, I argue that looking at the mother's race rather than child's race makes far more sense. If the cause of the race difference in infants' cognitive scores really has to do with parenting, household income, or anything else that the parents may control, then the parents' race is going to matter more than the child's race. Take as an example a mother who adopts two children—one Black and one White. The likelihood that she would rear the Black child differently from the White child because of that child's race makes little sense. But *her* race may drive how she parents both of the children.[16]

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[16] There is no straightforward way to determine if there are statistically significant differences between the variables when comparing the results of analyses using the mother's race and the child's race since including both races in the same model would introduce significant multicollinearity (92 % of the infants have a same race mother). However, as 8% of the sampled infants have a mother of a different race, the results presented here do differ slightly from results I ran using the child's race. They are for the most part the same, although there is a gross Black-White test score gap of one point in favor of Whites, in the full SEM model Black children do not significantly differ from their White peers in terms of their cognitive skills, and marital status is not a significant mediator between the Black child and cognitive skills coefficients. These analyses are available from the author.

Method

I will assess these hypotheses looking at the mother's race through a number of statistical models. After presenting mean differences by mother's race, I will present a series of individual Ordinary Least Squares (OLS) regressions for each hypothesis, then a presentation of a full model using Structural Equation Modeling (SEM). By utilizing these methods, I can parse out which hypotheses alter the Black-White test score gap both individually and net of each other.

OLS multiple regression is appropriate to this analysis because the dependent variable is continuous and the method allows for predictive analyses of my research questions (Allison 1999). Additionally, OLS can include statistical controls and interactions of race with my independent variables to explain as much of the variance in child development as possible (Allison 1999). The primary benefit to OLS is that it is the simplest appropriate method, and its relatively easy interpretation makes it the most accessible to the widest range of audiences, which is important for analyses that aim to influence social policy.

However, there are two benefits to utilizing SEM for the full analysis. One, structural equation models allow for a path analysis that can assess both the direct and indirect effects of the variables on cognitive skills (Maruyama 1998). This is important, particularly since I am interested in the relative mediating effects of the various resources. In a standard OLS model, one can assess only the direct effect of each of those variables on cognitive scores net of each other, as illustrated in Figure 5.1 below:

In such a model, I can assess only how the race effect changes with the inclusion of the various controls, but I cannot determine precisely how much of an effect each one has on race specifically. However, in an SEM, I can see if race has a significant effect on parenting and income, if those two variables have a significant effect on cognitive scores and which has a stronger mediating effect on race, as illustrated in figure 5.2 below.

Additionally, although the dotted lines may be nonsignificant, the straight lines may each be statistically significant and add up to a path of a statistically significant complex relationship between race and cognitive skills. Thus, SEMs allow for more complex hypotheses to be assessed with both direct and indirect effects.

Secondly, because the parenting concept forms a latent construct[17], Structural Equation Modeling is most appropriate in order to minimize problems of collinearity and to ensure unbiased measures. By using multiple indicators of an unmeasured construct (here the concept is "parenting"), SEMs can use confirmatory factor analysis which corrects for measurement error of the latent construct which provides better unbiased measures than were I to use each item individually or to scale them (as I do in the OLS models) (Bollen 1989).

In summary, OLS regression is useful for the individual models that do not incorporate indirect effects or latent variables, thus they will be used to assess the individual influences of each hypothesized antecedent to cognitive skills. Although, parenting is a latent variable in the full model, I use a scale of the parenting variables in the smaller OLS sub-analysis of just the controls and social capital indicators for ease of comparability between the individual models. The models used to assess the individual hypotheses in the OLS models are listed below, where each beta is a vector of multiple indicators entered separately in each equation:

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[17] Latent variables are abstract concepts that are said to underlie a set of observed variables. The observed variables are the items measured in a data set, and a latent variable is the abstract concept that drives the responses. For example, if a person is a highly interactive parent (the latent variable), she is more likely to respond that she reads and sings to her children frequently. By combining these observed variables into a latent variable, one can better get at the concept one is interested in while avoiding issues of multicollinearity that would arise were one to include each measure separately.

1.) $Y = \alpha + b_1 \chi_1 + e$
2.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + e$
3.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_3 \chi_3 + e$
4.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_4 \chi_4 + e$
5.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_5 \chi_5 + e$
6.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_6 \chi_6 + e$
7.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_7 \chi_7 + e$
8.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_8 \chi_8 + e$
9.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_9 \chi_9 + e$
10.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_{10} \chi_{10} + e$
11.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_{11} \chi_{11} + e$
12.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_{12} \chi_{12} + e$

Y = Cognitive Skills
χ_1 = *Race*
χ_2 = *Demographic Controls (child's gender, mother's age, region, urbanicity)*
χ_3 = *Health*
χ_4 = *Financial Capital*
χ_5 = *Human Capital*
χ_6 = *Parenting*
χ_7 = *Family Structure*
χ_8 = *Social Ties/Social Engagement*
χ_{10} = *Mother's Work Status*
χ_{11} = *Childcare*
χ_{12} = *Motor Skills*
e = *error term*

A conceptual diagram of the full model for the SEM is diagrammed below in figure 5.3 which also helps to illustrate the hypothesized relationships between the variables. Diagramming such a complex model is quite difficult because as the number of arrows increases the ease of reading significantly decreases, thus this diagram is simply a conceptual model and should not be interpreted as a fully specified path model. In the analysis I allow all of the exogenous variables to influence all of the endogenous variables. I also analyze a final model controlling on motor skills to see its effect on the coefficients, as indicated by the dashed lines. Additionally, each square box represents a list of variables that are actually entered separately in the models. The only latent

variable in the analysis is "parenting," the measurement of which is illustrated in figure 5.4 below.[18]

Results

Descriptive Statistics

Table 5.1 presents the mean values on the dependent and independent variables for the full sample and the mean scores by mother's race. Significant differences between Black and White mothers were assessed with a t-test and are illustrated with asterisks. From this table, we can see that the overall racial composition of the mothers is similar to most other nationally representative data. Fifty-Seven percent of the infants' mothers are White, 14% are Black, 23% are Hispanic/Latino, 3% are Asian, .2% are Pacific Islander, .7% are American Indian, and 2% are multiracial. [19] Most of the mothers have an infant of the same race, although there are differences. 95% of Black mothers have a Black child and 92% of the White Mothers have a White child.

The average score on the cognitive and motor skills portions of the Bayley Scale of Infant Development was 50. This is as to be expected as the Bayley t-scores used here are age-normed and standardized to have a mean of 50 and a standard deviation of 10. There is a marginally statistically significant difference between the infants of Black (49.847) and White (50.641) mothers on the cognitive skills portion of the Bayley. However, the Black mothers' infants (52.441) score a statistically significant 2.669 points higher than the infants of White mothers (49.772) on motor skills.

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[18] Though not illustrated in this diagram, the measurement model is identified because the higher order factor is correlated with the variable "errands" in the analysis.

[19] The children's racial composition is similar to the mother's —13.8% of the children born in the United States in 2001 were African American, 53.5% were White, 25.6% were Hispanic/Latino, 2.7% were Asian, .2% were Pacific Islander, .4% were American Indian, and 3.8% were multiracial. Most children have a same-race mother, although 3.7% of Black children have a non-Black mother and 2% of White children have a non-White mother.

The demographic controls also indicate differences between the Black and White mothers. African American mothers are statistically significantly younger than White mothers, at 26 and 29 years old, respectively; the overall average age of the mothers is 28. Sampled infants are 10.459 months on average; the Black and White mothers have infants about the same age (10.4 months) and the same percent have female infants (49%). White mothers are more likely than Black mothers to live in the Western region of the United States (18.4% and 7.9% respectively), about as likely to live in the Northeast (15.9% and 18% respectively), more likely to live in the Midwest (27.6% and 20.9% respectively), and they are less likely to live in the South (35.9% and 55.4% respectively). Black mothers are less likely than Whites to live in suburban areas (8.1% and 14.7% respectively), more likely to live in urban areas (83.3% and 64.7% respectively), and less likely to live in rural areas (8.6% and 20.6% respectively).

The average household income for the sample was $51,395. Infants with African American mothers live in households that have an average income of $29,809.02, whereas infants of White mothers live in households with an average income of $63,557.01.

The sampled mothers average 13.160 years of education. There are statistically significant differences in the human capital of Black and White mothers as well. The Black mothers had 12.477 average years of education, compared with 13.899 years of education for the White mothers. The White mothers also have a greater knowledge of infant development, scoring 7.59 out of a possible 11 points on a test of infant development, compared to 5.78 for the Black mothers. White mothers are also more likely to have read a book or magazine on parenting, 72.6% of them have as opposed to 57.6% of Black mothers.

On average, the sample scores .191 on the standardized scale of parenting.[20] There are differences on most of the measures of social capital between the Black and White mothers as well. In terms of parenting, the African American mothers score a -.551 (out of a possible -17.88 to 5.77) on the standardized scale of parenting, compared to .810 for White mothers. White mothers take their infants with them to run errands about the same as do African Americans at 2.530 and 2.407 on a scale of zero to four, which is between "three to six times per week" and "every day."

On average, among all sampled mothers, 66.7% are married, 26.4% are never married, and 6.8% are previously married. Infants of Black mothers have 1.124 siblings compared with .954 siblings for the infants of White mothers. The White mothers are much more likely to be married; 78.4% of them are, compared with 30.4% of African American mothers. There are not statistically significant differences between Black and White mothers rates of divorce, widowhood, and separation combined. African American mothers are far more likely to have never been married compared with White mothers (61.6% and 15.1% respectively).

The sampled mothers have, on average, 1.154 people to turn to for help with a question or concern about their child; White mothers have more of these social ties (2.905) than do Black mothers (1.224). Black and White mothers are equally likely to socialize with friends, although Black mothers attend religious services more frequently than do White mothers (1.421 and 1.311 respectively, or between "once or twice" and "several times" in the past year). There is a small but statistically significant difference in the percentage of Black and White mothers engaged in community service (26% and 30% respectively).

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[20] In order to gain summary statistics on this variable, a latent variable could not be used in an SEM. Instead, each of the observed variables were standardized, then summed, to form a scale of parenting that is similar to the parenting latent variable employed in the SEMs.

Black and White mothers have different rates of employment overall. Black mothers are most likely to be employed full time and White mothers are most likely to be a stay at home mothers. More Black than White mothers work full time (40% vs. 31%) or are looking for work outside the home (18% vs. 6%). More White mothers than Black mothers are working part time (24% vs. 16%) or are a stay at home mother (39% vs. 26%).

The average birth weight in the sample is 3319.310 grams or approximately 7.3 pounds. Black mothers have infants who weigh 3123.768 grams (6.87 pounds) on average at birth, compared to White mothers whose infants are born weighing 3374.418 grams on average (7.42 pounds). On average, the infants rate at -.248 standardized units for fussiness. African American mothers also have fussier babies who score an average of .398 standardized and summed points on the Infant Toddler Symptom Checklist, compared with -.472 points for babies of White mothers.

Finally, there are differences in the type of childcare that the infants are enrolled in. Fifty-one percent of the infants with White mothers are not in childcare of any type compared with 36% of the infants of Black mothers. Fifteen percent of the infants of Black mothers are in the care of a relative within their own home compared to 8% of the infants of White mothers in this arrangement. 18% of Black infants and 12% of White infants are in the care of a relative in another home. There are not significant differences between the infants on how often they are in the care of a relative but the location varies, although relatively few infants are in this arrangement overall. There also are few infants who are cared for by a nanny, but twice as many infants of White mothers (4%) have this arrangement than do the infants of Black mothers (2%). "In-home care" or care in a non-relative's home, does not differ significantly between Blacks and Whites at 13.6% and 13.1% respectively. Differences in the rates of attendance in care with a nonrelative where the location varies were not able to be assessed as no African American infants receive this care. Although, as only .2% of White infants receive this care, the difference

is likely negligible. The infants of Black mothers are more likely to be in childcare centers at 14% compared to 9% of White infants. Finally, there are not statistically significant differences between the infants in terms of the rates at which the overall childcare arrangement varies.

Ordinary Least Squares Regression

Looking at gross differences in cognitive scores between the infants of White and Black mothers from *Model 1* in Table 5.2, we see that there is a marginally significant difference at the $p<.10$ level whereby infants of Black mothers score .794 units lower than infants of White mothers. Because the cognitive scores are standardized to have a mean of 50 and a standard deviation of 10, this means that the infants of Black mothers score $8/100^{th}$ of a standard deviation lower than the infants of White mothers. This is a rather small gap, quite close to zero. The gap increases slightly to -.899 when incorporating the regional and gender controls (see Model 2) which means that net of regional, urban, and gender differences, the infants of African American mothers score just under $1/10^{th}$ of a standard deviation lower than European Americans. However, when looking at the Black coefficient in the models one can see that this gap is entirely eliminated with the introduction of many of the independent variables, with the exception of health, mother's work status, and childcare (see Models three to ten); below, I discuss the results of each of these models in more detail.

Model 3 is the financial capital model and shows that income has a direct positive effect on cognitive skills. Specifically, for each additional one unit increase in a logged dollar, cognitive skills scores increase by .786 points.[21] Additionally, income reduces

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[21] When a variable is logged, the logged value becomes a percent increase. Thus, for every additional 1 unit increase in logged dollars, the DOLLAR income amount will increase by 1.7%. Therefore, for each 1.7% increase in dollars, cognitive skills are increased by .786 points. For example, when a household moves from earning $10,000 to $10,170, or from earning $100,000 to $101,700, infants' scores will increase by .786

the Black-White test score gap to a non-statistically significant -.217. This lends support to hypothesis two that financial capital will mediate the race effect.

The human capital measures are included in *Model* 4 and lend support to hypothesis three that education mediates the race effect when other factors are not yet included. In fact, the effect of education on the race gap is almost identical to that of income; the Black mother coefficient drops to -.220 points controlling on human capital. Mother's education is positively related to the infant cognitive scores; each additional year of education increases the scores by .360 points. Mother's knowledge of infant development, however does not have a statistically significant effect on the scores. Mothers who have read a book or magazine on parenting have children who score 1.015 units higher than those mothers who have not done so. This indicates that with respect to human capital what drives the reduction in the racial gap is the mother's education and her likelihood of reading a book or magazine about parenting, not necessarily her knowledge of child development. Perhaps, however, there is other parenting information culled from her education and reading that improves child outcomes, such as the importance of nurturing their emotional, social, and intellectual development, that does not require an understanding of the ages at which infants reach particular milestones.

Model 5 is the first social capital model, and includes measures of parenting. Parenting also reduces the Black-White test score gap to a nonsignificant -.523. For each unit increase of cognitively stimulating parenting behaviors, the infants' cognitive skills increase by.252 units. Running errands with one's child does not have a statistically significant influence on cognitive skills, net of other parenting behaviors. This lends support to hypothesis 4a that parenting mediates the race effect.

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points, regardless of the fact that the first change was an increase of $170 and the second was a change of $1,700 dollars.

Model 6 assesses the influence of family structure on cognitive skills. In this model, we find the greatest reduction in the race coefficient, whereby Blacks score a nonsignificant .001 points higher than Whites. For each additional sibling, cognitive scores are decrease by .896 units. Never married mothers have children who score 1.258 points lower than their married counterparts at the .01 level. Formerly married mothers have children who score a marginally significant 1.152 units lower than their married peers at the $p<.10$ level. This supports hypothesis 4b that marital status and number of siblings mediate the race gap.

As shown in *Model 7*, social ties and social engagement reduce the racial gap to a non-significant -.584. This seems to be due more to parental social ties than parental social engagement. For each additional person a mother has to turn to for help, her infants' cognitive skills increase by .494 points. This indicates support for hypothesis 4c that social ties will mediate the Black-White test score gap. Socializing with one's spouse or partner, attending religious services, and participating in community service have non-statistically significant relationships with cognitive skills at the $p<.05$ level. Although, mothers who engage in community service have children who score .679 points higher than those who do not engage in this activity, which is a marginally significant difference at the $p<.10$ level. I speculate that this effect would go away with the inclusion of an employment indicator or income, as those who have more free time are more likely to be able to engage in community service activities. This lends some support to hypothesis 4d that social engagement will not mediate the Black-White test score gap because they do not have a significant effect on cognitive skills.

Mother's employment, as shown in *Model 8,* seems to slightly increase the Black-White test score gap to -.860, compared to the raw gap. Results show that if a mother works part time, her infant will score on average 1.086 points *higher* than the children of nonworking mothers. Additionally, there are no differences in the cognitive scores of the children whose mothers work full time or are looking for work, compared with the

children of the mothers who do not work outside the home (the coefficients are positive, but not statistically significant). This does not support Coleman's hypothesis—hypothesis 4d—that mothers who work will decrease the family social capital and hence have infants with lower cognitive scores. In fact, by controlling on work status, the racial gap in scores actually increases since African American mothers are more likely to work than White mothers, and working is associated with higher infant cognitive scores.

As shown in *Model 9*, when controlling on health, as measured by birth weight and fussiness, the Black-White test score gap becomes nonsignificant. Birth weight has a statistically significant positive effect on cognitive skills; for each additional gram a newborn weighs, his or her cognitive scores increase by .001 points. Fussiness does not have a statistically significant effect on cognitive skills in this model. These results provide partial support for hypothesis 5 that low birth weight, but not health, mediates the Black-White test score gap.

Model 10 indicates that controlling on childcare widened the cognitive skills gap between the infants of Black and White mothers. Specifically, were all infants to receive the same type of childcare, the Black mothers' infants would score an average of 1.025 points lower on the cognitive skills test than White infants. The key here appears to be in the difference between children who are in childcare with a relative in another home, as these children score 1.206 points higher than children not in childcare. Additionally, there is a marginally significant difference ($p<.10$) between children who receive care from a relative in their own home who score .821 points higher than their childcare center peers. This does not support hypothesis six that childcare is unlikely to affect the Black-White test score gap because it increases the gap. It appears that the type of childcare that African American children are getting gives them a boost in their scores that could potentially be making the gap smaller than it would be if these children were *not* in these types of childcare.

Finally, *Model 11* incorporates the measure of motor skills. Including this measure also increases the cognitive skills gap between Black and White infants. If White infants were given the same motor skills of African American children, the African American infants would score 1.565 points lower on the cognitive skills portion of the Bayley assessment. Additionally, for each unit increase in motor skills, there is a .294 unit increase in cognitive skills. This lends support to hypothesis 7 that controlling on motor skills will increase the racial test score gap.

In summary, the OLS models lend support to the hypotheses that argue that African American mothers' infants' lower access to financial, human, and social capital (with the exception of mother's work behavior) and their birth weights are implicated in the Black-White test score gap. However, infants of Black mothers' greater likelihood of being in a childcare center or cared for by a relative, relative to infants of White mothers, their mother's increased likelihood of working, and their precocious motor development, appear to have a positive effect on their scores that reduce the raw gap. Thus, there is support for all hypotheses except for 4e and 6, as shown in Table 5.3. Additionally, hypothesis 8 will be assessed with the SEM below. Looking at each of these factors individually instead of simultaneously, as is often done in other studies, it appears as though financial capital, family structure, and human capital have the largest impact on the cognitive skills race gap. However, as will be shown in the SEM, when combined together, social capital has the largest, most significant effect on the Black-White cognitive skills gap in infancy.

Structural Equation Models

The second stage of the analysis involved assessing the affect of the various hypothesized variables on the Black-White test score gap in concert through a Structural Equation Model (SEM). Analyzing the variables together is important, because they are likely highly correlated. For instance, Mayer argues that poverty often appears to be a

large cause of educational inequality, but that in reality income is not the cause of the problem, but a number of other factors (such as depression, uninvolved parenting, stress, etc.) that tend to cluster among the poor are the true root causes. Additionally, by including all of the measures in one model, one can better understand the larger picture of what goes into cognitive skills and how we can explain the Black-White test score gap. Thus, when incorporating all measures into one model they may have a different impact on the dependent variable than when entered individually.

Table 5.4 shows the results of the SEM analysis utilizing the Mplus software. The SEM model used the default Delta parameterization and the WLSMV estimator, which according to Muthén and Muthén (1998-2005) is the "weighted least square parameter estimator using a diagonal weight matrix with standard errors and mean- and variance- adjusted chi-square test statistic that use a full weight matrix" (368). The model has an acceptable model fit with a Root Mean Square Error of Approximation (RMSEA) of .027, which falls within the bounds of what is considered sufficiently low (under .05). The chi-square test of model fit for the baseline model has a value of 2719.714 with 49 degrees of freedom, and is significant at the .001 level. This could cast doubt on the model fit, however, this is commonly found with larger samples and should therefore not be used to reject the model.

I also assess the validity of the proposed latent variable (*parenting*). Validity refers to how well the item measures the intended concept and reliability refers to how consistent the item measures its intended concept. To assess this, I examine the significance of the factor loadings for the observed indicators (Bollen 1989) and find that all of the latent variable indicators are significant at the $p < .001$ level. Thus, as parenting increases, each of the cognitively stimulating activities increases. Additionally, in order to have a sense of the metric of the latent parenting variable, I ran a measurement model including the errands item to obtain the variance of the parenting item which was .149.

As shown in column two, net of all variables, the infants of African American mothers score about 1/10th of a standard deviation *higher* (.923 points) than the infants of European American mothers on the test of cognitive skills at the p<.05 level. This is to say that if White and Black mothers' infants had the same health, childcare, and financial, human, and social capital, the infants of African American mothers would score higher than the infants of European American mothers on the cognitive skills test. This result supports hypothesis 8.[22]

In an SEM each endogenous variable is both an independent variable and a dependent variable. As such, each can be interpreted in terms of its influence on the main dependent variable (cognitive skills) and in terms of how it is influenced by the exogenous variables (the demographic controls). Thus, in Table 5.4, each column represents a dependent variable and each row represents an independent variable. This allows us to see the race effect on each of the mediators, net of each other, whereas in the t-tests above, we can see only a gross race effect.[23] Additionally, by multiplying the path coefficients, one can assess the indirect effects between a variable. For instance, if the effect of "being Black" on income were, hypothetically, -.2 and the effect of income on cognitive skills was a hypothetical .3, we could tell that the indirect effect of race on cognitive skills through income was -.06. This is to say, that the fact that Blacks have .2 units of income less than Whites and that income increases cognitive skills by .3 units,

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[22] In a similar full OLS model, the Black coefficient was a positive and marginally significant (p<.10) .847 (standard error = .464). This model differed from the SEM in that it did not have a latent parenting variable, it was not a path model, and it had the series of dummies that were included in the individual OLS models, rather than the single binary dummy variables (such as with marital or childcare status).

[23] For those mediators that are dummy variables, they are assessed using a probit model and therefore these coefficients are difficult to interpret without transforming them into predicted probabilities and changes in predicted probabilities. As such, they are best interpreted in terms of their direction and not in terms of the size of the coefficient.

this income disparity depresses the Black cognitive skills by .06 units. I interpret the direct and indirect effects below.

Financial Capital

As indicated in the "Income" column of Table 5.4, the Black mothers' infants live in households with less financial capital than the White mothers' infants. Black households have .868 logged dollars less than White households. However, net of all other variables, income does not have a statistically significant effect on cognitive scores (see "Mental Skills" column). As such this also means that race does not have an indirect effect on cognitive skills scores through income, as shown in Table 5.5. This does not support the hypothesis that income mediates the race effect.

Human Capital

As shown in Table 5.4, mothers of African American infants have 1.110 years less education than White mothers (see "Mother's Education" column), are less likely to read a book or magazine on parenting (see "Read Book or Magazine on Parenting" column), and they score 1.654 units lower on the test of Infant Development (see "Mother's Knowledge of Infant Development" column). However, because these variables do not have a statistically significant direct influence on cognitive scores (see "Mental Skills" column), none of these items mediate the Black-White test score gap, as further shown in Table 5.5.

Social Capital

Parenting

As illustrated in Table 5.4, African American mothers engage in interactive parenting .321 units less (see "Parenting" column) and take them to run errands .143 times less often than White parents (see "Errands" column). Parenting has a statistically significant effect on cognitive scores, but running errands with one's child does not (see

"Mental Skills" column). Specifically, increasing the amount one engages with one's child (by singing, reading, telling stories to one's child, taking them on walks, playing peek-a-boo, and tickling/blowing on their bellies/playing with their feet) increases their cognitive skills scores by 1.033 units (see "Cognitive Skills" column). The disparity between Blacks and Whites on this item and its importance in cognitive skills development depresses the scores of African American infants by .332 units, as shown in Table 5.5. This supports the hypothesis that parenting mediates the Black-White test score gap among infants.

Family Structure

African American infants are born into homes with lower social capital than White infants. Their mothers are less likely to be married (see Table 5.4, "Married" column) and they have .434 more siblings (see "Number of Siblings" column). Married mothers (as opposed to those who are never or formerly married) have infants who score a significantly ($p<.05$) higher .484 units on the Bayley scale (see "Cognitive Skills" column) and each additional sibling decreases the cognitive skills of infants by .664 points (see "Cognitive Skills" column). As illustrated in Table 5.4, these differences and their impact on cognitive skills means that the indirect effect of being Black is significantly mediated by increasing the number of siblings and marginally significantly mediated by having a married mother. This supports the hypothesis that family structure mediates the Black-White test score gap in infancy.

Social Ties and Social Engagement

Mothers of Black infants have .664 fewer social ties, as illustrated in the "Social Ties" column of Table 5.4. In contrast, the Black mothers have equivalent or greater social engagement than White mothers (see "Socialize with Partner," "Religious Service Attendance," and "Community Service" columns of Table 5.4). There are no statistically significant differences between Blacks and Whites in terms of how often they socialize

with friends or in their likelihood of engaging in community service, but they attend religious services .163 units more than Whites. Whereas social ties have a direct positive relationship with cognitive skills, the measures of social engagement do not at the $p<.05$ level (see "Cognitive Skills" column); although there is a marginally significant negative effect of religious service attendance and a marginally significant positive effect of community service ($p<.10$). Specifically, for each additional person a mother has to turn to for help with a question or concern about her child, her child's cognitive skills increase by .329 units. As shown in Table 5.5, the indirect Black-White test score gap through social ties is .218 units. Social engagement does not impact the cognitive scores of the infants indirectly. Thus, this supports the hypotheses that social ties mediate the Black-White test score gap and that social engagement will not mediate the Black-White test score gap.

Mother's Work Status

Table 5.4 shows that African American infants are less likely to have a stay at home mother, one who is neither working nor looking for work, compared to Whites (see "Stay at Home Mother" column). However, because mother's work status does not have a statistically significant impact on cognitive skills of infants, there is no indirect effect between being Black and having a stay at home mother, as shown in Table 5.5.

Health

From this analysis, we again see that fussiness does not mediate the race effect but that birth weight does partially mediate the Black-White test score gap. Specifically, African American mother's infants are .691 units fussier and are born weighing a full 236.7 grams (.52 pounds) less than their White peers (see the "Fussiness (ITSC)" and "Birth Weight ÷ 100" columns). However, fussiness does not appear to have a statistically significant impact on cognitive skills (see "Cognitive Skills" column), thus this difference is unlikely to reduce the scores of African American infants. Birth weight

does have a significant impact on cognitive scores (see "Cognitive Skills" column); for each additional hectagram[24] a baby weighs, his or her scores increase by .087 units, significant at the $p<.001$ level. Additionally, looking at the indirect effects in Table 5.5, we see that there is no statistically significant indirect effect through fussiness but there is through birth weight. However, there is an indirect effect between mother's race and birth weight, birth weight depresses the scores of African American infants by .206 units. These results indicate support for the hypothesis that birth weight mediates the Black-White test score gap.

Childcare

The final measure shown in Table 5.4 is childcare. Results indicate that being a Black infant increases the likelihood of being in childcare versus being cared for exclusively by the mother (see "Some Childcare" column). However, being in childcare does not have a statistically significant impact on cognitive skills (see "Cognitive Skills" column). As such, there is not an indirect relationship between race and childcare on cognitive skills, as shown in Table 5.5. However, this is a rather crude measure of childcare and I will assess how variations in type and quality of childcare influence the race gap in Chapter 6.

Motor Skills

Table 5.6 shows results of analyses that controlled on motor skills.[25] Specifically, for each one unit increase in motor skills, infants' cognitive skills increase by .294 units. Additionally, infants of Black mothers score 2.256 points higher on motor skills than infants of White mothers. As such, when controlling on all measures

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[24] One hectagram = 100 grams

[25] Only effects for race and motor skills were shown but all variables were included in the analyses.

including motor skills, the Black-White test score gap drops to a non-significant 0.225. This supports hypothesis 8 that the African American mothers' infants' precocious motor skills give a boost to their cognitive skills, and that controlling on motor skills changes the effect of having a Black mother.

Interactions

To assess whether any of the independent variables had a different effect for infant cognitive skills scores by race, I ran two additional OLS models that included interactions with each race with each of the independent variables. One model included the motor skills variable and one did not. Incorporating this many interacting variables increases the chances of committing a Type I error (or rejecting the null hypothesis when in fact the null is true). However, as I have no prior theoretical reasons for including only certain interaction terms in the model, I decided to include them all. For simplicity purposes, I report only those interaction coefficients and their associated main effects, which are significant at the .01 level (see Table 5.7).

The interactions between "having a Black mother" and living in a suburb, being previously married, birth weight and motor skills were all statistically significant (see *Model 1*). More specifically, Black infants born in suburbs score more than 4 points lower on the cognitive skills test than do White children. This may be tapping into an issue of residential segregation and social isolation of Black mothers in suburbs, as Blacks are less likely on average to live in suburban or rural areas, than urban ones.

Interestingly, whereas divorce, widowhood, and separation have a negative effect on European American infant scores (i.e. White mothers who are previously married have infants who score an average 1.561 points lower than the infants of White mothers who are currently married), these marital statuses have a positive effect for Black children—Black children whose mothers are divorced, widowed, or separated score over three points higher than other infants. This could be due to the fact that since so many Black

mothers are never married (62%), divorced/widowed/separated mothers may be more likely to have a father figure in their life. White mothers, in contrast, are far more likely to be married (78%), thus among whites, the more likely alternative to divorced/widowed/separated mothers are married ones.

Model 2 shows that birth weight has a less positive effect for the infants of Black mothers than of White mothers, net of all controls including motor skills. For each additional gram a baby weighs at birth, cognitive scores increase by .001, but for Blacks that is negated and they seem to have an overall increase of zero. Perhaps low birth weight is less a marker of poor health for Blacks than for Whites.

Model 2 also shows that an increase in motor skills gives an added boost to Black mothers' infants cognitive scores compared to White mothers' infants' cognitive scores. While the average boost to cognitive skills is .263 units for each additional point on the motor skills portion of the Bayley, Blacks receive a boost of .371 points. Perhaps African American mothers encourage motor skills more than do White mothers, so that when they are engaged in the encouragement of motor skills they also stimulate cognitive skills. However, this speculation is not assessable with these data.

Discussion

As summarized in Table 5.8, given the same childcare, health, and financial, human, and social capital, infants of Black mothers would score slightly higher on a test of cognitive skills than the infants of White mothers. The indirect effects indicate that the social capital and health variables outweigh the financial[26] and human capital variables

[26] I performed sub-analyses based on "in poverty" versus "not in poverty" to assess whether or not the processes work differently for those in or not in poverty. I ran a model including interactions of "poverty" with all the independent variables to determine if there were statistically significant differences in the effect of the main variables on cognitive scores. I found that none of the interactions were significant. As such, I decided not to pursue running the models separately by poverty status.

in terms of their direct effects on cognitive skills. Specifically, the lower birth weights, the greater number of siblings, the greater likelihood of being unmarried (marginally significant), the fewer cognitively stimulating parenting behaviors, and the lower amount of social ties all depress the cognitive skills of African American infants. Further, the statistically significant indirect effects in Table 5.5 show that the total indirect effects (i.e. the sum of the effects of being Black through the various mediators) depress the scores of African American children by 1.804 units, or almost $2/10^{th}$ of a standard deviation.

In summary, as shown in Tables 5.1 and 5.2, I demonstrate that there is a marginally significant raw gap in cognitive skills between the approximately 10-month old infants of White and Black mothers. However, when one controls for the various social, human, and financial resources, and the health and childcare status differences, we see that the infants of African American mothers would actually do slightly better than the infants of White mothers, which is due to the differences in their motor abilities. The main reason why this precocity is suppressed is due to differences in their birth weight and social capital, particularly the mothers' social ties, family structure, and the amount they engage in cognitively stimulating activities.

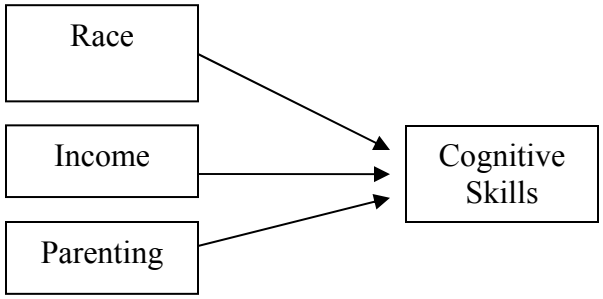

Figure 5.1. Example of Specification in an OLS Model to Assess Possible Causes of Cognitive Skills

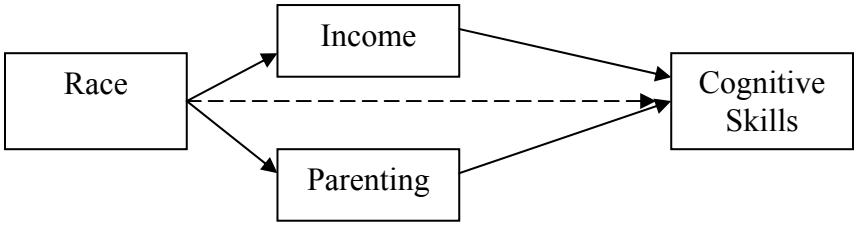

Figure 5.2. Example of Specification in an SEM to Assess Possible Causes of Cognitive Skills

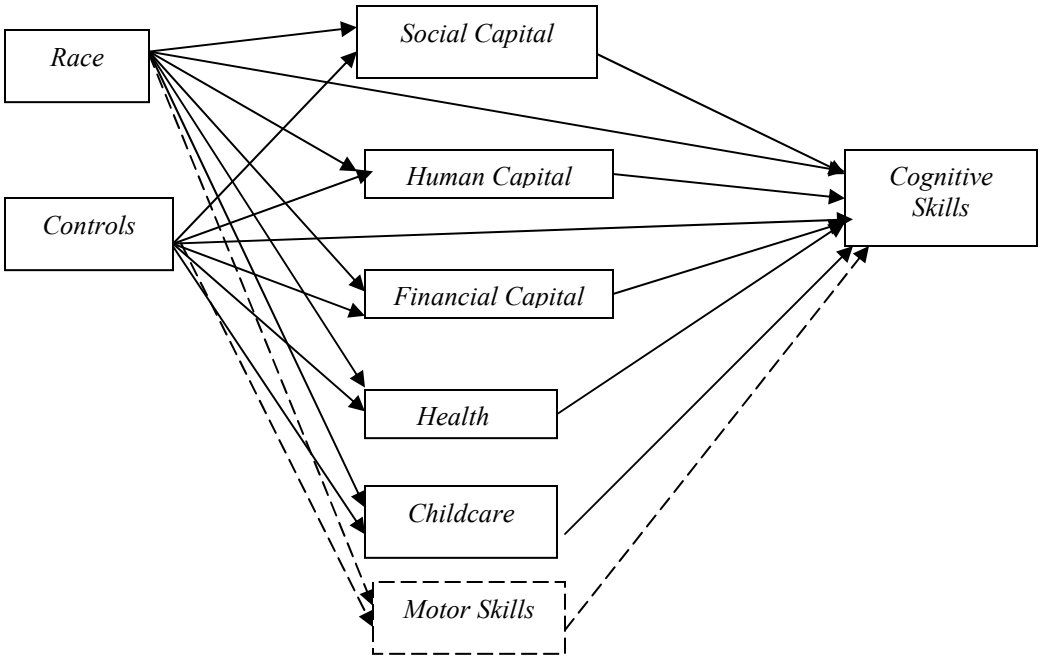

Figure 5.3. Conceptual Model of Arguments to be Assessed—The Dashed Box and Arrows Indicate That Motor Skills Will Be Added as a Second Model

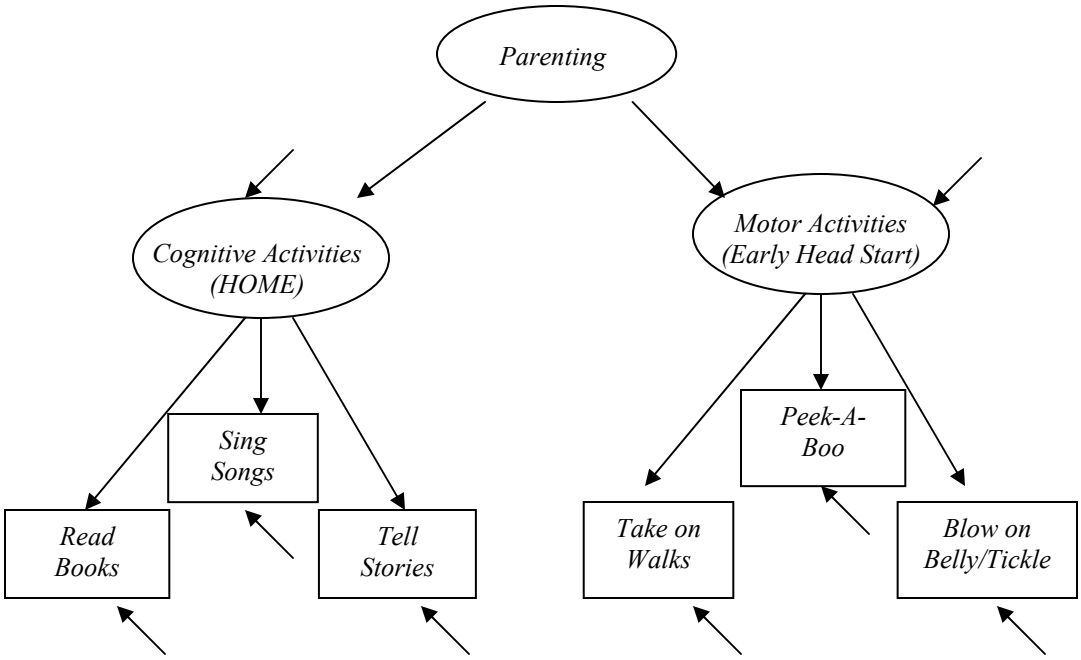

Figure 5.4. Measurement Model for the Latent Variable "Parenting"

Table 5.1. Mean Values on Dependent and Independent Variables

	Full Sample	Black Mother[g]	White Mother[h]
Race of Mothers and their Children			
White Mother	0.572		
	(.017)		
Black Mother	0.139		
	(.009)		
Hispanic/Latino Mother	0.230		
	(.014)		
Asian Mother	0.032		
	(.002)		
Pacific Islander Mother	0.002		
	(.0004)		
American Indian Mother	0.007		
	(.001)		
Multi-Racial Mother	0.018		
	(.002)		
Black Child	0.138	0.952***	.005
	(.009)	(0.008)	(.001)
White Child	0.535	0.005***	0.917
	(.018)	(0.002)	(0.007)
Hispanic/Latino Child [a]	0.256	0.023*	0.046
	(.014)	(0.006)	(0.005)
Asian Child [a, b, e]	0.027	0.0005	0.001
	(.002)	(0.0003)	(0.0002)
Pacific Islander Child [c]	0.002	0.0002*	0.001
	(.0004)	(0.0001)	(0.001)
American Indian Child [a, c]	0.004	0.0002	0.001
	(.0004)	(0.0002)	(0.0002)
Multiracial Child	0.038	0.0186	0.030
	(.003)	(0.004)	(0.004)
Bayley Scores			
Mental T-Score	50.070	49.847[+]	50.641
	(.213)	(0.451)	(0.281)
Motor T-Score	50.027	52.441***	49.772
	(.182)	(0.364)	(0.246)

Table 5.1—continued

	Full Sample	Black Mother [g]	White Mother [h]
	Demographic Controls		
Age of Mother (years)	28.218	26.064***	29.122
	(.143)	(.218)	(.210)
Age Of Child (Measured In 10th Of Months)	10.459	10.452	10.439
	(.048)	(0.083)	(0.061)
Female Child	0.488	0.489	0.490
	(.006)	(0.014)	(0.010)
West	0.241	0.079***	0.184
	(.009)	(0.007)	(0.015)
Northeast	0.168	0.159	0.180
	(.009)	(0.030)	(0.022)
Midwest	0.222	0.209*	0.276
	(.008)	(0.016)	(0.016)
South	0.368	0.554***	0.359
	(.010)	(0.026)	(0.019)
Suburban	0.121	0.081***	0.147
	(.011)	(0.009)	(0.016)
Urban	0.736	0.833***	0.647
	(.016)	(0.016)	(0.021)
Rural [a]	0.143	0.086***	0.206
	(.010)	(0.014)	(0.013)
	Financial Capital		
Household Income	$51,395.04	$29,809.02***	$63,557.01
	(1402.666)	(1283.983)	(1804.558)
	Human Capital		
Mother's Education [f]	13.16	12.477***	13.899
	(.070)	(0.078)	(0.085)
Mother's Knowledge Of Infant Development (M-KIDI)	6.727	5.778***	7.593
	(.047)	(0.071)	(0.057)
Mother Read Book Or Magazine On Parenting	0.687	0.576***	0.726
	(.008)	(0.0136)	(0.011)
	Social Capital		
	Parenting		
Parenting Scale	0.191	-0.551***	0.810
	(.071)	(0.108)	(0.094)
Take Child On Errands [e]	2.474	2.407***	2.530
	(.016)	(0.028)	(0.019)

Table 5.1—continued

	Full Sample	Black Mother [g]	White Mother [h]
Family Structure			
Number Of Siblings	0.987	1.124***	0.954
	(.014)	(0.040)	(0.020)
Married	0.667	0.304***	0.784
	(.010)	(0.018)	(0.010)
Previously Married (Divorced,	.068	.080^{+}	.064
Separate, Widowed)	(.004)	(.010)	(.006)
Never Married	0.264	0.616***	0.151
	(.009)	(0.019)	(0.006)
Social Ties and Social Engagement			
Social Ties—Number Of People To Turn To For Help Or Advice With A Question Or Concern About The Child	1.154	1.224***	2.905
	(.014)	(0.096)	(0.072)
How Often Mother Socializes With Partner And Friends	1.154	1.224	1.142
	(.014)	(0.032)	(0.018)
How often mother attends religious services	1.320	1.421***	1.311
	(.022)	(0.047)	(0.031)
Engaged in Community Service	0.256	0.262*	0.300
	(.009)	(0.012)	(0.011)
Mother's Employment			
Mother Works Full time	0.322	0.401***	0.311
	(.007)	(0.017)	(0.009)
Mother Works Part time	0.200	0.156***	0.241
	(.006)	(0.011)	(0.010)
Stay at Home Mother (Mother Does not Work Outside the Home)	0.395	0.265***	0.392
	(.009)	(0.013)	(0.012)
Mother is Looking for Work Outside the Home	0.082	0.177***	0.055
	(.005)	(0.014)	(0.006)
Health			
Birth Weight (in grams)	3319.310	3123.768***	3374.418
	(7.924)	(13.565)	(10.885)
Fussiness (Infant/Toddler Symptom Checklist)	-.248	.398***	-.472
	(.063)	(0.143)	(0.082)

Table 5.1—continued

	Full Sample	Black Mother[g]	White Mother[h]
	Childcare		
No Childcare	0.499	0.356***	0.508
	(.008)	(0.016)	(0.011)
Childcare with a Relative in the Child's Home	0.109	0.149***	0.076
	(.005)	(0.010)	(0.006)
Childcare with a Relative in Another Home	0.132	0.178***	0.122
	(.005)	(0.010)	(0.006)
Childcare with a Relative, location Varies	0.016	0.0175	0.020
	(.002)	(0.004)	(0.003)
Childcare with a Nonrelative in the Child's Home (Nanny)	0.034	0.016***	0.041
	(.002)	(0.003)	(0.003)
Childcare with a Nonrelative in Another Home (In Home Daycare)	0.120	0.136	0.131
	(.004)	(0.011)	(0.006)
Childcare with a Nonrelative Location Varies[a, d]	0.002	0.000	0.002
	(.001)	(0.000)	(0.001)
Childcare Center	0.081	0.135***	0.090
	(.005)	(0.013)	(0.007)
Childcare Varies[a]	0.008	0.012	0.009
	(.001)	(0.004)	(0.002)

Unstandardized coefficients, standard errors in parentheses

* p<.001, ** p<.010, * p<.05, [+] p<.10

[a] Pacific Islanders (N=52) were dropped from the t-tests due to a score of zero on this variable.

[b] American Indians (N=368) were dropped from the t-tests due to a score of zero on this variable.

[c] Asians (N=1256) were dropped from the t-tests due to a score of zero on this variable.

[d] African Americans (N=1633) were dropped from the t-tests due to a score of zero on this variable.

[e] Multiracial (N=269) were dropped from the t-tests due to a score of zero on this variable.

[f] Years education recoded to correspond approximately to years required to complete each category: Less than Grade 8=8, Less than high school = 10.5, High school=12, Vocational/Associates Degree=14, Some College = 14, Bachelor's Degree = 16, Some Graduate School=17, Master's Degree = 18, Law/MD/Ph.D.=21.

[g] 8 Strata were omitted because they contained no subpopulation members, however, this does not affect the significance testing or the estimates since the estimates are based on those who are in the subpopulation (subpop=Black)

[h] One Stratum was omitted because they contained no subpopulation members, however, this does not affect the significance testing or the estimates since the estimates are based on those who are in the subpopulation (subpop=White)

Full Sample: N=9,903 (population size=3,923,948.1) / White Sample: N= 9388 (population size=3,819,101.3) / Black Sample: N=9568 (population size=3,900,258.1)

Table 5.2. OLS Regression Results on Cognitive Skills

	Model 1	*Model 2*	*Model 3*	*Model 4*
		Race		
Black Mother [a]	-0.794+	-0.899*	-0.217	-0.220
	(0.436)	(0.405)	(0.428)	(0.419)
Hispanic Mother [a]	-1.464**	-1.321**	-0.821+	-0.295
	(0.464)	(0.456)	(0.459)	(0.456)
Asian Mother [a]	-2.285**	-2.065**	-2.032**	-2.097**
	(0.457)	(0.462)	(0.448)	(0.473)
Pacific Islander Mother [a]	-2.182*	-1.973+	-1.668	-1.014
	(1.055)	(1.075)	(1.171)	(1.195)
American Indian Mother [a]	-3.276**	-3.325**	-2.809**	-2.893**
	(1.012)	(0.972)	(0.961)	(0.957)
Multiracial Mother [a]	-1.209	-1.279+	-0.938	-0.988
	(0.790)	(0.742)	(0.760)	(0.752)
		Demographic Controls		
Female infant		1.357**	1.398**	1.362**
		(0.262)	(0.262)	(0.259)
Mother's Age		-0.025	-0.068**	-0.089**
		(0.020)	(0.021)	(0.020)
Northeast [b]		-0.612	-0.648	-0.647
		(0.764)	(0.778)	(0.767)
Midwest [b]		0.713	0.741	0.691
		(0.477)	(0.478)	(0.461)
West [b]		-0.372	-0.347	-0.281
		(0.562)	(0.567)	(0.535)
Suburban [b]		-0.795	-0.579	-0.525
		(0.688)	(0.695)	(0.692)
Rural [b]		0.235	0.531	0.640
		(0.712)	(0.726)	(0.721)
		Financial Capital		
Income (logged)			0.786**	
			(0.141)	
		Human Capital		
Mother's Education				0.360**
				(0.066)
Mother's Knowledge of Infant Development				0.075
				(0.081)
Mother Read Book or Magazine on Parenting				1.015**
				(0.377)
Constant	50.641**	50.764**	43.475**	46.175**
	(0.281)	(0.721)	(1.529)	(0.879)
R-squared	0.01	0.01	0.02	0.02

Table 5.2—continued

	Model 5	*Model 6*	*Model 7*	*Model 8*
		Race		
Black Mother [a]	-0.523	0.001	-0.584	-0.860*
	(0.391)	(0.440)	(0.415)	(0.417)
Hispanic Mother [a]	-0.838+	-0.933*	-0.854+	-1.227**
	(0.468)	(0.456)	(0.458)	(0.454)
Asian Mother [a]	-1.580**	-2.403**	-1.728**	-1.938**
	(0.485)	(0.464)	(0.470)	(0.467)
Pacific Islander Mother [a]	-1.880+	-1.514	-1.429	-1.958+
	(1.095)	(1.196)	(1.075)	(1.095)
American Indian Mother [a]	-3.168**	-2.754**	-3.088**	-3.271**
	(0.961)	(0.995)	(0.970)	(0.965)
Multiracial Mother [a]	-1.195	-0.916	-1.223	-1.251+
	(0.764)	(0.745)	(0.761)	(0.737)
		Demographic Controls		
Female infant	1.350**	1.384**	1.383**	1.361**
	(0.259)	(0.262)	(0.259)	(0.263)
Mother's Age	-0.028	-0.000	-0.040+	-0.029
	(0.019)	(0.024)	(0.021)	(0.021)
Northeast [b]	-0.589	-0.560	-0.575	-0.617
	(0.766)	(0.786)	(0.779)	(0.754)
Midwest [b]	0.826+	0.847+	0.531	0.670
	(0.473)	(0.468)	(0.488)	(0.480)
West [b]	-0.434	-0.187	-0.215	-0.346
	(0.547)	(0.562)	(0.555)	(0.566)
Suburban [b]	-0.770	-0.592	-0.839	-0.789
	(0.678)	(0.690)	(0.690)	(0.696)
Rural [b]	0.289	0.436	0.247	0.245
	(0.710)	(0.733)	(0.711)	(0.704)
		Social Capital		
		Parenting		
Parenting Scale	0.252**			
	(0.044)			
Errands	0.274			
	(0.185)			
		Family Structure		
Number of Siblings		-0.896**		
		(0.152)		
Ever Married [d]		-1.152+		
		(0.611)		
Never Married [d]		-1.258**		
		(0.353)		

Table 5.2—continued

	Model 5	*Model 6*	*Model 7*	*Model 8*
Social Ties and Social Engagement				
Social Ties			0.494**	
			(0.101)	
Socialize with Partner/Friends			0.183	
			(0.129)	
Religious Service Attendance			0.021	
			(0.113)	
Engaged in Community			0.679+	
Service			(0.369)	
Mother's Work Status				
Mother Works Full Time [e]				0.456
				(0.327)
Mother Works Part Time [e]				1.086**
				(0.352)
Mother is Looking for Work [e]				0.008
				(0.474)
Constant	49.925**	50.982**	49.311**	50.482**
	(0.788)	(0.814)	(0.867)	(0.738)
R-squared	0.02	0.02	0.02	0.02

Table 5.2—continued

	Model 9	*Model 10*	*Model 11*
	Race		
Black Mother [a]	-0.621	-1.025*	-1.565**
	(0.406)	(0.405)	(0.365)
Hispanic Mother [a]	-1.267**	-1.382**	-1.019*
	(0.451)	(0.463)	(0.428)
Asian Mother [a]	-1.779**	-2.123**	-2.147**
	(0.464)	(0.466)	(0.398)
Pacific Islander Mother [a]	-1.892+	-1.913+	-3.411**
	(1.089)	(1.051)	(1.017)
American Indian Mother [a]	-3.321**	-3.304**	-3.077**
	(0.942)	(0.970)	(0.854)
Multiracial Mother [a]	-1.137	-1.260+	-1.817*
	(0.737)	(0.740)	(0.708)
	Demographic Controls		
Female infant	1.466**	1.350**	1.315**
	(0.262)	(0.263)	(0.239)
Mother's Age	-0.032	-0.016	0.015
	(0.021)	(0.020)	(0.021)
Northeast [b]	-0.626	-0.696	-0.340
	(0.766)	(0.773)	(0.703)
Midwest [b]	0.676	0.645	1.101*
	(0.477)	(0.477)	(0.455)
West [b]	-0.397	-0.378	-0.336
	(0.562)	(0.564)	(0.546)
Suburban [b]	-0.826	-0.863	-1.012
	(0.689)	(0.682)	(0.637)
Rural [b]	0.284	0.146	0.014
	(0.720)	(0.720)	(0.672)
	Health		
Birth Weight	0.001**		
	(0.000)		
Fussiness (Infant Toddler Symptom Checklist)	-0.048		
	(0.033)		

Table 5.2—continued

	Model 9	*Model 10*	*Model 11*
		Child Care	
Childcare Center		0.207	
		(0.489)	
Childcare with a Relative in the Child's Home [f]		0.821+	
		(0.426)	
Childcare with a Relative in Another Home [f]		1.206**	
		(0.334)	
Childcare with a Relative Location Varies [f]		1.632	
		(1.153)	
Childcare with a Non-Relative in the Child's Home [f]		-0.431	
		(0.761)	
Childcare with a Non-Relative in Another Home [f]		0.587	
		(0.488)	
Childcare with a Non-Relative Location Varies [f]		5.217	
		(3.514)	
Childcare Arrangement Varies		-1.822	
		(1.771)	
		Motor Skills	
Motor Skills			0.294**
			(0.018)
Constant	48.109**	50.258**	34.875**
	(1.107)	(0.741)	(1.159)
R-squared	0.02	0.02	0.10

Unstandardized coefficients, standard errors in parentheses

[+] significant at 10%; * significant at 5%; ** significant at 1%

N=9903

[a] Omitted category is White Child

[b] Omitted category is South

[c] Omitted category is Urban

[d] Omitted category is Married

[e] Omitted category is Stay-at-Home-Mother/Mother Not Working

[f] Omitted category is Child Not in Childcare

Table 5.3. OLS Support for Hypotheses

	Black Mother	Support for Hypothesis
Raw	-0.794^{+}	Marginally yes
	(0.458)	
Controls	-0.899*	—
	(0.433)	
[H2] Financial Capital + controls	-0.217	Yes
	(0.450)	
[H3] Human Capital + controls	-0.220	Yes
	(0.419)	
[H4a] Parenting + controls	-0.523	Yes
	(0.391)	
[H4b] Family Structure + controls	0.001	Yes
	(0.440)	
[H4c] Social Ties and	-0.584	Yes
[H4d] Social Engagement	(0.415)	Yes
+ controls		
[H4e] Mother's Work Status + controls	-0.860*	No
	(0.417)	
[H5] Health + controls	-0.621	Yes
	(0.406)	
[H6] Childcare + controls	-1.020*	No
	(0.403)	
[H7] Motor Skills + controls	-1.565**	Yes
	(0.365)	

Table 5.4. Structural Equation Model Results on Cognitive Skills

	Mental Skills	Income (logged)	Mother's Education	Read Book or Magazine on Parenting	Mother's Knowledge of Infant Development
Black Mother [a]	0.923*	-0.868***	-1.110***	-0.423***	-1.654***
	(0.449)	(0.033)	(0.128)	(0.057)	(0.086)
Hispanic Mother [a]	0.481	-0.636***	-2.143***	-0.254***	-2.216***
	(0.477)	(0.036)	(0.099)	(0.059)	(0.088)
Asian Mother [a]	-1.408**	-0.043	0.546***	-0.069	-1.913***
	(0.519)	(0.041)	(0.093)	(0.054)	(0.084)
Pacific Islander Mother [a]	-1.111	-0.387*	-1.822**	-0.554*	-1.112**
	(2.119)	(0.170)	(0.562)	(0.225)	(0.372)
American Indian Mother [a]	-2.371***	-0.657***	-0.686**	-0.342***	-0.783***
	(0.697)	(0.061)	(0.228)	(0.098)	(0.164)
Multiracial Mother [a]	-0.833	-0.435***	-0.520*	-0.218^{+}	-0.320^{+}
	(0.806)	(0.071)	(0.218)	(0.126)	(0.181)
Female Child	1.499***	-0.052**	-0.026	0.015	-0.008
	(0.266)	(0.018)	(0.061)	(0.036)	(0.054)
Mother's Age	-0.067*	0.055***	0.157***	0.010**	0.050***
	(0.026)	(0.002)	(0.005)	(0.003)	(0.004)
Northeast [b]	-0.707	0.046	0.184	-0.096^{+}	0.032
	(0.802)	(0.048)	(0.131)	(0.056)	(0.150)
Midwest [b]	0.688	-0.035	-0.006	-0.009	0.384***
	(0.516)	(0.046)	(0.133)	(0.052)	(0.103)
West [b]	-0.229	-0.032	-0.321*	0.061	0.054
	(0.544)	(0.038)	(0.128)	(0.058)	(0.109)
Suburban [d]	-0.549	-0.276***	-0.465***	-0.288***	-0.001
	(0.614)	(0.039)	(0.106)	(0.069)	(0.128)
Rural [c]	0.622	-0.376***	-0.880***	-0.210***	-0.198^{+}
	(0.717)	(0.038)	(0.119)	(0.049)	(0.102)
Income (logged)	-0.012				
	(0.157)				
Education (mother's)	0.110				
	(0.068)				
Mother's Knowledge of Infant Development	0.020				
	(0.084)				
Read Book or Magazine on Parenting	0.176				
	(0.256)				
Married [d]	0.461^{+}				
	(0.240)				
Number of Siblings	-0.664***				
	(0.164)				

Table 5.4—continued

Parenting	1.033**				
	(0.352)				
Errands	0.158				
	(0.184)				
Social Ties	0.329***				
	(0.091)				
Socialize	0.080				
	(0.122)				
Religious Service attendance	-0.307+				
	(0.186)				
Community Service	0.420+				
	(0.240)				
Stay at Home Mother [e]	-0.111				
	(0.304)				
Birth Weight ÷ 100	0.087***				
	(0.017)				
Fussiness (ITSC)	-0.018				
	(0.036)				
Some Childcare [f]	0.183				
	(0.320)				
R^2 =	0.048	0.299	0.298	0.040	0.248

unstandardized coefficients, standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%, *** significant at .1%

N=9903

[a] Omitted category is White Mother

[b] Omitted category is South

[c] Omitted category is Urban

[d] Omitted category is Divorced, Widowed, Separated, Never Married

[e] Omitted category is Mother works full time, part time, or is looking for work

[f] Omitted category is Child is not in childcare

Note: Dependent variables are indicated in the first row and independent variables are in the first column.

Table 5.4—continued

	Parenting	Errands	Married	Number of Siblings
Black Mother [a]	-0.321***	-0.143***	-1.258***	0.434***
	(0.041)	(0.031)	(0.060)	(0.048)
Hispanic Mother [a]	-0.514***	-0.135***	-0.528***	0.217***
	(0.038)	(0.032)	(0.057)	(0.035)
Asian Mother [a]	-0.379***	-0.536***	0.363***	-0.280***
	(0.045)	(0.036)	(0.087)	(0.054)
Pacific Islander Mother [a]	-0.097	-0.127	-0.568**	0.295+
	(0.163)	(0.126)	(0.257)	(0.160)
American Indian Mother [a]	-0.226**	0.104+	-0.777***	0.277***
	(0.081)	(0.057)	(0.125)	(0.058)
Multiracial Mother [a]	-0.082	0.041	-0.434***	0.233*
	(0.097)	(0.078)	(0.106)	(0.114)
Female Child	0.005	0.006	0.040	0.047+
	(0.029)	(0.022)	(0.038)	(0.026)
Mother's Age	0.009***	-0.007***	0.088***	0.066***
	(0.003)	(0.002)	(0.003)	(0.002)
Northeast [b]	0.086+	-0.098+	-0.206**	-0.030
	(0.052)	(0.051)	(0.073)	(0.042)
Midwest [b]	-0.041	-0.129***	-0.168**	0.077+
	(0.053)	(0.035)	(0.061)	(0.045)
West [b]	0.089+	0.023	-0.121+	0.151***
	(0.049)	(0.038)	(0.068)	(0.034)
Suburban [c]	-0.070	0.089*	-0.013	0.232***
	(0.047)	(0.038)	(0.059)	(0.044)
Rural [c]	-0.040	0.023	-0.062	0.223***
	(0.049)	(0.047)	(0.052)	(0.042)
R^2 =	0.094	0.029	0.373	0.137

unstandardized coefficients, standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%, *** significant at .1%

[a] Omitted category is White Mother

[b] Omitted category is South

[c] Omitted category is Urban

Table 5.4—continued

	Social Ties	Socialize with Partner	Religious Service Attendance	Community Service
Black Mother [a]	-0.664***	0.011	0.163***	0.039
	(0.090)	(0.033)	(0.048)	(0.043)
Hispanic Mother [a]	-0.766***	-0.080*	0.077	-0.399***
	(0.096)	(0.034)	(0.050)	(0.058)
Asian Mother [a]	-0.504***	-0.001	-0.131**	-0.416***
	(0.073)	(0.038)	(0.042)	(0.064)
Pacific Islander Mother [a]	-0.978*	-0.186	0.282	-0.158
	(0.405)	(0.173)	(0.230)	(0.285)
American Indian Mother [a]	-0.467**	0.033	-0.370***	-0.013
	(0.145)	(0.074)	(0.079)	(0.103)
Multiracial Mother [a]	-0.035	-0.086	-0.270**	-0.057
	(0.190)	(0.082)	(0.100)	(0.148)
Female Child	-0.074+	0.014	0.048	0.029
	(0.044)	(0.026)	(0.037)	(0.041)
Mother's Age	0.016***	-0.019***	0.027***	0.043***
	(0.004)	(0.002)	(0.002)	(0.003)
Northeast [b]	0.024	-0.071+	-0.334***	-0.140*
	(0.121)	(0.042)	(0.044)	(0.067)
Midwest [b]	0.388**	-0.046	-0.143**	0.013
	(0.142)	(0.042)	(0.049)	(0.064)
West [b]	-0.337***	0.051	-0.102	0.012
	(0.098)	(0.035)	(0.068)	(0.096)
Suburban [c]	0.038	-0.051	0.002	0.164**
	(0.091)	(0.037)	(0.054)	(0.054)
Rural [c]	-0.036	-0.099*	0.004	0.117*
	(0.091)	(0.043)	(0.046)	(0.053)
R^2 =	0.074	0.016	0.041	0.102

unstandardized coefficients, standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%, *** significant at .1%

[a] Omitted category is White Mother

[b] Omitted category is South

[c] Omitted category is Urban

Table 5.4—continued

	Stay at Home Mother	Birth Weight ÷ 100	Fussiness (ITSC)	Some Childcare
Black Mother [a]	-0.349***	-2.367***	0.691***	0.376***
	(0.047)	(0.165)	(0.154)	(0.049)
Hispanic Mother [a]	0.135*	-0.412^{+}	0.213	-0.079^{+}
	(0.053)	(0.221)	(0.152)	(0.042)
Asian Mother [a]	0.235***	-2.231***	1.165***	-0.002
	(0.060)	(0.213)	(0.146)	(0.056)
Pacific Islander Mother [a]	-0.475*	0.013	1.669^{+}	-0.194
	(0.226)	(0.796)	(0.925)	(0.256)
American Indian Mother [a]	-0.087	0.271	0.670*	-0.084
	(0.100)	(0.430)	(0.312)	(0.100)
Multiracial Mother [a]	-0.144	-1.344**	0.113	-0.053
	(0.099)	(0.493)	(0.357)	(0.094)
Female Child	0.024	-1.183***	-0.276**	0.012
	(0.037)	(0.113)	(0.092)	(0.036)
Mother's Age	-0.001	0.045***	-0.051***	-0.005^{+}
	(0.003)	(0.010)	(0.009)	(0.003)
Northeast [b]	0.039	0.118	-0.035	0.083
	(0.080)	(0.247)	(0.239)	(0.069)
Midwest [b]	-0.085	0.3^{+}	-0.139	0.039
	(0.057)	(0.174)	(0.156)	(0.052)
West [b]	0.173**	0.11	-0.258	-0.120*
	(0.053)	(0.189)	(0.175)	(0.049)
Suburban [c]	-0.047	0.255	-0.066	0.033
	(0.060)	(0.184)	(0.158)	(0.061)
Rural [c]	-0.028	-0.385^{+}	0.178	0.070
	(0.056)	(0.215)	(0.202)	(0.055)
R^2 =	0.037	0.036	0.015	0.030

unstandardized coefficients, standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%, *** significant at .1%

[a] Omitted category is White Mother

[b] Omitted category is South

[c] Omitted category is Urban

Table 5.5. Indirect Effects Between Black Mother and Cognitive Skills

	Estimates
Total Effects	-0.881*
	(0.383)
Total Indirect	-1.804***
	(0.295)
Specific Indirect	
Financial Capital	
Black Mother → Income (logged) → Cognitive Skills	0.011
	(0.136)
Human Capital	
Black Mother → Mother's Education → Cognitive Skills	-0.123
	(0.077)
Black Mother → Read Book or Magazine on Parenting → Cognitive Scores	-0.074
	(0.108)
Black Mother → Mother's Knowledge of Infant Development → Cognitive Skills	-0.033
	(0.139)
Social Capital	
Parenting	
Black Mother → Parenting → Cognitive Skills	-0.332**
	(0.115)
Black Mother → Errands → Cognitive Skills	-0.023
	(0.026)
Family Structure	
Black Mother → Married → Cognitive Skills	-0.580^{+}
	(0.298)
Black Mother → Siblings → Cognitive Skills	-0.289***
	(0.074)
Social Ties and Social Engagement	
Black Mother → Social Ties → Cognitive Skills	-0.218**
	(0.068)
Black Mother → Socialize with Partner/Friends → Cognitive Skills	0.001
	(0.003)
Black Mother → Religious Service Attendance → Cognitive Skills	-0.050
	(0.034)
Black Mother → Community Service → Cognitive Skills	0.016
	(0.021)
Mother's Work Behavior	
Black Mother → Stay at Home Mom → Cognitive Skills	0.039
	(0.106)

Table 5.5—continued

Health	
Black Mother → Fussiness → Cognitive Skills	-0.012
	(0.025)
Black Mother → Birth Weight → Cognitive Skills	-0.206***
	(0.041)
Childcare	
Black Mother → Some Childcare → Cognitive Skills	0.069
	(0.122)

Unstandardized coefficients, standard errors in parentheses

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

N=9903

Table 5.6. Full SEM Model Incorporating Motor Skills as a Mediator

	Cognitive Skills	Motor Skills
African American Mother [a]	0.225	2.256***
	(0.432)	(0.390)
Motor Skills	0.294	
	(0.011)	
R-Squared	.132	.025

Unstandardized coefficients, standard errors in parentheses

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

N=9903

RMSEA=.027

[a] Omitted category is White Child

Table 5.7. Significant Interactions (OLS)

	Model 1	*Model 2*
Black Mother [a]	3.283	-0.647
	(5.739)	(5.066)
Suburban [b]	0.249	-0.092
	(0.726)	(0.680)
Previously Married [c]	-1.561*	-1.567*
	(0.752)	(0.715)
Birth Weight	0.001**	0.001**
	(0.000)	(0.000)
Motor Skills		0.257**
		(0.021)
Black * Suburban	-4.963**	-4.132**
	(1.352)	(1.226)
Black * Previously Married	5.956**	5.560**
	(1.598)	(1.402)
Black * Birth Weight	-0.001+	-0.001**
	(0.001)	(0.000)
Black * Motor		0.113**
		(0.035)
Constant	40.963**	28.041**
	(2.653)	(2.746)
R^2	0.06	0.14

unstandardized coefficients, standard errors in parentheses

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

N=9903

[a] Omitted category is White Mother

[b] Omitted category is Urban

[c] Omitted category is Married

Table 5.8. Support for Hypotheses in SEM

Hypothesis	Support Hypothesis?
[H2] Health and Low Birth Weight will mediate the race gap	Health = No Birth Weight = Yes
[H3] Financial Capital will mediate the race gap	No
[H4] Human Capital will mediate the race gap	No
[H5a] Family Structure and Family Size will mediate the race gap	Sibling Size = Yes Marital Status = Yes
[H5b] Parenting will mediate the race gap	Parenting = Yes Running Errands = No
[H5c] Social Ties will and Social Engagement will not mediate the race gap	Social Ties = Yes Social Engagement = No
[H5d] Mother's Work Status will mediate the race gap	No
[H6] Childcare will have little effect on the race gap	Yes
[H7] Controlling on Motor Skills will lower the effect of having a Black mother	Yes

CHAPTER 6

EFFECT OF CHILDCARE ON COGNITIVE SKILLS SCORES

My final set of analyses examine the effect of childcare on cognitive scores for the children currently in childcare. I assess whether specific aspects of childcare (i.e, the child's age when first placed in childcare, the adult to child ratio of childcare providers, etc) influence cognitive skills among this subpopulation. Research has shown only limited support for the influence of childcare on cognitive outcomes, especially when making comparisons between those in and those not in childcare (Blau 1999b). As demonstrated in the preceding chapter, we see that childcare does not alone eliminate the Black-White test score gap, likely because so many African American children are in childcare. There does seem to be evidence, however, that if African American and White children had the same amount of childcare, the Black-White test score gap could increase.

In this analysis, I examine the effect of various types and quality of childcare on cognitive scores, among those infants in the care of someone other than their mothers. Knowing how childcare influences the cognitive skills of infants will not only add to the literature, but it can help inform policy decisions about where resources should be focused. The policy implications of this analysis will be discussed in more detail in Chapter 7, as well.

Measures

In addition to the measures used in the preceding chapters' analyses, I also incorporate measures of childcare type and quality. *Childcare type* is a set of dummy variables indicating the primary type of childcare the child receives, including: childcare center, childcare by a relative in the child's home, childcare by a relative in another

home, childcare by a relative (location varies), childcare by a nonrelative in the child's home (nanny care), childcare by a nonrelative in another home (in-home daycare[27]), childcare by a nonrelative location varies, and childcare provided equally in more than one setting. Based on past research (Magnuson and Waldfogel 2005), I expect to find that infants in childcare centers have higher cognitive skills than infants in other types of childcare.

A variable indicating *the ratio of adults to children at the childcare location* is a measure of quality, because some research has indicated that more individualized care is better for children (Magnuson and Waldfogel 2005). Other research (Blau 1999b), however, has shown that this is not a good indicator of childcare quality. Assuming that ratio of adults to children is a good measure of childcare quality, I expect that infants in childcare where the ratio of adults to children is lower have higher cognitive skills than infants in childcare where the ratio of adults to children is higher. In contrast, assuming that this is a poor measure of quality, this measure will have no effect on the infants' cognitive skills.

Finally, two additional measures are included—the number of hours spent in childcare per week and child's age in months when childcare began. How these two variables influence cognitive development are not clearly specified in past research. Research has shown that long-term intensive childcare that involves a great deal of verbal stimulation has positive effects on children's cognitive and language development (Shonkoff and Phillips 2000). Because of this, I posit that the more hours an infant spends in childcare and the earlier childcare begins, the higher the infant will score on a test of cognitive ability.

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[27] Childcare by a nonrelative in another home is generally referred to as "in home daycare" because the care takes place in the provider's home.

Method

OLS regression models are used to predict infants' cognitive scores. As discussed above, SEMs are not possible due to the need for the inclusion of multiple dummy variables and potential problems with multicollinearity. In order to properly weight the data in the statistical software package STATA, I use the "subpopulation" command which produces estimates for the subpopulation (here, those in childcare) but the standard errors are estimated for the full population. If I were to simply drop the cases not in childcare, the calculation of the error terms would not be accurate (UCLA 2006).

The OLS regressions assess the varying influences that different measures of childcare quality have on the cognitive skills scores of infants, net of all the measures used in the previous chapter. I also include interactions of race with each of the childcare measures to assess whether or not childcare works differently for the infants of Black or the infants of White mothers. I estimated each childcare variable separately, a model with all childcare variables, and a model with all childcare variables interacted with race; all of these models also control for all the variables used in the previous analyses. Additionally, to assess significant differences between types of childcare, I ran a Wald test. I present results for models using the mother's race; analyses were also performed for child's race and results were quite similar to those presented here. The equations used for the models are as follows:

1.) $Y = \alpha + b_1 \chi_1 + e$
2.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + e$
3.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_3 \chi_3 + e$
4.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_4 \chi_4 + e$
5.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_5 \chi_5 + e$
6.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_6 \chi_6 + e$
7.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_7 \chi_7 + b_4 \chi_4 + b_5 \chi_5 + b_6 \chi_6 + e$
8.) $Y = \alpha + b_1 \chi_1 + b_2 \chi_2 + b_3 \chi_3 + b_4 \chi_4 + b_5 \chi_5 + b_6 \chi_6 + b_3 \chi_3 * b_1 \chi_1 + b_4 \chi_4 * b_1 \chi_1 + b_5 \chi_5 * b_1 \chi_1 + b_6 \chi_6 * b_1 \chi_1 + e$

Y = Cognitive Skills
χ_1 = Mother's Race
χ_2 = Demographic Controls, Financial Capital, Human Capital, Social Capital, Health
χ_3= Hours In Childcare Per Week
χ_4= Age Child Began Childcare
χ_5 = Ratio Of Adults To Children
χ_6 = Type Of Childcare
e = error term

Results

Descriptive Statistics

Table 6.1 lists the mean values for the children in childcare overall and by mother's race. Infants in childcare are roughly equivalent to the overall sample, with the exception of household income and mother's work status. Children in childcare live in households with slightly higher incomes and mother's who are more likely to work than do the full sample.

In terms of the type and quality of childcare, the infants in the care of a relative in their own home comprise 22% of these infants, 27% are in the care of a relative in another home, 3% are in the care of a relative with a varying location. Those who receive care from a nonrelative are in the minority as 6% receive care from a nanny, 24% attend in-home daycare, and .3% attend daycare with a nonrelative in a varying location. Sixteen percent of the infants attend a childcare center and 1% vary in where they receive childcare. Blacks are more likely than Whites to be in the care of a relative in their own home and marginally more likely to be in the care of a relative in another home and are less likely than Whites to be in the care of a nanny or to attend an in-home daycare. The average amount of time the infants spend in childcare is 31 hours per week, and the

infants of Blacks spend about 6.4 more hours per week in childcare than do the infants of Whites. The average age at which the infants begin care is 3.6 months and there are not significant differences between Blacks and Whites in when they begin care. Finally, the average ratio of adults to children is .73, or in other words there are 7 adults for every 10 children on average; Blacks and Whites do not differ significantly on this item.

Ordinary Least Squares Regression

Table 6.2 presents results for each of the childcare models. With the exception of *Model 1*, all other models control on all demographic controls, financial, human, and social capital, and health, however, only the coefficients for the race and childcare variables are presented to increase readability. As shown in *Model 1*, there is a marginally significant raw gap between the children of Black and White mothers, whereby the Black mothers' infants score 1.022 points lower than the infants of White mothers at the $p<.10$ level. However, with the incorporation of the full model control variables, the effect of race becomes insignificant (see *Model 2*).

None of the measures of childcare appear to have much of an effect on the Black-White test score gap when entered individually. *Model 3* demonstrates that hours spent in childcare has a small but statistically significant negative impact on cognitive scores; for each additional hour spent in childcare, cognitive skills decrease by .023 units. However, hours spent in childcare does not significantly change the Black mother coefficient. As shown in *Model 4*, age childcare began has a negative impact on cognitive skills; for each month a child is older when beginning childcare, his or her scores are decreased by .218 units. This also does not significantly change the Black mother coefficient. *Model 5* demonstrates that the adult to infant ratio does not have a statistically significant effect on cognitive skills and the inclusion of the measure also does not significantly change the effect of having a Black mother.

As shown in *Model 6*, there were few differences between types of care in their direct impact on the cognitive skills. However, the Wald test did demonstrate that infants who receive care from a nanny seem to score lower on cognitive skills tests than infants who receive care from a relative. This makes sense as the care arrangements are quite similar—in each, one person is caring for a child and her siblings in the child's, or the relative's, home. However, relative care is likely carried out by someone who loves the child from birth and has a deeper emotional attachment to the child than would a nanny. Because research by Loeb et al. (2004) finds that caregiver responsiveness and sensitivity have a positive effect on cognitive development, I conjecture that a more emotionally attached caregiver would be more sensitive to the child's needs, which should increase their cognitive development.

Model 7 which includes all controls and childcare measures (with childcare center as the omitted category) indicates a marginally significant effect of having a Black mother; infants of Black mothers score 1.051 points *higher* than their peers with a White mother at the .10 level. Only hours spent in childcare and age that childcare began have a statistically significant (.10 and .05 levels, respectively) effect on the cognitive scores. For each additional hour spent in childcare, cognitive skills are decreased by .021 units and for each month older a child is when beginning care, his or her scores are decreased by .216 units.

Finally, as shown in *Model 8*, there were no statistically significant interactions between being Black and the childcare measures, which means that any benefit or detriment that occurs from an infant's childcare arrangement has the same impact on the infants of both Black and White mothers.

Overall, there appears to be little effect of childcare type or quality on the cognitive skills gap between Black and White infants. Based on the earlier models in Chapters 4, there does appear to be some boost given to children in childcare relative to children not in care, but once in care, whatever differences there are between Blacks and

Whites are negligible in terms of their group differences. One serious caveat to this analysis, however, is that the measures employed here are rather crude ones and do not take into account differences in the activities engaged in by the providers, warmth of the caregivers, or the degree of linguistic interaction provided to the children which could make a difference to cognitive skills. In his analysis, Blau (1999b) also found that measures such as those employed here do not have a significant effect on cognitive skills, but the more sensitive measures did. Nonetheless, I would surmise that because the Black-White test score gap is so small at this age and because within the subpopulation of children in childcare there is no gap, finding significant differences would be unlikely if even these more nuanced measures to be included in my specific analysis.

Table 6.1. Mean Values for Families with Infants in Childcare Overall and by Mother's Race

	All Infants in Childcare	Black Mothers	White Mothers
Mother's Race			
White Mother	0.562		
	(0.019)		
Black Mother	0.178		
	(0.011)		
Hispanic Mother	0.204		
	(0.014)		
Asian Mother	0.030		
	(0.002)		
Pacific Islander Mother	0.001		
	(0.0005)		
American Indian Mother	0.006		
	(0.001)		
Multiracial Mother	0.017		
	(0.002)		
Child's Race			
White Child	0.520	0.004	0.907***
	(0.020)	(0.002)	(.011)
Black Child [a]	0.174	0.951	0.004***
	(0.012)	(0.011)	(0.002)
Hispanic Child [a]	0.233	0.026	0.051*
	(0.016)	(0.007)	(0.007)
Asian Child [a, b, d,]	0.025	0.000	0.000
	(0.002)	(0.000)	(0.000)
Pacific Islander Child [d, e, f]	0.001	0.000	0.001[+]
	(0.0004)	(0.000)	(0.001)
American Indian Child [a, f]	0.004	0.000	0.001
	(0.0004)	(0.000)	(0.000)
Multiracial Child	0.042	0.018	0.036[+]
	(0.004)	(0.005)	(0.006)
Bayley Scale of Infant Development			
Cognitive Skills	50.446	49.877	50.986[+]
	(0.258)	(0.528)	(0.352)
Motor Skills	50.370	52.286	49.894***
	(0.218)	(0.420)	(0.281)

Table 6.1—continued

	All Infants in Childcare	Black Mothers	White Mothers
	Demographic Controls		
Mother's Age	27.983	25.718	29.109***
	(.154)	(0.332)	(0.069)
Child's Age	10.510	10.555	10.499
	(0.058)	(0.103)	(0.069)
Female Child	0.491	0.486	0.489
	(0.008)	(0.018)	(0.013)
West	0.208	0.065	0.159***
	(0.011)	(0.010)	(0.015)
Northeast [a]	0.178	0.168	0.185
	(0.010)	(0.034)	(0.022)
Midwest	0.233	0.200	0.292**
	(0.010)	(0.017)	(0.018)
South	0.381	0.566	0.365***
	(0.012)	(0.031)	(0.022)
Suburban	0.121	0.086	0.146**
	(0.013)	(0.013)	(0.019)
Urban	0.727	0.821	0.633***
	(0.018)	(0.021)	(0.024)
Rural [a]	0.152	0.093	0.221***
	(0.012)	(0.017)	(0.015)
	Financial Capital		
Household Income	$56,771.97	$32,458.950	$69,761.420***
	(1609.717)	(1741.588)	(2334.127)
	Human Capital		
Mother's Education [e]	13.496	12.691	14.193***
	(0.075)	(0.100)	(0.099)
Mother's Knowledge of Infant Development	6.794	5.794	7.609***
	(0.053)	(0.077)	(0.066)
Mother has Read a Book or Magazine on Parenting	0.690	0.578	0.730***
	(0.010)	(0.016)	(0.016)
	Social Capital		
	Parenting		
Parenting [b, d]	0.162	-0.486	0.725***
	(0.074)	(0.115)	(0.095)
Errands	2.422	2.404	2.456**
	(0.018)	(0.034)	(.023)

Table 6.1—continued

	All Infants in Childcare	Black Mothers	White Mothers
Family Structure			
Number of Siblings	0.829	1.002	0.783***
	(0.019)	(0.046)	(0.028)
Married	0.624	0.284	0.757***
	(0.011)	(0.021)	(0.013)
Never Married	0.297	0.635	0.172***
	(0.010)	(0.025)	(0.009)
Previously Married	0.078	0.081	0.070***
	(0.006)	(0.014)	(0.008)
Social Ties and Social Engagement			
Social Ties	2.623	2.252	2.949***
	(0.065)	(0.098)	(.092)
Socialize with Partner/Friends	1.175	1.213	1.178*
	(0.018)	(0.037)	(0.023)
Religious Service Attendance	1.278	1.500	1.237***
	(0.022)	(0.051)	(0.033)
Community Service Engagement	0.244	0.274	0.272
	(0.010)	(0.016)	(0.014)
Mother's Work Status			
Mother works Full Time	0.548	0.550	0.536
	(0.010)	(0.022)	(0.014)
Mother Works Part Time	0.270	0.193	0.319***
	(0.010)	(0.015)	(0.015)
Mother Does Not Work (Stay-At-Home-Mom) [a]	0.126	0.135	0.114
	(0.007)	(0.014)	(0.009)
Mother is Looking for Work [a]	0.056	0.122	0.031***
	(0.005)	(0.015)	(0.006)
Health			
Birth Weight	3321.436	3138.635	3384.400***
	(10.053)	(18.156)	(13.987)
Fussiness (Infant Toddler Symptom Checklist)	-.291	0.369	-0.561***
	(.085)	(0.180)	(0.107)

Table 6.1—continued

	All Infants in Childcare	Black Mothers	White Mothers
Childcare			
Childcare with a Relative in the Child's Home	0.217	0.231	0.155***
	(0.008)	(0.016)	(0.011)
Childcare with a Relative in Another Home	0.266	0.277	0.247^{+}
	(0.009)	(0.015)	(0.011)
Childcare with a Relative, location varies	0.033	0.027	0.041
	(0.004)	(0.007)	(0.006)
Childcare with a Non-Relative in the Child's Home (Nanny Care)	0.064	0.025	0.083***
	(0.005)	(0.005)	(0.007)
Childcare with a Non-Relative in Another Home (In-Home Daycare)	0.241	0.212	0.267**
	(0.009)	(0.015)	(0.012)
Childcare with a Relative, location varies [a, c]	0.003	0.000	0.004
	(0.001)	(0.000)	(0.002)
Childcare Center	0.162	0.210	0.184
	(0.010)	(0.019)	(0.013)
Childcare location Varies [a]	0.014	0.018	0.019
	(0.002)	(0.006)	(0.004)
Hours Spent in Childcare	31.082	35.858	29.486***
	(0.376)	(.724)	(0.507)
Age Childcare began	3.626	3.687	3.619
	(0.052)	(.102)	(0.079)
Ratio of Adults to Children	0.734	.719	0.680
	(0.014)	(.019)	(0.019)

Unstandardized coefficients, standard errors in parentheses

* p<.001, ** p<.010, * p<.05

N=9903(total) / N=4949 (in childcare subpopulation) / N= 2,215 (White mothers with infants in childcare) / N=1,021 (Black mothers with infants in childcare)

[a] Pacific Islander Mothers (N=20) were dropped from the t-tests due to a score of zero on this variable.

[b] American Indian Mothers (N=168) were dropped from the t-tests due to a score of zero on this variable.

[c] African American Mothers (N=1009) were dropped from the t-tests due to a score of zero on this variable.

[d] Multiracial Mothers (N=134) were dropped from the t-tests due to a score of zero on this variable.

[e] Hispanic Mothers (N=760) were dropped from the t-tests due to a score of zero on this variable.

[f] Asian Mothers (N=622) were dropped from the t-tests due to a score of zero on this variable.

[g] Years education recoded to correspond approximately to years required to complete each category: Less than Grade 8=8, Less than high school = 10.5, High school=12, Vocational/Associates Degree=14, Some College = 14, Bachelor's Degree = 16, Some Graduate School=17, Master's Degree = 18, Law/MD/Ph.D.=21

Table 6.2. OLS Regression Results—Childcare

	Model 1 Raw gap	*Model 2 Race with Full Model Controls*	*Model 3 Race with Full Model Controls*	*Model 4 Race with Full Model Controls*	*Model 5 Race with Full Model Controls*	*Model 6 Race with Full Model*
Black Mother	-1.022+	0.959	1.038	1.009	0.960	0.925
	(0.594)	(0.648)	(0.640)	(0.643)	(0.647)	(0.645)
Hours Spent in Childcare			-0.023*			
			(0.010)			
Age Childcare Began				-0.218*		
				(0.087)		
Ratio of Adults to Children					0.467	
					(0.287)	
Childcare with a Relative in the Child's Home [a]						0.837
						(0.679)
Childcare with a Relative in Another Home [a]						0.821
						(0.614)
Childcare with a Relative, location varies [a]						0.797
						(1.172)
Childcare with a Non-Relative in the Child's Home (Nanny Care) [a]						-1.070
						(0.807)
Childcare with a Non-Relative in Another Home (In-Home Daycare) [a]						0.383
						(0.687)
Childcare with a Relative, location varies [a]						4.102
						(3.125)
Childcare location Varies [a]						-2.247
						(1.924)
Constant	50.978**	47.505**	47.828**	48.851**	46.869**	45.873**
	(0.353)	(2.438)	(2.454)	(2.518)	(2.369)	(2.384)
R-squared	0.01	0.04	0.04	0.04	0.04	0.05

Unstandardized coefficients, standard errors in parentheses

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

N=4915

[a] Omitted category is Childcare Center

Table 6.2—continued

	Model 7 Race with Full Model	*Model 8 Race with Full Model*
Black Mother	1.051+ (0.630)	2.013 (1.528)
Hours Spent in Childcare	-0.021+ (0.011)	-.013 (.015)
Age Childcare Began	-0.216* (0.088)	-0.118 (0.151)
Ratio of Adults to Children	0.287 (0.299)	-0.080 (0.444)
Childcare with a Relative in the Child's Home	0.454 (0.704)	0.694 (1.170)
Childcare with a Relative in Another Home	0.477 (0.662)	1.000 (1.061)
Childcare with a Relative, location varies	0.378 (1.115)	1.186 (1.439)
Childcare with a Non-Relative in the Child's Home (Nanny Care)	-1.199 (0.795)	-1.280 (0.986)
Childcare with a Non-Relative in Another Home (In-Home Daycare)	0.274 (0.701)	1.237 (0.821)
Childcare with a Non-Relative, location varies	3.790 (2.977)	6.592* (3.226)
Childcare location Varies	-1.990 (1.960)	-1.334 (2.534)
Black Mother * Age Childcare began		-0.151 (0.232)
Black Mother * Childcare with a Relative in the Child's Home		1.826 (2.178)
Black Mother * Childcare with a Relative in Another Home		-1.677 (1.451)
Black Mother * Childcare with a Non-Relative in the Child's Home (Nanny Care)		-0.628 (1.779)
Black Mother * Childcare with a Relative, location varies		-3.974 (3.576)
Black Mother * Childcare with a Non-Relative in Another Home (In-Home Daycare)		-1.922 (1.420)
Black Mother * Childcare location Varies		-4.799 (3.756)
Black Mother * Hours Spent in Childcare		0.017 (0.026)
Black Mother * Ratio of Adults: Children		0.175 (0.762)

Table 6.2—continued

	Model 14 Race with Full Model	*Model 15 Race with Full Model*
Constant	47.584**	47.117**
	(2.508)	(2.636)
R-squared	0.05	0.06

Unstandardized coefficients, standard errors in parentheses

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

N=4915

[a] Omitted category is Childcare Center

CHAPTER 7

CONCLUSIONS AND POLICY RECOMMENDATIONS

In this dissertation, I demonstrate that there is little to no raw gap in cognitive skills between the infants of White and Black mothers in the United States. Further, when one controls for the various social, human, and financial resources, and the health and childcare status differences, the infants of African American mothers would actually do slightly better than the infants of White mothers, which is due to the differences in their motor abilities.

This provides room for much optimism in addressing long term racial inequality. At least at the earliest stage yet assessed, infants of Black and White mothers are pretty much on par, although some improvements could be made to increasing the birth weights of the Black mothers' infants and increasing the amount that these mothers engage in cognitively stimulating activities with their babies. One reason that African American mothers may not engage in these activities as much as White mothers is that they are more likely to be single mothers and thus have fewer social resources. Therefore, I would argue that there is evidence that African American mothers could use greater social supports to help them engage with their infants more.

Policy Recommendations

The results of my study have many policy implications, each of which I discuss in order below.

Financial Capital

There are great disparities between Black and White infants in the amount of money their households have the year they are born. Specifically, White households have roughly $36,000 more than Blacks in the infant's first year of life. This is a huge difference and one that may concern policy makers if this gap is related to other social

problems. However, as it relates to the Black-White test score gap in infancy, financial capital appears not to be a mediator of the gap.

Human Capital

There are also differences in the amount of human capital the different mothers have. White mothers of infants have, on average, more education than do Black mothers, the latter have about an Associates Degree on average, the former a High School Diploma. White mothers also know more about infant development and are more likely to have read a book or magazine on parenting. However, these things also seem not to be mediators of the Black-White test score gap. Perhaps, one does not need a lot of education to know that it is important to soothe a crying baby, to read to one's child, or to take one's baby on walks. Many of the cognitively stimulating activities have likely been carried out by mothers since the birth of humankind, long before the existence of academic human development courses or *Parenting* magazine.

Social Capital

What does seem to be the most significant mediator of the small Black-White test score gap in infancy has to do with the mother's social capital. There is clear evidence in my analysis that mother's who take their children on walks, who play peek-a-boo with them, who tickle their feet and blow on their bellies, who read and sing to them, and who tell them stories have children who have higher cognitive skills scores. White mothers do these things more than Black mothers, which is part of what explains this small test score gap. However, the extent that the mothers engage in cognitively stimulating activities also seems to be related to how many social resources the mother has and how many children she has to care for. White mothers have one person more that they can turn to for help with the child, on average, and this person is likely a partner or spouse. Being a single-mother clearly makes it harder for African American mothers to have the time to interact with their infants. Additionally, the Black infants have more siblings than their

White peers which means that the mothers have more children to care for and fewer hands to help them in the work.

One *could* argue that a solution therefore, might be to get more African American women to marry. However, I believe that that would not be a realistic goal and I am not convinced that marriage would necessarily provide the support the mothers need. These analyses did not assess if the *biological fathers* of these children would provide help to the mothers; what the analyses did demonstrate was that having more social ties help the infants. Thus, I argue that social policies needs to be developed that can help mothers, particularly single Black mothers, engage in cognitively stimulating activities with their children by providing them with social supports.

How to do this is a complex and potentially expensive task; and a fully specified viable solution is beyond the scope of this dissertation. One program that has been in place in the Toronto, Canada public school system are parent resource centers, which are drop-in play rooms within elementary schools where parents or other caregivers can bring children from birth through 5 years old to play, read books, have a snack, and get parenting tips from Early Childhood trained educators. These programs provide the children and their caregivers with a chance to interact with each other, which not only helps the infants socialize with other children, but it helps caregivers connect with one another and increase their social ties. Centers such as these also encourage cognitively stimulating activities such as reading to and singing to ones children, that parents can do at home with their infants as well. According to the Toronto District School Board website, students who attend parenting centers are more prepared for kindergarten than their neighborhood peers who did not attend centers such as these (TDSB 2006). One potential problem with this and other programs is that they operate only during business hours. Since a majority of African American mothers work full time, programs would need to offer services on evenings and weekends as well, to accommodate a variety of schedules for working mothers.

The Early Head Start program is another promising program for increasing cognitive skills and positive parenting behaviors among financially disadvantaged pregnant women and families with infants and toddlers. This program reaches out to families either in childcare centers that provide additional parenting education and home based visits, or through home visits and parent-child socialization activities (Love et al. 2005). In a large, randomized trial of 3,001 families in 17 programs, Love et al. (2005) found that Early Head Start had modest, but statistically significant positive impacts on infants' and toddlers' cognitive skills and on positive parenting behaviors, compared to the control group. They further found that the program sites that were most fully implemented earlier on had children who did better than in program sites that took longer be fully established. Although this program is aimed mainly at families living in poverty, there are likely be lessons to be gained from it for helping decrease race-based cognitive skills differences.

Health

There is further evidence that the incidence of low birth weight in the Black community depresses the cognitive skills scores of the infants on average. Although the effects are small, and the best means to increase birth weights is not clear from these analyses. Nonetheless, this is an avenue for policy through public health initiatives and policy makers would be well advised to seek out greater understanding of how best to address low birth weight among the infants of Black mothers.

The overall fussiness of the infants does not seem to affect either the cognitive skills scores or the Black-White test score gap. However, there is likely an indirect effect between how fussy the babies are and how much the parents can interact with their children. If a baby is crying, it is very difficult to have the baby sit still to listen to a story or sing a song. Thus, though my analyses do not indicate a need for policy solutions in

this area, this may be further related to increasing social supports to mothers to help them cope with the demands of a fussier baby.

Childcare

The SEM model, in Chapter 5, found no effect for being in childcare versus not being in childcare on all children's scores. The analyses of the quality of care discussed in Chapter 6 also found few effects of childcare quality on the Black-White test score gap, although being in fewer hours of childcare and starting childcare at an earlier age seemed to have a positive impact on cognitive scores for all children.

Nonetheless, despite the fact that these analyses indicated that childcare has little effect on the cognitive skills scores in infancy, it may still have an indirect effect on the scores. I would argue that childcare can be seen as a form of social capital, whereby parents have more people to help them with their children if they have a childcare provider. Additionally, childcare may also not matter as much to 10 month old infants, but may become more important as children move into toddlerhood when they begin to learn to talk.

It does seem that at this age, the type of childcare matters little, except that care with a relative is better than nanny care. This may be because the arrangements are similar, one-to-one care with a person who may not have early childhood education credentials, but a relative is likely someone who feels a stronger emotional bond to the child and who knows the child from birth. This is difficult to form policies around as families who do not have relatives to care for their infants cannot be provided with new family members to help them out. However, this does speak to a need for families to be supported in their care of each other.

Caveats

Despite my emphasis on the relative importance of certain resources in mediating the Black-White test score gap, a few caveats are in order here. One, due to limitations in

the data, I have no measures of "genetics" (i.e., mother's IQ) in the SEM analyses, which is important for those who argue that the cause of the Black-White test score gap is due to heritable differences in the intelligence of Blacks and Whites (Herrnstein and Murray 1994, Rowe 2005, Scarr and Weinberg 1978). However, based on my analysis presented in Chapter 4 on genetics, I do not believe that genetic explanations are founded for explaining the Black-White test score gap in infancy.

Another limitation is in a few of my measures. First, because the income data is measured at just one point in time, some would argue that this is a poor measure of permanent income (Mayer 1997a). A better measure will be attainable when future waves of the data are collected and released, where one could average the incomes over the different data waves to get a more permanent measure of income. Secondly, my measures of childcare are rather crude. Ideally, I would have like to explored other nuances of the childcare arrangements, such as how much time the caregivers spent reading to the children, whether or not the children are left to watch television with little adult interaction, or how loving the caregivers are to the infants; these items will be more available in the second wave of the ECLS-B.

A similar caveat to the problems with these measures is in the lack of data on the fathers. Due to the sampling design, 20% of the nonresident birth fathers were not included in the sample. This created a dilemma in terms of losing 20% of the nonresident cases in order to incorporate father data, or look only at the mother's responses. I chose the latter in order to have the most representative sample. The data weights are adjusted due to the nonresponse of the fathers, however, the remaining data disproportionately reduce the number of Black families, which I felt to be too problematic for my analysis. Nonetheless, future analyses examining the role of fathers is highly warranted and important for fully understanding the racial gap in cognitive differences in young children, particularly considering that nearly two-thirds of the Black mothers are unmarried, compared with fewer than one-quarter of the White mothers.

Another caveat is that some studies examining the relationship between the Bayley Scores and later IQ scores find that the Bayley Scores have little predictive power for later IQ (Hack et al. 2005) and should be viewed as an assessment of cognitive skills rather than of intelligence (Lewis and McGurk 1972). However, most of these studies were small and did not use nationally representative samples and there has been some support in the literature that these scores can predict intelligence in older children among low birth weight infants (Dezoete, MacArthur, and Tuck 2003). Further, in future analyses using later waves of these data there can be greater illumination into how predictive the Bayley scores are, in fact. Additionally, the behaviors that encourage cognitive development in infancy, such as talking with children and reading to them, are associated with later language development (Hart and Risley 1995) and the foundation for these behaviors, I argue are laid in infancy.

A final caveat is in the small explained variance of the models. As shown in Tables 5.2, 5.4, and 6.2, race explains an extremely small percent of the variance alone (close to zero) and even the full SEMs explain only about 5% of the variance in the cognitive skills scores. I conducted similar analyses using the non-age-normed scale scores, while controlling on child's age and was able to explain about 62-69% of the variance. From this, I believe that the explained variation is low, not because of important omitted variables, but because there is simply little variation in the scores of infants and that what little variation there is is due to the age of the infants. As Piaget argued, infants follow a somewhat standard developmental trajectory that depends on their age more than anything else. As children age, variation in intellectual skills increases which I believe would make for a much higher amount of explained variation were I to use the same measures employed here. Future analyses using later waves of the data should explain more of the variance, I believe. Because of this I do not believe that the low R^2 values should be viewed as overly problematic to these analyses.

Future Research

This research adds to the literature by being the first study to use nationally representative data to examine the race gap in cognitive skills among infants, to use the mother's race instead of the child's race, to incorporate a broad number of measures in the regression analysis, to use SEM in order to provide the least biased estimates possible while assessing both direct and indirect effects, and to incorporate previously omitted motor skills into the analysis. However, more research is in order to further expand these analyses.

As this analysis demonstrates that social capital is central to the Black-White test score gap in infancy, further understanding of what contributes to racial differences in social capital would be warranted. I am eager to explore the causes of the differences in parenting behaviors among the different racial groups in more depth. Additionally, I am interested in how the types of social ties (fathers vs. parents vs. social workers, and so on) may influence parenting behaviors. Another area of research would be to examine the racial composition of children's books to assess if perhaps racially biased children's literature is related to the lower propensity of Black mother's to read to their children. Similarly, I am interested in the interaction between being a Black mother and divorced, widowed, or separated, and in its positive effect on cognitive skills. I am also interested in the role of residential segregation on parenting behavior, perhaps social ties matter based on who one lives near and neighborhood resources. I believe this lends further evidence to the notion that social capital is key to racial inequality in infant development.

I also am interested in examining later waves of data in order to see if social capital continues to be primary to cognitive development, or if other influences such as financial or human capital begin to matter more as the children age. Additionally, I plan to conduct a fixed-effects analysis using the first and second waves of data, to explain the scores of two-year olds, net of unchanging unmeasured characteristics such as the mothers' IQ. As future waves of data become available, looking at how the children's

scores change over time will be informative. Additionally, the second wave of data will have far more detailed measures of childcare quality which will be useful for better examining the influence of childcare quality on the Black-White test score gap among two-year olds.

I also believe that looking at other data sets to see if using the measure of the parents' race versus the child's race makes a difference in other samples would be interesting, as well. Similarly, I am interested in expanding the analysis to look at other races. Particularly interesting is the finding that net of all of the resources, the infants of Asian mothers perform almost $2/10^{th}$ of a standard deviation lower than the White children, although as they age, Asian American youths have been shown to outperform their peers of all races on many standardized tests (see for e.g. Chubb and Loveless 2002). What makes this shift is a potentially interesting avenue for future research.

Conclusion

Racial disparities in cognitive skills is a controversial topic. To say that one racial group has lower cognitive skills can imply that all members in one group are not smarter than all members of another group. First, we must remember that all of the findings here are averages and these averages do not speak for every child. In fact, the highest scoring infant in my sample is Black. However, simply because something is controversial is not a reason to ignore it. To do so would be a grave travesty to not only all of the children who have the potential for high achievement but to our society as well which would be more equitable and just were all children be given a fair footing upon which to begin their life paths.

Only when we are able to better pinpoint when the racial gap in cognitive development begins can we effectively begin to address this issue. From the analysis performed here, the Black-White test score gap appears to begin to make a very marginal appearance in infancy. However, the gap can be clearly explained by differences in birth

weight and social capital. As such, I argue that by removing the racial disparities in these two arenas, we can begin to close the gap. It is not too late to end racial inequality, but in order to do so we need to address disparities early in the life course.

APPENDIX

SENSITIVITY ANALYSES

Interviewer Effects

A critique that could be made of this analysis is that the racial differences are being driven by interviewer bias. This is a serious consideration since there are many assumptions about race that could influence how the interviewers code the cognitive or motor skills of infants. As important as this is, fully controlling for it is a near impossibility. Interviewers were not randomly sent across the country to do interviews. Because interviewer ID is correlated with the race of the mothers, we cannot tell if the interviewer is race-biased, if each interviewer is sent to an all White sample, or an all Black sample.

The consortium of researchers who collected the data analyzed the likelihood of interviewer bias and found that who the interviewer was did account for a significant portion of the cognitive skills scores. However, this may have been because the interviewer as located in a neighborhood that had a higher number of low-scoring children. As the data manual for the ECLS-B notes:

> These results suggest that on the BSF-R mental scale, interviewers account for as much as 14 percent of the total variance in mental scale scores. This implies that as much as 14 percent of the total variance depends on the particular interviewer selected to conduct the assessment. **However, since interviewers work in different geographical areas, interviewer differences are confounded with any real differences between areas.** True-score differences between children account for fully 86 percent of the total variance and are confined to Level 1 of the model.[28]

I performed a Manova test as well that indicated that the interviewers are strongly related to the race of the child interviewed ($p <= 0.001$). We would need more variation

[28] Scale scores were used in the analyses, which tend to have higher R^2 values than the t-scores used in my analyses.

on child's race "within interviewer" in order to detect potential bias from the interviewer. This also means that controlling on the interviewer may be akin to controlling on the mother's race, if the interviewer only interviews people of one race. This would influence changes in the race coefficient that are not due to interviewer bias.

As a final check, I included interviewer id in my OLS regression models, controlling on dummy variables for the interviewers and found some minor changes to the Black coefficients. The race coefficients alone are presented in Table A1, although the models included all of the full model measures.

Table A1. Assessor Effects on the Cognitive Skills Scores

	Full Model Not Controlling Interviewer	Full Model Controlling on Interviewer
Black Mother	0.846+	0.991*
	(0.464)	(0.451)
Constant	42.860**	43.578**
	(1.698)	(1.954)
R^2	0.040	0.210

Standard errors in parentheses

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

N=9903

These results indicate that the interviewer *may* be scoring the children of Black mothers lower than the children of White mothers, but again, this may be an artifact of the interviewers not being fully randomly assigned to the children.

Influential Outliers

In order to assess if there were influential outliers in the analysis, biasing results, I computed a Cook's statistic from the full regression model on both the child's race and the mother's race models. This analysis showed that there were no outliers influencing the results.

Multicollinearity

In order to assess if any of the independent variables were too collinear, I computed a VIF statistic from the full regression model on both the child's race and the mother's race models. The highest VIF score was 1.96 which is lower than the standard cut-off of VIF < 4. Therefore, I concluded that there is not a problem with multicollinearity in this analysis.

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