

# The role of family socioeconomic resources in the black–white test score gap among young children

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## Abstract

This paper reviews evidence on the family origins of racial differences in young children's test scores and considers how much of the gap is due to differences in the economic and demographic conditions in which black and white children grow up. Our review of the literature finds that the estimated size of the gaps varies considerably across studies. However, a surprisingly consistent result is that a collection of measures related to family socioeconomic resources appears to account for a little less than half a standard deviation of the black–white test score gap, regardless of the assessments used or the populations studied. We discuss the policy implications of these findings and suggest avenues for future research.

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## Introduction

In the fall of 1998, the US Department of Education launched the kindergarten component of the Early Childhood Longitudinal Study (ECLS-K)—the most comprehensive assessment of school readiness among the nation's kindergarteners. Test score results, drawn from a representative sample of over 13,000 children enrolled in both public and private kindergartens, show alarming gaps in school readiness between white and Asian students on the one hand and black and Hispanic students on the other.

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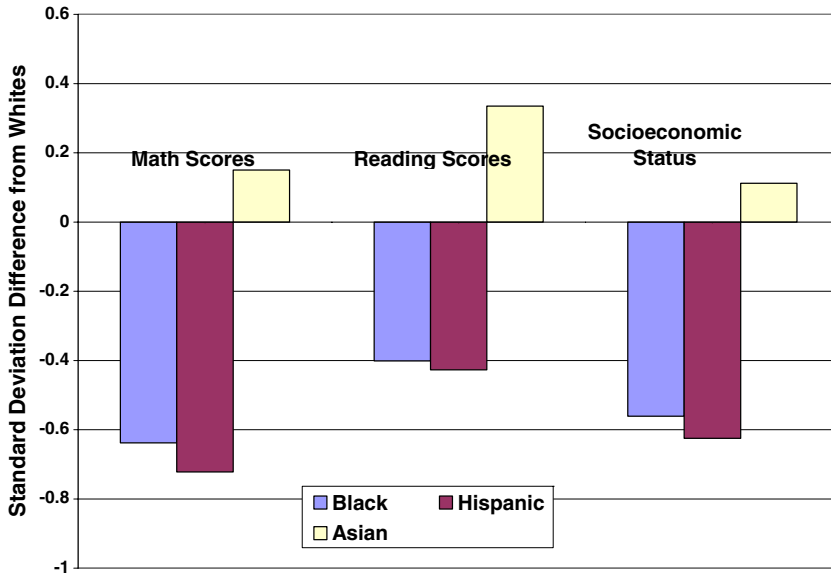


Fig. 1. Test score and socioeconomic differences for kindergartners from different race/ethnic groups in the Early Child Longitudinal Study-Kindergarten Cohort (ECLS-K).

For math achievement—skills such as recognizing numbers and geometric shapes, counting, recognizing patterns—both black and Hispanic students scored about two-thirds of a standard deviation below whites, while Asian students outscored whites (Fig. 1).<sup>1</sup> Two-thirds of a standard deviation is a large difference. On a 64-item mathematics test, white children averaged 25 correct answers whereas Hispanic and black children averaged only 19 and 20 correct answers, respectively. These scores were derived using item response theory (IRT), a method in which all children are first given a set of items designed to assess their skill levels, and then a second set of items tailored to their skills. Thus, none of the children was given all 64 items (National Center for Education Statistics, 2001).

For reading achievement—skills such as recognizing letters and associating letters with sounds at the beginning of words—the racial and ethnic gaps were only slightly smaller. Black and Hispanic students scored just under half a standard deviation lower, while Asians again performed better than whites, in this case by one-third of a standard deviation. However, the reading assessment was given only to children who passed an English language screening test. Thus, the gaps shown in Fig. 1 may understate differences in reading skills between groups because students who were not proficient in the English language were removed from the comparison.

What might be causing these differences? One obvious possibility is that historical racial and ethnic inequalities in the US have created disparate socioeconomic circumstances for the families in which white, black, Hispanic and Asian children are reared, and these differences explain the racial and ethnic achievement gaps. The ECLS-K also asked children's parents about their own schooling, occupations and household incomes. Combining these

<sup>1</sup> The authors calculated these and other ECLS-K figures.

elements into a single socioeconomic status (SES) index and comparing across groups yields a pattern quite similar to that found for achievement. The average SES level of black kindergartners was nearly two-thirds of a standard deviation below that of whites (Fig. 1). Hispanic children had even lower socioeconomic standing relative to whites. Also consistent with the test score patterns, Asian children enjoyed SES levels that were slightly higher than those of white children.

With racial and ethnic gaps in family socioeconomic circumstances matching so closely the gaps in test scores, it is tempting to conclude that equalizing the social and economic circumstances of young white, black, Hispanic and Asian children would eliminate the achievement gaps. But there are many reasons why socioeconomic circumstances may not be as consequential for children's achievement as one might think. Maybe what really matters is a collection of psychological dispositions of parents—for example depression—and thus the association between socioeconomic status and achievement for children may merely reflect the fact that both are higher in the case of better-adjusted parents. Or maybe the association between socioeconomic status and achievement stems from the poor health and developmental problems of the children themselves, which can lower a child's academic achievement and reduce a family's resources by limiting parents' employment.

Some behavioral geneticists also conclude that socioeconomic conditions are of little importance, but put forth a different logic. For them, genetic endowments of ability are a key determinant of parents' education and income, family environments, and children's test scores. Thus they point out that children reared in more affluent families score higher on achievement tests because genetic endowments are passed on from one generation to the next (Rowe & Rodgers, 1997). If parental mental health, child health, or genetic endowments are what really matter for children's achievement, then increasing parents' income or education without also improving these more fundamental causes would not boost achievement.

This paper reviews evidence on the family origins of the ethnic and racial differences in test scores: how much of the gap is due to differences in the socioeconomic conditions in which children grow up? Because there are so few studies that consider these questions for Hispanic and Asian children, we focus our attention on the black–white achievement gap. We begin with a review of estimates of the size of the achievement gaps and how they change across childhood. Next, we review theories as to why family socioeconomic resources might matter for children's early achievement, as well as studies that attempt to account for the black–white achievement gaps by examining differences in family SES. We conclude with a discussion of policy recommendations and avenues for future research.

### **Racial test score gaps from birth to school entry**

Although we focus on average test score gaps between racial and ethnic groups, we begin by pointing out some of the limitations of this approach. A first concern is with the categories used by the studies we review—white and black (as well as Hispanic and Asian). Presenting the average scores of students by broad, socially constructed racial and ethnic categorizations obscures considerable diversity within these groups. In the United States, black group membership is determined largely by phenotypic traits, but nevertheless entails possible cultural differences, as well as minority status and its accompanying experiences of discrimination. “Black,” for example, refers to a diverse array of African and Caribbean immigrant groups as well as African Americans (Garcia Coll et al., 1996; Kao & Thompson, 2003).

Second, our use of averages obscures considerable variation in skills within each of the racial and ethnic groups. Although the average gap in math achievement between white and black kindergarteners in the ECLS-K was two-thirds of a standard deviation, nearly one-quarter of black children outscored the typical (median) white student in reading achievement.

Third, how to measure academic achievement, especially in the early elementary grades, is a controversial question. Although research typically focuses on standardized assessments, it is unclear whether other types of measures would produce different estimates of the achievement gaps. Turning again to the ECLS-K for illustration, teachers were asked to rate the mathematics skills of children in the study. Black children were rated about half a standard deviation lower than white children, a difference similar to what is found with the ECLS-K achievement test. There was even a gap—more than a quarter of a standard deviation in this case—between teacher-rated black and white children's math skills among black teachers who rated both black and white students in their classrooms.

Fourth, academic achievement is only one aspect of school readiness. When asked to name the most important determinants of readiness to learn, kindergarten teachers do not rank early achievement indicators such as knowing numbers, shapes, colors and letters very highly. Instead they talk about the importance of good physical health and social skills—including being able to communicate needs, wants, and thoughts verbally, being enthusiastic and curious in approaching new activities, taking turns and knowing how to sit still and pay attention (U.S. Department of Education, 1993).

The ECLS-K study also provides information on racial differences in several teacher reported measures of problem behavior (e.g., arguing, fighting, and disruptiveness) and self-control (e.g., controlling temper, respecting the property rights of others). On average, blacks have higher levels of problem behavior and lower levels of self control than whites, although the magnitudes of the behavior gaps are smaller (.35 of a standard deviation or less) than for academic skills. Since few other studies are able to provide estimates of racial gaps in behavioral dimensions of school readiness, we focus on academic and cognitive test scores in the remainder of this paper. However, understanding the gaps in other dimensions of school readiness is an important goal for future research, and likely to be quite complicated given the difficulty of accurately assessing children's behavior and social skills in large studies.

### *How large are racial achievement gaps?*

Virtually all studies of the achievement scores of young white and black children find large disparities, although the magnitude of the gap varies with the particular test given. Using recent data from the nationally representative Panel Study of Income Dynamics (PSID), Yeung and Pfeiffer (2005) estimate gaps in math and reading skills for preschool age children that are remarkably similar to those found the ECLS-K (−.78 and −.43 of a standard deviation for math and reading, respectively).

Data from other studies, however, show somewhat larger gaps. Using national data from the Children of the National Longitudinal Survey of Youth 1979 (CNLSY), Phillips et al. (1998, Table 4–2) estimate that 5- and 6-year-old black children scored more than a full standard deviation below white children on a picture vocabulary test score. Using the same children and test, Farkas and Beron (2004) express racial differences in terms of the average age at which black and white children correctly identify 40 words in the test. For

whites, this happened two months after the children's 4th birthdays. For blacks, it was a full year later. By this accounting, blacks were already a year behind whites in their language development just prior to school entry.

Brooks-Gunn and colleagues (2003) estimated black–white achievement gaps in a sample of low birth weight 5-year-olds enrolled in the Infant Health and Development Program (IHDP). Although their sample is not nationally representative, the study is noteworthy because it contains several measures of achievement as well as IQ. Using the same picture-vocabulary test as in the CNLSY, they find a very large racial gap, amounting to 1.3 standard deviations. The racial gap in the verbal component of their IQ test was 0.97 standard deviations, still large but considerably smaller than for the picture-vocabulary test. Because two different language tests administered to the same group of children at the same time produced such different estimates of racial skills gaps, we caution against putting too much weight on results from any single test. The potential for tests to be biased has long been recognized, with methods of administration, content and test conditions all being potential sources of discrepancies in both the size and explanation of the gap (Burchinal & Cryer, 2003; Helms, 1992; Jencks, 1998; Rock & Stenner, 2005; Suzuki & Valencia, 1997).

The National Assessment of Educational Progress (NAEP) has measured children's mathematics and reading skills for over 30 years, but because their earliest point of assessment is fourth grade, NAEP data reflect the influences of both preschool and early elementary-school environments. Large achievement gaps are evident in the 2003 assessments, with both black and Hispanic fourth graders scoring about 0.92 of a standard deviation below whites in reading and 1.08 standard deviations lower in math.<sup>2</sup>

At a minimum, racial gaps amount to about half a standard deviation and some studies estimate the racial gap to be more than a full standard deviation. Why the difference in the relative size of the achievement gaps? To date, there is no clear explanation. The same studies using different measures of skills and achievement, as well as different studies using the same measures, arrive at strikingly different estimates of racial test score gaps. Rock and Stenner's (2005) review of the ECLS-K, CNLSY, and IHDP data dismiss several hypotheses that might explain differing estimates of early racial test score gaps—including sample selection, test content, and racial bias.

### *Do racial gaps change over the course of childhood?*

It is difficult to measure cognitive ability and achievement at very early ages and to track them consistently across childhood. Infants and toddlers are obviously unable to perform the reading and verbalizing tasks associated with conventional tests, and their varying abilities to focus on test tasks produce considerable measurement error even in the assessments designed for their developmental stage. Moreover, the explosive growth in children's developmental capabilities in early and middle childhood makes it difficult to test the "same" dimension of ability or achievement at different ages (McCall & Carriger, 1993). Nevertheless, accumulated data suggest that the achievement gaps seen between

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<sup>2</sup> <http://nces.ed.gov/nationsreportcard/reading/results2003/natsubgroups.asp>, accessed on March 25, 2004. The 2003 assessments are not comparable to scores from the NAEP long-term trend assessments, which are discussed later in the article, because their standard deviations have not been corrected to account for measurement error. The NAEP is the only one of the studies we review that adjusts its standard errors for measurement error. NAEP gaps will therefore be larger, *ceteris paribus*, than gaps estimated with other data.

black and white kindergartners are apparent by age 3, and may grow larger during pre-school and the early school years.

Brooks-Gunn et al. (2003) find a small amount of growth between ages 3 and 5 in the black–white picture vocabulary gap. Phillips, Crouse, and Ralph (1998) find that kindergarten achievement gaps between black and white children grow by about 0.2 of a standard deviation from school entry to high school. Recent analyses of the Early Childhood Longitudinal Survey-Kindergarten cohort (ECLS-K) (Fryer & Levitt, 2005) and Panel Study of Income Dynamics Child Development Supplement (PSID-CDS) (Yeung & Pfeiffer, 2005) also show modest growth in racial achievement gaps during the early school years (Fig. 2). Both studies find similar growth in reading and math gaps—about 0.2 of a standard deviation over the first few years of school. Thus, gaps appear to grow after children enter school, but much and perhaps most of the gap appears to be present by school entry. Unfortunately, research to explain why these gaps may grow is sparse and largely inconclusive (Fryer & Levitt, 2005; Murnane, Willet, Bub, & McCartney, 2006; Phillips et al., 1998; Todd & Wolpin, 2005).

*Have racial gaps narrowed over time?*

A different issue is whether the racial or ethnic gap in school-entry test scores has narrowed over the past few decades. The ECLS-K and PSID-CDS were conducted in 1998, up to a decade after the Children of the National Longitudinal Survey of Youth (CNLSY)

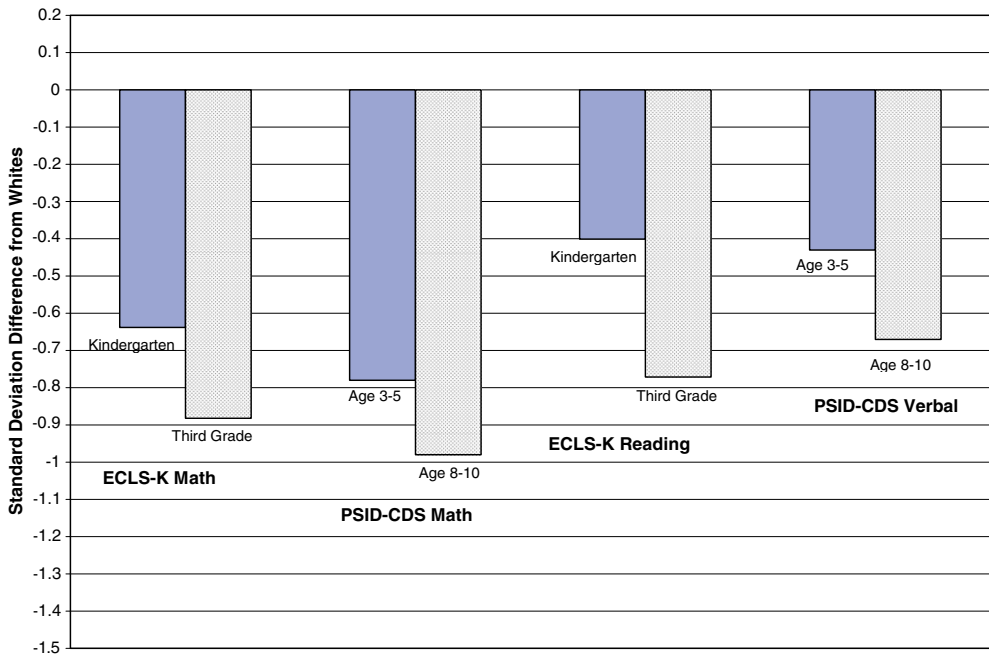


Fig. 2. Black–white test score gaps in academic skills in the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K) and the Panel Study of Income Dynamics Child Development Supplement (PSID-CDS).

and Infant Health and Development Program (IHDP) assessments. Fryer and Levitt (2004) suggest that the smaller gap found in the ECLS-K compared with estimates from prior studies may reflect the fact that the young children’s achievement gap has narrowed over time. It is difficult to assess this argument, because tests have not been administered to national samples of kindergartners more than once. The NAEP has tested reading and math skills consistently since the 1960s, but never before fourth grade.

Fig. 3 plots the relative scores of black and white fourth graders taking the NAEP reading test. As before, we express these differences in standard deviation units, so the  $-1.04$  difference in 1973 indicates that black children scored one full standard deviation below whites in that year. Encouraging in Fig. 3 is that the racial gap appears to have declined through the 1970s and 1980s to 0.71 of a standard deviation in 1988. Similar patterns are found for the NAEP reading test gap, which starts at  $-0.97$  in 1973 and falls to  $-0.74$  in 1986. Less encouraging is the lack of progress during the 1990s, when the gap may have widened. By 1999 the respective gaps in reading and math were  $-0.90$  and  $-0.84$  of a standard deviation. The most recent data available for 2004 show a decrease in the gaps of about 25% since 1999.

Most of the narrowing of the gaps for fourth grade students over the 1970s and 1980s is due to larger increases over time in black students’ academic skills compared with increases in white students’ skills (Grissmer, Flanagan, & Williamson, 1998). However, the pattern of gains differs somewhat for the math and reading tests. Math test scores for black fourth graders rose steadily between the early 1970s and late 1980s, with the gains over the entire period amounting to an impressive 0.6 of a standard deviation. In the case of reading scores, black gains occurred early (nearly 0.5 of a standard deviation during the 1970s) and changed little in the 1980s. Then, black students’ reading scores actually fell slightly in the 1990s, before increasing again in 2004. It is unclear if the ground gained by the time of the 2004 assessment reflects a transitory fluctuation or a positive trend.

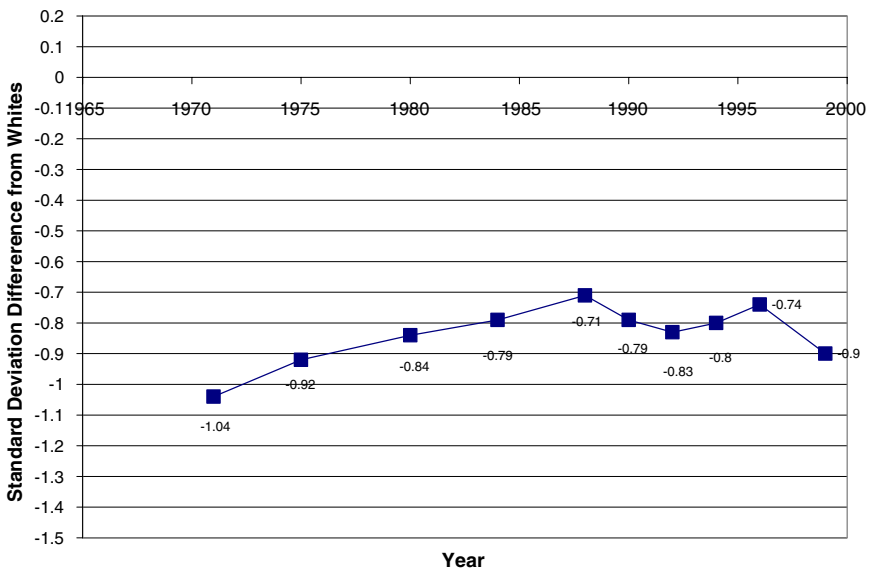


Fig. 3. Black–white gap in fourth grade National Assessment of Educational Progress (NAEP) reading scores.

Hedges and Nowell (1998) also take up the question of converging gaps, by comparing estimates of black–white test score gaps among high school seniors in six large, national studies that span the late 1960s to early 1990s. They found that estimates of test score gaps declined from over one standard deviation in the late 1960s and early 1970s to about 0.8 of a standard deviation in 1992, a decline of similar magnitude to what is found in the NAEP data. They conclude that the reduction in the gap is largely due to improved scores among black students in the lower end of the achievement distribution, with the greatest gains occurring in the 1960s and 1970s. All in all, evidence provides little hope that achievement gaps will simply continue to disappear with the passage of time. Encouraging gains for blacks have occurred in the past few years, but gains have been the exception rather than the rule since the 1980s.

### **Family socioeconomic status**

Consider the differences between a family with a single parent struggling to make ends meet by working at two minimum-wage jobs and a family with one highly paid wage earner and a second parent who stays at home to care for their children. The potential range of material and psychological hardships faced by the first family and avoided by the second is vast (Bradley & Corwyn, 2002; Evans, 2004; Haveman & Wolfe, 1994; McLoyd, 1998). For example, the first family may experience a lower-quality home environment that exposes children to pollutants and toxins such as lead and provides fewer learning opportunities in the home, and lower-quality child care. In addition, greater stress for the first mother may increase her irritability, and reduce her warmth and responsiveness to her children. Strained parent–child relations may, in turn, reduce children’s wellbeing. Because there are systematic and often large differences in the amount of resources—particularly financial resources—across racial and ethnic groups, it is natural to suspect that family resource differences may account for much, if not all, of the racial and ethnic differences in early school readiness.

### *Socioeconomic status*

Some social scientists lump many indicators of financial and social resources under the umbrella of “socioeconomic status” (SES). SES refers to one’s access to economic and social resources and the social positioning, privileges, and prestige that derive from these resources (Hauser & Warren, 1997; Mueller & Parcel, 1981). Some scholars emphasize the economic, educational, and occupational determinants of SES, while others take a more expansive view, arguing that cultural differences in habits, tastes, linguistic patterns, preferences, and worldviews are the key determinants of SES (Entwisle, Alexander, & Olson, 2005; Lareau, 2003). While these approaches differ in what they offer as central explanatory constructs, both perspectives ultimately suggest that proximal environments, particularly family and childrearing environments, are the critical link between a family’s SES and a child’s wellbeing. We follow in this tradition, and in doing so emphasize gradients in social and economic resources, rather than cultural underpinnings of categorical social classes.

Researchers’ differing conceptual views of SES lead to discrepant approaches to measurement. Because it may be difficult to measure a family’s access to economic and social resources or their position in a social hierarchy directly, social scientists often use one indicator, typically occupation or maternal education, or combine multiple indicators (e.g.,

parental education and income) into scales that indicate families' relative position in a social hierarchy (Hauser & Warren, 1997; Mueller & Parcel, 1981). For example, most occupational prestige scales of SES are derived from a weighted sum of the average earnings and education level of particular occupations. The Hollingshead index, used frequently in developmental studies, differs from this tradition in that it is a weighted sum of an individual head of household's occupational prestige and education (Duncan & Magnuson, 2003).

The differences in SES levels shown in Fig. 1 exemplify the single-indicator combination approach. Scholars using an index to measure SES often view social stratification as an organizing force in individuals' lives, and presume that one's social standing (or social class) is more important than the particular combination and gradients of economic and social resources that determine it.

An alternative approach to measuring SES is based on the premise that distinct types of socioeconomic resources contribute to social inequality and stratification along differing economic and social dimensions (Bollen, Glanville, & Stecklov, 2001). For example, although parents' educational attainments, incomes and occupations are related, each may affect children in different ways (Duncan & Magnuson, 2003). Rather than using a summary SES measure, proponents of this approach consider each component separately. Given the moderate to high correlations among SES components, it is difficult to sort out their separate effects, especially in school or community samples that lack the full range of population variability. Even with sufficient variability, an attempt to estimate the contribution of distinct SES components may understate the importance of either the constellation or accumulation of household resources. Nevertheless, scholars have concluded that components of SES have differential effects on parenting and children's development, and should not be combined into a single scale (Bornstein, Hahn, Suwalsky, & Haynes, 2003; Duncan & Magnuson, 2003).

When viewed from a dynamic systems perspective, regardless of measurement strategy, much of research on the effects of SES on children is reductionistic, in that it attempts to translate complex ecological processes into associations between a few simple measures (Lerner, 2003). Developmental systems theory holds that individuals are embedded in multi-level ecological contexts (Bronfenbrenner & Morris, 1998). By focusing attention on the integrative, interdependent and synthetic nature of individuals and environments, a systems approach emphasizes transactional developmental processes, in which reciprocal effects occur across all ecological levels (Lerner, 2003).

Despite the seeming complexity of a dynamic systems framework, it provides several key principles that may be useful for studying SES effects on children. First, it suggests that SES is one set of conditions that affects, and will be affected by, other contexts in children's lives. Put another way, the effects of SES (or any single SES component such as household income) may depend on a host of other key contexts and conditions, as well as child characteristics. This insight has spawned a host of risk and resilience research seeking to understand how the accumulation of negative contexts associated with poverty influences children's wellbeing as well as to identify which individual and contextual factors promote positive outcomes for children raised in economically disadvantaged families (Evans, 2004; Garmez, 1991; Kim-Cohen, Moffit, Caspi, & Taylor, 2004; Luthar & Zigler, 1991; Masten, 2001; Werner & Smith, 1982).

Second, developmental systems display both multifinality and equifinality. A set of conditions may be linked to several end states and divergent conditions may lead to the same

end state. This argues that SES may be linked to a broad set of child outcomes and the processes by which SES influences children may not be uniform. Finally, a dynamic systems approach suggests that the timing and duration of SES resources may matter as much as the presence or absence of resources at any one time point (Bronfenbrenner & Morris, 1998). For example, in the case of poverty, effects may differ depending on the age at which it is experienced, the timing of the outcome being measured, and duration of economic hardship (Duncan & Brooks-Gunn, 1997; Elder, 1974).

Throughout this article we take a multidimensional approach to SES by concentrating on four key components of parental socioeconomic status that are particularly relevant for children's wellbeing—income, education, family structure and neighborhood conditions. In the sections that follow, we summarize research on the links between SES and children's achievement, as well as the gaps in our understanding. Unfortunately, few studies have fully employed a dynamic systems approach to understanding SES effects, although studies often incorporate some aspects of this perspective. Therefore, at times our review paints a relatively simplistic portrait of the links between SES and children's achievement, although we attempt to highlight findings that are consonant with dynamic systems theory.

Despite theory suggesting that parents' occupations may be linked to their parenting behaviors (Kohn, 1963; Luster, Rhoades, & Haas, 1989; Menaghan & Parcel, 1991), we do not review the parent occupation literature. To date, there is little convincing evidence that parents' occupation per se influences children's achievement (see Bradley & Corwyn, 2002 for a review), and there are no clear interventions that directly target it.

### *Household income*

Family economic resources can be measured in a number of ways but most often include household income and sometimes wealth. Household income is the sum of income received by all members of the household over some time period, typically a calendar year or month. Dividing household income by household size or, better yet, a poverty threshold based on household size, produces a more refined measure of its per capita command over resources (Citro & Michael, 1995). Contrary to popular belief, family income is often quite volatile, and this income instability makes a single year's measure of household income a somewhat erroneous measure of "permanent" income. In contrast, averaging income over multiple years provides a more accurate portrait of economic resources. Income and wealth are positively correlated, but distinct. Wealth is the point-in-time "stock" of a household's financial assets, including both "liquid" forms such as money in a savings account as well as "illiquid" forms such as the net equity tied up in an owned home.

At over \$30,000, the gap between black and white children's household income is substantial. Rates of poverty are equally disparate; in 2004, the black–white child poverty gap was nearly 20 percentage points. Even more striking are racial differences in wealth. In the mid 1990s, the gap in net worth between the average black family and white family was well over \$150,000 (Gittleman & Wolff, 2004). If household income, poverty or wealth is consequential for children's development, then such large differences in economic resources may go a long way to explaining racial achievement gaps.

Household income has most often been hypothesized to influence children's proximal environments through at least two distinct, but related pathways—material deprivation and parental distress. It is easy to imagine how children are advantaged by higher incomes. Financial resources influence the quality of the goods and services parents can purchase

for their families such as prenatal health care and nutrition; enrich learning environments both in the home and outside the home; enable families to live in a safe and stimulating neighborhoods; and, for older children, provide access to higher-quality schools and a college education (Bradley & Corwyn, 2002; Duncan & Brooks-Gunn, 1997; Evans, 2004; Guo & Mullan Harris, 2000; Magnuson & Duncan, 2002; McLoyd, 1998). Thus, children from higher income families may benefit from a range of positive developmental contexts which lower income children do not experience. At the other end of the spectrum, children's exposure to multiple negative contexts may lead to elevated stress, which overwhelms their adaptive resources and thus lowers their level of wellbeing (Evans, 2004).

The experience of material hardship is distressing for many parents. Being unable to meet household and other basic expenses may cause some poor parents to feel frustrated, helpless, and depressed (Conger et al., 2002; McLoyd, 1998; Mistry, Biensanz, & Taylor, 2004). The worry and stress associated with the constant struggle to provide for one's family leaves many low-income parents with few psychological or other resources with which to cope with adverse experiences (Gallo, Bogart, Vranceanu, & Matthews, 2005). Given these strains, it is not surprising that studies find that many low-income mothers have poor mental health (Brown, Brody, & Stoneman, 2000; Gallo et al., 2005). Psychological distress, in turn, may compromise the quality of parent-child interactions, such that low-income parents may be less warm and supportive, as well as harsher and more punitive than more affluent parents (McLoyd, 1998). This lower quality parenting may, in turn, hinder the development of children's socio-emotional wellbeing and academic achievement (Conger et al., 2002; McLoyd, 1998; Mistry et al., 2004).

Despite theoretical predictions and vast correlational evidence, whether family income and poverty are causal determinants of children's achievement and behavior remains a controversial issue. As mentioned earlier, some scholars argue that both low family incomes and low achievement are the by-products of genetic, psychological, and social differences between poor and near-poor families, which are the "true" causes of poor achievement (Mayer, 1997).

In the absence of experimental studies, researchers have sought to capitalize on longitudinal data to better understand the effects of family income on children's achievement and education. Duncan and Brooks-Gunn (1997) coordinated analyses of 12 groups of researchers working with 10 different longitudinal developmental data sets. Analyses were designed to isolate the effects of permanent income from other SES components, particularly family structure and maternal education. This effort resulted in several important findings. First, the effects of household income appear to be non-linear, with larger effects of additional income for families in the lower end of the income distribution. In addition, family income in early childhood appears to be more important for shaping ability and achievement than income during middle childhood or adolescence. Finally, persistent poverty and deep poverty are particularly detrimental to children's wellbeing. More recent studies have confirmed these findings, using sibling comparison and change models to isolate the effects of income from other parent and child characteristics (Ackerman, Brown, & Izard, 2004; Dahl & Lochner, 2005; Dearing, McCartney, & Taylor, 2001; Duncan et al., 1998).

How large are the effects of income? Smith, Brooks-Gunn, and Klebanov (1997) estimated that persistently poor young children had achievement scores 0.3 of a standard deviation lower than nonpoor children—a difference large enough to account for substantial share of racial gap in achievement. However, trying to rule out a longer list of alternative

explanations for poverty-achievement correlations, subsequent studies using the same data have arrived at somewhat smaller estimates of poverty effects (Phillips et al., 1998).

A series of experimental welfare reform evaluation studies undertaken during the 1990s provided a unique opportunity to observe how increases in family income affect poor children's development (Morris, Duncan, & Clark-Kauffman, 2005). Although all of the experimental programs increased parental employment, only some of the programs also supplemented parents' earnings thereby boosting family income. Comparing the effects of programs that only boosted parental employment with those that boosted both employment and income provides estimates of the extent to which increases in family income benefits children. Preschool and elementary-school children's academic achievement was improved by reforms that increased income, but not by programs that only increased parental employment (Morris et al., 2005). When these same data were used to isolate the impact of income on the achievement of young children, estimates suggest a \$1,000 increase in income over several consecutive years was associated with a .06 standard deviation increase in achievement.

Other studies reach varying conclusions regarding the importance of household income. Blau (1999) and Mayer (1997) find null to weak impacts but do not focus on the early childhood period. Dahl and Lochner (2005) use income increases associated with an expansion in the earned income Tax Credit and find significant impacts on both reading and math achievement. A balanced reading of the evidence appears to support the idea that poverty probably matters for children's achievement, although not as much as some of the early studies suggested. In addition, young children may be more susceptible to negative effects of poverty than older children, particularly deep and persistent poverty.

Whether household wealth has an independent influence on children's achievement is more uncertain. Recent forays in understanding the effects of family wealth on children have yielded mixed conclusions about whether family wealth predicts children's achievement, holding constant permanent income (Orr, 2003; Phillips et al., 1998; Yeung & Pfeiffer, 2005).

### *Parental human capital*

Human capital constitutes a second form of SES-based family resources, and includes the collection of parental skills acquired in both formal and informal ways that are valuable in the labor market and at home (Becker, 1981). Formal schooling is the most familiar and most studied form of human capital, and a large body of literature has demonstrated that obtaining higher levels of education increases individuals' future employment and earnings (Card, 1999). Most studies consider parents' education to be fixed during a child's life. Yet it has become increasingly common for adults to accrue education in a discontinuous fashion, and to extend their schooling well into adulthood (Astone et al., 2000; Jacobs & Stoner-Eby, 1998). Attending school during adulthood is particularly common for economically disadvantaged mothers (Rich & Kim, 1999).

Parents' completed schooling varies widely by race. We found that among the ECLS-K kindergarteners, 18% of black mothers had failed to complete high school as compared with only 7% of white mothers. At the other end of the scale, 28% of white, but only 9% of black mothers had completed a four-year college. There may also be disparities in the quality of schooling that black parents received compared with white parents, as studies routinely find that blacks attend lower quality schools than whites (Phillips & Chin, 2003). However, few studies have been able to consider whether the quality of parents' schooling

influences their children's achievement (see Phillips et al., 1998, for an exception). With research suggesting that an additional year of parental education has equally strong associations with white and black children's achievement (Davis-Kean, 2005; Phillips et al., 1998), it may be that differences in the average school quality white and black parents experience is not very consequential for their children's development.

Higher levels of parental education (and higher quality education) may benefit children indirectly by leading to a higher family income. Less obvious are the ways in which parents' skills may directly improve child well-being, for example, by improving parenting behaviors and parents' abilities to accomplish their parenting goals (Bronfenbrenner, 1986; Hoff, 2003; Laosa, 1980; Michael, 1972). Research has found that parents with higher levels of education promote their children's achievement by holding higher expectations for their children, providing more stimulating learning materials and activities, engaging in higher quality instruction, using more varied and complex language and speech patterns, as well as becoming involved in and supportive of their children's learning (Davis-Kean, 2005; Hoff, 2003; Laosa, 1983; Neitzel & Stright, 2004; Raviv, Kessenich, & Morrison, 2004; Richman, Miller, & LeVine, 1992). With such a range of possible mechanisms linking parents' schooling to their children's development, it is interesting to note that most studies have considered these pathways in isolation. Consequently, the extent to which these pathways uniquely explain transmission of educational advantage is uncertain. In addition, the way in which these processes interact to promote and reinforce children's achievement is not well understood.

Studies of children's development routinely find that children with more highly educated parents have higher levels of cognitive development and academic achievement than children of parents with lower levels of education (Haveman & Wolfe, 1995). Remarkably, the association between children's cognitive development and parental education is evident as early as 3 months of age (Roe & Bronstein, 1988). Yet, most comparisons do not clearly isolate parental education as the cause of high achievement (Davis-Kean & Magnuson, 2004; Mercy & Steelman, 1982). Few studies are able to disentangle parents' educational attainment from other sources of advantage, such as cognitive endowments, that may lead to higher levels of achievement among both parents and children. The few US studies that have tried to isolate the effects of parental education *per se* find positive and policy-relevant effects of maternal and paternal education on children's outcomes, with an additional year of schooling associated with an increase in children's test scores of about 0.15 of a standard deviation (Neiss & Rowe, 2000; Rosenzweig & Wolpin, 1994). Results from studies of European data, however, have been less conclusive about whether parental education has positive effects on children's development (Black, Devereux, & Salvanes, 2004; Plug, 2003).

Perhaps because parental education is often employed as a control variable, few studies have sought to move beyond estimating average linear effects, and to more fully understand how effects and mechanisms of influence may differ according to family and child characteristics, particularly children's developmental stage. There is some evidence that the effects of parental education may be non-linear, such that increasing the education of mothers with a high school degree or less boosts children's achievement more than increasing the schooling of college-educated mothers (Haveman & Wolfe, 1995; Magnuson, 2004). For example, a recent study suggests welfare recipients randomly assigned to participate in mandated education or training improved their young children's academic school readiness by as much as a quarter of a standard deviation (Magnuson, 2003).

## *Family structure*

### *Single-parent families*

Increasing rates of cohabitation, divorce, and non-marital childbearing have profoundly changed children's experiences of family life. Currently, about one-third of all children are born outside of marriage, and over half will reside in a single-parent family at some point in their childhood. Relatively high rates of multiple partner fertility also contribute to the complex family structures of many low-income families (Carlson & Furstenberg, 2004; Meyer, Cancian, & Cook, 2005). As is the case for education and income, family structure differences across racial groups are also large. Our calculations of the ECLS-K data indicate that 15% of white kindergartners live in single-parent households, whereas 50% of black children do. Racial differences are also apparent in the pathways into single-parent families, with black children being more likely to be born outside of marriage, and white children more likely to experience divorce.

Economic and psychosocial resources in single-parent families differ markedly from those in two-parent families (McLanahan & Sandefur, 1994). Young children in single-mother families face poverty at five times the rate of preschoolers in intact families (50% vs. 10%), and the declines in children's household incomes after a divorce are dramatic and lasting (US Census Bureau, 2004). Financial and time constraints faced by single parents may limit their ability to supervise and discipline their children, as well as provide emotionally supportive and cognitively stimulating home environments (Amato, 1993; Clarke-Stewart et al., 2000; Coley, 1998; Miller & Davis, 1997). Parental conflict and strain found in divorcing families may also be harmful to children's development, especially if it compromises parents' mental health and reduces the quality of their parenting (O'Connor, Plomin, Caspi, & DeFries, 2000). Children in single-parent families may experience several transitions in family life, including subsequent cohabitations, remarriages, separations, and divorces. This instability and complexity in their family relationships may pose additional risks to child wellbeing (Sigle-Rushton & McLanahan, 2003). Finally, due to the prevalence of low levels of father involvement among single-parent families, children in these households often have fewer relationships with male role models, which might be detrimental to their social development (Black, Dubowitz, & Starr, 1999; Coley, 1998).

On average, children raised by single parents have lower levels of social and academic well-being than children from intact marriages (McLanahan & Sandefur, 1994). Studies find that most children have a difficult time during and shortly after the divorce process, and that problems are larger for children's behavior than for school achievement (Ackerman, Brown, Schoff D'Eramo, & Izard, 2002; Amato, 1993; Amato & Keith, 1991; Hetherington & Stanley-Hogan, 1999; McLanahan, 1997; O'Connor et al., 2000). Children in elementary school are the most profoundly affected by divorce, and although difficulties may re-emerge later in life, studies suggest that the vast majority of children from divorced families do not exhibit severe or enduring problem behaviors (Chase-Lansdale, Cherlin, & Kiernan, 1995).

Divorce is not the only path to a non-intact family, and it is important to distinguish families affected by divorce from never-married, cohabiting, and blended (remarried) families. Most research has focused only on the effects of divorce on children, or has lumped together all single-parent families (McLanahan, 1997). The few studies that have addressed this question find little difference between children of divorced and never-married parents; both groups are at risk for poorer achievement and behavior as compared with children

from intact families (Carlson & Corcoran, 2001; Cooksey, 1997; DeLeire & Kalil, 2002; McLanahan, 1997).

Although most children from non-intact families fare worse than children growing up in intact families, studies suggest that pre-existing differences in parent and family characteristics (e.g., educational attainment and income), rather than family structure *per se*, account for much, but not all, of the gap (Aughinbaugh, Pierret, & Rothstein, 2005; Brown, 2004; Carlson & Corcoran, 2001; Clarke-Stewart et al., 2000). For example, findings from a recent adoption study suggest that the academic problems in divorced families may be explained by the transmission of genetic influences, but these factors do not account for elevated levels of problem behavior (O'Connor et al., 2000).

### *Teen parenthood*

Rates of teenage childbearing have been steadily declining over the recent past, dropping 22% between 1991 and 2000, from 62.1 to 48.1 births per 1000 15–19-year-olds (Ventura, Mathews, & Hamilton, 2002). Despite this drop, the US continues to have high rates of teenage parenthood compared with other European countries. In the US, teen birth rates differ substantially by race. Our analysis of the ECLS-K study revealed that about 1 in 5 black children were born to mothers less than 20 years old, nearly twice the rate for white children.

Typically, children of teen mothers face a constellation of socioeconomic-related hardships throughout their lives including single-parenthood, poverty, and lower maternal educational attainment (Coley & Chase-Lansdale, 1998). As outlined earlier, each of these circumstances may influence children's outcomes through a variety of processes. However, a mother's young age may also pose a unique risk to children's healthy development by limiting mothers' understanding of and expectations about motherhood (Sommer, 1993). More specifically, compared with older mothers, young mothers may have imprecise or erroneous knowledge about children's development and parenting as well as negative perceptions about both their parenting role and their children's behavior. Research suggests that this lack of cognitive preparedness and negative attitudes may translate into lower quality parent–child interactions, particularly lower levels of responsiveness, which in turn may result in poor developmental outcomes (Fergusson & Woodward, 1999; Miller, Miceli, Whitman, & Borkowski, 1996).

Although studies find that children of adolescent parents on average have poorer outcomes than other children, they also suggest great variability in outcomes (Coley & Chase-Lansdale, 1998). In seeking to understand why some children of adolescent mothers do better than others, researchers have explored whether differences in maternal characteristics and parenting quality explain these differences. As is the case for single parents, it appears as if some of the poor outcomes are more accurately attributed to a host of other maternal characteristics, such as antisocial behavior and lower levels of education, rather than mothers' young ages *per se* (Jaffee, Caspi, Moffitt, Belsky, & Silva, 2001). Consequently, the extent to which children would benefit from their mothers' postponing their childbearing by a few years is uncertain, although likely modest (Jaffee et al., 2001; Levine, Pollack, & Comfort, 2001; Turley, 2003).

### *Neighborhoods*

Neighborhoods vary widely along a number of dimensions that may shape children's development, although it is likely that adolescents are more susceptible to neighborhood

conditions than young children, who spend little unsupervised time in neighborhood settings (Brooks-Gunn, Duncan, & Aber, 1997). The risks posed by low quality neighborhoods are most striking in high poverty urban communities plagued by violence, gangs, drug activity and environmental pollutants. In these communities, some parents may not allow children to walk to school alone or play outside for fear that they will be in harm's way (Jarrett, 1997). How might such a neighborhood influence children? Pathways identified in the research literature include: stress, which may be elevated as a result of community violence; lack of social organization, including few positive role models and a lack of consensus around common values, which might in result in little control over a youth's problem behavior; few institutional resources such as enriching schools and police protection; negative peer influences, which might spread problem behavior; and exposure to environmental toxins such as lead paint and dust (Ellen & Turner, 1997; Evans, 2004; Jencks & Mayer, 1990; Sampson, Morenoff, & Ganon-Rowley, 2002).

Broad-based studies of neighborhood effects on preschool children indicate that despite the many possible ways in which neighborhoods may affect children, the associations between neighborhood characteristics and children's outcomes are quite modest. A review of studies suggests that only between 5 and 10% of the variation in children's achievement and behavior outcomes are explained by neighborhood characteristics, after controlling for family characteristics (Leventhal & Brooks-Gunn, 2000).

A recent experiment provides a compelling test of the extent to which neighborhood residence matters for children's outcomes. The Moving to Opportunity (MTO) experiment offered housing-project residents in five of the nation's largest cities a chance to move to low-poverty neighborhoods. Analyses of children's achievement test scores and problem behavior collected four to seven years after families moved revealed no statistically significant differences between program and control group children, even among those who were preschoolers when the program began (Orr et al., 2003; Sanbonmatsu, Kling, Duncan, & Brooks-Gunn, *forthcoming*). So despite improvements in neighborhood conditions, particularly neighborhood safety, there were virtually no favorable treatment effects on children's test scores, school success or engagement and problem behaviors. Why not?

It appears that one of the possible factors behind the program's lack of effects on children is that the large improvements in neighborhood poverty enjoyed by experimental-group families were accompanied by no more than modest improvements in the quality of the schools attended by their children (Sanbonmatsu et al., *forthcoming*). Evidence from a qualitative study of MTO families suggests that parents took advantage of school choice programs and enrolled their children in schools near their original neighborhoods (Popkin, Harris, & Cunningham, 2001). Another possible explanation is that while MTO-related neighborhood advantages appeared to improve the mental health of mothers, they did not translate into other kinds of household resources or advantages that might have improved children's well-being (Kling et al., 2004; Orr et al., 2003). After moving, adults in the MTO program were still similar to their control-group counterparts in terms of their employment status, welfare dependence, family income, parenting practices, and connections to their children's schools and to the parents of their children's friends.

Thus, results from the interim evaluation of the MTO residential mobility program indicate that residential mobility programs are not cure-alls for the achievement problems of children who live in public housing in a high-poverty neighborhood. It appears that interventions focused exclusively on neighborhoods, rather than on the larger constellation of factors directly related to the child, family and school contexts are unable to solve the

myriad problems of children growing up in high-poverty urban neighborhoods. Nevertheless, it remains possible that small effects are meaningful, and as dynamic theory suggests, that neighborhood poverty may interact with other dimensions of SES resources in important ways.

### **Nurture and nature**

There is little doubt that children are born with differing social and cognitive capacities and that at least some of these differences are genetic in origin. At the same time, virtually all scholars agree that environmental conditions, including family environments, also shape children's social and cognitive development (Plomin, 1994). Although, the relative importance of genetically and environmentally determined differences in explaining SES and racial gaps in achievement remains controversial (Huston, McLoyd, & Garcia Coll, 1997; Nisbett, 1998; Rowe & Rodgers, 1997), efforts to parse out genetic or environmental determinants of achievement or other behaviors are increasingly being called into question as accumulating evidence indicates that gene expression is the result of a complex interplay between genetic endowments and environmental experiences (Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000; Lerner, 2003).

Although a full accounting of the controversies and consensus in the field of behavioral genetics regarding the achievement gap is beyond the scope of this article (Helms, 1992; Hernstein & Murray, 1994; Huston et al., 1997; Jensen, 1969; Nisbett, 1998; Rowe & Rodgers, 1997), several points about the role of genes in group achievement differences are important. The first relates to the likely genetic bias in most studies of the contribution of SES to the test-score gaps. Because it is likely that genetic processes are linked with both children's academic abilities and parents' economic resources, researchers face the challenge of gene–environment correlations (Scarr, 1992). Several dimensions of parents' genetic endowments are likely to influence the levels of socio-economic resources they provide to their children as well as to be, at least in part, inherited by their children (Walker, Petrill, & Plomin, 2005). Therefore, analyses that estimate the contribution of family and neighborhood SES to test-score gaps may overstate the importance of SES unless research designs somehow incorporate genetic influences in their modeling (Rowe, 1994; Walker et al., 2005).

Suggesting that genetic factors may bias estimates of the importance of parental SES, however, does not imply that gaps in achievement between low and high SES children are largely determined by the inheritance of genetic traits. Environmental experiences are important in regulating the expression of genetic traits. A recent adoption study illustrated the importance of environment in shaping cognitive development by comparing the pre- vs. post-adoption outcomes of low-IQ children adopted around age 5 into low-, middle- and high-SES families (Duyme, Dumaret, & Tomkiewicz, 1999). IQ growth was strikingly different by the SES of the adopting families (defined by father's occupation), with the gains associated with adoption into high- and middle-SES families much larger than the IQ gains for children adopted into low-SES families. Thus, evidence suggests that SES, and not solely genetic endowments, was responsible for the differential gains. Perhaps more pertinent to racial achievement gaps, the Minnesota Transracial Adoption Study (Scarr, Weinberg, & Waldman, 1993) demonstrated that low-SES black children adopted into high-SES white families had IQs of 97 at age seven—close to the overall population mean. A different IQ test was administered at age 17, and as a result of different norming criteria

the IQ scores of the black adopted children were lower, but the decrease in their scores (from 97 to 88) was similar to the drops of non-adopted white children (from 117 to 109) and other family members. Moreover, the correlations between the IQ scores of the adopted children and their adoptive parents did not decline over this time.

Exactly how genetics should be incorporated into research on SES and achievement is not obvious. Research indicates that the heritability of achievement varies substantially between children reared in low- and high-SES families, and is strongest in advantaged families (Guo & Stearns, 2002; Rowe, Jacobson, & Van den Oord, 1999; Turkheimer, Haley, Waldron, & Gottesman, 2003). For example, Turkheimer et al. (2003) found that the family (shared) environments of low-SES children accounted for about 60% of the variation in aptitude, whereas genetic factors accounted for almost none of the aptitude differences. For high-SES children, these fractions are almost exactly reversed. Thus, individual differences in higher-SES environments appear to be driven more by genetic processes, whereas individual differences in low SES environments appear to be more closely linked to environmental influences. This apparent differential heritability of cognitive ability in high- and low-SES environments complicates any simple-minded attempt to adjust for genetic bias to SES effects in estimating group differences.

### Can family socioeconomic resources explain racial achievement gaps?

Both theory and evidence suggest that the family socioeconomic environments in which children are reared may account for at least some of school-entry achievement gaps. This section summarizes results from a collection of what we refer to as accounting studies, which estimate the extent to which school-entry racial and ethnic achievement gaps are the result of SES differences across groups. These studies do so primarily by observing the extent to which the gap between young white and black children's test score performance is reduced when measures of family SES are included in regression analyses with few other controls (for a discussion of black–white high school achievement gaps see [Hedges & Nowell, 1998](#)).

As with our section on SES, we begin with a warning about the difficulty of establishing causal relationships: accounting studies assume that SES differences *cause* achievement differences. To the extent that this is not the case, estimates of how much of the achievement gaps are accounted for by SES or other unmeasured differences will overstate the impact of policies directed at eliminating the SES differences. On the other hand, poor measurement of SES resources or an incorrect specification of the functional form of these associations may lead research to understate the role of SES in explaining gaps.

#### *Explaining the gaps*

Fig. 4 shows representative results from two recent studies of black–white differences in test scores around the point of school entry. Math and reading results are presented from our own calculations using Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K) data and from [Yeung and Pfeiffer \(2005\)](#) using Panel Study of Income Dynamics Child Development Supplement (PSID-CDS) data. The first bars show the simple, unadjusted mean racial and ethnic differences. As we note in the introduction, black children score two-thirds of a standard deviation lower than whites in math and close to half a standard deviation lower in reading. The second set of bars indicates the size of racial gaps, holding constant family socioeconomic resources.

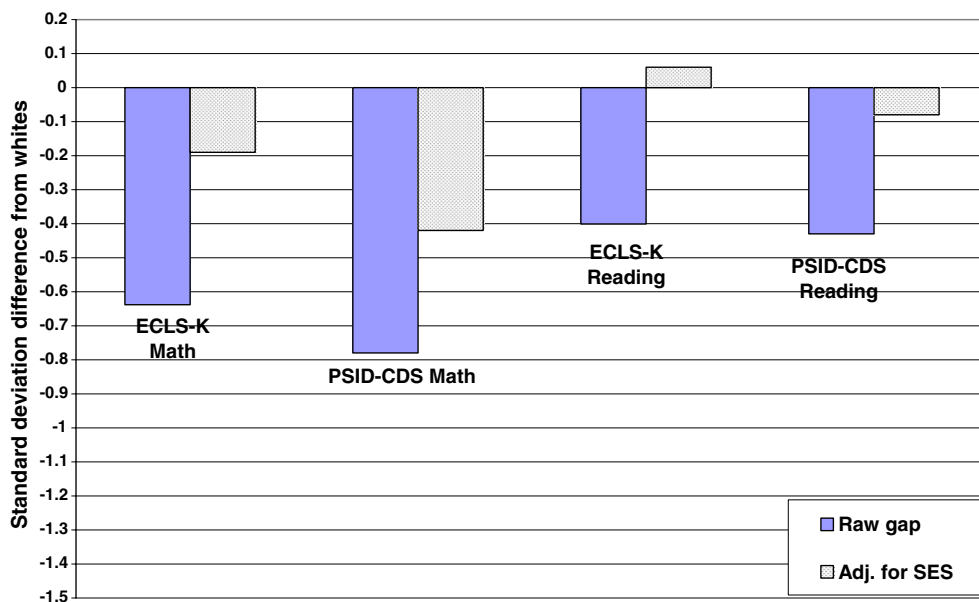


Fig. 4. Accounting for the black–white test score gap with SES, data from the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K) and the Panel Study of Income Dynamics Child Development Supplement (PSID-CDS).

How much of these racial gaps are due to differences in socioeconomic resources? Following Fryer and Levitt (2004), we adjusted for an SES composite, an indicator of whether the family is poor, age at entry into kindergarten, age of mother at the time of the birth, a basic measure of family structure (two parents no siblings, two parents and siblings, single parent no siblings, single parent with siblings) and whether the mother received benefits from the Women, Infants and Children (WIC) Nutrition program. This handful of SES-related measures accounts for nearly all (about .46 of a standard deviation) of the black–white difference in math and reading test scores. Fryer and Levitt’s analysis excludes the poverty and family structure indicators and includes the number of books in the house and the child’s birthweight. Given our resource-based definition, these two measures may not be appropriate as SES indicators since they may reflect parents’ preferences, values and health more than their social and economic resources. Nevertheless, their results are virtually identical to ours.

A set of analyses conducted by Yeung and Pfeiffer (2005) with data from the PSID-CDS closely parallel Fryer and Levitt’s (2004) methods. Yeung and Pfeiffer estimated the magnitude of black–white gaps on two subtests of the Woodcock Johnson Achievement Tests, one measuring children’s early reading skills and the other measuring early mathematical skills. They also considered the extent to which family SES explains these gaps. Of particular interest are the analyses conducted with preschool children (ages 3–5) which yielded racial gaps of a similar magnitude to those found by Fryer and Levitt (2005) (Fig. 4). Moreover, Yeung and Pfeiffer found that measures of the log of family income, parents’ educational attainment, occupational prestige and net wealth explained nearly the entire reading gap and about 0.36 of a standard deviation of the math gap.

The conclusion that SES differences explain nearly all of the racial and ethnic test score gaps is unusual in previous studies. For example, Fig. 5 summarizes results from a study of gaps in the picture/vocabulary scores (PPVT-R) of black and white 5- and 6-year-olds from the Children of the National Longitudinal Survey of Youth (CNLSY) (Phillips et al., 1998). Not only is the unadjusted gap much larger in the CNLSY than ECLS-K and PSID-CDS data—more than one standard deviation—but measures of family income and wealth accounts for only about 0.2 standard deviations of the gap (Phillips et al., 1998, Table 4–3, column 8). One possible source of difference in the CNLSY data is the way in which the household income variable is calculated in the National Longitudinal Survey of Youth (NLSY), the larger study of labor force participation and earnings in which the mothers participated. It involves adding several reports of different types of income together, which as Cole and Currie (1994) demonstrate introduces more opportunity for “measurement” errors as decisions are made about how to handle each source of income. Two conventions employed in NLSY are noteworthy: total household income does not include the earnings of youths’ non-married cohabiting partners and income is top coded at \$100,000. In addition, for youth residing with their parents, youths’ income was coded as the total household income when information on parental income was missing and the questions about parental income changed after 1986. Cole and Currie (1994) “cleaned” the total household income variable for the 1979 NLSY female sample, and found that they corrected the net household income variable for about 10% of the sample each year from 1980 to 1990. Certainly measures of household income in other studies also include some measurement error, although studies like the PSID devote considerably more resources to cleaning their income data, and do not employ the same coding conventions.

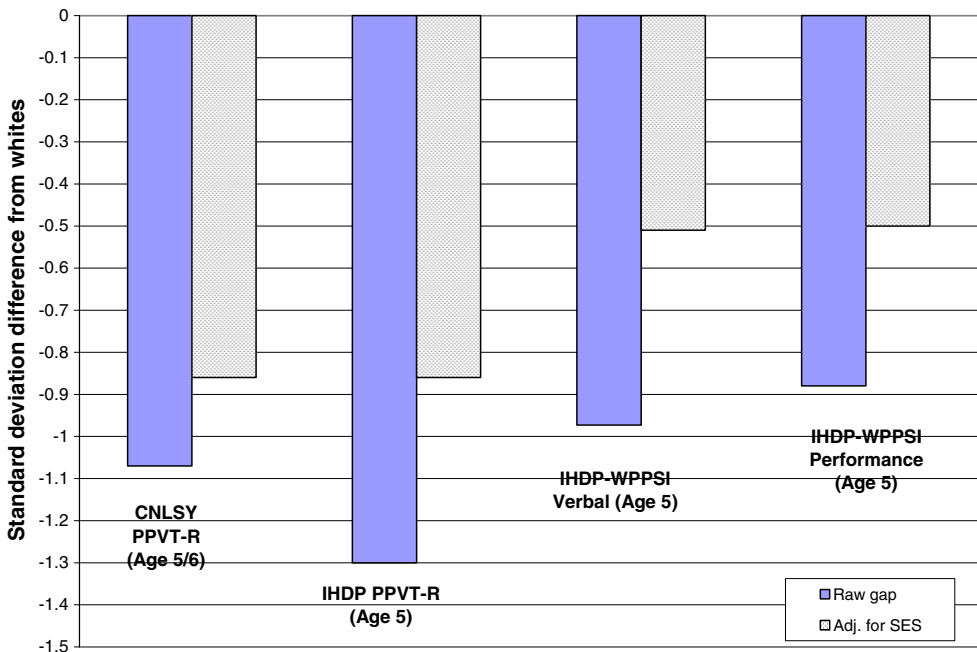


Fig. 5. Accounting for black–white test scores gaps with SES, data from the children of the National Longitudinal Survey of Youth (CNLSY) and the Infant Health and Development Program (IHDP).

It is also worth noting that alternative specifications of the CNLSY employed by Phillips and colleagues (1998) show that including just a few additional indicators of family SES, such as occupational prestige or parental education, does little to further explain the gap. However, a much larger set of family background measures that includes indicators of the mothers' school experiences and cooperation with the interviewer, explained a greater proportion of the gap (.47 of a standard deviation, Phillips et al., 1998, Table 4–5, Column 4).

Analyses conducted with data on 5-year-olds in the Infant Health and Development Program (IHDP) study are also presented in Fig. 5 (Brooks-Gunn et al., 2003). The IHDP study administered both the PPVT-R (the same measure used in the CNLSY) and two subscales of the Wechsler Preschool and Primary Scale of Intelligence (WPPSI)—verbal and performance (non-verbal thinking and problem solving). As with the CNLSY, the verbal test score gaps amount to about a full standard deviation. Nevertheless, about 0.45 of a standard deviation in the gaps for the verbal measure appears to be the result of the SES differences between white and black children, as measured by the families' 3-year average income-to-need ratio. The performance gap is slightly less than a standard deviation, but the same measure of family income appears to explain about 0.4 of a standard deviation of the gap.

Following Fryer and Levitt's (2004, 2005) methods, Murnane and colleagues (2006) conducted a set of analyses with data from the NICHD Study of Early Child Care. Although this study is not nationally representative, like the IHDP it follows a relatively large cohort of children over time, and like the PSID-CDS it assessed children's skills with subscales of the Woodcock Johnson. These data yield raw estimates of black–white skill gap of about one standard deviation for both reading and math. Using a nearly identical set of measures as used by Fryer and Levitt (2004), Murnane and colleagues (2006) found that about 0.5 of a standard deviation of the racial kindergarten achievement gaps was explained by SES.

Finally, both Fryer and Levitt (2005) and Yeung and Pfeiffer (2005) took advantage of the longitudinal nature of their data to consider whether the same set of SES measures explain the somewhat larger achievement gaps found among older children. Despite modest growth in the gaps over the early school years, Fryer and Levitt (2005) found that their small set of control variables explain about the same amount of the gap (0.5 of a standard deviation) in the spring of third grade as they did in the fall of kindergarten. Similarly, Yeung and Pfeiffer (2005) found that their SES measures explain roughly the same amount of the preschoolers' reading gap (ages 3–5) as the school-age children's gap (ages 8–10). However, SES appears to explain a slightly larger amount of the math gap when children were older (.47 vs. .37). Because the proportion of the racial achievement gap explained by SES resources was consistent over time, it is unlikely that the increase in gaps is due to family socio-economic differences.

Although the findings from studies provide divergent sizes of the estimated gaps, an interesting consistency is that a handful of SES indicators explain roughly the same absolute amount of the gap among young children. With one exception (CNLSY, Phillips et al., 1998), a rather small collection of SES-related measures (including parents' income, educational attainment and occupational prestige, plus age) appears to account for a difference of between .4 and .5 of a standard deviation in white–black reading and math test score gap, regardless of the assessments used or the populations studied. In cases where the raw gaps are about half a standard deviation, this implies that family background accounts for

nearly the entire gap. When the raw gaps are considerably larger, this implies that family background can account for only a portion of the gap.

### *Is it really SES?*

Simply documenting that SES accounts for about .4–.5 of standard deviation of the black–white test score gap does not prove that differences in SES have *caused* differences in children’s test scores. For example, although Fryer and Levitt (2004) are able to account for virtually all of the racial and ethnic gaps in kindergarten achievement using measures of family background, they lack any measure of genetic endowments and are thus unable to discount the possibility that what appear to be family socioeconomic effects are really caused by other family characteristics.

Phillips and colleagues (1998) approached the issue of genetic bias in two ways. First, they took advantage of the fact that the Children of the National Longitudinal Survey of Youth (CNLSY) assessed mothers’ academic aptitude using the comprehensive Armed Forces Qualifying Test. Although not a direct measure of genetic endowment, and not available for fathers, the scores can provide a rough gauge of the potential magnitude of biases in studies that lack such measures. Racial differences in mothers’ test scores accounted for about one-third of the test score gap, but a 0.75 standard deviation difference still remains. Family environment, which includes more than just indicators of SES, was still able to account for about half (0.38 of a standard deviation) of this remaining gap.

Second, Phillips et al. (1998) constructed a “cognitive genotype index” by combining the mother’s test score, class rank in high school, and the interviewer’s assessment of the mother’s understanding of the interview. They also constructed an SES index based on a host of education, income, occupation and other background factors. The simple correlation between children’s test scores and their SES index was 0.62. After accounting for the potential confound with the genotype index, this correlation was lowered to 0.46—a 26% reduction. A decrease of this magnitude is comparable to what is found in more specialized studies of such mother-child correlations between biological and adoptive families (Loehlin, Horn, & Willerman, 1989; Scarr & Weinberg, 1976). Although far from trivial, this reduction indicates that genetic factors are unlikely to account for the bulk of the association between SES and children’s achievement. Nevertheless, we remind readers that this approach to understanding the role of genetics is likely an oversimplification, given the evidence reviewed above regarding the lower levels of heritability and increased importance of environmental influences among low-SES families.

### **Can trends in family socioeconomic resources account for the convergence of racial test scores?**

Another way of investigating the role of SES is to assess whether racial trends in SES account for trends in the racial test score gaps. If income and schooling have causal impacts on achievement, then we would expect to see that a narrowing of the income and schooling gaps between blacks and white would produce corresponding reductions in child achievement gaps. So if we consider, for example, the narrowing of the gap between 1970 and 1985 and its fluctuations thereafter, then data indicating that blacks and whites became more alike in terms of incomes, parental schooling and family structures up to but not after 1985 would be consistent with the idea that family SES is a telling determinant of the gap.

Historically, black (and Hispanic) families faced racism, discrimination, and segregation, which limited their educational, economic, and occupational attainment. By the 1960s, the civil rights movement had set in motion societal changes that opened opportunity structures and improved the SES standing of ethnic and racial minority populations. Since the 1970s, black families have experienced larger gains than white families. For example, the poverty rate for black children has dropped over 9 percentage points since 1980, from 42 to 33%, whereas white children's poverty rates have shown little overall decline. Likewise, since 1979 the share of mothers with a high school diploma has increased more among blacks than whites (37 vs. 13%).

However, not all trends in indicators of SES over the past 20 years favor black families. Since 1979, increases in the percentage of mothers with college degrees were larger for white children compared with black children (17 vs. 11%). Though the rates of single-parent families differ dramatically across white and black families, the trends in these rates over time have been similar. Changes since the 1990s suggest that some trends have favored blacks and others whites. Consequently, it is unclear how much of the convergence in young children's school readiness scores should be attributed to changes in SES.

Analyses that have attempted to account for the sources of convergence have nearly always focused on older children, primarily because time-series data with reliable measures of achievement and family background are not available for young children. Nevertheless, two studies suggest that between 15 and 25% of the convergence of scores before the 1990s may be due to improvements in children's parental backgrounds, such as increases in mothers' educational attainment (Cook & Evans, 1998; Grissmer et al., 1998).

### Summary and policy discussion

On average, black students begin school with far worse academic skills than whites, and the gap seems to grow during the school years. The very different family incomes, parental schooling, and family structures of black and white students are surely the cause of at least some of the initial academic gap. Most accounting studies find that SES differences explain a little less than half of a standard deviation in the school-entry achievement gaps. Time-series studies find that trends in SES can account for about one quarter of the racial trends in high school achievement. Because the accounting studies are unable to adjust for a full set of genetic and other confounding causes of achievement, and may also lack exact measurement or proper functional form, their estimates of the role of family SES are likely to be imprecise.

To the extent that differences in the socioeconomic backgrounds of young white and black children play a causal role in creating achievement gaps, what implications does this have for policy? The answer to this question is far from clear, because wise policy decisions require an understanding of both causal mechanisms *and* cost-effective interventions that produce desired changes.

To illustrate, suppose that we believed that boosting maternal schooling by one year causes children's kindergarten achievement scores to increase by one quarter of a standard deviation. With the achievement gap between whites and blacks at one half to three quarters of a standard deviation, a policy that could increase maternal schooling for all black mothers by an average of one or two years, without also changing the schooling of white mothers, would go a long way toward eliminating the achievement gaps.

A first issue is whether it is useful to even frame policy questions in terms of *relative achievement gaps* rather than *absolute achievement levels*. Interventions can be designed to improve black (and/or white) children's relative skills and absolute levels of academic skills at differing points in the skill distribution. However, it is not immediately obvious which is more detrimental to blacks and to society in general—lower levels of achievement among black children or lower achievement of black as compared with white children. Although both may be detrimental, the policies and programs that reduce black–white achievement gaps may differ from those that improve absolute levels of achievement among all children (Ceci & Papierno, 2005). For example, if boosting low levels of achievement is of greater concern, then a program that generated higher achievement among all low-achieving children, regardless of race, would be successful. In contrast, if reducing racial gaps is a higher priority, then policies and programs must improve black children's skills but hold constant, or reduce, white children's skills. This would likely be achieved only by policies that targeted successful interventions to black children, which may be politically infeasible.

While we recognize that achievement gaps between blacks and whites *per se* may be detrimental, we suggest that low levels of skill achievement are likely to be more harmful for blacks, regardless of their standing relative to whites. Low absolute levels of academic skills not only limit an individual's life chances, but also may take a toll on our nation's prospects for economic growth, which depend on a highly skilled workforce (Heckman & Krueger, 2003). Consequently, we believe that boosting the absolute level of low-achieving students' skills should be the top policy priority, with perhaps less emphasis placed on addressing achievement gaps.

### *Maternal schooling*

With respect to maternal schooling, it is critical to identify policies to improve mothers' educational attainment. With large gaps in parental education levels between racial and ethnic groups, interventions that increase rates of high school completion may have a large payoff for future generations. The historical record of the past 40 years clearly shows large improvements in the completed schooling of black parents. But there is little agreement on why schooling has increased and, most importantly, how policy might promote future increases in schooling.

Unfortunately, few of the various academic programs developed to increase high school graduation among at-risk adolescents have proved effective. A recent review of 16 random-assignment evaluations of dropout-prevention programs found only one of them to show clear benefits (Dynarski, 2001). On the other hand, rigorous evaluations of a small number of intensive teen mentoring programs have produced more promising results (Dubois, Holloway, Valentine, & Cooper, 2002; Roth & Brooks-Gunn, 1998). But the successes of even these intensive programs are not guaranteed, particularly when they are implemented on a large scale.

Studies of low-income populations routinely report that even without any programmatic intervention, close to 50 percent of disadvantaged mothers return to school after having children (Furstenberg, Brooks-Gunn, & Morgan, 1987; Love et al., 2002; McGroder et al., 2000). Yet even with high rates of continued schooling, educational attainment among economically disadvantaged parents remains much lower than among advantaged families. Thus, another intervention approach is to promote educational activities among parents. For example, programs targeting teen mothers may provide supports and

incentives to stay in school after the birth of a child, or welfare programs may make cash benefits contingent on mothers' participation in education and training. Have such programs worked? Evaluations suggest that to date, these types of interventions have not been successful in boosting mothers' educational activities above the relatively high level of participation of control group mothers (McGroder et al., 2000; Quint, Bos, & Polit, 1997).

The high enrollment of disadvantaged mothers suggests a more promising approach to promoting parental education: offsetting the costs of education, particularly higher education, and increasing access to adult educational opportunities. Indeed, public spending on higher education, including more generous financial aid and the expansion of community colleges, has been consistently linked to increases in college attainment and enrollment (Dynarski, 2002; Seftor & Turner, 2002; Turner & Bound, 2003; but see also Heckman & Krueger, 2003). Still another approach to promoting schooling is to increase the age at which children may leave school or begin employment. Changes in these policies over the past century have had a modest positive effect on youths' educational attainment (Acemoglu & Angrist, 1999; Oreopoulos, Page, & Stevens, 2003).

### *Family income*

There is a large gap in family income between white children and black children. What policies might help to close these gaps? One strategy, embodied in several of the welfare reform programs described above, is to promote parents' attachment to the labor market and reduce low-income families' use of welfare benefits. But even the most generous welfare reform programs were able to boost average family incomes by only one or two thousand dollars per year. Other types of employment interventions, such as low-cost job search programs, have produced relatively small absolute earnings gains for women—a few hundred dollars over the course of a year or two (Heckman, LaLonde, & Smith, 1999). More intensive, training-based employment programs have produced proportionately bigger earnings gains for women—a few thousand dollars over several years—but none produced the kinds of long-term income increases that would begin to narrow the income or poverty gap between white and ethnic and racial minority families. Results of employment interventions for disadvantaged adult men are even less encouraging. Across all types of programs, only about one-third of the interventions produced increases in either employment or earnings, and no particular type of program emerged as a cure-all (Heckman et al., 1999).

An alternative approach to increasing family incomes and reducing poverty is to supplement the incomes of low-income working families through such policies as the Earned Income Tax Credit (EITC). A refundable federal tax credit for low-income working families with children, the EITC was expanded during the 1990s, and is now the largest cash transfer program for low-income families. In 2003, the maximum EITC benefit for a family with two children was about \$4,200, and nearly 19 million families received the credit (US House Committee on Ways & Means, 2004). In 1997 the program lifted about 2.2 million children out of poverty (Council for Economic Advisors, 1998). Some evidence suggests that the income increases occasioned by recent expansions in EITC benefits may have boosted children's achievement (Dahl & Lochner, 2005).

Moreover, an encouraging result from the research literature is the apparently selective nature of income impacts, with poverty mattering more in the preschool period than later in childhood. This suggests the wisdom of child-focused redistributive efforts using, say, tax

credits, European-style child allowances or future increases in the EITC in which benefits are restricted to families with preschool children. The political feasibility of such programs is enhanced by the fact that by covering only a fraction of children, they are considerably cheaper than programs that cover all children.

### *Family structure*

We know very little about the potential of interventions to promote stable two-parent families and marriage among disadvantaged populations (Dion et al., 2002). The current round of federal marriage promotion programs will have to be remarkably successful in order to make much of a dent in the huge family structure differential between blacks and whites. Furthermore, it appears that for children's achievement to benefit substantially from marriage, there must also be an increase in family resources such as income. Whether higher rates of marriage will necessarily improve other aspects of socioeconomic circumstances is unclear (Sigle-Rushton & McLanahan, 2003). First, many unmarried couples are already cohabiting, so marriage may not improve families' economic circumstances. Second, it is unclear whether marriage will result in longer lasting and more prosperous relationships. We hope that evaluations of marriage programs will yield information on the feasibility of increasing marriage rates, as well as whether doing so will improve children's well-being.

One way to reduce the rate of teen childbearing is to reduce adolescents' sexual activity and increase contraceptive use. A review of experimental and quasi-experimental evaluations of teen pregnancy prevention programs suggests that, more often than not, programs designed to prevent youths' sexual behavior fail to reduce the frequency or delay the onset of sexual behavior (Kirby, 2001). Of 28 programs focused on abstinence, sexual education, and HIV prevention, only 10 delayed the age of sexual initiation. Furthermore, only 19 programs measured the frequency of youths' sexual activity, and of these programs 13 had no meaningful effects on the outcomes of interest. In addition, the programs were rather unsuccessful at increasing teenagers' use of contraception. Only four of the eleven sexuality program evaluations that measured teenagers' use of contraception found positive program impacts. However, a handful of more intensive interventions that provided mentoring and constructive after-school activities have been more successful (Coley & Chase-Lansdale, 1998; Kane & Sawhill, 2003). We do not know, however, if the success of these programs can be replicated on a larger scale. As is the case for dropout prevention programs, it seems that successful pregnancy prevention programs are possible, but they require an intensive effort, and additional research is necessary to identify characteristics associated with program success (Coley & Chase-Lansdale, 1998).

### **Directions for future research**

We close with several recommendations for new directions in research. First, our review of racial and ethnic test-score gaps focused primarily on black–white gaps, because only very few studies have considered Hispanic–white gaps. The proportion of children of Hispanic origin is growing steadily (Hernandez, 2005), and as evident in the Early Childhood Longitudinal Survey-Kindergarten Cohort (ECLS-K) data presented in the introduction, they too enter school with fewer academic skills than white children. As with other racial and ethnic groups, Hispanic populations are quite heterogeneous, and reflect different

experiences in the United States. Moreover, the average level of Hispanic families' socio-economic resources is quite low, raising the possibility that SES differences may explain much of the Hispanic–white achievement gaps.

Because many Hispanic children have parents who are immigrants, an examination of the role of SES in these gaps is particularly complex (Fuligni & Yoshikawa, 2003). The assessment of Spanish-speaking children's reading and language achievement may be compromised by their limited English language proficiency. In addition, some SES resources may not be comparable in immigrant and native-born families. For example, the content and structure of education in other countries may not readily correspond to the US educational system (Fuligni & Yoshikawa, 2003). Perhaps the most important problem is that data on Hispanic children's achievement are relatively scarce. Few of the older large-scale longitudinal studies include a representative sample of Hispanic children, because these studies began before the most recent wave of Hispanic immigration occurred. The ELCS-K is one exception, and Fryer and Levitt (2004) find that a handful of family background measures, including SES, account for most of the Hispanic-white reading and math gaps at school entry. Because of the need to better understand disparities in academic achievement, it is crucial that researchers grapple with these methodological challenges and further explore the ways in which family SES influences Hispanic–white achievement gaps.

Second, nearly all of the research on racial gaps has focused specifically on children's academic achievement. Yet, other dimensions of children's school readiness may also be of consequence for school success. Children's social skills, problem behavior, school engagement, and attention may be correlated with their learning and later school achievement (Hinshaw, 1992; Ladd, Birch, & Buhs, 1999; McClelland, Morrison, & Holmes, 2000). As noted earlier, data from the ECLS-K suggest that gaps in teacher ratings of young children's classroom behavior are smaller than gaps in their achievement. However, estimating differences in social skills and behavior may be more complicated than assessing children's relative academic skills, as valid and reliable measurement of children's behavior may be difficult to accomplish in large-scale survey studies (Konold, Walthall, & Pianta, 2004). A recent review of gaps in school readiness found very few studies of black–white gaps in children's behavior (Rock & Stenner, 2005). Consequently, we recommend that future studies explore how SES may influence racial disparities in behavioral and social dimensions of school readiness.

Two studies reviewed here indicate that black–white achievement gaps grow during the early school years. Fryer and Levitt's (2005) analysis of the ECLS-K rules out some obvious explanations for the growth in the gap, but does not identify likely causes. For example, they find that less than a third of the growth in the gaps is due to differences in school or class quality (see also Murnane et al., 2006; Phillips et al., 1998; Todd & Wolpin, 2005). Many hypotheses about what may be causing this growth remain to be examined, and we highlight two particularly promising possibilities—teachers' differential treatment of and expectations for black and white students as well as the emergence of stereotype threat (Steele & Aronson, 1995; Weinstein, Gregory, & Strambler, 2004). Ferguson's (1998) review concluded that teacher's lower expectations for black students are likely to account for a portion of the gap, and it seems possible that this influence may become increasingly important during the early school years (see also Farkas, 2003). McKown and Weinstein (2003) found that children's awareness of cultural stereotypes increases during middle childhood, and that this elevated awareness was linked to the underperformance of minority children on challenging tests. These findings provide some evidence that children may

experience stereotype threat—anxiety resulting from a fear of confirming cultural stereotypes. Further research into these two areas may provide more insight into the growth in racial achievement gaps.

A related topic that deserves more research is whether testing competence and performance differs for white children and black children. As noted earlier, it is well known that testing conditions influence an individual's performance on achievement tests. Because most assessments of young children's skills are conducted by one-on-one interview, this has led to some speculation that children's comfort and experience with interviewers of a different racial background may influence their performance (Kim, Baydar, & Greek, 2003). Unfortunately, this possibility has not been widely explored, either because large studies have not made information on interviewers' race available or because the interviewer was of the same race as the child. One exception is the Children of the National Longitudinal Survey of Youth (CNLSY), in which 75% of black children were assessed by white interviewers. Using these data, Kim and colleagues (2003) found that matching child and interviewer race had some positive effects on black's children tests scores overall, but a significantly larger influence on older children (ages 8–9). Whether this is due to an increased level of comfort with the interviewer or some other factor is unclear. Yet their findings suggest that additional research is needed to better understand how the gap between performance and competence may differ for black and white children, and how it may change over time.

Although resiliency research has identified several factors that may protect children from the negative effects of low-SES resources (Kim-Cohen et al., 2004; Luthar & Zigler, 1991; McLoyd, 1998), nearly all studies have assumed that the influence of SES is unidirectional and have neglected the active role that children play in their own development. Consequently, possibly fruitful avenues for future research include examining the development of children's awareness of their own and others' socioeconomic resources, the individual and ecological factors influencing their understanding of economic hardship, and how individual differences in perceptions and understanding of socio-economic resources, in turn, affect development. Given the economic inequality in our culture and the salience of social comparison processes among children, it is remarkable that so little research has been conducted on this topic (Crosby & Mistry, 2003).

Our understanding of how SES affects children may also be furthered if research is informed by dynamic systems theory. For example, more careful attention to the nature of associations among components of SES is needed. Studies have indicated that changes in family income and maternal education have independent effects on children's achievement, but the cumulative and interactive effects of SES components are not well understood. For example, do effects of income differ for children with more or less educated parents? Do the effects of mothers' education differ depending on family structure or fathers' educational attainment? Moreover, little attention is given to the correct functional form for the effects of income, education, and occupation. Linear effects are often assumed in developmental research, despite increasing evidence that the effects of both parents' education and income are non-linear, with increments in parents' education and income yielding less benefit for more advantaged children. Furthermore, household income, family structure, and even parental education are not static over the life course, nor are their effects on children. Thus, studies should continue to explore how the effects of SES resources differ by their timing, duration, and persistence in children's lives.

Finally, we close by underscoring that policy approaches to redressing school achievement gaps should focus more on boosting achievement among all low-skilled children than on reducing gaps between different groups. Given the intervention record, this probably means assigning only a modest role to the current range of programs designed to increase parents' socioeconomic resources, many of which have not proved to be effective. At the same time, we need a better understanding of the kinds of policies that have boosted the socioeconomic resources in the past as well as evaluations of new program and policy initiatives in order to identify more successful avenues of intervention. There are a wide range of interventions for children, including policies and programs that directly target children's aptitudes and mental and physical health, as well as some that intervene to change parenting behavior. Going beyond SES interventions, child and parenting interventions may prove to be the most cost-effective ways of addressing disparities in achievement.

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