I. Introduction

Starting with the Coleman Report more than forty years ago, numerous studies have examined racial and socioeconomic differences in academic achievement test scores, as well as the relative power that school and home factors have in explaining these inequalities. The Coleman report found large differences in academic achievement between blacks and whites and between the rich and poor at every grade level, and discovered that these differences widened as children advanced through their education (Coleman et al. 1966). In the forty-five years since the Coleman Report, researchers are still producing scholarship examining the racial achievement gap. Studies have looked at explanations for the achievement gap at many different ages and grade levels using cross sectional data (e.g. Jencks and Phillips 1998 and Duncan and Brooks-Gunn 1997). Some studies even look at achievement gap at the outset of school, in order to assess family influences on academic achievement in isolation of schooling (see Lee and Burkam 2002). However, few studies use longitudinal data to explain the second finding from Coleman: that the gaps widen as children advance through their education. Understanding how and why the achievement gap changes while children are attending school is important for those concerned about educational inequality in the United States.

Children come to school not as blank slates, but as developing minds that have been influenced by their home environments, parents and other family members, and communities. Therefore, it is unsurprising that disadvantaged home environments would be highly correlated with low achievement if one takes a cross sectional approach. However, once children enroll in school, they are also influenced by their school environment, teachers, and peers. It is during this period that schools are responsible for facilitating learning, above and beyond what children already know. While the influence of home and family continue to act upon them in their school years, children spend a significant amount of time in their school environments and schools are explicitly tasked with facilitating learning, while families are not. The extent to which schools facilitate learning across different environments requires a focus not on cross-sectional gaps, but on the change in achievement differences over time.

There are two theoretically convincing reasons for this phenomenon, but as of yet, we do not know which perspective has the most support. The growth in the gap may be due to cumulative disadvantage. The influence of family situation may act in such a way as those who are deprived in early childhood may learn at a slower pace, their disadvantages compounding as they are exposed over time to poor home environments. A related idea is that because of the nature of schooling, those who fall behind early in their academic careers may never catch up. Therefore, children who begin kindergarten with less knowledge and fewer skills may never gain those skills, and therefore can not advance their learning.

A second perspective conjectures that the growth in the gap is due to the differing school environments of children from different socioeconomic and racial backgrounds. Teaching may be worse at schools attended by disadvantaged students, expectations and curriculum may be of a lower level, or school resources may differ across schools attended by different types of students. This perspective allows for the fact that children come to school with different levels of preparedness, but that schools may actually exacerbate gaps, instead of serving as the great equalizer[1]

[1] Another important possible explanation for the growth in the achievement gap is the influence of summer breaks on learning. Studies have found that the achievement gap based on social class grows during the summer months, when school is not in session, and recedes during the school year (Alexander, Entwisle and Olson, 2007). However, the black/white gap increases during the school year in kindergarten and first grade, but not during the summer in

This paper analyzes the extent to which these two perspectives can explain the growth in the racial and socioeconomic gap between kindergarten and 3rd grade. This question has been examined by a few scholars, and this paper will build on their work by expanding beyond the black/white gap to examine both Hispanic and Asian children in comparison to whites and by controlling for achievement at the start of school (fall of a child's kindergarten year). The achievement gap does not just affect black children, and as other minority communities, such as Hispanics, expand to make a greater share of school age children, understanding the Hispanic-white achievement gap has become increasingly important. Further, controlling for achievement at kindergarten allows me to examine the growth in the achievement gap after the influence of school begins, and to understand whether and how schools influence the expanding achievement gap, net of family environment. While many studies examine the achievement gap at a single point in time, the longitudinal nature of the ECLS-K dataset allows for examination of the growth in the achievement gap. Using test scores from two points in time allows this study to address change in racial and socioeconomic disparities over time, an often neglected topic in the sociology of education.

II. Background

A sizable literature concerning socioeconomic and racial test score gaps has accumulated since the 1960s. Researchers have discovered that low-income children perform more poorly on achievement tests at the outset of school than their high-income peers, and that low-income children lose ground on these tests relative to their peers over time (Alexander et al. 2007; Downey, von Hippel, and Broh 2004; Entwisle and Alexander 1992; Entwisle and Alexander 1994). Low-income children start first grade approximately one instructional year behind their middle-class peers. By twelfth grade, the average low-income student will have academic skills equal to those of a high-income student in eighth grade (Farkas 1996; Farkas 2000; Jencks and Phillips 1998). Therefore, over the school years, the achievement gap quadruples from one to four years difference between the most and least advantaged. Jencks and Phillips estimate that at least half of the 12th grade gap in test scores could be eliminated by closing the 1st grade gap (Jencks and Phillips 1998). The same pattern is found for gaps between racial minorities and whites. Using the National Assessment of Educational Progress (NAEP) for 2000, Phillips and Chin found that black eighth graders were significantly farther behind whites than when they were as fourth graders. Hispanic children, who now comprise a larger share of minority children than blacks, are also behind academically, but the Hispanic-white gap is slightly smaller and appears to change little over time (Phillips and Chin 2004). Though it appears that the Hispanic-white gap is smaller than the black-white gap, it is important to note that the Hispanic-white gap has been steady in recent decades (Clotfelter, Ladd, and Vigdor 2009). Some studies suggest that Asian-Americans outscore whites, especially at higher grades (Clotfelter, Ladd, and Vigdor 2009), while others suggest that Asian-American children lose their advantage as their exposure to school continues (Fryer and Levitt 2004).

Two questions emerge from these established research findings 1) why do socioeconomically disadvantaged children and minority children start school achieving at lower levels than children from more affluent families and white children? and 2) why do the gaps between children in these groups expand over time? The first question has gotten the most attention, and, as such, the reasons for these achievement differences are well understood.

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between (Downey, von Hippel, and Broh 2004). Therefore, summer gaps are not a convincing explanation for the black/white gap. In any case, we can not consider the influence of summer gaps because the ECLS-K did not carry out fall and spring assessments after 1st grade.

However, explanations for the growth are less well understood. Two viewpoints have emerged which attempt to explain this phenomenon. The first perspective points to differences in school quality. According to this argument, children from low-income backgrounds attend inferior schools at higher rates than affluent children, and therefore learn less during each successive year of school. Further, they suggest that children from minority backgrounds may be attending schools which are worse than those attended by their white peers of the same socioeconomic standing. Studies of residential segregation find that blacks live in worse neighborhoods than whites with the same levels of income and education (Massey and Denton 1993; Charles 2003), and, since school enrollment is often determined through residence, perhaps even advantaged black and other minority children may be attending worse schools than similar whites. Indeed, children in non-poor black families are more likely than even children in poor white families to live in impoverished neighborhoods where at least 20% of households live below the poverty line (Phillips, Brooks-Gunn, Duncan, Klebanov, and Crane 1998).

The second perspective points to differences in the home environment of schoolchildren as the mechanism leading to the expanding gap in achievement between rich and poor children, and minority and white children over childhood. Researchers use a developmental perspective, emphasizing the importance of school transition points as critical periods for determining later educational outcomes. For example, how well children adjust to schooling in the early grades, may influence them for the remainder of their schooling because of teachers' and schools' use of such stratification devices as placement in special education and retention, or ability grouping, which places children on distinct educational trajectories (Entwisle et al. 1997). Insomuch as low-income or minority children find navigating educational transitions more difficult due to their family influences prior to school, the gaps seen at later stages may be traced back to home environment factors. Farkas (2000) explains the widening gap by pointing to curricular shifts from basic to more advanced skills as children transition from elementary to secondary education; if children have not mastered basic skills by a certain age, they will probably never learn those skills, leading them to fall further behind over time.

III. Data and Measures

Data

The Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K) is a nationally representative sample of more than 20,000 American children who entered kindergarten in 1998. The ECLS-K is ideal for the current study because it is the most recent and representative sample of children in schools, it begins data collection during the start of formal schooling at kindergarten entry, and allows for longitudinal analysis of change over time. The ECLS-K draws from approximately 1,000 schools, with an average of 20 students in each sampled school. Data collected includes information from parents, teachers, and school administrators, as well as direct cognitive assessments of sampled children.

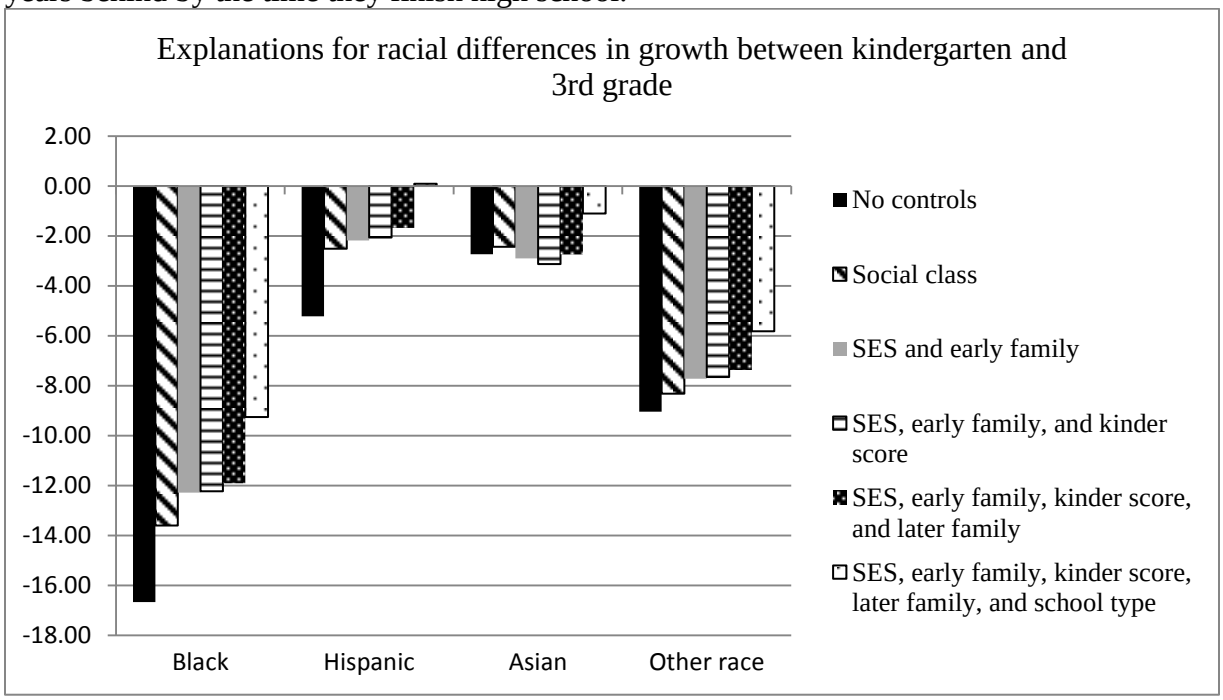
In order to carry out longitudinal analysis of changes in test scores, the overall ECLS-K sample must be restricted to those children who have test scores at each point in time. Specifically, I limit my sample to those cases that have both a kindergarten score for reading and math, and a 3rd grade score for both reading and math. I also restrict the sample to those children who were attending the same school in kindergarten and 3rd grade. Since I will be using variables that are specific to the school environment, I made the decision to keep the school environment constant. However, analyses without this restriction lead to the same conclusions.

Measures

I conceptual four distinct sets of indicators which should influence kindergarten through 3rd grade growth. First are ascriptive variables, namely race, SES, and gender. These are largely unchangeable and highly influential. Next is the early home environment. To measure the early home environment, I use such measures as family structure, mother working outside the home, and parents' involvement in reading to their child. However, children's home life is not necessarily constant, so I also look at the influence of more proximate home life indicators. These include later family structure and reading behavior, attending a school conference, and attending a school event. Finally, I include school level indicators. I focus on segregation across schools using the indicators percent minority and private versus public school. To preserve space, I do not report descriptive statistics here.

IV. Results

Table 1 displays regression coefficients for a varying intercept model predicting kindergarten through 3rd grade growth scores in reading.[2] Additionally, Figure 1 shows the results graphically. Racial gaps in reading growth are substantially reduced when social class is taken into account, as prior research has indicated. However, family variables, both measured before or during a child's schooling are not highly associated with the growth in the reading achievement gap. Instead, simple indicators of school segregation and school type, added in the final model in Table 1 explain a significant portion of the growth in the gap. In fact, the growth in the Hispanic/white and Asian/white gap that is not explained by social class is completely explained by differences in school environments. The black/white gap is also explained somewhat by schools, reducing the gap by about the same margin as when social class was included. Even after controlling for socioeconomic status and specific family influences, schools still have a hand in the divergent trajectories of racial groups. Historically disadvantaged minorities, such as blacks and Hispanics fall behind their white peers during the first four years of school due to attending different schools, and if the pattern in this analysis holds, may be years behind by the time they finish high school.



[2] The same analyses have been done with math scores, but for the sake of space are not reported.

Table 1: Varying intercept regression predicting growth score between kindergarten and 3rd grade

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Black	-16.67 ***	-13.61 ***	-12.29 ***	-12.24 ***	-11.92 ***	-9.26 ***
Hispanic	-5.23 ***	-2.52 **	-2.19 **	-2.07 **	-1.69 *	0.08
Asian	-2.74 *	-2.44 *	-2.90 *	-3.13 **	-2.75 *	-1.11
Other race	-9.04 ***	-8.32 ***	-7.73 ***	-7.66 ***	-7.38 ***	-5.83 ***
Reference is white						
Male	-3.52 ***	-3.40 ***	-3.36 ***	-3.25 ***	-3.20 ***	-3.19 ***
Reference is female						
First SES quintile		-17.23 ***	-14.13 ***	-13.50 ***	-13.36 ***	-12.84 ***
Second SES quintile		-11.55 ***	-9.38 ***	-8.91 ***	-8.91 ***	-8.60 ***
Third SES quintile		-7.59 ***	-6.05 ***	-5.67 ***	-5.84 ***	-5.60 ***
Fourth SES quintile		-5.03 ***	-4.17 ***	-3.90 ***	-4.10 ***	-4.05 ***
Reference is fifth (highest) SES quintile						
One parent family (kindergarten)			-1.40 *	-1.31	-0.86	-0.59
Other family arrangement (kindergarten)			0.07	-0.02	1.58	1.91
Reference is two parent family						
Mother did not work between birth and kindergarten			-0.57	-0.59	-0.47	-0.36
Mother work status not applicable			-0.85	-0.87	-0.80	-0.81
Reference is mother working between birth and kindergarten						
Non-English language spoken at home			0.89	1.00	0.74	1.50
Reference is Engilsh spoken at home						
Parents never read to children (kindergarten)			-9.60 **	-9.62 **	-11.31 ***	-11.13 ***
Parents read once or twice a week (kindergarten)			-1.92 **	-1.74 *	-2.67 ***	-2.62 ***
Parents read 3-6 times a week (kindergarten)			-0.84	-0.72	-1.27 *	-1.28 *
Reference is reading every day						
Mother's age at first birth			0.32 ***	0.30 ***	0.30 ***	0.29 ***
Lives with biological mother			1.79	1.77	1.99	2.34
Reference is living with non-biological mother						
Kindergarten score				0.09 ***	0.07 **	0.06 *
One parent family (3rd grade)					-0.56	-0.49
Other family arrangement (3rd grade)					-1.86	-1.41
Reference is two parent family						
Parents never read to children (3rd grade)					6.11 ***	6.00 ***
Parents read less than once a week (3rd grade)					2.11 **	1.98 **
Parents read 1-2 times a week (3rd grade)					-0.14	-0.19
Reference is reading every day						
Parent attended a teacher conference (3rd grade)					-1.20	-1.34
Reference is not attending a teacher conference						
Parent attended a school event (3rd grade)					2.37 **	2.17 **
Reference is not attending a school event						
Greater than 10% to less than 25% minority						0.74
Greater than 25% to less than 50% minority						-1.96 *
Greater than 50% to less than 75% minority						-2.04
Greater than 75% minority						-6.19 ***
Reference is less than 10% minority						
Public school						-0.88
Reference is private school						
Constant	98.66 ***	105.12 ***	95.08 ***	91.75 ***	89.86 ***	91.58 ***
Variance of the constant	54.84	31.25	28.67	28.09	27.64	25.10
Residual variance	435.94	425.26	422.44	422.05	415.78	414.65
BIC (averaged across the 5 data sets)	80527	80128	80133	80127	80057	80048