Are Schools the Great (Noncognitive Skills) Equalizer?

Thesis

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By

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Abstract

Noncognitive skills such as self-control, organization, and attentiveness substantially shape educational and later life outcomes. However, scholars debating the role of schools in reproducing the stratification system have largely ignored noncognitive skills. I examine the effect of schooling on the noncognitive skills of a nationally representative sample of kindergartners using data from the *Early Childhood Longitudinal Study – Kindergarten Cohort of 1998-99*. Using an innovative methodological approach, partial seasonal comparisons, I find evidence that gaps in non-cognitive skills between low- and high-socioeconomic students develop when school is not in session and are unchanged when school is in session. These results suggest that non-school factors generate gaps in noncognitive skills along socioeconomic status and that schooling halts that process. These patterns are consistent with the compensation perspective, which considers schools to be an equalizing social institution rather than one that stratifies students based on their social origins.
Acknowledgments

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Introduction

Scholars continue to debate the role schools play in reproducing inequality across generations. Reproductionist scholars believe that schools promote inequality across social groups through a variety of within- and between-schools mechanisms, including discrimination against lower socioeconomic students and unequal funding allocation across schools (Condron and Roscigno 2003; Roscigno 1998; DiMaggio 1982). Reproductionists hold that differences in school experiences lead to academic outcomes that favor middle- and upper-class students, thereby reproducing inequalities across generations. Other scholars maintain that schools are compensatory institutions that actually reduce inequality among students from different social strata (Heyns 1978; Entwisle and Alexander 1992; Downey, von Hippel, and Broh 2004). They believe that non-school factors, such as differences in family socioeconomic status, early learning experiences, and neighborhood stability, contribute the most to unequal school outcomes, and schools, if anything, reduce the level of inequality we would observe in their absence.

Scholars engaged in this debate focus on cognitive (i.e., academic) outcomes, especially standardized achievement test scores. While cognitive skill development is clearly an important school outcome, schools likely teach children more than reading and math. School experiences can also promote children’s noncognitive skills (i.e., non-
academic skills), such as organization, persistence at difficult tasks, self-control, and skills for getting along with peers (Battistich et al. 1989; Jennings and DiPrete 2010; Roeser, Eccles, and Sameroff 2000). Such noncognitive skills enable individuals to manage their emotions and actions, and they play an important role in academic and labor market outcomes. Recent research shows that noncognitive skills are positively associated with grades (Jennings and DiPrete 2010) and improved labor market attachment (Heckman, Stixrud, and Urzua 2006).

Given the role of noncognitive skills in shaping life outcomes, it is important to explain how schools influence these skills across social groups. My study moves the debate about the stratifying effects of schools beyond test scores toward another critical educational outcome. By understanding the influence of schools on noncognitive skills, we gain a more complete perspective on the role schools play in reproducing inequality.

To assess whether schools promote inequality of noncognitive skills by favoring development of socioeconomically advantaged over disadvantaged children, I analyze a large nationally representative sample of kindergarteners using OLS regression and a “partial seasonal” comparison design. The data allow me to estimate gaps in noncognitive skills: (1) at the beginning of kindergarten, before schooling begins, and (2) at the end of kindergarten, thereby allowing me to estimate how the gap changed when school was in session. Using this unique strategy, I assess whether the reproductionist perspective or the compensation perspective best explains patterns of noncognitive skills.
Conceptual Framework

Cognitive Skills Inequality Through Schools

Reproductionists posit that schools reproduce inequality over time through a variety of mechanisms. Reproductionists argue that funding differences between schools favor high SES students (Biddle and Berliner 2003). Such funding disparities can create dramatically different learning environments for students (Condron and Roscigno 2003). School spending on facilities affects schools’ physical conditions and is positively associated with student attendance and academic achievement (Condron and Roscigno 2003; Kozol 1991). Schools with more financial resources also have better educated and more experienced teachers, which are associated with better student outcomes (Greenwald, Hedges, and Laine 1996). Finally, schools with fewer resources are less able to provide smaller class sizes, specialized teachers, and flexible learning environment (Bowles and Gintis 1976). As a result, high SES students attend schools that offer them more opportunities to gain the skills which will enable them be successful as they proceed through the educational system.

In addition to these between school differences, reproductionists argue that discriminatory treatment of lower-class students within schools contributes to cognitive skills inequality. Teachers may have lower expectations of low SES students (Alvidrez

1 For an opposing view, see Hanushek, 1989.
and Weinstein 1999; Aurwarter and Aruguete 2008), resulting in lower math and reading outcomes (Ferguson 1998; Jussim and Eccles 1992; Roscigno 1998). Teachers may also assign young students with lower-class social markers, such as old clothing or unsophisticated language patterns, to lower ability groups (Rist 1970). Therefore, children who look and act socially disadvantaged are actually given less challenging material and less teacher support to excel academically (Oakes 1985). Finally, teachers may reward students who, through their speech or mannerisms, signal affiliation with elite groups, thus adding to the disadvantage of lower-class students (Bourdieu and Passeron 1977; DiMaggio 1982; Lamont and Lareau 1988). Through these discriminatory processes, reproductionists posit, students from privileged backgrounds are given better opportunities to succeed in school.

*Schools as Cognitive Skills Equalizers*

While ample evidence suggests that schools reproduce or exacerbate academic inequalities across social groups, many scholars challenge that claim. Coleman et al. (1966) concluded that differences between schools were not powerful predictors of student achievement. They found that school characteristics, including facilities and teacher attributes, explained only about 8 percent of variation in the verbal ability in the 9th graders; however models that also included student background characteristics explained 38 percent of variation. Jencks et al. (1972) reanalyze Coleman’s data and similarly conclude “…the character of a school’s output depends largely on a single input, namely the characteristics of entering children. Everything else … is either secondary or completely irrelevant (p 256).” Both analyses raise doubts that schools are
the primary culprit of academic inequalities. In fact, they find that non-school factors play the predominant role.

Recent research using seasonal comparison analysis boldly claims that schools might even be equalizing, or compensatory, institutions (Heyns 1978; Entwisle and Alexander 1992; Downey et al. 2004; Alexander, Entwisle, and Olson 2007). With this technique, the school year approximates a natural experiment with treatment and control periods (Heyns 1978). When school is in session, student learning is affected by both school and non-school influences. However, when school is not in session, non-school factors, such as the availability of stimulating activities, predominately shape learning. By comparing the educational “seasons,” scholars have a powerful tool for understanding how school and non-school factors shape academic outcomes.

Seasonal comparison scholars consistently find that academic skill inequalities develop largely during the non-school periods of students’ lives. Low SES students benefit more from school exposure than high SES students (Entwisle and Alexander 1992; Ready 2010), but poor students learn far less during the summer than non-poor students (Entwisle and Alexander 1992). Importantly, SES differences in the academic skills of high school students can be explained almost entirely by (1) summer learning differences and (2) skill differences that are present at the beginning of the first grade (Alexander et al. 2007). These findings suggest that non-school factors profoundly influence cognitive skills inequality between low- and high-SES students; and that between- and within-school mechanisms are not driving academic inequalities.
Downey and colleagues (2004) further challenge the reproductionist position by replicating prior seasonal comparison studies using a nationally representative sample of kindergarten and first graders. Their research shows that low SES students lose skills during the summer while high SES students gain skills – thus the skills gap grows when school is out. While students are in school, however, all students gain skills at higher rates than they did during the summer, and learning rate inequality declines across SES groups. Their research supports the position that schools play a compensatory role by reducing learning rate inequality compared to learning rate inequality in the non-school environment.

In sum, prior research raises doubts about reproductionist claims. Seasonal comparison research makes a formidable case that non-school factors are key contributors to cognitive skills inequality and that cognitive skill inequality would be much worse if not for schooling. It is challenging to reconcile the evidence that schools are unequally funded and treat students differently based on social characteristics with these compensatory patterns. One explanation is that inequalities in the school environment are likely to be far less pronounced than inequalities in the non-school environment (Downey et al. 2004). Low SES students may, in fact, be treated unfairly in school, but low SES students likely experience greater deprivation (relative to what they confront at school) in their non-schools environments. School experiences, therefore, might be more unique and stimulating to low SES than to high SES students compared to their non-school experiences.
Seasonal comparison scholars, however, have not explored how schools affect noncognitive skills. It seems unlikely that schools would serve as equalizing forces for cognitive skills learning while simultaneously promoting noncognitive skills inequality across SES groups. Unfortunately, existing research does not tell us much about how schools shape noncognitive skill development for different social groups, therefore this pattern is unclear.

*The Importance of Noncognitive Skills*

Noncognitive skills impact adult life outcomes in important ways. Early life noncognitive skills shape short term and long term educational achievement, perhaps because these skills shape children’s educational trajectories. Students with high noncognitive skills are likely to be attentive to instruction and to engage in learning opportunities within and outside of school more diligently (Jennings and DiPrete 2010). Thus, noncognitive skills affect the academic performance of children by facilitating more beneficial in-school and out-of-school learning behaviors.

Research shows that noncognitive skills affect academic outcomes. Jennings and DiPrete (2010) and Duncan et al. (2007) find that noncognitive skills among young children are positively associated with later math and reading achievement. Moreover, problem behaviors, such as being disruptive in class, at young ages (6-8 years) are negatively associated with high school completion and college enrollment, even after controlling for gender and SES (McLeod and Kaiser 2004). Among middle-school students, self-discipline significantly predicts grade point average (GPA) even after controlling for previous grades, prior test scores, and measured IQ (Duckworth and
Seligman 2005). Noncognitive skills remain important in high school, as teacher ratings of high school student work habits and disruptiveness affect both objective measures of student achievement - standardized test scores – and subjective measures of achievement – assigned grades (Farkas et al., 1990). Finally, Jacob (2002) shows that the female noncognitive skills advantages explain a large portion of the gender gap in college enrollment.

Noncognitive skills clearly shape academic achievement, but they also independently influence labor market outcomes. These skills, such as attitude and motivation, affect occupational attainment independent of cognitive test scores and years of schooling (Bowles and Gintis 2002). Student sociability and motivation in high school are positively associated with young adult earnings, even after controlling for achievement test scores and educational attainment (Lleras 2008). And, better noncognitive skills are related to lower job turnover rates, higher labor force participation rates, and increased wages (Heckman and Rubenstein 2001; Heckman et al. 2006).

Success in life requires more than just cognitive skills. Labor market success is significantly shaped by the noncognitive skills that people possess as adults, regardless of their levels of cognitive skills or educational credentials. As a critical determinant of life outcomes, one must ask how schools shape development of noncognitive skills and whether they shape those skills differently for different groups.

*Schools and Noncognitive Skills*

How do schools influence gaps in noncognitive skills across socioeconomic status? While some scholars have explored this issue theoretically, none have offered
sufficient evidence to address this issue convincingly. Bowles and Gintis (1976) claim that schools mold the noncognitive skills of students in an effort to make them suitable workers for the capitalist economy. They argue that schools teach and reward behaviors that correspond with students’ expected future positions in the labor market. Children from working class families, therefore, are exposed to an emphasis on obedience and rote memorization while children from upper class families have school experiences that emphasize creativity and independence (Bowles and Gintis 1976, 2002). While Bowles and Gintis offer a reasonable theoretical argument, they do not provide strong empirical evidence that schools are the primary locus of noncognitive skill development or that schools promote noncognitive skill growth unequally. Thus it is important to determine if schools are an important context of noncognitive skills development and whether they promote these skills unequally across social groups.

If noncognitive skills are learned at school, then it is important to know whether schools help disadvantaged students gain noncognitive skills at the same rate as advantaged students. Following the reproductionist argument, one would expect that the school environment would promote more noncognitive skill growth for advantaged children than for their disadvantaged counterparts.

Why might schools exacerbate inequality in noncognitive skills? One reason is that the kinds of schools serving advantaged children have more resources and may provide environments (e.g., smaller classes, better teachers, superior physical space) that are more conducive to the development of noncognitive skills. Also, teachers come predominantly from the middle class, so they may find the noncognitive behaviors of low
SES children frustrating and might therefore be less willing to nurture their skills. This cultural mismatch could result in a teacher-student relationship characterized by strain and conflict (Alexander, Entwisle, and Thompson 1987). Therefore, reproductionists would predict that the inequality in noncognitive skills between advantaged and disadvantaged students should grow faster during the school period than during the non-school period. This pattern is depicted in Figure 1.

![Graph showing noncognitive skills growth](image)

The reproductionist perspective suggests that (1) there are modest skill differences between groups at the beginning of school and (2) gaps in skills grow over time as a result of different school experiences.

Figure 1: Predicted Pattern of Noncognitive Skills Growth – Reproductionist Perspective

Alternatively, schools may equalize noncognitive skill growth in the same way that they equalize cognitive skill growth. There are several reasons to expect this pattern. First, it would be surprising to find that schools reduce inequality in one crucial way
(cognitive skills), yet increase inequality in another important way (noncognitive skills). If the explanation for why schools equalize cognitive skills – that inequality in schools is much smaller than inequality in the non-school environment – is accurate, then we would expect school exposure to also improve the noncognitive skills of the disadvantaged more than the advantaged. Second, lower socioeconomic students may receive less guidance from home regarding the kinds of noncognitive skills they need to succeed in the classroom. Once at school, however, they may respond favorably to teachers’ efforts to promote better classroom citizenship. Finally, teachers are likely to recognize that low SES students begin school with lower skills, on average, and they might actually give low SES students more personal attention than high achieving students in order boost their skills an acceptable level.

Figure 2 presents the patterns of noncognitive skills that would be predicted by the compensation perspective. High SES children start school with greater noncognitive skills than low SES children as a result of their non-school advantages and their higher rates of skills growth in the non-school period. While in school, however, the compensation perspective would predict that low SES and high SES students gain noncognitive skills at the same rate; therefore the gap in noncognitive skills is stable during the school year. These equal growth rates are depicted by parallel dashed lines in the “With School Exposure” model.

If students did not attend school, then noncognitive skills gaps would likely continue to diverge at roughly the same rate as they did prior to the start of school. The gap in noncognitive skills grows wider over time as a result of inequalities in the non-
school environment. This pattern is depicted in the “Without School Exposure” model in Figure 2.

![Diagram](image)

This figure explores changes in noncognitive skills with and without school exposure. The left panel depicts (1) that children from diverse backgrounds gain noncognitive skills at different rates prior to school which results in a skill gap at the beginning of school, and (2) they gain skills at equal rates during the school year. The right panel depicts a world in which children are not exposed to school. Gaps in noncognitive skills expand over time due to highly unequal non-school environments.

**Figure 2: Predicted Noncognitive Skills Growth With and Without Schools - Compensation Perspective.**

According to the compensation perspective, if students were not exposed to school, inequalities among children from different social groups would likely be much greater. Schools do not equalize absolute skill achievement. The skills of low SES students trail those of high SES students regardless of school exposure. Schools do not necessarily overcome non-school inequalities to narrow the gaps between SES groups.
The compensation prediction is that schools produce learning rates more equal than those observed when school is not in session; therefore they are an “equalizing” institution.

To summarize, evidence consistent with the reproductionist perspective would include: (1) a small gap in noncognitive skills at the beginning of kindergarten across socioeconomic groups, and (2) a much larger gap in noncognitive skills across socioeconomic groups at the end of kindergarten. In contrast, the compensation perspective would predict (1) a large gap at the beginning of school that results from differences in the non-school environment, and (2) the socioeconomic gap in noncognitive skills grows less quickly when school is in session than when school is not in session.

I test two hypotheses to determine whether the reproductionist or compensation perspective better explains the effect of schools on noncognitive skills. In accordance with prior research on early childhood (Brooks-Gunn and Duncan 1997; Duncan, Brooks-Gunn, and Klebanov 1994; Kahn, Wilson, and Wise 2005), I hypothesize that low SES students will have lower noncognitive skills than high SES students at the beginning of kindergarten’s start.

Given that schools equalize learning rates of cognitive skills and that kindergarten is intended to promote both cognitive and noncognitive development of students, I hypothesize that high and low SES students will gain noncognitive skills at the same rate during the school year.

I address these hypotheses by looking at noncognitive development of kindergarten students using a nationally representative data set and a partial seasonal
comparison research design. In this approach, I compare the noncognitive skills of high 
SES and low SES kindergarteners at the beginning of kindergarten as well as their 
noncognitive skills growth rates to understand how schools and non-school environments 
affect noncognitive skill development.
Data and Measures

I use data from the *Early Childhood Longitudinal Study – Kindergarten Class* (ECLS-K). The ECLS-K is a nationally representative sample of approximately 21,400 in children from over 1,000 schools who entered kindergarten in the 1998-1999 academic year. The ECLS-K includes an array of data on school and classroom characteristics, student school performance, and student background characteristics (such as child’s race and gender, parental marital status, and family socioeconomic status). The ECLS-K provides the best available data to test my hypotheses because it offers noncognitive skill data at the beginning of formal schooling and an additional time point within the academic year. These data points allow me to estimate the effect of non-school factors on the socioeconomic gap in noncognitive skills before schooling matters, and to observe the way school shapes that initial gap.

I exclude 560 students who attend schools with year-round academic calendars because I am using a partial seasonal approach and year-round school calendars are not appropriate for this technique. In addition, noncognitive scale scores are based on teacher evaluations of student noncognitive ability rather than standardized measures, such as a standardized math test. I therefore exclude 1,280 students who are rated by different teachers in the fall and spring to ensure that changes in noncognitive skill
evaluations are not influenced by changes in evaluators.\(^2\) After excluding these cases, my analytic sample is 19,550\(^3\) public and private school students.\(^4\)

To address missing data\(^5\), I use multiple imputation (Rubin 1987). I employ STATA’s “ICE” function to impute five versions of the data. I use STATA’s “MICOMBINE” function to analyze the data.\(^6\) I include all cases in my sample to impute missing data, including cases with missing data on the dependent variable (Allison 2002). However, I omit cases with missing dependent variable information from my analyses. This approach, multiple imputation, then deletion (MID) improves imputation estimates (von Hippel 2007).

**Dependent Variables**

To gauge students’ noncognitive skills, I use four scales constructed by the ECLS-K. Kindergarten teachers rated students on a variety of noncognitive skills and behaviors in the fall and spring of the kindergarten year to produce noncognitive skill scales including: *Approaches to Learning*, *Self-Control*, *Interpersonal Skills*, and *Externalizing Behavior*. Each scale includes four to six relevant skill areas. For each scale item, teachers rate students as exhibiting the characteristic on a 1 to 4 scale, with 1=Never and 4=Almost Always. The *Externalizing Behavior* scale assesses how frequently a child behaves in undesirable ways, such as fighting or arguing. I reverse

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\(^2\) Supplemental analyses show that these results do not substantively vary if I include children who move and the children who do not move in the sample.

\(^3\) All sample sizes are rounded to the nearest 10 students per NCES requirements.

\(^4\) My sample includes both public and private school students, however my supplemental analyses show that results do not substantively vary if I use only public school students.

\(^5\) I deleted implausible school calendar and assessment dates and later imputed them. Implausible dates include assessment dates that occurred prior to the start of school and assessments that occurred well after then end of the academic year.

\(^6\) Supplemental analyses show that the OLS regression results do not substantially change when I use list-wise deletion on unimputed data.
code this scale with 1=Almost Always and 4=Never, so that I can interpret positive coefficients as better noncognitive skills for all scales.

Each scale measures a unique noncognitive skill set that can affect academic achievement and life outcomes. The *Approaches to Learning* scale (alpha = .89) evaluates student skills that directly relate to learning. Teachers rate students on skills such as task persistence and eagerness to learn. The *Self-Control* scale (alpha= .79) assesses students’ ability to control their temper and respect others’ property and ideas. The *Interpersonal Skills* (alpha = .89) scale evaluates students’ sensitivity and ability to form friendships. Teachers rate students on skills such as sensitivity and their ability to get along with students who are different from them. Finally, the *Externalizing Behavior* (alpha = .90) scale focuses on poor classroom behavior. Teachers rate how often students were disruptive, arguing, and acting impulsively.

For some of my analyses, the monthly rate of change of each noncognitive skills scale is my dependent variable of interest. For these analyses, I subtract each student’s fall assessment score from their spring assessment score on each noncognitive skill scale to get their total change in noncognitive skills. I divide each student’s change by the number of months between assessments.\(^7\) This yields a rate of change in noncognitive skills during kindergarten for each noncognitive skills scale.

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\(^7\) This includes fractions of months.
<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Description</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach To Learning (Fall)</td>
<td>Teacher rating of child (1) attentiveness (2) task persistence (3) eagerness to learn (4) learning independence (5) flexibility and (6) organization</td>
<td>1 = Low to 4 = High</td>
</tr>
<tr>
<td>Approach To Learning (Spring)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self Control (Fall)</td>
<td>Teacher rating of child (1) respecting property right of others (2) controlling temper (3) accepting peer ideas for group activities and (4) responding appropriately to pressure from peers</td>
<td>1 = Low to 4 = High</td>
</tr>
<tr>
<td>Self Control (Spring)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpersonal Skills (Fall)</td>
<td>Teacher ratings of child (1) Forming and maintaining friendships (2) getting along with people who are different (3) comforting or helping other children (4) expressing feelings, ideas, and opinions in a positive way (5) showing sensitivity to the feeling</td>
<td>1 = Low to 4 = High</td>
</tr>
<tr>
<td>Interpersonal Skills (Spring)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Externalizing Behavior (Fall)</td>
<td>Teacher ratings of the frequency that the child (1) argued (2) fought (3) got angry (4) acted impulsively and (5) disrupted ongoing activities</td>
<td>1 = Low to 4 = High</td>
</tr>
<tr>
<td>Externalizing Behavior (Spring)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Dependent Variable Descriptions

**Independent Variables**

I include several independent variables to account for student characteristics and school exposure. I use the ECLS-K’s pre-constructed SES variable – which takes into account parental education, parental occupation, and household income – to create five SES quintile dummy variables. The bottom SES quintile is the reference category in my regression analyses. I include a dummy variable to control for gender (female=1), and five dummy coded variables to control for student race: White, Black, Latino, Asian, and
Other/More than one.\textsuperscript{8} White is the reference category. I include parent marital status (1=child has married parents) and the number of siblings the child has at the beginning of kindergarten to account for family structure. I also control for the child’s age (in months) at time of the fall assessment and the child’s fall reading score.

Finally, I use four school exposure measures. I include a dummy controlling for kindergarten repeater status (repeater is the reference category) and a measure of the number of absences the student had during kindergarten. I include an initial school exposure variable, which controls for the number of calendar days between the beginning of school and the fall assessment. I also include a control for school exposure between the fall and spring assessments, given that the number of days between assessments varies across schools in the sample.

\textsuperscript{8} Some students in my sample had missing race (N=70) and gender (N=10) data. Those students were coded as having “Missing Race” or “Missing Gender” and included in all models. Coefficients for missing race and missing gender were nonsignificant in all models.
Analytic Strategy

Ideally, I would use seasonal data that allowed me to compare the growth in noncognitive skills by SES when children are in school and out, but these data do not exist. Because the best available data do not allow me to generate an accurate estimate of summer noncognitive skills growth rates, I cannot parse the effects of school and non-school factors on noncognitive skills growth. This prevents me from making a true seasonal comparison. However, I am able to perform analyses that are methodologically superior to much of the current educational research and provide important insight into the how schools affect inequality in noncognitive skills across social groups.

My solution is to employ a partial seasonal research design. First, I estimate socioeconomic rates of noncognitive skill growth when school is in session during kindergarten. I do this by regressing monthly noncognitive skills growth rates on gender, SES quintile, race, age, and family structure, as well as school exposure controls, such as number of absences during kindergarten. From these models, I can see if noncognitive skills growth rates significantly vary across socioeconomic groups.

Of course, noncognitive skill scales lack the statistical properties of cognitive skill scales, which are carefully calibrated to avoid ceiling effects. One concern about these results (seen in Table 3) is that they may underestimate the noncognitive skill growth
among high SES children because they started with better average noncognitive skills and would have less room to improve. This potential problem arises from the fact that the noncognitive skill scales employed in these analyses have a maximum score (or ceiling) of four. Since scales of noncognitive skills lack the psychometric properties to handle the demands of this longitudinal model, I address this problem by limiting the analytic sample to students who scored 3.001 or below during the fall assessment and re-estimating the model (seen in Table 4). This sample adjustment strategy retains students with ample room to gain skills (more than one standard deviation unit), and it preserves a reasonably large sample. I focus on Table 4’s results below, and I will note important inconsistencies between the two analytic approaches when necessary.

I would ideally compare growth rate patterns during the school year to those observed when school is not in session. However, I lack multiple measures of noncognitive skills when school is out, therefore I cannot estimate growth rates during non-school periods. I can, however, determine noncognitive skill gaps at the beginning of kindergarten. Skill levels at kindergarten onset primarily represent the influence of non-school factors. Therefore, the initial gap at the beginning of kindergarten provides important information about whether the non-school environment promotes gaps in noncognitive skills across SES groups.

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9 In analyses not shown, I used alternative cut-off-points to create a sample that included students who scored 3.5 or below (yielding the largest adjusted sample) and a sample that included students who scored 2.5 or below (yielding the smallest adjusted sample). Each of these modeling strategies produced substantively similar results for SES, and I would change my conclusions based on alternative strategies.

10 The sample reduction strategy employed preserves 50 to 58 percent of the of the original samples for the four dependent variables.
It is important to note here, that I limit “schooling” and “school exposure” to the universally available, mandatory schooling that is publicly funded. Children also receive schooling or training that is dependent on parents’ efforts and resources, such as after school tutoring, and prior to kindergarten children might attend private pre-schools. My focus is on how inequality changes once schooling is publicly available – schooling that is independent of parental effort.

As a result, I interpret the initial gap in noncognitive skills at the beginning of kindergarten to be primarily a function of non-school factors. This assumption may be inaccurate to the extent that some children have schooling opportunities available to them that are independent of their parents’ efforts, such as publicly funded programs pre-kindergarten programs like Head Start. In my sample, 10.2 percent of the children attended Head Start as their primary form of non-parental care prior to kindergarten. In supplementary analyses, I explore the extent to which these early school opportunities affect observed gaps in noncognitive skills at the beginning of kindergarten.11

With that caveat in mind, I interpret a large gap in noncognitive skills across SES groups at the beginning of kindergarten as evidence that non-school factors play an important role in shaping the socioeconomic patterns of noncognitive skills growth. With a sizable initial gap, I would need to observe that schooling increases the gap substantially to find support for the reproductionist perspective. On the other hand, if the initial kindergarten gap in noncognitive skills between socioeconomic groups is small, then non-school factors play only a minor role in shaping noncognitive skills growth. If

11 These data do not provide detailed information about other publicly funded preschools; therefore I only include Head Start in my supplementary analyses.
this pattern were observed, then even a small expansion of the noncognitive skills gap during the school period would represent support for the reproductionist position.

While the partial seasonal approach has limitations, it offers important advantages over the techniques that are frequently employed by education researchers. First, scholars typically struggle to separate with confidence the effects of school and non-school factors on the dependent variable. This approach allows me to isolate the effects of the non-school environment by looking at skill gaps at the beginning of schooling; therefore I can understand how the non-school environment affects learning.

Second, reproductionist research designs often focus on the covariance of independent and dependent variables. Unfortunately, any statistically significant variable, such as teacher-student ratio, teacher experience, or prior achievement might simply be highly correlated with the true but unobserved causal variables (Downey, von Hippel, and Hughes 2008). By using a seasonal comparison approach that looks at changes between fall and spring, all unobserved, unchanging differences of students, school characteristics, and non-school characteristics are controlled. Therefore, time-invariant variables for which I do not statistically control are, nevertheless, removed as potential causes of differences in outcomes (Liker, Augustyniak, and Duncan, 1985).

Of course, knowing the initial gap in noncognitive skills across socioeconomic groups at the beginning of kindergarten does not tell us how quickly that gap was forming prior to school. It may have formed entirely during the first two year of life and then not at all prior to kindergarten. Or it may have formed only during the year immediately prior to kindergarten. There is no way to know for sure so I consider my
results based on several different assumptions about how quickly noncognitive skills gaps were growing prior to kindergarten.
Results

*Does the non-school environment promote SES gaps in noncognitive skills?*

There is a sizable gap in noncognitive skills between the bottom and top socioeconomic quintiles at the beginning of kindergarten, indicating that the gap expands when school is not in session.

<table>
<thead>
<tr>
<th>Noncognitive Skill Scale</th>
<th>Top SES Quintile</th>
<th>Bottom SES Quintile</th>
<th>Top Quintile - Bottom Quintile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
</tr>
<tr>
<td><strong>Approaches to Learning</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall Average</td>
<td>3.167</td>
<td>.618</td>
<td>2.754</td>
</tr>
<tr>
<td>Spring Average</td>
<td>3.283</td>
<td>.610</td>
<td>2.853</td>
</tr>
<tr>
<td><strong>Self-Control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall Average</td>
<td>3.194</td>
<td>.581</td>
<td>2.954</td>
</tr>
<tr>
<td>Spring Average</td>
<td>3.283</td>
<td>.590</td>
<td>3.020</td>
</tr>
<tr>
<td><strong>Interpersonal Skills</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall Average</td>
<td>3.116</td>
<td>.601</td>
<td>2.812</td>
</tr>
<tr>
<td>Spring Average</td>
<td>3.254</td>
<td>.608</td>
<td>2.933</td>
</tr>
<tr>
<td><strong>Externalizing Behavior</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall Average</td>
<td>2.542</td>
<td>1.111</td>
<td>2.490</td>
</tr>
<tr>
<td>Spring Average</td>
<td>2.509</td>
<td>1.088</td>
<td>2.480</td>
</tr>
</tbody>
</table>

*p<.05 **p<.01 ***p<.001

Table 2: Fall and Spring Noncognitive Skill Scale Ratings Among Top and Bottom SES Quintile Kindergarten Students
Table 2 shows that low SES students have significantly lower noncognitive skills at the beginning of kindergarten in each of the noncognitive skill areas. The difference between low SES and high SES students at the beginning of kindergarten is greatest in the *Approaches to Learning* scale, .413 units (p<.001), or nearly two-thirds of a standard deviation. The socioeconomic gap is smallest for *Externalizing Behavior*, at .052 (p<.05) or about 5 percent of a standard deviation. Descriptive statistics for all variables are available in Appendix A.

**How do Schools Affect Noncognitive Skills Inequality Across SES Groups?**

Once school is in session, low- and high-socioeconomic children’s divergent paths halt – both gain non-cognitive skills at the same rate. The comparisons of fall to spring noncognitive scores in Table 2 indicate that low- and high-SES students mature during the kindergarten year - gaining noncognitive skills in *Approaches to Learning*, *Self-Control*, and *Interpersonal Skills*, while they lose skills in *Externalizing Behavior*. This growth, however, appears to be similar for low and high SES students. High SES students continue to have significantly better noncognitive skills than low SES students at the end of kindergarten in three of the four scales; however gaps in skills barely change. The socioeconomic gaps in *Approaches to Learning*, *Interpersonal Skills*, and *Self-Control* increase by roughly .02 units, while the socioeconomic gap in *Externalizing Behavior* decreases and becomes insignificant.

---

12 In supplemental analyses, I find that in models accounting for exposure to school prior to kindergarten, notably Head Start, SES gaps in initial noncognitive skills are reduced by between 5 and 10 percent. Importantly, Head Start is a program that serves low SES children almost exclusively. Therefore this finding suggests that the SES gap at the beginning of school might have been even wider if low SES children did not have access to Head Start services.
Tables 3 and 4 present results from multivariate OLS regression analyses. The coefficients in these tables represent monthly rates of divergence across socioeconomic status, controlling for a wide range of additional factors including: age of assessment, number of absences, first time kindergartener status, and the number of calendar days between the beginning of school and the fall skills assessment. In Table 3 note that the coefficients for SES quintiles are nonsignificant for all dependent variables, indicating that low- and high-SES groups gained noncognitive skills at the same rate during kindergarten.

Socioeconomic status is not a significant predictor of noncognitive skills growth rates during kindergarten. The coefficients for the highest SES quintile in all four scales are nonsignificant (and often negative in Table 4). Even after removing students near the noncognitive scale ceiling, low SES and high SES students still appear to gain approximately equal noncognitive skills during kindergarten. These patterns support my second hypothesis that low and high SES students gain noncognitive skills at the same rate during the school year.
<table>
<thead>
<tr>
<th></th>
<th>Approaches to learning</th>
<th>Self Control</th>
<th>Interpersonal Skills</th>
<th>Externalizing Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b (s.e.)</td>
<td>b (s.e.)</td>
<td>b (s.e.)</td>
<td>b (s.e.)</td>
</tr>
<tr>
<td>2nd SES Quintile,   d</td>
<td>.0013 (.0022)</td>
<td>.0009 (.0023)</td>
<td>.0000 (.0024)</td>
<td>.0005 (.0052)</td>
</tr>
<tr>
<td>3rd SES Quintile</td>
<td>.0008 (.0022)</td>
<td>-.0010 (.0023)</td>
<td>-.0012 (.0024)</td>
<td>.0045 (.0055)</td>
</tr>
<tr>
<td>4th SES Quintile</td>
<td>.0019 (.0023)</td>
<td>.0017 (.0024)</td>
<td>.0012 (.0025)</td>
<td>-.0061 (.0057)</td>
</tr>
<tr>
<td>5th SES Quintile</td>
<td>.0005 (.0025)</td>
<td>.0015 (.0026)</td>
<td>.0010 (.0026)</td>
<td>-.0007 (.0063)</td>
</tr>
<tr>
<td>Female, c</td>
<td>.0024 (.0013)</td>
<td>.0007 (.0014)</td>
<td>.0012 (.0014)</td>
<td>-.0076 * (.0032)</td>
</tr>
<tr>
<td>Black, e</td>
<td>-.0019 (.0020)</td>
<td>-.0033 (.0021)</td>
<td>-.0042 * (.0021)</td>
<td>.0035 (.0049)</td>
</tr>
<tr>
<td>Latino</td>
<td>.0031 (.0019)</td>
<td>-.0001 (.0020)</td>
<td>-.0008 (.0020)</td>
<td>-.0008 (.0046)</td>
</tr>
<tr>
<td>Asian</td>
<td>.0095 * (.0040)</td>
<td>.0073 (.0041)</td>
<td>.0069 (.0042)</td>
<td>-.0045 (.0096)</td>
</tr>
<tr>
<td>Other Race</td>
<td>.0049 (.0032)</td>
<td>.0001 (.0033)</td>
<td>.0000 (.0034)</td>
<td>.0098 (.0079)</td>
</tr>
<tr>
<td>Fall Reading Score</td>
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<td>.0000 (.0001)</td>
<td>.0000 (.0001)</td>
<td>-.0002 (.0002)</td>
</tr>
<tr>
<td>Number of Siblings</td>
<td>.0009 (.0006)</td>
<td>.0007 (.0007)</td>
<td>.0007 (.0007)</td>
<td>-.0002 (.0015)</td>
</tr>
<tr>
<td>Married Parents, f</td>
<td>.0038 * (.0016)</td>
<td>.0040 * (.0016)</td>
<td>.0047 ** (.0016)</td>
<td>-.0001 (.0038)</td>
</tr>
<tr>
<td>Intercept</td>
<td>.0365 (.0365)</td>
<td>.0172 (.0172)</td>
<td>.0187 (.0187)</td>
<td>.0487 (.0487)</td>
</tr>
</tbody>
</table>

N 16,620 15,990 15,760 15,280

*p<.05  **p<.01  ***p<.001

a Monthly noncognitive skill growth rates are calculated by subtracting the fall assessment score (T1) from the spring assessment score (T2) and dividing that difference by the number of months between assessments.
b Analyses control for age at fall assessment, number of absences in kindergarten, first time kindergartener status, and number of days in school before fall assessment.
c Male is the reference category  d Lowest SES quintile is the reference category
e White is the reference Race  f Unmarried Parents are the reference category

table 3: ols regression of monthly noncognitive skill growth rates, across ses groups
<table>
<thead>
<tr>
<th></th>
<th>Approaches to Learning</th>
<th>Self Control</th>
<th>Interpersonal Skills</th>
<th>Externalizing Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b (s.e.)</td>
<td>b (s.e.)</td>
<td>b (s.e.)</td>
<td>b (s.e.)</td>
</tr>
<tr>
<td>2nd SES Quintile&lt;sub&gt;e&lt;/sub&gt;</td>
<td>.0004 (.0027)</td>
<td>-.0001 (.0030)</td>
<td>.0018 (.0029)</td>
<td>.0021 (.0033)</td>
</tr>
<tr>
<td>3rd SES Quintile</td>
<td>-.0011 (.0032)</td>
<td>-.0034 (.0033)</td>
<td>-.0011 (.0030)</td>
<td>.0033 (.0055)</td>
</tr>
<tr>
<td>4th SES Quintile</td>
<td>-.0010 (.0032)</td>
<td>.0031 (.0033)</td>
<td>.0016 (.0032)</td>
<td>-.0016 (.0057)</td>
</tr>
<tr>
<td>5th SES Quintile</td>
<td>-.0006 (.0034)</td>
<td>-.0018 (.0037)</td>
<td>-.0022 (.0034)</td>
<td>-.0036 (.0063)</td>
</tr>
<tr>
<td>Female&lt;sub&gt;d&lt;/sub&gt;</td>
<td>.0131 (.0018) ***</td>
<td>.0081 (.0019) ***</td>
<td>.0057 (.0018) **</td>
<td>.0136 (.0032) ***</td>
</tr>
<tr>
<td>Black&lt;sub&gt;f&lt;/sub&gt;</td>
<td>-.0052 (.0026) *</td>
<td>-.0151 (.0027) ***</td>
<td>-.0117 (.0026) **</td>
<td>-.0079 (.0047)</td>
</tr>
<tr>
<td>Latino</td>
<td>.0059 (.0025) *</td>
<td>-.0038 (.0027)</td>
<td>-.0028 (.0026)</td>
<td>-.0004 (.0047)</td>
</tr>
<tr>
<td>Asian</td>
<td>.0181 (.0059) **</td>
<td>.0070 (.0062)</td>
<td>.0016 (.0055)</td>
<td>.0197 (.0104)</td>
</tr>
<tr>
<td>Other Race</td>
<td>.0020 (.0043)</td>
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<td>-.0054 (.0043)</td>
<td>-.0042 (.0076)</td>
</tr>
<tr>
<td>Fall Reading Score</td>
<td>.0014 (.0001) ***</td>
<td>.0004 (.0001) **</td>
<td>.0004 (.0001) **</td>
<td>.0003 (.0002)</td>
</tr>
<tr>
<td>Number of Siblings</td>
<td>.0018 (.0008) *</td>
<td>.0023 (.0009) **</td>
<td>.0007 (.0008)</td>
<td>.0034 (.0015) **</td>
</tr>
<tr>
<td>Married Parents&lt;sub&gt;g&lt;/sub&gt;</td>
<td>.0090 (.0020) ***</td>
<td>.0064 (.0022) **</td>
<td>.0060 (.0021)</td>
<td>.0025 (.0037) **</td>
</tr>
<tr>
<td>Intercept</td>
<td>-.0256 (.0020)</td>
<td>.0303 (.0022)</td>
<td>.0110 (.0021)</td>
<td>.0444 (.0037)</td>
</tr>
</tbody>
</table>

N 9,040 7,980 9,210 8,880

*p<.05  **p<.01  ***p<.001

a Monthly Noncognitive skill growth rates are calculated by subtracting the fall assessment score (T1) from the spring assessment score (T2) and dividing that difference by the number of months between assessments.
b Samples include only students who scored 3.0 or lower on noncognitive skill scale (range: 1 to 4) during fall assessment to account for possible ceiling effects.
c Analyses control for age at fall assessment, number of absences in kindergarten, first time kindergartener status, and number of days in school before fall assessment.
d Male is the reference category.
e Lowest SES quintile is the reference category.
f White is the reference Race.
g Unmarried Parents are the reference category.

Table 4: OLS Regression of Monthly Noncognitive Skill Growth Rates<sub>a</sub> Across SES Groups with Sample Adjusted for Ceiling Effects<sub>b,c</sub>
To address this problem, I use the initial gap in skills at the beginning of kindergarten as leverage for estimating the SES-based rate of divergence when school is out. I estimate average rates of noncognitive skills divergence prior to kindergarten and compare those estimated rates to the divergence rates observed in Table 4. If estimated monthly rates of divergence prior to kindergarten are smaller than the rates shown in Tables 4, then this would suggest that schools exacerbate noncognitive skills inequality across groups. If estimated monthly divergence rates prior to kindergarten are greater than they are during kindergarten, then it suggests that schools are actually reducing inequality in noncognitive skills across SES groups. This final comparison allows me to imitate a true seasonal comparison analysis with only partial seasonal data.

I calculate conservative estimates of average monthly divergence rates by dividing the average initial socioeconomic gap in noncognitive skills by the average age in months on the date of the assessment. This produces an average monthly rate of noncognitive skills divergence from birth until the fall assessment. While some might argue that newborn children do not gain noncognitive skills and that noncognitive skills growth begins at a later age, others could reasonably argue that all ages and all socialization eventually promotes noncognitive development. The conservative estimate also offers the most stringent possible test of the compensation perspective. However, I also consider the assumptions that noncognitive skill development occurs primarily after ages one, two, three, and four.
<table>
<thead>
<tr>
<th>Approaches to Learning</th>
<th>Self-Control Skills</th>
<th>Interpersonal Skills</th>
<th>Externalizing Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Observed Rates of Divergence</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th SES Quintile (Table 4)</td>
<td>-.0006</td>
<td>-.0018</td>
<td>-.0022</td>
</tr>
<tr>
<td><strong>Estimated Rates of Divergence</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-K Estimated (Birth )</td>
<td>.0060</td>
<td>.0035</td>
<td>.0044</td>
</tr>
<tr>
<td>Pre-K Estimated (Age 1)</td>
<td>.0073</td>
<td>.0042</td>
<td>.0054</td>
</tr>
<tr>
<td>Pre-K Estimated (Age 2)</td>
<td>.0093</td>
<td>.0054</td>
<td>.0068</td>
</tr>
<tr>
<td>Pre-K Estimated (Age 3)</td>
<td>.0127</td>
<td>.0074</td>
<td>.0093</td>
</tr>
<tr>
<td>Pre-K Estimated (Age 4)</td>
<td>.0201</td>
<td>.0117</td>
<td>.0148</td>
</tr>
</tbody>
</table>

*p.<.05  **p<.01   ***p<.001

Table 5: Comparison of Monthly Noncognitive Skill Divergence Rates During and Before Kindergarten

The divergence rates reported in Table 5 compare the rates at which the high SES students diverge from low SES students during kindergarten (as shown in Table 4) to the estimated rates of divergence prior to kindergarten using different assumptions about the timing of development. The rates of divergence of noncognitive skills are greater for the pre-kindergarten period than they are during the school year. Regardless of which assumption I choose about the timing of noncognitive skills development, these results indicate noncognitive skill gaps expand more rapidly during the pre-kindergarten period, when non-school factors dominate noncognitive skill development, than during the school period. This analysis does not replace seasonal comparison analysis, but it offers additional evidence that schools have an equalizing effect on noncognitive skills learning rates.

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13 I cannot test if the estimated pre-kindergarten rates of divergence are significantly different from kindergarten rates.
Conclusion

Evidence is growing that schools are the “Great Equalizer” with respect to cognitive skills. This study extends the claim to noncognitive skills. Gaps in noncognitive skills across socioeconomic status grow quickly when school is out, but gaps do not grow when school is in session. Previous scholars have suggested that equalizing patterns for cognitive skills likely represent how school environments are more equal than non-school environments (Downey et al. 2004). While schools may not be equal in how they treat students, the argument goes, they are much more equal than non-school environments. Applied to noncognitive skills, it may be that teachers target their efforts toward children most in need of noncognitive skills development. Indeed, a strong interpretation of this pattern is that schools benefit low SES students more than high SES students because low SES students require a larger investment from schools to grow at the same rates as high SES students. At the very least, schools equitably promote noncognitive growth of students from different socioeconomic backgrounds.

The central claim of reproductionists is that schools and teachers offer more resources and support to high SES students, and that they discriminate against and alienate low SES students. This position is at odds with my results, however. It appears that teacher-student interactions are highly beneficial for low-SES students in promoting noncognitive growth. While this research cannot evaluate the details of teacher-student
relationships, it is consistent with the position that those relationships are not uniquely beneficial to high SES students or uniquely harmful to low SES students.

This research is not without limitations. First, teacher ratings students’ skills are subject to biases across race (Downey and Pribesh 2004) and class lines (Alvidrez and Weinstein 1999). Teacher bias could mean that the observed gap at the beginning of kindergarten appears to be larger than it really is. If this were the case, then the initial SES skills gap could be insignificant, and schools might have no net effect on noncognitive skills growth. However, it is unlikely that teacher biases shift throughout the course of the academic year. Therefore, the observed patterns of noncognitive skills growth during kindergarten likely represent genuine development and equal growth across socioeconomic groups.

While I cannot definitively assess the extent of teacher bias, I note that parents in the ECLS-K also rated their children on similar dimensions. If teachers see socioeconomic differences in noncognitive skills when there really are none, we might find that low- and high-SES parents rate their children similarly. But, in analyses not shown, I find that low- and high-SES parents also recognize that their children have different noncognitive skills, adding credibility to the teacher ratings.

Since this research looks at kindergarten, its results cannot be readily generalized to the entire academic career. Prior research, however, on cognitive skills suggests that schools play a compensatory role at different stages of the educational career including kindergarten and first grade (Downey et al. 2004), first grade through fourth grade (Alexander et al. 2007), and 6th and 7th grade (Heyns 1978). Thus, if noncognitive skills
are shaped by schools in a similar to cognitive skills, their equalizing effect likely continues until at least middle school.

Finally, as stated previously, this research did not employ a true seasonal comparison design. A key assumption is that the gap at the beginning of kindergarten emerged because of differences in the non-school environment. This assumption depends in part on how we define “schooling.” My definition emphasizes the kind of schooling that is freely available to all children independent of parents’ resources. Most of the school-like experiences children have before kindergarten do not fit this definition.14

Weaknesses aside, this research offers valuable initial insight into the effect of schools on noncognitive skills. More importantly, it adds a new dimension to the view that schools offer widespread and relatively equal opportunity. Future research should include a complete seasonal model – including both summer and academic year components – in order to develop rates of noncognitive skill growth during both school and non-school periods. This approach would offer more leverage to the researcher to answer whether schools stratify or equalize noncognitive skills growth. In addition, future research should examine more carefully inequalities in noncognitive growth rates across other social axes, especially across racial lines.

This research is the first attempt to test whether schools, as an institution, promote unequal growth in noncognitive skills. While scholars have dedicated substantial attention to the role of schools in cognitive inequality, this research explores an important

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14 One exception is Head Start, which is free to low-income children. But my supplemental analyses suggest that Head Start participation reduces the SES gaps in noncognitive skills observed in the ECLS-K. Non-school factors, therefore, clearly increase the SES gap in noncognitive skills.
school outcome about which we knew very little. Consistent with seasonal research on cognitive skills, I find that schools are compensatory institutions. Together, seasonal comparison research on cognitive and noncognitive skills challenges sociologists to look elsewhere to understand how social origins shape life outcomes. While skills learned in school (like cognitive and non-cognitive skills) clearly shape other life outcomes, schools themselves do not appear to play a central role in reproducing inequality across generations.

Finally, these results challenge our definition of educational equality. Regardless of socioeconomic background, students learn about the same amount while in school. However, initial skills gaps between high and low SES students remain relatively unchanged when the school year ends. While schools might be compensatory, they do not create equality of achievement, only equality of growth. Students from diverse socioeconomic backgrounds remain on unequal footing. These results are simultaneously promising, because they suggest that more schooling (e.g. longer school years) or other interventions could minimize achievement gaps throughout the academic career, while also discouraging in the way they highlight the intractable inequalities outside of school
References


Appendix A: Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Alpha</th>
<th>Min</th>
<th>Max</th>
</tr>
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</tr>
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<td></td>
<td>0</td>
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<tr>
<td>Latino</td>
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</tr>
<tr>
<td>Age at Fall Assessment&lt;sub&gt;a&lt;/sub&gt;</td>
<td>68.531</td>
<td>4.416</td>
<td>45.8</td>
<td>96.5</td>
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</tr>
<tr>
<td>Fall Reading Score</td>
<td>21.706</td>
<td>8.418</td>
<td>10.078</td>
<td>69.655</td>
<td></td>
</tr>
<tr>
<td>First Time Kindergartener (1= Yes )</td>
<td>.953</td>
<td>.212</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Initial School Exposure&lt;sub&gt;c&lt;/sub&gt;</td>
<td>56.768</td>
<td>17.340</td>
<td>11</td>
<td>139</td>
<td></td>
</tr>
<tr>
<td>School Exposure Between Assessments&lt;sub&gt;d&lt;/sub&gt;</td>
<td>190.337</td>
<td>22.135</td>
<td>98</td>
<td>263</td>
<td></td>
</tr>
<tr>
<td>Kindergarten Absences</td>
<td>6.037</td>
<td>10.580</td>
<td></td>
<td>0</td>
<td>174</td>
</tr>
</tbody>
</table>

<sub>a</sub> Means and Standard Deviations based on imputed data.
<sub>b</sub> Age in Months at Fall Kindergarten Assessment
<sub>c</sub> Number of calendar days between the beginning of school and the date of the Fall Assessment.
<sub>d</sub> Number of calendar days between the Fall and Spring Assessments

Table 6: Descriptive Statistics