Teacher Effects on Social/Behavioral Skills in Early Elementary School

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Abstract

Though many recognize that social and behavioral skills play an important role in educational stratification, no studies have attempted to estimate teachers' effects on these outcomes. Using data from the Early Childhood Longitudinal Study — Kindergarten Cohort (ECLS- K), we estimate teacher effects on social and behavioral skills as well as on academic achievement. Teacher effects on social and behavioral skill development are sizeable, and are somewhat larger than teacher effects on academic development. Because – as we show – social and behavioral skills have a positive effect on the growth of academic skills in the early elementary grades, the teachers who are good at enhancing social and behavioral skills provide an additional indirect boost to academic skills in addition to their direct teaching of academic skills. Like previous studies we find that observable characteristics of teachers and the instructional approaches utilized in their classrooms are weak predictors of teacher effects. However, our results suggest that the teachers who produce better than average academic results are not always the same teachers who excel in enhancing social and behavioral skills.

For the last three decades, sociologists have argued that class differences in socialization contribute to educational stratification by aligning advantaged students' social and behavioral skills (henceforth, social/behavioral skills) with those valued by schools and employers (Bowles and Gintis 1976; Bills 1983; Bourdieu 1984; Farkas 2003; Olneck and Bills 1980). Early research in this tradition emphasized the school's role in socialization, and focused on how schools contributed to and legitimated social reproduction (Bowles and Gintis 1976, Willis 1981). A related line of research on cultural capital theory investigated how high-brow cultural knowledge of art and music translated into educational success (Aschaffenburg and Maas 1997; Bourdieu 1984; DiMaggio 1982; DiMaggio and Mohr 1985; Dumais 2002; Mohr and DiMaggio 1995). More recent work on cultural capital has explored how banal assets like organization, interpersonal skills, or the ability to interact effectively with authority become valuable resources in the classroom (Lareau 2003; Farkas 1996, 2003). Other scholars do not use the concept of cultural capital, but also have asserted that non-cognitive skills, broadly defined, affect socioeconomic outcomes (Heckman and Rubenstein 2001; Duncan et al. 2007; Heckman, Stixrud, and Urzua 2006).

Though many recognize that social and behavioral skills play an important role in educational stratification, no studies have attempted to estimate teachers' effects on these outcomes. This is surprising in light of the growing literature demonstrating that teacher effects on academic achievement are substantial in size (Clotfelter, Ladd, and Vigdor 2006; Murnane 1983; Rivkin, Hanushek, and Kain 2005; Rockoff 2004). It is not known whether teachers can play a role in social and behavioral development; if they can, it becomes of interest to understand whether the teachers who produce better than average

academic results are the same teachers who excel in enhancing students' social/behavioral skills. Moreover, if social and behavioral development is an important component of academic development, and if the production of these skills requires different competencies than the production of math and reading development, then we miss an important social policy tool by leaving social/ behavioral skills out of the study of teacher effects.

Using data from the first five waves of the Early Childhood Longitudinal Study--Kindergarten Cohort (ECLS-K), we build upon previous studies of teacher effects to address both academic achievement and social/behavioral development. First, we engage with the broader socialization and cultural capital literature to theorize about how social/behavioral skills may affect academic skills, and why teachers may vary in their ability to produce these skills. Next, we determine the extent to which social/behavioral skills affect academic achievement. We then estimate the size of teacher effects on social/behavioral skills in order to understand how the size of these effects compares with teacher effects on academic development. We ask whether teacher competencies in fostering social/behavioral skills are tightly or loosely coupled with teacher competencies in fostering academic development. Finally, we assess the extent to which observable characteristics of teachers and their instructional approaches account for differences in teacher effectiveness. In answering these questions, we inform both theoretical debates about social/behavioral skills and their impact on educational outcomes as well as policy debates over what it means to be an effective teacher.

Theoretical Background: Do Social/Behavioral Skills Affect Academic Development?

Our paper makes two contributions to the broader literature on social/behavioral skills and the specific version of this literature known as cultural capital theory. First, in contrast to the literature's current argument that cultural capital primarily provides signaling and evaluation benefits in the educational career, we demonstrate that children with higher levels of social/behavioral skills actually *learn* more in school than others. Second, we theorize that teachers' varying success in promoting social/behavioral skills can be attributed both to teachers' conflicting views about the value of these skills in producing true academic growth, as well as conflicting views about the extent to which they are important to future educational and labor market success.

Regarding the first issue, some sociologists have argued that social/behavioral skills are of central importance to employers and to productivity (Farkas 1996; Rosenbaum 2001), and this theme has increasingly been picked up by economists interested in the production of human capital (Heckman and Rubenstein 2001; Heckman, Stixrud, and Urzua 2006). However, other scholars who conceptualize these non-cognitive behaviors as cultural capital borrow from the education as skills vs. education as credentials debate in sociology. These scholars interpret cultural capital purely as a signaling mechanism, rather than "real" capital that favorably impacts productivity. For example, DiMaggio (2001) wrote, "At the societal level, stocks of human capital contribute directly to the economic productivity of labor….By contrast, there is no intrinsic reason that 'stocks' of cultural capital should boost aggregate productivity" (p. 459).

Scholars such as Lareau and Weininger (2003) disagree with DiMaggio and others' focus on high-brow cultural activities and instead emphasize styles of behavior taught to children primarily in middle-class households. Nonetheless, they still maintain that cultural capital primarily has value in the *evaluation* process rather than in the *learning* process. Lareau's definition of cultural capital focuses on the intersection of the macro, "the capacity of a social class to 'impose' advantageous standards of evaluation on the educational institution," (p. 567) and the micro-interactions through which middle class parents and children win advantages by mastering the evaluation system (Lareau 2003, Lareau and Weininger 2003). According to Lareau, this mastery comes from socioeconomically advantaged children's familiarity with the particular linguistic structures and authority patterns used by schools, and produces better academic evaluation for the same stock of human capital. Academic achievement itself thereby becomes a form of cultural capital (Lareau and Weininger 2003), and is not viewed as a separate and measurable quantity. In treating social/behavioral skills as class-linked advantages in academic evaluation, these scholars ignore the ways that the structure of the educational process may result in advantaged children actually learning more by making use of their social/behavioral skills.

Farkas (1996) and Rosenbaum (2001), in contrast, see social/behavioral skills as part of the education production function. Farkas emphasized their value in academic learning, while Rosenbaum stressed their value in the labor market. In other words, if "human capital" is defined as those skills which can generate an economic return in the labor market, then social/behavioral skills are a form of human capital not unlike mathematics or reading skills. Rosenbaum argued that employers value these skills

because they allow a worker to better apply his technical skills to produce more in the workplace. We make the parallel argument that social/behavioral skills allow students to better apply their cognitive skills and thereby learn more. Teachers provide a variety of opportunities to learn in classrooms, and students' ability to benefit from these opportunities is affected by their own familiarity with behavioral standards expected in the classroom – i.e. their effort, attention, and ability to control their own impulses. This would be true even if the school's standards themselves are biased towards dominant-class conceptions of the educational process and of the skills and knowledge that constitute a "good" education. Teachers also encourage students to keep learning outside of school - for example, by assigning homework - and students social/behavioral skills likely play a role in whether and how students use these opportunities. In sum, aside from any advantage that children with high cultural capital have in the process of evaluation at school, students who have been socialized to act in accordance with the standards of the school are better able to take advantage of classroom learning opportunities, and are thus likely to learn more.

If social/behavioral skills play a critical role in the educational process, it is important to understand where they come from. Bourdieu studied these skills under the rubric of cultural capital and understood cultural capital as the product of class-based socialization by parents. He asserted that cultural capital cultivated outside the home is assigned a different value than that cultivated within, and argued that schools reward children who possess dominant class cultural capital. His concept of embodied cultural capital, or the *habitus*, suggests that dispositions that are initiated and internalized early in a child's socialization are both enduring and resistant to change. If this is true, schools

can do little to alter students' stocks of cultural capital. In fact, the exclusionary, static character of cultural capital is a central part of its definition (Lamont and Lareau 1988).

We join other scholars who agree that schools can enhance students' social/behavioral skills. That teachers can play a role in teaching students the "codes of power" is well accepted in the educational practice literature (Delpit 1996), and the role of the school in socializing students to successfully navigate institutions is acknowledged in the ethnographic literature on private high schools as well (Cookson and Persell 1985; Khan 2008; Stevens 2007). Yet to date, no studies have attempted to estimate teacher effects on these skills.

Why might teachers differ in their promotion of social/behavioral skills? At the most basic level, we know that teachers bring a diverse toolkit of skills to the classroom. Just as teachers vary in their ability to promote academic skills, we expect that teachers vary in their capacity to increase student stocks of social/behavioral skills as well. Teachers' professional beliefs also have a potentially important role to play along with teacher competencies. Teachers vary in their valuation of academic and social competencies, particularly in kindergarten (Dombkowski 2001), which would generate differences in how much they emphasize the teaching of each type of skill. Even if teachers agreed on the relative importance of academic achievement versus the enhancement of social/behavioral skills, they may disagree about the extent to which these skills are of instrumental importance in promoting academic achievement, which would produce heterogeneous teaching styles even among those teachers who were primarily focused on academic goals. They may also disagree about their ability to affect the stocks of these skills, with "Bourdieuian" teachers believing that student behavioral

deficits are impervious to change and "non-Bourdieuian" teachers seeing social/behavioral skills to be potentially as teachable as reading and mathematics.

Non-school factors, such as parents and state regulatory systems, may matter as well. There is some evidence that high SES parents value academic and social competencies differently than do low SES parents and parents may demand different approaches for their children as a result (Jacob and Lefgren 2007). Parents of different backgrounds may see different types of social skills as appropriate for their children; as Lareau (2003) has discovered, high SES parents privilege the use of language to negotiate with authority, while low SES parents prefer that their children do not question authority. Finally, states, schools, and districts differ in the incentives they offer teachers to focus on academic versus social/behavioral skills (Russell 2007). For example, teachers in states with more stringent accountability systems may face stronger incentives to emphasize academic skills. In sum, both the socioeconomic and the regulatory context of the school would be expected to produce variation in the extent to which teachers focus on enhancing social/behavioral skills in early elementary school.

Literature Review on Teacher Effectiveness

Despite its inattention to non-cognitive outcomes, a large literature has now demonstrated that teacher effects on academic achievement are large relative to the effect sizes of other common dimensions of school quality, such as school resources, instructional interventions, and class size reductions, (Odden, Borman, and Fermanich 2004). In their review of the literature, Nye, Konstantopoulos, and Hedges (2004) found that 7% to 21% of the variance in achievement gains results from differences in teacher effectiveness. In their own analysis of the Tennessee STAR experiment, they determined

that moving a student from the 25th to the 75th percentile of teacher effectiveness would increase reading and math gains by .35 and .48 standard deviations, respectively. Rowan, Correnti, and Miller (2002) identified much larger effect sizes, ranging from .77 to .78 for reading gains, and .72 to .85 for math gains. Rivkin, Hanushek, and Kain (2005) found a one standard deviation increase in teacher effectiveness is associated with a lower-bound gain of .11 standard deviations for math achievement and .10 standard deviations for reading, while Rockoff found an effect close to the lower bound estimate of Rivkin et al. The different size of estimated effects arises partly from differences in the grade under study and other data issues and partly from differences in the methodological strategy that is employed to address the problems of self-selection and sampling variability.

If teachers matter as much as these studies suggest, a critical question is to what extent a teacher's performance can be predicted by observable characteristics such as experience, education, certification, and test scores. Numerous studies conclude that experienced teachers are more effective in increasing student achievement (Clotfelter, Ladd, and Vigdor 2006; Greenwald, Hedges, and Laine 1996; Murnane 1983; Rivkin, Hanushek, and Kain 2005; Rockoff 2004). In a particularly comprehensive treatment of teacher experience, Clotfelter, Ladd, and Vigdor (2006) found that having a highly experienced teacher in the fifth grade– that is, a teacher with more than 27 as compared to zero years of experience – is associated with an increase of .13 standard deviations for math and .095 standard deviations for reading, with half the gain occurring in the first two years of teaching. Other studies find that measures of teachers' ability, as captured by standardized tests or licensure scores are positively associated with student achievement (Ferguson 1991, 1998; Ferguson and Ladd 1996; Clotfelter, Ladd, and

Vigdor 2006; Rowan, Chiang, and Miller 1997). Most of the variation in teacher quality, however, is not captured by the teacher characteristics measured in administrative and survey data.

Taken together, the existing studies have greatly improved our knowledge of teachers' effects on student academic achievement. Education is about more than academic achievement, however, and we know very little about schools' or teachers' effectiveness in achieving other educational goals. In particular, little is known about the determinants of social/behavioral development, including a positive orientation to learning, the ability to interact in a school-sanctioned way with teachers and other students, or the ability to observe school rules and avoid behaviors that violate the schools' standards of appropriate student conduct, such as fighting with other students. It is possible that teachers that are effective in promoting academic growth also enhance students' social/behavioral skills. On the other hand, these teacher qualities may be largely independent of each other, whether because they call on different abilities, or because teachers disagree about the relative importance of social/behavioral development in promoting academic development and in influencing future success in the labor market. It may even be the case that instruction in academic and social/behavioral-related skills may compete with each other, with the consequence that specific teachers excel in either one area or the other.

We have identified only two studies (Alexander, Entwisle, and Thompson 1987; Downey and Pribesh 2004) that address the relationship between teachers' attributes and students' non-cognitive outcomes. Neither of these studies, however, specifically estimates teacher effects on non-cognitive outcomes. Rather – and consistent with

prevailing (and, we argue, limited) sociological theories about cultural capital – they both address the issue of school evaluation processes, and specifically how student-teacher status differentials (measured in terms of class or race) result in low status students' receipt of poorer evaluations. Alexander, Entwisle, and Thompson (1987) examined the effects of teacher-student social background matching in the first grade on teachers' evaluations of students' maturity. The authors found that students' race strongly conditioned the evaluations of teachers from high status backgrounds, but had no effect on the evaluations of low SES teachers. Downey and Pribesh (2004) used nationally representative samples of kindergartners (the Early Childhood Longitudinal Study – Kindergarten Cohort) and adolescents (the National Educational Longitudinal Study) to examine the effects of student-teacher racial matching on teachers' evaluations of students' externalizing problem behaviors and approaches to learning. They found that black students receive poorer behavioral ratings when they are matched to white teachers, with effect sizes of .05 to .1 standard deviations. Both studies used cross-sectional outcome measures and therefore did not address change in teachers' ratings of students over time.[1]

In sum, the current literature leaves unaddressed the impact of teacher quality on the development of social/behavioral skills at school, particularly during the early elementary years. Our paper uses data from the Early Childhood Longitudinal Study Kindergarten Cohort (ECLS-K) to fill this gap in several respects. First, we identify a set of dimensions of social/behavioral skills and establish their impact on later academic achievement. Second, we estimate kindergarten teacher effects on social/behavioral development and compare these effects with published estimates of the size of teacher

effects on mathematics and reading achievement. In constructing these estimates, we use a variety of strategies (including the use of behavioral ratings by parents) that address the potential bias that stems from the fact that social/behavioral development is measured by teacher ratings. Third, we estimate the correlation between teacher effects on social/behavioral development and teacher effects on academic achievement in order to determine whether these teaching skills are tightly coupled. Fourth, we estimate the impact of social/behavioral development on subsequent academic development. Finally, we combine these results with our estimates of teacher effects in order to identify the indirect effects of teachers on academic achievement that operate through their impact on social/behavioral development.

We focus our attention on teachers in early education because of our theoretical expectations that teacher effects on social/behavioral development are likely to be larger for younger children than for older children. This expectation stems from the broader literature on social development, which finds that social behaviors are most plastic in early childhood (Campbell et al. 2002, Hawkins et al. 2001, 2005; MacDonald 1985; Nelson 1999; Stiles 2000; Yoshikawa 1995), as well as Bourdieu's suggestion that dispositions internalized early in life have enduring consequences. Little is known about social/behavioral development in the education process, however, and it is possible (and indeed, we hope it is true) that teachers can shape a student's behavior throughout elementary school and into high school. We therefore see our paper as a starting point for a broader effort that focuses on multiple points in the educational process.

Data and Methods

The ECLS-K is a study of a nationally representative sample of 21,260 kindergarteners who attended kindergarten in the 1998-1999 school year, and who have now been followed through fifth grade.[2] These data provide parent reports on the socioeconomic and demographic characteristics of the children, teacher and parent reports of their social/behavioral skills, cognitive assessments, and measures of teacher and school characteristics. The ECLS-K was designed as a multilevel study that collected data on multiple kindergarten children for the same teacher, often for multiple classrooms in the same school.[3] This multilevel character allows us to estimate the effects of teacher quality on academic and social/behavioral development.

The estimation of teacher effects is complicated by the problem of non-random selection, and the strategies used in contemporary research differ in part because of the strengths and limitations of the alternative data sets. In order to evaluate the strategy allowed by ECLS-K, we need to place it in the context of recent methodological strategies employed by scholars who have estimated teacher effects on academic outcomes. Rivkin, Hanushek and Kain (2005) had test score data across multiple grades for three cohorts of students in Texas, but lacked information on the specific identity of the teachers. By computing changes across grade for specific cohorts, they were able to eliminate the unmeasured fixed effects of students and families. They computed the difference in these differences across the same grades for different cohorts and attributed the difference to the change in the mix of teachers over time. Using information on teacher turnover along with a set of strong assumptions (that teacher exit is exogenous, that a teacher is equally effective across cohorts, and that there is no measurement error in the cohort data), they were able to estimate a lower bound on the teacher effect.

Clotfelter, Ladd, and Vigdor (2006) analyzed administrative data for all North Carolina elementary students. They examined whether elementary students in the same school but in different classrooms were statistically distinguishable across six criteria and grouped schools in to the 45% where the students were not distinguishable and the 55% where they were distinguishable on at least one criterion. For both groups of schools they estimated fixed effects models for teachers both including and omitting lagged test scores. Under the theory of random assignment, the estimated teacher effects should not vary across the two specifications or between the two sub-samples of schools, and they found this to be true when they included fixed effects for schools and an extensive set of student controls in the model. More recent work questions, however, whether even this multifaceted approach, which incorporates both observable characteristics and time-invariant unobservable characteristics, fully addresses non-random assignment (Rothstein 2007).

Rockoff (2004) estimated teacher effects on academic outcomes using data for two New Jersey school districts that linked teachers with students who were followed for up to twelve years. The ability to observe the same teachers across multiple cohorts allowed Rockoff to estimate multiple teacher effects for the same teacher and thereby separate the "permanent" teacher effect from transitory effects that were due in part to sampling variability on student outcomes within classrooms. He found that the variation in "permanent" effects, while substantively important, was only about half of the variation estimated for any given year.

The ECLS-K data have the advantage over these other sources of providing detailed measures of social/behavioral skills. Unlike the administrative data typically

used to estimate teacher effects, the ECLS-K data contain detailed student controls and therefore can address non-random assignment to students to classrooms within schools on observable characteristics. Like all studies of teacher effects, in the absence of experimental data, we must acknowledge the possibility that assignment to classrooms occurs on time-varying unobserved characteristics of students. The ECLS-K data also have the disadvantage of being able to estimate teacher effects for only one cohort, which – based on the Rockoff results – would lead to an overestimate of teacher effects. We address this issue by employing a set of alternative estimation strategies that include, as we describe below, conservative estimates of teacher effects on growth in social/behavioral skills between the start and end of kindergarten.

In order to separate school and teacher effects, we restricted our sample to first-time kindergarteners attending schools with two or more sampled kindergarten teachers. Furthermore, to accurately estimate teacher effects, we further restricted our sample to include only students in classrooms with three or more sampled students. (In supplemental analyses, we also estimated models requiring at least five students per classroom and obtained similar results.) Of the originally sampled 21,260 kindergarten students, we excluded 5,920 of the 21,260 cases because of these scope conditions, leaving us with 15,340 cases.[4] Our analytical results, therefore, apply to schools that have multiple kindergartens.

In addition to the above exclusion, we omitted 950 additional students who changed schools or teachers between the beginning and end of kindergarten, 6550 observations from our primary analyses because they lacked measures of academic or social skills at the beginning or end of kindergarten or in first grade, 320 observations

because these students were not enrolled in kindergarten for the first time, 500 observations because of missing covariates, and 1650 students who did not attend schools with at least two kindergarten teachers and at least sample members per class after sample exclusions for missing values. Our final sample included 5380 children taught by 1,050 teachers in 420 schools. In our analyses of the effect of social/behavioral skills on academic skills from kindergarten through third grade, which did not require that students attend schools with two or more kindergarten teachers and three or more students per class, our sample included 6910 children. (We also have estimated these models with the sample restrictions above and obtained similar results.)

We also performed a series of analyses to test the sensitivity of our results to missing data. First, approximately 1990 cases were excluded from our sample of because they lacked a teacher social rating at the beginning of kindergarten. We thus reestimated teacher effects including these cases, using the prediction equation in Appendix Table A2 to generate beginning of kindergarten social/behavioral skill estimates for the students missing these data; we find almost identical teacher effects on social/behavioral skills. Second, we noted that approximately half of the cases excluded from our sample were missing because of sample attrition in 1st grade. We thus reestimated teacher effects on end of kindergarten scores for math and reading for the larger sample of 9500 students, or 62% of students within our scope conditions, and compared these estimates with those from our smaller sample (displayed in Appendix Table B4). Though the resulting sample was more socioeconomically and ethnically diverse than our sample, we again found almost identical teacher effects, which provides some assurance that these unavoidable sample restrictions when analyzing the ECLS-K do not alter our findings.

Measures of Academic Achievement and Social/Behavioral Skills: Dependent Variables

Our analyses make use of students' test scores in reading and math at the beginning and end of kindergarten, at the end of first grade, and at the end of third grade. The ECLS tests were designed to reduce ceiling and floor effects. To this end, students were first administered a routing test which determined the level of difficulty of their subsequent test. The ECLS then employed item response theory to place kindergarten students on a common 64 point scale for mathematics and 92 point scale for reading. To ease interpretation, we converted these scores to standardized units, and use these standardized scores as our primary dependent variables. [5] In supplementary analyses we obtained similar results when we use IRT scores or percentile units as the dependent variables.

Teachers were asked to rate students' social/behavioral skills at the beginning and end of kindergarten, the end of first grade, and the end of third grade. It should be noted that these measures represent the dominant understanding of what it means to adequately fulfill the student role in a particular historical moment, though we do expect a high correlation between the most valued social/behavioral skills over time. It should also be noted that the behavioral skills that best assist in academic achievement may vary by the field in question and over the life course; for example, the skills that make one a successful kindergarten student may not make one a successful graduate student.

In order to identify the major dimensions underlying the five social scales that are available in ECLS-K, we conducted an exploratory factor analysis.[6] Three scales – the Approaches to Learning scale, the Self-Control scale, and the Interpersonal skills scale – loaded primarily on one factor. The Approaches to Learning Scale rates the child's

attentiveness, task persistence, eagerness to learn, learning independence, flexibility, and organization. The Self-Control Scale indicates the child's ability to control behavior by respecting the property rights of others, controlling temper, accepting peer ideas for group activities, and responding appropriately to pressure from peers. The Interpersonal Skills scale rates the child's skill in forming and maintaining friendships, getting along with people who are different, comforting or helping other children, expressing feelings, ideas and opinions in positive ways, and showing sensitivity to the feelings of others (NCES 1999). The loadings for this factor analysis are displayed in Appendix Table A1. Hereafter, we refer to this dimension as the social/behavioral factor, or (when it would be confusing otherwise) simply as social/behavioral skills.

Because the remaining two social scales formed separate dimensions in the factor analysis, we analyzed each of them separately. Supplementary analyses available in the appendix demonstrated that measures of externalizing problem behaviors (acting out behaviors such as the frequency with which a child argues, fights, gets angry, acts impulsively, and disturbs ongoing activities) and internalizing problem behaviors (the apparent presence of anxiety, low self-esteem, loneliness, and sadness) are empirically less stable from year to year, which may suggest that they are more sensitive to the temporary effects of shocks in the student's life. For both of the reasons above, we focus our attention in the body of the paper on the approaches to learning, interpersonal skills, and self-control measures. However, we also present supplementary analyses of the externalizing and internalizing problem behavior measures in Appendix Tables B3 and B4.

Independent Variables

Students are not randomly assigned to teachers in the ECLS-K, and so these data have the same potential selection bias as all other observational studies. We use the standard strategy to limit the magnitude of this bias by controlling for variables that have been associated with students' academic achievement and social/behavioral skills in previous research. These variables include race, gender, socioeconomic status, family structure, the presence of a biological mother, whether the student is an only child, home language, disability status, the student's age, AFDC receipt, whether the student attends a full-day kindergarten, and whether the student attends a public school. Descriptive statistics for these variables can be found in Table 1. As with all analyses based on observational data (and even for some studies based on experimental data), we exercise caution in interpreting the estimated effects as causal; it is through the accumulation of reinforcing estimates from studies with varying data and alternative plausible methodologies that a conclusion that estimated effects are indeed causal becomes justified.

In the final section of this paper, we examine the extent to which observable characteristics of teachers and the instructional approaches used in their classrooms are associated with our estimates of teacher effects. Following Milesi and Gamoran (2006), we constructed four instructional scales, which capture the range of curricular approaches used to teach reading and math in elementary classrooms. To construct these scales, we summed multiple items. The first scale, the "whole language" scale, captures the frequency with which students write words with invented spellings, write stories/reports, write in a journal, and choose books the read. The second scale, the "phonics" scale, includes the frequency with which students work on letter names, practice writing the

alphabet, work on phonics, and work on workbooks and worksheets. The third scale, the "teaching for understanding of math" scale, includes the frequency with which students work with counting manipulatives (concrete items that students use to count or perform other numerical operations), solve math problems in small groups or with a partner, and work on problems that reflect real-life situations. The final scale, the "math drill" scale, captures the frequency with which students do math worksheets, use math textbooks, and do math on the chalkboard. Descriptive statistics for these scales can also be found in Table 1.

Analytic Strategy

Our study includes four components. We first estimate the impact of social/behavioral skills on academic development in kindergarten through third grade. We then estimate teacher effects on the development of social/behavioral skills, and compare them with estimated teacher effects on academic outcomes using multiple methods in order to establish the robustness of our results. Third, we determine whether the teachers who are good at promoting academic outcomes are the same teachers as those who are good at enhancing students' social/behavioral skills. Finally, we decompose teacher effects on academic outcomes in later elementary grades in order to determine the indirect importance of being a good social/behavioral skills teacher on subsequent *academic* development.

To estimate the impact of social and behavioral skills on the growth of academic skills, we used a variety of estimation strategies. We began with OLS regressions of reading and math test scores on lagged reading and math test scores, lagged social/behavioral skills, and the controls described above for each wave of the ECLS-K.

In other words, we estimated three separate models predicting test scores at the end of K, the end of 1st, and the end of 3rd grade. To address potential endogeneity issues (including measurement error in both the academic and social measures), we estimated instrumental variables (IV) models with lagged (or, depending on the model, further lagged) test scores and social/behavioral skills ratings as the instruments. For example, in our models predicting 3rd grade reading scores, we instrumented 3rd grade social/behavioral scores and 1st grade math and reading scores with all available lags of these variables.

The estimation of teacher effects on social/behavioral skill development is complicated by the problem of bias in measurement. While a standardized testing instrument evaluated all students in reading and math, teachers rate their own students' social/behavioral skills, and this fact makes it difficult to distinguish differences in kindergarten teachers that are due to objective differences in skill development of students from differences in how kindergarten teachers rate their students. We address this problem by constructing measures of skill development that do not depend on the ratings of the kindergarten teacher, and compare these with measures based on the kindergarten teacher ratings.

A naïve method for estimating social/behavioral teacher effects would proceed in parallel fashion to the estimation of academic teacher effects, and would use teacher ratings of social/behavioral skills at the beginning and end of kindergarten as the measure of improvement without taking account of the potential ratings bias. This measure is unlikely to be satisfactory because it does not allow a separation of real gains from tendencies of individual kindergarten teachers to systematically over or underrate either

the social/behavioral competencies of their students or students' changes in these competencies during K. Therefore, we use ratings of others to measure both the initial and ending point ratings of student social/behavioral skills. To obtain an origin score, we regress the kindergarten teacher's student social/behavioral ratings at the start of kindergarten on a series of predictor variables from the parent survey including parental ratings of child behaviors on a set of social and behavioral scales (see Appendix Table A2). For the destination score, we used the rating of the first grade teacher at the end of first grade. The difference between these scores provides an estimate of growth in social/behavioral skills from the beginning of kindergarten to the end of first grade. The start-of-kindergarten measure is – by construction – correlated with demographic and socioeconomic characteristics as are subsequent teacher social/behavioral ratings or math or reading test scores. However, the equation from which we derive our teacher effects estimates includes all of these same covariates with the exception of parental ratings of social/behavioral skills at the start of kindergarten, which provides the identifying information for social/behavioral skills at the first time point. The inclusion of these measures is equivalent to using variables in the regression that have been purged of their effects.

Our use of first-grade teacher ratings to measure the effect of kindergarten teaching on social/behavioral skills is a more demanding standard than usually used in the literature on teacher effects. In effect, we are estimating the longer-term instead of the immediate effects of a particular teacher on student outcomes. Longer-term estimates are inherently attenuated (Jacob, Lefgren, and Sims 2008). In the discussion below, we note that this attenuation offsets other biases that may cause naive estimates relying on

kindergarten teacher ratings to overstate the actual effects of kindergarten teachers on social/behavioral skills.

The use of first-grade teacher ratings as measures of kindergarten teacher effects raises two questions. First, if all ECLS students with the same kindergarten teacher also had the same first grade teacher, then our method would not isolate separately the effect of kindergarten from first-grade teachers, though it would still establish whether pairs of teachers had measurably different effects from each other, which would still establish the existence of social teaching effects and allow us to compare their magnitude with academic teaching effects. In fact, students in the same kindergarten classroom frequently were in different first grades or even in different schools. Only 6% of all kindergarten teachers had students rated by only one first grade teacher, while 32% were rated by at least two teachers, 39% were rated by at least three teachers, and the remaining 28% were rated by four or more teachers. We thus interpret our estimates as the one-year-removed effects of the kindergarten teacher that the students in question had in common.

The second question concerns bias in the ratings of first grade teachers. Clearly, if all the first grade teachers of the students of a given kindergarten teacher had the same bias as the kindergarten teacher herself, our strategy would not solve the potential bias problem from self-rating. As we show in Appendix Table A3, our estimates using first grade teacher ratings clearly show much less rating bias than do our estimates using the ratings of Kindergarten teachers. Whether we have eliminated all ratings bias cannot be determined empirically, and thus must remain an unanswered question with the available data.

To obtain estimates of teacher effects, we use two different methods, one based on a random effects model and other an application of the method used by Nye, Konstantopoulos, and Hedges (2004) in their review of previous teacher effects studies. The random effects model is a three-level hierarchical linear model, where students (level 1) are nested within teachers (level 2), who are nested within schools (level 3), i.e.,:

$$y_{ijkt} = \hat{\mathbf{a}}'\mathbf{X}_{it} + \zeta_{jk}^{(2)} + \zeta_{k}^{(3)} + \varepsilon_{ijkt} \qquad (1)$$

where y_{ijkt} is a measure of a student's achievement at times *t*, *i* is the child in the classroom of teacher *j* in school *k*, $\mathbf{X_{it}}$ are characteristics of the child and the child's family including the score or rating at *time 1*, race, gender, socioeconomic status, family structure, the child's age, the presence of the biological mother, whether a language besides English is spoken at home, student disability, AFDC receipt, full-day kindergarten, and whether the student attends public school. In the models where scores or ratings at the end of first grade are the dependent variables, we also include student retention in kindergarten and whether the student has the same teacher in first grade as in kindergarten. The parameters in β are the fixed parameters. The random intercept $\zeta_{jk}^{(2)}$ varies across teachers and therefore schools, while the random intercept $\zeta_{k}^{(3)}$ varies across schools. Using these results we calculate the intraclass correlation (ICC) for the teacher and the school and compare the results for social/behavioral and academic outcomes. We use standard formulas for the intraclass correlation, which can be defined in more than one way when the data have more than two levels (Skrondal and Rabe-Hesketh 2004; Rabe-Hesketh and Skrondal 2008). The share of the total variance that is between teachers is defined as the between-teacher variance divided by the sum of the between-teacher variance, the between-school variance, and the residual variance. We

also calculate the within-school, between-teacher ICC, defined as the between-teacher variance divided by the sum of between-teacher and residual variance. Finally, we calculate the between-school ICC, defined as the between-school variance divided by the sum of between-teacher, between-school, and residual variance. In subsequent models, we incorporate teacher observable characteristics and the instructional approaches used in their classrooms to examine what proportion of between-teacher variance is explained by these factors.

In order to explore the factors that covary with teaching effectiveness, we compute empirical Bayes estimates of teacher effectiveness. The empirical Bayes estimate of teacher effectiveness is the mean of the posterior distribution of $\zeta^{(2)}$, and the variance of the prediction errors of $\zeta^{(2)}$ depends on the other variance component as well as the number of students observed per teacher (Skrondal and Rabe-Hesketh 2004, pp. 229). The individual teacher estimates of quality– being based upon outcomes involving as few as three students – are not measured with high precision (which is captured by the estimated standard errors for these estimates). Our purpose in computing these estimates is to assess (so far as the data allow) whether good teaching is a general skill that implies positive outcomes across the range of student achievement dimensions, or whether it involves specialized and at least to some extent independent competencies, as described further below.

The second method for estimating teacher effects parallels the estimator proposed by Nye, Konstantopoulos, and Hedges (2004) to review a set of 18 analyses drawn from seven existing studies of teacher effects. Their method compared the R^2 when prior achievement, demographic variables, and school dummy variables are controlled with the

R^2 when teacher dummy variables are added to the equation along with the already-included variables. Nye et al. argued that ΔR ($\sqrt{(R^2_2 - R^2_1)}$), can then be "loosely" interpreted as a standardized regression coefficient. Nye et al. used this method to draw a comparison between the set of seven existing studies and their own analysis of experimental data from the Tennessee Project STAR, and, as they report, they obtained estimates that were similar in magnitude to these earlier studies. Nye et al.'s method probably overstates the size of teacher effects because it does not account for the multiple degrees of freedom that are used up when the teacher dummy variables are added to the equation. We modified their proposed method by using adjusted R^2 in the computation. This approach cannot go as far to address nonrandom selection as the Clotfelter et al (2006) fixed effects strategy (which cannot be implemented because of limitations of the ECLS-K design). However, it has the advantage of providing a direct comparison with Nye et al's estimates of teacher academic effects from their review of existing studies.

Results

We begin by examining the distributions of ECLS-K's measures of academic achievement and the social/behavioral factor. These distributions are displayed in Figure 1. Panels A and B demonstrate that the ECLS-K reading and math assessments did reduce ceiling effects; the right skew in these distributions shows that these assessments distinguished various degrees of high achievement. Panel C shows that the social/behavioral factor, which is generated from the approaches to learning scale, the self-control skill, and the interpersonal skills scales is approximately symmetric, and it is this measure that we primarily use in the models presented in this paper.

Do social/behavioral skills affect academic development?

While social/behavioral skill development is important as an end in itself, we are also interested in the extent to which these skills affect academic outcomes. In order to estimate the cross-over effects between social and academic development, we estimate both OLS and IV models where the dependent variables are academic measures and the key explanatory variables are the social/behavioral measures. Estimates of these effects in combination with estimates of the impact of teachers on social/behavioral skills allow a determination of the "total" effect of a teacher as the combined "direct" effect on academic growth plus the "indirect" effect on academic growth via the teacher's impact on social/behavioral skill development.

Table 2 shows that social/behavioral skills are positively associated with academic achievement. The left panel displays the coefficients on social/behavioral skills in three separate OLS regressions where academic skills at the end of kindergarten, the end of 1st grade, and the end of 3rd grade are the dependent variables; the social/behavioral skills measure included in the model is lagged, and lagged academic measures for both reading and math are also included in addition to our full set of controls. Our OLS models demonstrate that a standard deviation increase in social behavioral skills is associated with a gain of .024 to .07 standard deviations in reading depending on the grade level in question and a .046-.049 standard deviation increase in math.

The right panel of Table 2 displays in the coefficients on our social/behavioral skills factor in instrumental variables models where both social and academic skills are instrumented with all available prior lags of these measures to address measurement error; following the standard use of IV models to address measurement error, the

instrumented social/behavioral skills measure included in the model is measured contemporaneously with the academic outcome. For example, our models predicting 3rd grade test scores instrument 3rd grade social skills and 1st grade reading and math scores with all available previous lags of these measures – social/behavioral skills in 1st grade, the end and the beginning of kindergarten, and academic skills at the end and beginning of kindergarten. These IV estimates also suggest that social/behavioral skills are strongly and positively associated with academic achievement. An increase of one standard deviation in social/behavioral skills is associated with a .038-.140 standard deviation increase in academic skills depending on the grade in question, and a .079 and .082 standard deviation increase in math scores at the end of kindergarten and the end of 1st grade. In our IV models, the effect of social/behavioral skills was not statistically significant for 3rd grade math. (In Appendix Table B3, we also display the effects of the remaining two measures of social/behavioral skills on academic skills.)

How large are teacher effects on academic and social/behavioral skills?

We next examine how much of the variation in social/behavioral skills and academic achievement lies between schools and how much lies between kindergarten teachers within schools. Table 3a displays both intraclass correlations (ICC) for an unconditional model, which contained no measured covariates, and then with a model that included our full set of control variables. We report the coefficient estimates for this model in Appendix Table A3. Beginning with the unconditional models which regress end of kindergarten scores on beginning of kindergarten scores in reading and math, we find that .196 and .185 of the variance for reading and math outcomes, respectively, is between schools, a fact that we attribute largely to nonrandom sorting of families to

schools. The proportion of social/behavioral skills outcome variance that lies between schools is much smaller (.088). The difference in the school variance for social/behavioral skills and academic outcomes strongly suggests that teachers within schools rate students on social/behavioral skills in comparison with students similar to their within-school peers (e.g., previous students that the teacher has instructed) rather than with the broader population of students across the country.

The within-school, between-teacher variance for reading and math (.051 and .029) in the unconditional models is much smaller for academic skills than for "naïve" social/behavioral skills measures based on the Kindergarten teacher ratings, where the teacher variance was .213 (see Appendix Table B3). When we control for socioeconomic, demographic, and prior performance covariates, we find that the between-teacher variance for academic outcomes remains smaller than the between-teacher variance for social/behavioral skills using the same naïve method that relies on kindergarten teachers themselves for social/behavioral skill ratings. In contrast, our method for measuring social/behavioral skills in Table 3a does not utilize kindergarten teacher ratings for either the starting or the ending measurement of social/behavioral skill development, and the between teacher, within school ICC is dramatically smaller using our method than when using the naïve beginning to end of kindergarten method. From these estimates, we infer that teacher effects on social/behavioral skills are at least as large as teacher effects on academic outcomes.

The larger teacher effects on social/behavioral skills than on academic outcomes can similarly be observed if we contrast teacher effects at the 25th and 75th points in the teacher effects distribution (see Table 4). Using our estimates from regressing the end of

kindergarten on the beginning of kindergarten, which is the most accurate for estimating kindergarten teacher effects on same-grade *academic* achievement, moving a student from the 25th percentile to the 75th percentile of the teacher effects distribution would increase kindergarten achievement by .216 standard deviations for math and .323 standard deviations for reading. The size of these effects is smaller than those established by Nye et al (2004), who found that moving a student from the 25th to the 75th percentile of the distribution would increase math test scores for elementary school children by .48 standard deviations and reading test scores by .35 standard deviations. Older studies, such as Armour (1976) and Hanushek (1992), find effects similar to those in Nye et al. In the Armour study, which included primarily African-American and Latino students in Los Angeles, a 25-75th percentile shift in teacher effectiveness yields a gain of .35-.50 standard deviations for reading; in Hanushek's study, this shift produces a gain of .43 standard deviations for reading. We expected that kindergarten teachers would have smaller effects on academic achievement than other elementary grade teachers, and suggest that the estimated effect size differences described above are in part explained by the grade under study. The smaller academic effects of kindergarten teachers might even be a consequence of their spending proportionately greater time on social/behavioral skill development than do subsequent elementary school teachers.

To compare academic and social teaching effects, we focus on the results from regressions of end of 1st grade scores on beginning of kindergarten scores in Table 4. The results in Table 4 support the results in Table 3 in demonstrating that social teaching effects are at least as large, and potentially larger, than academic teaching effects for kindergarten teachers. Moving a student from a below-average to an above-average

kindergarten teacher would increase student achievement by approximately .042 standard deviations in math and .141 standard deviations in reading between the start of kindergarten and the end of first grade, and .185 standard deviations in social/behavioral skills.

Rockoff showed that the estimation of teacher effects based on single-classroom data overestimates the teacher effect variance by about 100% (i.e., actual teacher effects are about half the size of estimated teacher effects on the basis of single-classroom data). Table 4 shows that estimating kindergarten teacher effects at the end of first grade versus these effects at the end of kindergarten, understates the estimated teacher effects obtained for math and reading by 50% or more. Thus, the end of 1st grade results appear to give an estimate of teacher effects on academic growth from the beginning to the end of kindergarten that would approximate what we might have obtained if we could estimate same-year teacher effects with multiple cohorts of students. This fact suggests that the estimated effects for social teaching, which measure these effects at the end of 1st grade, might also therefore be a reasonable approximation to the estimated same-year teacher effects that would be obtained with uncontaminated measures for the same teacher across multiple cohorts.

One possible reason why the estimated teacher effects on social/behavioral skill development are larger than the estimated teacher effects on academic development is that social/behavioral skills may not be measured as reliably as academic skills. Table A4 in Appendix A shows that the correlations over time in teacher ratings of social/behavioral skills are somewhat lower than are correlations of academic test scores. In Appendix B, we discuss our estimates of the impact of possible differences in

reliability of these measurements on estimated teacher effects. These results show that the differences in reliability magnify the estimated difference in teacher effects between social/behavioral and academic skills. However, the impact of reliability differences is less than our estimated difference in teacher effects between academic and social/behavioral skills from equation (1), which supports the conclusion that kindergarten teachers differ more in their ability to affect social/behavioral skills than they do in their ability to affect growth in math and reading scores.

Our estimates above were based on random effects models. As a robustness check, we then used a more conservative version (i.e., one corrected for the degrees of freedom used in the regression) of the method of Nye et al. (2004) to estimate academic and social teacher effects. These results are presented in Table 3b. Column 1 of this table shows the R^2 for a model with individual covariates and school dummy variables. Column 2 adds teacher dummy variables. Column 3 shows Nye et al.'s estimate of the effect of a standard deviation increase in teacher quality on student outcomes. For a benchmark, note that Nye et al. obtained a value of .32 for the Hanushek (1992) study of reading change in second through sixth grades, while we obtain a value of .275 for reading change from the beginning to the end of kindergarten with the ECLS-K data using the (unmodified) Nye et al method. This may indicate that kindergarten teachers have less of an impact on improvement in reading than do elementary school teachers, which is consistent with the fact that reading is generally taught more intensively in the elementary school grades than in kindergarten. As noted earlier, the Nye et al. method inflates estimates by failing to account for the change in R^2 due to the degrees of freedom used up in the addition of teacher dummy variables to the model. This is

corrected in Table 3b, and, for example, this modification diminishes the estimate of teaching quality on reading from the .275 figure noted above to .142 (see column 3, row 3). Our estimate of .205 for social teaching effects. The .205 result for social teaching skills is slightly larger than Rockoff and Rivkin et al.'s estimates of the impact of teachers on math and reading in higher grades, and – consistent with our random effects results – is larger than the estimates we obtain for the impact of kindergarten teachers on academic skills using the modified Nye et al. measure (see Table 3b).

How tightly coupled are teacher competencies?

The fact that teaching involves multiple skills raises the question of whether these teaching skills cluster in such a way that teachers who are good at one specific teaching skill tend to be good at others. Data limitations, potential bias, and the consequent lack of precision in our teacher-specific estimates of teaching skill prevent a definitive answer to this question on the basis of ECLS-K data. However, we can provide insight into this question by examining the correlations among our empirical Bayes estimates of teacher effects.

We estimated these correlations using three alternative methods. In the first method, we simply computed empirical Bayes estimates of teacher effects for math, reading, and social/behavioral skills, and calculated the correlations among these three estimates. Because teacher effect estimates are calculated based on the learning of their students in different subject areas, this first approach begs the question of whether there are within-student linkages between the development of reading and mathematics skills such that improvement on one dimension because of good teaching would produce a certain level of improvement on the other dimension even if the teacher's skill in the

other subject was mediocre. To address this issue, the second method specified math skills to be the sum of an underlying common math/reading/social factor and a unique factor for math, and, *mutatis mutandis,* did the same for reading and social/behavioral skills. We estimated teacher effects on this common math/reading/social factor and also teacher effects on the unique factors for math, reading, and social/behavioral skills. We then compared the correlation between estimated teacher effects on the common math/reading/social factor and the unique math or reading factors with the correlation between estimated teacher effects on the common math/reading/social factor and the unique social factor. Finally, in the third method we specified only math and reading to be the sum of an underlying common math/reading factor and a unique factor for math or reading, respectively. We then estimated teacher effects on social/behavioral skills, on the common math/reading factor, and on the unique math and reading factors. We then compared the correlation between estimated teacher effects on the common math/reading factor and the unique math factor with the correlation between the common math/reading factor and our estimate of social teaching effects, and also made a similar comparison for reading.

Our results using all three methods tell the same story. Table 5 shows that the correlation between math and reading teaching was higher than were the correlations between social teaching and either math or reading teaching. We further found that the correlations between either unique math-factor or unique reading-factor teaching and the common factor were higher than were the correlations involving social teaching and either version of the common factor. Because of the relatively low number of students per teacher in the ECLS-K sample, these correlations are almost certainly

underestimated. Furthermore, the lower reliability of social/behavioral measures probably also contribute to the lower correlations involving measures of teacher quality on social teaching (see Appendix Table A4). These results suggest that social/behavioral teaching is a distinct competency from the teaching of math or reading, but better data are needed to answer this question definitively.

Do observable characteristics of teachers or instructional approaches predict teacher effects?

A key question for policymakers is the extent to which observable characteristics such as experience, education, and certification predict teacher effects. We therefore re-estimated equation (1) including observed teacher characteristics in order to establish the extent to which differences in these characteristics can account for academic and social/behavioral outcomes at the end of first grade, net of the level of these skills at the start of kindergarten. These characteristics include dummy variables for teacher age (where the reference category is less than 35 years old), teacher experience (where the reference category is teachers with more than five years experience), a dummy variable coded as 1 if the teacher holds a Masters degree, a dummy variable coded as 1 if the teacher holds the highest certification available, and dummy variables for teacher race and teacher*student race interactions. Table 6 shows that a kindergarten teacher's receipt of the highest certification is associated with a statistically significant increase in the growth of social/behavioral skills between the start of kindergarten and the end of first grade. Moreover, low levels of teaching experience by kindergarten teachers (specifically, teachers with one year of experience) are associated with a statistically significant decreased rate of growth in social/behavioral skills at the end of first grade. This pattern is similar to that found by Clotfelter, Ladd, and Vigdor (2006) for academic

outcomes. It provides additional confirmation that our method is capturing both real change over time in social and behavioral skills, and empirically meaningful effects of kindergarten teachers on the growth of these skills. Our findings also mirror previous research in finding that observable characteristics of teachers are weak predictors of student outcomes; the inclusion of these measured characteristics does not reduce the between-teacher ICC for academic or social/behavioral outcomes.

We then reestimated the equation above including teachers' instructional styles (whole language and phonics in reading, and teaching for understanding and drill for math), while recognizing that instructional styles may be as much a consequence as a cause of differences in teacher quality. Even though regression coefficients may not tell us much about the extent to which instructional style affects student learning, it is of interest to establish whether instructional styles are at least related to the observed variation in the quality of teaching social/behavioral skills. Our results, also displayed in Table 6, show that instructional approaches do not predict teachers' effectiveness in promoting social/behavioral skills. Kindergarten teacher effects on social/behavioral skill accumulation are substantial, but neither teacher attributes measured in the ECLS-K nor measured instructional approaches tell us much about why some teachers are more effective than others.

What is the total impact of social/behavioral skills on academic achievement?

The first section of this paper estimated the effect of social/behavioral skills on academic growth, while the second section of this paper estimated the effect of teachers on social/behavioral skills. If teachers can affect social/behavioral skills, which itself has longer-run implications for academic development, it therefore follows that the overall

impact of teachers on academic development has two components, a direct effect on academic achievement, and an indirect effect which operates through social/behavioral skills. To get a rough estimate of the size of the indirect effect of teacher quality on academic growth which runs through a teacher's impact on social/behavioral skills, we estimated the increase in these skills that a student would be expected to have from a "good" as opposed to a "bad" teacher, and we scored this increment by its expected impact on third grade academic achievement, net of academic achievement at the start of kindergarten. Specifically, we estimate the effect of social/behavioral skills at the end of kindergarten on academic achievement in third grade, controlling for academic achievement at the start of kindergarten. We then multiplied these estimates by a change in a social/behavioral skill percentile score that we estimate would be obtained by having a teacher in the 75th percentile as opposed to the 25th percentile. The result is an estimate of the indirect impact of having a teacher who is "good" as opposed to "bad" at teaching social/behavioral skills on math and reading achievement gains by third grade. If we further assume that first and second grade teachers also have a likely impact on social/behavioral skill, we can ask the question of how big an impact on reading or math achievement would come from having good teachers of social/behavioral skill in the first two years of school in comparison to bad teachers. We then performed the same procedure for academic skills by estimating the impact of having a 75th versus 25th percentile math or reading teacher.

We estimate that moving a student from the 25th to the 75th percentile of the teacher distribution for social skills teaching is .028 standard deviations for math and .035 standard deviations for reading. Not surprisingly, the indirect effect of social

teaching on academic growth is smaller than the *direct* effects of having a highly effective academic teacher, which yields gains of .058 standard deviations for math and .153 standard deviations for reading. As the literature on social/behavioral skills has long maintained, these skills have wide-ranging benefits, and even scholars who see non-cognitive skills as important resources for academic growth stress their independent value in the labor market and other life arenas. The fact that good social teaching produces an academic gain that is at least 25% as great as good academic teaching enhances the theoretical importance of social/behavioral enhancement during early elementary education. At the same time, it is also important to gain a greater understanding of the extent to which the imparting of social/behavioral skills in early education is complementary to or in competition with the imparting of academic skills in future research.

Discussion

The central contribution of this study is the demonstration that kindergarten teachers can increase the stocks of social/behavioral skills in their students, and that teacher effectiveness on this dimension varies widely. Our estimates of teacher effects on social/behavioral skill development in kindergarten are substantial, and are somewhat larger than kindergarten teacher effects on academic development. We find that having a kindergarten teacher at the 75th percentile of the teacher effects distribution as opposed to one at the 25th percentile increases social/behavioral skills by .185 standard deviations, which was larger than our estimates of teacher effects on academic skills.

In addition to establishing the effects of teachers on social/behavioral skills, this article provides strong evidence that students' stocks of these skills influence students'

academic development apart from the advantages that these students have in the receipt of favorable evaluations at school. We proposed that students' social/behavioral skills affects students' ability to take full advantage of a classroom's learning opportunities. Future research should attempt to test for the existence of these mechanisms. The fact that social/behavioral skills likely influence later academic development illuminates a new pathway by which teachers can potentially affect student outcomes.

Finally, we found that teachers who have greater experience and the highest level of certification are better at teaching social/behavioral skills. This finding corresponds to the pattern found by Clotfelter et al. (2006) in their estimates of teacher effects on academic skill growth in North Carolina, and supports the claim that our estimates are measuring both real gains in social/behavioral skills, and real impacts of teachers on the development of these skills. At the same time, we also found that the teachers who are good at promoting social/behavioral skills may not be the same teachers that are good at promoting academic development. We proposed that teachers' varying beliefs about the importance of social/behavioral skills to students' futures and teachers' beliefs about the role of these skills in producing academic achievement may explain this finding, along with the effects of the local school and socioeconomic environment. In future research, sociologists of education should problematize the currently dominant notion of teacher quality, which assumes that a "good" teacher is effective across all educational domains. The possibility that many kindergarten teachers essentially specialize in academic or social/behavioral development suggests that the question we should be asking is "good at what?" Though public education has many goals, both research and policy have focused narrowly on measuring

and promoting academic outcomes. Because social/behavioral skills are an important end of education in itself and also provide a pathway to academic development, these skills needs to be integrated into research and policy agendas.

Aside from the limitation that the ECLS-K data are observational rather than experimental, our study has three limitations that should be addressed in future research. The first limitation derives from measurement issues in the ECLS-K. Ideally, a study of social/behavioral skills would utilize rating methods that are reliable and exogenous to the teaching process that may improve these skills over time. In the absence of such a measure, we estimated teacher effects on social/behavioral skills using a metric based on parental ratings and first-grade teacher ratings for purposes of evaluating the effectiveness of kindergarten teachers. This method had the disadvantage of precluding any measure of social/behavioral skills at the end of kindergarten, which is the time when the impact of the kindergarten teacher would have been at its maximum. We hope that future work can specify the magnitude of these effects more precisely.

The second limitation concerns the lack of sufficient data on multiple students per classroom for the same teacher across multiple years, and for teachers in grades beyond kindergarten. Because we restrict our study to early elementary education, we do not address how teacher effects on social/behavioral change as students move through upper grades. Psychological studies of social development have found that social behaviors become more difficult to change as children age (Campbell et al. 2002, Hawkins et al. 2001, 2005; MacDonald 1985; Nelson 1999; Stiles 2000; Yoshikawa 1995). These studies suggest that teacher effects on social/behavioral skills may be attenuated in upper grades, but research is needed to establish the extent of attenuation, and specifically the

possibility of specific interventions to support the social/behavioral development of at-risk adolescents.

A third limitation of the present study is our inability to identify the characteristics of teachers that strongly predict their ability to improve the social/behavioral skills of students in their classroom. In this respect, our results are similar to those obtained in the study of academic teacher effects. More effective strategies are needed in order to isolate the characteristics of teachers and the exogenous effects of various teaching styles used by teachers to increase student interest in learning, improve student work habits, and impart greater self-discipline. Only after we better understand the mechanisms by which teachers can improve student behavior as well as student math and reading scores can we offer concrete guidance on how policymakers, administrators, and teachers can structure schools and classrooms to increase students' social/behavioral skills as well as their academic competencies.

Notes

[1] A study of teacher effects on social/behavioral skills, as opposed to teacher effects on perceptions, would require a control for students' initial position and better attention to the accurate measurement of social/behavioral skills.

[2] Because the fifth-grade data have only recently become available, this paper is limited to a study of the ECLS-K sample through third grade.

[3] The number of students sampled per classroom varied because of school sector (private schools with 12 or fewer kindergarteners were eligible, while public schools with 24 or more kindergarteners were eligible), the need to oversample Asian Pacific Islanders, the inclusion of a twin subsample, and parental non-response. In general, the target number of children sampled at any one school (not including the second twin) was 24.

[4] All sample sizes included in this paper have been rounded to the nearest 10, in order to comply with NCES data security regulations concerning the publication of research based on NCES restricted data. As a consequence of this rounding, subtotals may not exactly sum to totals in our discussion of sample sizes.

[5] NCES cautions against the estimation of absolute change in test scores because of the possibility that the metrics at different areas of the test score distribution are not comparable. This possibility provides an additional justification for our focus on standardized scores. Furthermore, we measure academic development on a relative scale because social/behavioral skills measured on a relative scale.

[6] Because the underlying items used by NCES to construct its five scales of social skills are proprietary, we were not able to perform our factor analysis on the underlying items themselves, which certainly would have been preferable from a scientific perspective.

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Table 1. Descriptive Statistics

Variable	N	Mean	SD	Min	Max
*Dependent Variables**					
Δ social/behavioral skills, beginning of K-end of K	5380	.006	.841	-4.068	3.330
Δ social/behavioral skills, beginning of K-end of 1	5380	.010	1.117	-3.757	3.638
Δ social/behavioral skills, beginning of K hat-end of 1st	5380	-.050	1.005	-3.184	2.156
Δ reading, beginning of K-end of K	5380	.004	.698	-2.902	3.481
Δ reading, beginning of K-end of 1	5380	.013	.918	-3.632	2.720
Δ math, beginning of K-end of K	5380	.008	.674	-4.814	2.484
Δ math, beginning of K-end of 1	5380	.008	.877	-4.133	2.729
Δ reading, beginning of K-end of 3rd**	6910	.000	.962	-4.881	2.721
Δ math, beginning of K-end of 3rd**	6910	.000	.827	-3.528	2.862
Student Characteristics					
African-American	5380	.133	—	0	1
Hispanic	5380	.097	—	0	1
Asian	5380	.023	—	0	1
Female	5380	.509	—	0	1
SES	5380	.093	.804	-4.750	2.690
Single parent family	5380	.218	—	0	1
Age in months	5380	68.438	4.408	58.500	86.230
Biological mother present	5380	.945	—	0	1
Only child	5380	.149	—	0	1
Home language not English	5380	.035	—	0	1
Student has a disability	5380	.150	—	0	1
AFDC receipt	5380	.082	—	0	1
Full day kindergarten	5380	.571	—	0	1
Student retained in K	5380	.028	—	0	1
Same teacher for K and 1	5380	.022	—	0	1
Days between K academic assessments	5380	175.200	22.608	119	261
Days between K social assessments	5380	184.510	60.483	0	362
Public school	5380	.894	—	0	1
Missing days between K social assessments (Coded as 0 above)	5380	.078	—	0	1
Teacher Characteristics					
Between 35-49 years old	1050	.439	—	0	1
More than 50 years old	1050	.221	—	0	1
Novice teacher	1050	.047	—	0	1
1 year experience	1050	.047	—	0	1
2-5 years experience	1050	.170	—	0	1
Masters degree	1050	.334	—	0	1
Highest certification	1050	.636	—	0	1
Black	1050	.061	—	0	1
Hispanic	1050	.024	—	0	1
Instructional Styles					
Whole language scale	1050	16.796	5.183	0	24
Phonics scale	1050	20.920	3.540	0	24
Teaching math for understanding scale	1050	11.950	3.530	0	18
Drill-based math	1050	8.802	3.850	0	18

Source: Early Childhood Longitudinal Study – Kindergarten Cohort of 1999. See text for sample restrictions. * These dependent variables are reported in standardized units, and accordingly the mean values of changes over time will be zero; ** n in analyses of K-3 data.

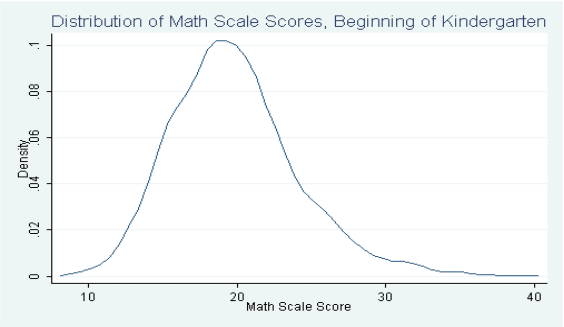
Table 2. Estimated Effects of the Social/Behavioral Skills on Reading and Math Test Scores, OLS and IV Estimates

	OLS		IV	
	Reading	Math	Reading	Math
End of K	0.024** (.009)	0.049*** (.011)	0.038** (.014)	0.079*** (.017)
End of 1st	0.062*** (.011)	0.048*** (.013)	0.126*** (.031)	0.082* (.034)
End of 3rd	0.070*** (.016)	0.046*** (.013)	0.140*** (.031)	0.039 (.026)

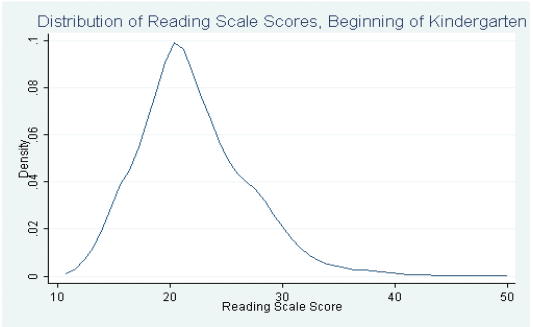
n=6910

Source: Early Childhood Longitudinal Study – Kindergarten Cohort of 1999. See text for sample restrictions. The left panel displays the coefficients on social/behavioral skills in three separate OLS regressions where academic skills at the end of kindergarten, the end of 1st grade, and the end of 3rd grade are the dependent variables; the social/behavioral skills measure included in the model is lagged, and lagged academic measures for both reading and math are also included. The right panel displays in the coefficients on social/behavioral skills in instrumental variables models where both social and academic skills are instrumented with all available prior lags of these measures to address measurement error; the instrumented social/behavioral skills measure included in the model is contemporaneous. Across both OLS and IV estimates, control variables include race, gender, socioeconomic status, family structure, the child's age, days between assessments for models where the outcome is measured at the end of kindergarten, and retention for models where the outcome is in 1st or 3rd grade.

Figure 1. Distributions of Academic Achievement and Social/Behavioral Skills



(A)



(B)

(C)

Table 3a. Intraclass Correlations for School and Kindergarten Teacher Effects for Academic and Social/Behavioral Outcomes

	No Controls			With Controls			With Controls + Teacher Characteristics		
	Between schools	Between teachers within schools	Between teachers	Between schools	Between teachers within schools	Between teachers	Between schools	Between teachers within schools	Between teachers
Math, End of K	.185	.035	.029	.063	.028	.026	.065	.027	.025
Reading, End of K	.196	.064	.051	.097	.065	.058	.097	.063	.056
Math, 1st grade	.195	.018	.014	.106	.001	.001	.106	.001	.001
Reading, 1st grade	.197	.025	.020	.115	.013	.011	.114	.013	.011
Social/Behavioral Skills, 1st grade	.088	.012	.011	.080	.021	.019	.081	.018	.016

Note: Estimates are taken from equation (1). Control variables include the math, reading, or estimated social/behavioral score at the beginning of kindergarten, race, gender, socioeconomic status, family structure, the child's age, the presence of the biological mother, whether a language besides English is spoken at home, student disability, whether the school is a public school, AFDC receipt, and full-day kindergarten. For comparisons of academic outcomes between the start and end of kindergarten, we include the number of days between assessments. For comparisons between the start of kindergarten and the end of first grade, we also include student retention in kindergarten and whether the student has the same teacher in first grade as in kindergarten. For the social/behavioral skills model, we control for the predicted social/behavioral rating at the beginning of kindergarten.

Table 3b. Teacher and School Effects Estimated Using Nye et al. "Effect Size" Measure, Adjusted for Degrees of Freedom

	School Effects	Teacher Effects	Teacher Effects Controlling for School Effects
Math, End of K	0.167	0.203	0.117
Math , End of 1st	0.228	0.257	0.118
Reading, End of K	0.208	0.252	0.142
Reading, End of 1st	0.257	0.298	0.152
Social/Behavioral Effects, End of 1st	0.279	0.347	0.205

Note: Control variables include the math, reading, or estimated social/behavioral score at the beginning of kindergarten, race, gender, socioeconomic status, family structure, the child's age, the presence of the biological mother, whether a language besides English is spoken at home, student disability, whether the school is a public school, AFDC receipt, full-day kindergarten,. For comparisons of academic outcomes between the start and end of kindergarten, we include the number of days between assessments. For comparisons between the start of kindergarten and the end of first grade, we also include student retention in kindergarten and whether the student has the same teacher in first grade as in kindergarten. For the social/behavioral skills model, we control for the predicted social/behavioral rating at the beginning of kindergarten.

Table 4. Effect of Moving a Student from the 25th to the 75th Percentile in the Teacher Effects Distribution

	Random Effects			"Effect Size Measure"		
	Math	Reading	Social/Behavioral Skills	Math	Reading	Social/Behavioral Skills
K1-K2	.216	.323	N/A	.157	.190	N/A
K1-1st Grade	.042	.141	.185	.158	.204	.275

Note: Calculations are based on results displayed in Tables 3a and 3b, and are measured in standard deviation units.

Table 5. Correlations Between Estimates of Kindergarten Teacher Effects (Measured at the end of 1st grade) on Academic Achievement and Social/Behavioral Skills

a) Teacher effects estimated separately for reading, math, and social/behavioral skills.

	Reading	Math
Math	.422	
Social	.152	.146

b) Teacher effects estimated for a common reading/math/social factor and three unique reading, math, and social factors.

	Unique Reading	Unique Math	Unique Social
Common Reading/Math/Social	.428	.358	.133

c) Teacher effects estimated for common math/reading factor, unique factors for math and reading, and a separate social factor.

	Unique Reading	Unique Math	Social
Common Math/Reading	.482	.426	.170

Table 6. Random-Effects Regression of End of 1st Grade Math, Reading, and Social/Behavioral Skills on Teacher Characteristics and Instructional Approaches

	Math		Reading		Social/ Behavioral	
	(1)	(2)	(3)	(4)	(5)	(6)
Between 35-49 years old	0.020	0.021	0.033	0.038	0.002	0.009
	(.028)	(.028)	(.030)	(.03)	(.038)	(0.039)
More than 50 years old	0.007	0.008	0.057	0.064^	-0.011	-0.003
	(.034)	(.035)	(.037)	(.037)	(.047)	(0.047)
Novice	-0.018	-0.018	-0.005	0.005	0.071	0.077
	(.052)	(.052)	(.056)	(.056)	(.07)	(0.070)
1 year experience	0.013	0.009	-0.033	-0.028	-0.192**	-0.187*
	(.054)	(.054)	(.058)	(.058)	(.074)	(.074)
2-5 years experience	0.040	0.039	-0.006	-0.005	-0.022	-0.020
	(.034)	(.034)	(.036)	(.036)	(.046)	(.046)
Masters degree	0.028	0.031	-0.022	-0.019	-0.006	-0.004
	(.024)	(.024)	(.026)	(.026)	(.033)	(.033)
Highest certification	0.027	0.028	-0.015	-0.014	0.085*	0.090*
	(.026)	(.026)	(.028)	(.028)	(.035)	(.036)
African-American	0.017	0.020	0.033	0.039	-0.049	-0.051
	(.073)	(.073)	(.077)	(.077)	(.098)	(.098)
Hispanic	-0.245**	-0.236*	-0.223*	-0.202*	-0.058	-0.048
	(.094)	(.095)	(.100)	(.100)	(.13)	(.128)
African-American teacher*African-American student	-0.087	-0.073	-0.085	-0.099	0.066	0.048
	(.097)	(.097)	(.100)	(.100)	(.130)	(.131)
Hispanic teacher*Hispanic student	0.291^	0.291^	0.180	0.152	0.052	0.027
	(.160)	(.160)	(.160)	(.160)	(.210)	(.207)
Whole language		0.004		0.007		0.000
		(.015)		(.016)		(.019)
Phonics		0.003		0.035*		0.010
		(.014)		(.014)		-0.018
Understanding Math		-0.023		-0.031*		-0.031
		(.015)		(.015)		(.020)
Drill Math		-0.018		0.007		0.037^
		(.015)		(.016)		(.020)
Between-teacher ICC (without teacher observables)	.001	.001	.011	.011	.019	.019
Between-teacher ICC (with teacher observables)	.001	.001	.011	.011	.016	.018

Note: Standard errors are in parentheses. Control variables include the math, reading, or estimated social/behavioral score at the beginning of kindergarten, race, gender, socioeconomic status, family structure, the child's age, the presence of the biological mother, whether a language besides English is spoken at home, student disability, whether the school is a public school, AFDC receipt, full-day kindergarten, and retention in grade.

Appendix A

Table A1. Loadings from Factor Analysis of Social/Behavioral Skills

Variable	Beginning of kindergarten	End of kindergarten	End of 1st grade
Interpersonal Skills	.859	.876	.884
Self-Control	.843	.860	.857
Approaches to Learning	.756	.739	.732

Table A2. OLS Regression Predicting Kindergarten Teachers' Social/Behavioral Ratings of Students at the Beginning of Kindergarten

	Social/Behavioral
African-American	-0.106^ (.059)
Hispanic	-0.097^ (.057)
Asian	0.136* (.068)
Female	0.348*** (.032)
SES	0.088*** (.020)
Single Parent Family	-0.145** (.048)
Age in months	0.087*** (.016)
Biological mother present	0.210** (.076)
Only child	-0.100* (.05)
Home language not English	-0.059 (.093)
Student has a disability	-0.065 (.06)
Parent rating of child behavior	0.219*** (.017)
Public school	0.148* (.061)
AFDC Receipt	-0.309*** (.06)
Full day kindergarten	-0.039 (.053)
Intercept	-0.375*** (.11)
R^2	.164

^ p≤.10; * p≤.05; ** p≤.01; *** p≤.001

Note: Standard errors are in parentheses.

Table A3. Regression of End of 1st Grade Math, Reading, and Social/Behavioral Outcomes, with School and Teacher Random Effects But No Measured Teacher Characteristics

	Math	Reading	Social/behavioral
Math, Beginning of K	0.581*** (.011)		
Reading, Beginning of K		0.555*** (.011)	
Predicted Social, Beginning of K			0.314*** (.024)
African-American	-0.251*** (.035)	-0.103** (.036)	-0.100* (.046)
Hispanic	-0.040 (.036)	-0.024 (.038)	0.060 (.049)
Asian	-0.151** (.048)	0.071 (.05)	-0.039 (.064)
Female	-0.071*** (.018)	0.059** (.019)	0.130*** (.035)
SES	0.088*** (.011)	0.083*** (.012)	0.025 (.016)
Single Parent Family	0.046 (.027)	-0.038 (.028)	-0.047 (.037)
Age	-0.004 (.0099)	-0.012 (.01)	0.017 (.014)
Biological mother present	0.038 (.040)	0.032 (.042)	-0.057 (.056)
Only child	-0.077** (.026)	0.025 (.027)	-0.047 (.036)
Home language not English	0.097 (.050)	0.031 (.052)	0.116 (.067)
Student has a disability	-0.100*** (.027)	-0.110*** (.028)	-0.034 (.037)
AFDC Receipt	-0.121** (.037)	-0.166*** (.038)	0.008 (.053)
Full day kindergarten	0.070* (.029)	0.024 (.031)	-0.017 (.037)
Student retained in K	-0.870*** (.057)	-1.055*** (.059)	0.216** (.076)
Student had same teacher in K and 1	-0.194** (.067)	-0.089 (.07)	-0.063 (.089)
Public school	0.078 (.043)	-0.009 (.046)	0.009 (.054)
Intercept	-0.014 (.062)	0.004 (.065)	0.014 (.084)

^ p≤.10; * p≤.05; ** p≤.01; *** p≤.001

Table A4: Reliability of Academic and Social/Behavioral Measures

Academic Skills

Math	Beginning of K	End of K	End of 1st	End of 3rd
Beginning of K	1.0000			
End of K	0.8032	1.0000		
End of 1st	0.7096	0.7739	1.0000	
End of 3rd	0.6929	0.7389	0.7830	1.0000

n=4810

Reading	Beginning of K	End of K	End of 1st	End of 3rd
Beginning of K	1.0000			
End of K	0.7585	1.0000		
End of 1st	0.6574	0.7398	1.0000	
End of 3rd	0.5989	0.6174	0.6916	1.0000

n=4790

Teachers' Measures of Students' Social/Behavioral Skills

Learning/ Interpersonal	Beginning of K	End of K	End of 1st	End of 3rd
Beginning of K	1.0000			
End of K	0.6756	1.0000		
End of 1st	0.4283	0.4560	1.0000	
End of 3rd	0.3883	0.4307	0.4924	1.0000

n=4140

Externalizing Problem Behaviors	Beginning of K	End of K	End of 1st	End of 3rd
Beginning of K	1.0000			
End of K	0.7209	1.0000		
End of 1st	0.5078	0.5479	1.0000	
End of 3rd	0.4648	0.5053	0.5350	1.0000

n=4170

Internalizing Problem Behaviors	Beginning of K	End of K	End of 1st	End of 3rd
Beginning of K	1.0000			
End of K	0.5545	1.0000		
End of 1st	0.2029	0.2476	1.0000	
End of 3rd	0.1996	0.2313	0.2451	1.0000

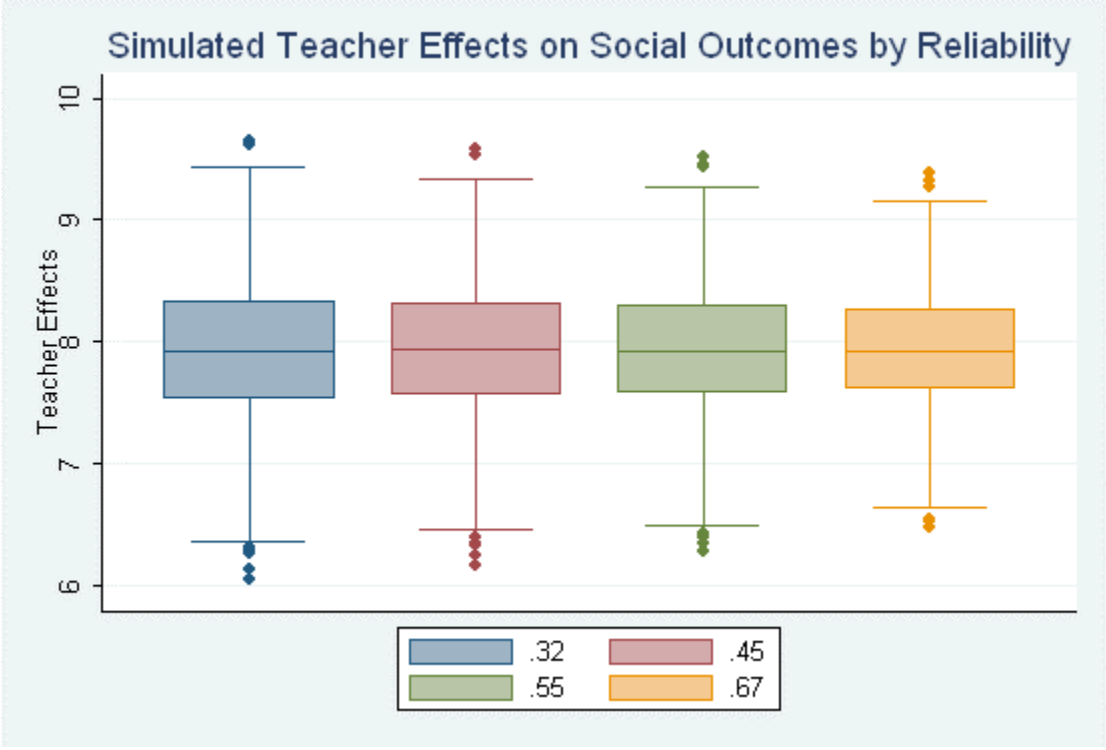
n=4170

Appendix B: Reliability Simulation

The magnitude of estimated teacher effects on social/behavioral skills may be affected by the reliability of the social/behavioral skills measures in ECLS. To assess the extent to which reliability differences between these measures would alter our results, we generated a dataset with 7000 students and randomly assigned them to 700 teachers. Each student's observed score can be divided into three components: a "true score," an error component, and a teacher effect. We estimated the reliability of our social/behavioral skills measure by regressing each student's end of kindergarten score on their beginning of kindergarten score. In our data, the reliability of the social/behavioral skills measure is .68. From the distribution of true and error components implied by this reliability, each student was assigned a true score and an error score as well as a teacher effect. In this simulation, the social/behavioral skills teacher effect was assigned a standard deviation of 8. We then decreased the reliability of the social/behavioral skills measures to .55, .45, and .32 to determine how our estimates of teacher effects would be affected as a result, and ran each of these simulations 1,000 times.

Figure A1 below demonstrates that substantially decreasing the reliability of the social/behavioral measures has only a small effect on our teacher effect estimates. We conclude that even large differences in the reliabilities of the academic and social/behavioral measures would not alter our assertion that teacher effects on social/behavioral are at least as large as teacher effects on academic development.

Figure A1



Appendix B

Table B1. Intraclass Correlations for School and Kindergarten Teacher Effects for End of K and End of First Grade Individual Social/Behavioral Outcomes

	Approaches to Learning		Interpersonal Skills		Self-Control		Externalizing		Internalizing	
No controls	Between schools	Between teachers	Between schools	Between teachers	Between schools	Between teachers	Between schools	Between teachers	Between schools	Between teachers
K1-K2	.030	.156	.005	.220	.021	.206	.038	.102	.023	.226
K1-End of 1st	.056	.017	.086	.007	.091	.011	.051	0	.064	.020
With Controls	Between schools	Between teachers	Between schools	Between teachers	Between schools	Between teachers	Between schools	Between teachers	Between schools	Between teachers
K1-K2	.013	.168	0	.210	0	.208	.014	.091	.014	.157
K1-End of 1st	.063	.078	.069	.055	.080	.064	.049	.046	.064	.028
Predicted K1-End of 1st	.056	.031	.079	.013	.078	.016	.046	.004	.067	.016

Note: Estimates are taken from equation (1). Control variables include the math, reading, or estimated social/behavioral score at the beginning of kindergarten, race, gender, socioeconomic status, family structure, the child's age, the presence of the biological mother, whether a language besides English is spoken at home, student disability, whether the school is a public school, AFDC receipt, full-day kindergarten,. For comparisons of academic outcomes between the start and end of kindergarten, we include the number of days between assessments. For comparisons between the start of kindergarten and the end of first grade, we also include student retention in kindergarten and whether the student has the same teacher in first grade as in kindergarten. The Externalizing Problem Behaviors and Internalizing Problem Behaviors scale are reverse coded to facilitate consistent interpretation of results, that is, moving up the scale implies higher social/behavioral skills. Receiving a higher rating on these indicators means that a student exhibited *fewer* externalizing or internalizing problem behaviors.

Table B2 Correlations Between Social/Behavioral Skills Measures

Panel A: Individual-Level Correlations Between Social/Behavioral Skills Measures

	Teacher beginning of K	Teacher end of K	Teacher end of 1st	Parent rating beginning of K
Teacher beginning of K	1			
Teacher end of K	.692	1		
Teacher end of 1st	.447	.489	1	
Parent rating beginning of K	.294	.284	.241	1

Panel B: Classroom-Level Correlations Between Social/Behavioral Skills Measures

	Teacher beginning of K	Teacher end of K	Teacher end of 1st	Parent rating beginning of K
Teacher beginning of K	1			
Teacher end of K	.681	1		
Teacher end of 1st	.169	.185	1	
Parent rating beginning of K	.260	.272	.140	1

Table B3. Estimated Effects of Externalizing and Internalizing Problem Behaviors on Reading and Math Test Scores, OLS and IV Estimates

	OLS		IV	
	Reading	Math	Reading	Math
	End of K			
Externalizing	0.020* (.0093)	0.041*** (.01)	0.028* (.013)	0.057*** (.014)
Internalizing	0.008 (.01)	0.023** (.0088)	0.014 (.019)	0.043** (.017)
	End of 1st			
Externalizing	0.049*** (.013)	0.024^ (.013)	0.075** (.026)	0.027 (.025)
Internalizing	0.018 (.012)	0.041*** (.01)	0.034 (.058)	0.131* (.055)
	End of 3rd			
Externalizing	0.045*** (.013)	0.019 (.013)	0.078** (.025)	0.014 (.024)
Internalizing	0.040** (.012)	0.038*** (.011)	0.046 (.037)	0.035 (.035)

Source: Early Childhood Longitudinal Study – Kindergarten Cohort of 1999. See text for sample restrictions. The left panel displays the coefficients on social/behavioral skills in three separate OLS regressions where academic skills at the end of kindergarten, the end of 1st grade, and the end of 3rd grade are the dependent variables; the social/behavioral skills measure included in the model is lagged, and lagged academic measures for both reading and math are also included. The right panel displays in the coefficients on social/behavioral skills in instrumental variables models where both social and academic skills are instrumented with all available prior lags of these measures to address measurement error; instrumented social/behavioral skills measure included in the model is contemporaneous. Across both OLS and IV estimates, control variables race, gender, socioeconomic status, family structure, the child's age, days between assessments for models where the outcome is measured at the end of kindergarten, and retention for models where the outcome is in 1st or 3rd grade.

Table B4. Intraclass Correlations for School and Kindergarten Teacher Effects for End of K and End of First Grade Outcomes

	No Controls			With Controls		
	Between schools	Between teachers within schools	Between teachers	Between schools	Between teachers within schools	Between teachers
Social/Behavioral Factor, End of K	.017	.217	.213	0	.239	.239
Social/Behavioral Factor, End of 1st	.088	.012	.011	.077	.092	.085
Externalizing, End of K	.038	.106	.102	.014	.093	.091
Externalizing, End of 1st	.051	.000	.000	.049	.048	.046
Internalizing, End of K	.023	.231	.226	.014	.160	.157
Internalizing, End of 1st	.064	.022	.020	.064	.030	.028

Source: Control variables include the social/behavioral score at the beginning of kindergarten, race, gender, socioeconomic status, family structure, the child's age, the presence of the biological mother, whether a language besides English is spoken at home, student disability, whether the school is a public school, AFDC receipt, and full-day kindergarten. For comparisons between the start of kindergarten and the end of first grade, we also include student retention in kindergarten and whether the student has the same teacher in first grade as in kindergarten. For social/behavioral skills models, we control for the predicted social/behavioral rating at the beginning of kindergarten in the models where the dependent variable is the end of 1st grade.