Social/Behavioral Skills and the Gender Gap in Early Educational Achievement

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Abstract

Though many studies have suggested that social and behavioral skills play a central role in gender stratification processes, we know little about the extent to which these skills affect gender gaps in academic achievement. Analyzing data from the Early Child Longitudinal Study-Kindergarten Cohort, we demonstrate that social and behavioral skills have substantively important effects on academic outcomes from kindergarten through fifth grade. Gender differences in the acquisition of these skills, moreover, explain a considerable fraction of the gender gap in academic outcomes during early elementary school. Boys get roughly the same academic return to social and behavioral skills as their female peers, but girls retain an advantage both because they begin school with more advanced social and behavioral skills, and because their skill advantage grows over time. While part of the effect may reflect an evaluation process that rewards students who better conform to school norms, our results imply that the acquisition of social and behavioral skills enhances learning as well. Our results call for a reconsideration of the family and school-level processes that produce gender gaps in social/behavioral skills and the advantages they confer for academic and later success.

Introduction

Social and behavioral skills (also known as "non-cognitive skills") have assumed a central role in explaining persistent differences in school performance by socioeconomic status and race (Bowles and Gintis, 1976; Rosenbaum, 2001; Farkas, 2003; Lareau, 2003). Bowles and Gintis argued that differential socialization by class (later often summarized under the rubric of "cultural capital") played a central role in the reproduction of class over generations by affecting both school and occupational outcomes. Just as Duncan, Featherman, and Duncan (1972) argued that the content of IQ came to be those skills which are most highly demanded in high-status occupations, so Bowles and Gintis and later Bourdieu (1984) and Lareau (2003) argued that teachers and employers rewarded those whose socialization reproduced the cultural behaviors associated with the professional and upper classes. Farkas et al. (1990) has shown that test scores and such noncognitive behaviors as student work habits, disruptiveness, and absenteeism almost completely explained differences in course grades by gender, race/ethnicity, and poverty status for middle school students. Rosenbaum (2001) made a similar demonstration that test scores and non-cognitive factors measured on high school seniors can explain most of the differences by gender, race/ethnicity and class in high school grades and subsequent educational attainment.

The theoretical mechanism behind these explanations has focused on the reproduction of social class. In 1990, Farkas et al. (1990) could write about "teacher bias" as arising in part from teacher perceptions and in part from the effects of self-fulfilling prophecies on student performance. Teacher perceptual bias arose –they argued– when "teachers *perceive* lower levels of performance when evaluating poor, African-American *or female students* [emphasis ours], and give lower grades even when the students actual performance is no different from that of other children (p 128)." In 1990, Farkas et al. could argue that the evidence on whether girls perform better than boys, net of aptitude, was "mixed." Twenty years later, in contrast, there is consensus in the literature that girls generally outperform boys in both reading and math courses (Duckworth and Seligman, 2005; Perkins et al., 2004), both in absolute terms and after

achievement tests are controlled (Entwisle et al., 2007). These gender differences in academic performance carry forward to high school and to college, and appear to play a central role in producing the increasingly prominent gender gap in favor of women in educational attainment in the U.S. (Buchmann and DiPrete, 2006; Buchmann et al., 2008)

Largely because of the growing gender gap in educational attainment in favor of women, the question of whether gender differences in social and behavioral skills plays a role in the rising gender advantage in educational attainment has gained new salience. Why do these gender differences in school performance exist? Class-based theories of socialization and cultural capital do not readily explain gender differences in culturally desirable behaviors because daughters and sons are evenly distributed across class boundaries. Efforts to preserve a cultural capital explanation to account for gender have asserted that teacher bias in schools takes the form of a pro-female/pro-professional class culture because teachers are professional and largely female (Entwisle et al., 1997; Entwisle et al., 2007). However, the problem with this explanation is that teachers –particularly at the elementary level – have long been professional and female even when schools were perceived to be neutral or dismissive of the academic potential of girls. Furthermore, there is little concrete historical evidence about the relative performance of girls and boys in schools, particularly as regards to their grades.

Based on analyses of the first six years of elementary school with data from the Early Child Longitudinal Study–Kindergarten Cohort (ECLS-K), we argue that girls in contemporary America possess advantages in social and behavioral skills over boys and perform better on standardized tests from the start of kindergarten, before there is time for biases in the school evaluation process to play a role. We further find that social and behavioral skills are generally predictive of academic achievement in early elementary school even within groups defined by race, class, and gender, and that these variables explain relatively little of the variation in rated social and behavioral skills in the elementary school population. These facts render untenable the simple identification of social and behavioral skills with class-based socialization practices: differences in mean levels of social and behavioral skills by gender are actually

larger than are differences by poverty status. At the same time, social and behavioral skills can clearly be taught, because children from higher socioeconomic backgrounds have more of them. The contribution of these skills to academic achievement runs partly through their continuing effects on cognitive test scores. They provide an even greater advantage in teacher-based academic evaluation, which, we argue, arises not so much because of "teacher bias" as because teachers generally use "well-rounded" performance evaluations that take account of the production of assignments and the full participation in the school process that is enhanced by social and behavioral skills. Our results call for a reconsideration of the family and school-level processes that produce these skills and the advantages they confer for academic and later success.

Social/Behavioral Skills, Academic Achievement, and Gender

A large and growing literature has documented the impact of social and behavioral skills (abbreviated below as "social/behavioral skills") on cognitive outcomes, on educational attainment, and on labor market success. The term "non-cognitive skills" illustrates the lack of specificity in conceptualizing as well as measuring these skills. Duncan et al. (2007) note that psychologists classify many of these skills under the categories of either "cognitive self-regulation" or "emotional self-regulation." "Cognitive self-regulation" includes planning, sustaining attention, effortful control of attention or action, task persistence, and inhibition of impulsive responses. "Emotional self-regulation" includes the ability to control anger, sadness, joy, and other emotional reactions, which predict both externalizing and internalizing problem behaviors. The lack of standard terminology reflects the multidimensional character of these skills as well as the multidisciplinary collection of scholars who study these skills and their consequences.

Though many studies have shown that social and behavioral skills are associated with academic achievement and attainment (Alexander et al., 2003; Ladd, Birch, and Buhs, 1999; Nor-

mandeau and Guay, 1998; Raver et al., 2005; Trzesniewski et al., 2006), scholars continue to debate the specific skills that matter, the size of their effects, and the extent to which they explain gaps in educational achievement by race, class, and gender (Bowles, Gintis, and Osborne, 2001; Borghans et al., 2008; Murnane, Willett, and Levy, 1995). In a series of papers, Heckman and colleagues argue that parents influence the development of social and behavioral as well as cognitive skills, and that interventions such as enriched child-care centers (e.g., the Perry preschool program) boosted social and behavioral skills of children, and improved academic performance through this vehicle (Heckman and Rubenstein, 2001; Cawley, Heckman, and Vytlacil, 2001; Carneiro and Heckman, 2003; Cunha et al., 2006; Heckman and Masterov, 2007; Heckman, Stixrud, and Urzua, 2006; Urzua, 2006).

A second body of studies derived from interventions intended to buttress specific skills has drawn its focus more narrowly. Many of these studies find a stronger relationship between reading and social skills than between math and social skills. For example, Coie and Krehbiel (1984) found that low-achieving socially rejected 4th graders who were assigned to an intensive social and academic skills training intervention gained in reading, but not in math; similar results were obtained by the MTA Cooperative Group, 1999, which focused on children with attention deficit and hyperactivity disorder (ADHD). Some studies in this literature provide evidence that only a subset of social and behavioral skills affect academic outcomes. For example, Dolan et al. (1993) report no cross-over effects of behavioral training on reading gains even though aggressive and shy behavior diminished.

Meanwhile, cultural capital researchers contend that a broad array of cultural skills affect educational attainment primarily through their impact on the evaluation process in school (Bourdieu, 1984; Lareau, 2003). Research suggests that social and behavioral skills have particularly strong effects on teacher-rated academic achievement, especially at the start of elementary school (Ladd et al., 1999; Lin, Lawrence, and Gorrell, 2003). Duncan et al. (2007) argue this is because early elementary teachers evaluate student progress on a broader set of tasks that includes turning in assignments on time, getting along with others, and showing

involvement in classroom activities.

Given these findings, social and behavioral skills are a prime suspect in producing gender differences in educational outcomes. Abundant literature reports that boys have greater development problems than girls (Buchmann, DiPrete, and McDaniel, 2008). Boys have higher rates of antisocial behavior, attention disorders, reading disabilities, mental retardation, stuttering, delayed speech, and other related phenomena (Halpern, 1997; Muter, 2003; Rutter et al., 2004). The lower rate of antisocial behavior of girls in early childhood persists into the pre-school and elementary years, where they exhibit less disruptive conduct than do boys. Several studies have demonstrated stronger tendencies towards externalizing behavior by boys (Entwisle, Alexander, and Olson, 2005; Raffaelli, Crockett, and Shen, 2005). Gilliam (2005) reports that boys are five times as likely as girls to be expelled from pre-kindergarten. In early elementary school they continue to be more disruptive than girls, and they also are less engaged in classroom learning (Ready et al., 2005; Zill and West, 2000). These gender differences persist through high school (Downey and Vogt Yuan, 2005; Dumais, 2005).

In addition, a growing literature documents academic performance differences between girls and boys. Entwisle et al. (2007) find that the gender gap emerges relatively late in the elementary school experience. Other research, however, shows that girls have better reading skills than boys in kindergarten (Chatterji, 2006; Tach and Farkas, 2006; West, Denton, and Reaney, 2000), and that this advantage persists throughout elementary school (Trzesniewski et al., 2006; U.S. Department of Education, 2006).[1] Some scholars have found generally similar performance of girls and boys in mathematics and reading tests in the early grades, though their trajectories are different: boys gain in mathematics achievement relative to girls during elementary school (Penner and Paret, 2009 (forthcoming)), while girls gain in reading achievement relative to boys (Maccoby and Jacklin, 1974; Willingham and Cole, 1997).

[1]Trzesniewski et al. (2006) found that the correlation between anti-social behavior and reading was significantly stronger for boys than for girls in the E-Risk Longitudinal Twin Study. Environmental rather than genetic factors explain most of the correlation between these variables. They further found that antisocial behavior may have a causal impact on reading for both genders, but that the reciprocal effect (poor reading leading to antisocial behavior) appears to apply only to boys.

The extent to which gender differences stem from biological differences, from differences in the ways that boys and girls are raised, or from an interaction between biology and cultural practices is difficult to determine, because these differences emerge slowly through time, during which they may experience different treatment in the social environment (Dehaene, 1997; Halpern, 2000; Spelke, 2005; Spelke and Newport, 1998).[2] This fact draws attention to the crucial question of the early life course trajectory of gender differences as well as the factors that produce them.

Gender-based family socialization processes appear to play an important role in creating the gender gap. Entwisle et al. (1994, 1997) argue that families typically give young boys more independence than young girls. They argue that the greater time spent playing in the neighborhood with other boys in complex and spatially demanding games could be a source of the male mathematics advantage. Nancy Lopez's (2003) ethnographic study of low-income, second generation Dominican, West Indian and Haitians similarly produced evidence that parents give more independence to boys and exert more social control on girls. Interaction with other children outside the nuclear family may strengthen alternative norms for male behavior that are more likely to be at odds with adult standards for behavior and therefore are treated as undesirable by both parents and teachers.

Schools may also play an important role. Entwisle and Alexander (1989; see also Entwisle et al., 1997) argue that the transition into full-time schooling constitutes a "critical period." During this critical period, children must adapt to new forms of social control over daily activities and a new process of formal teaching and learning. Girls are typically at a different point in their mental and physical development than boys at this age. Schools and teachers provide educational climates that may advantage students in the adjustment process who have the particular behavioral skills that young girls have in greater abundance than young boys. Schools and teachers could provide educational climates that maintain or enhance the social and behavioral advantages of girls. They could provide direct rewards for these skills in the evaluation

[2]Thus, Entwisle et al. (2007) note that parents have lower reading expectations for boys than for girls, though such differences may themselves be conditioned by biological differences between the genders.

process. Or they could discriminate against students presumed to have fewer of these skills in either the learning or the evaluation process. However, this link is produced, Downey and Vogt Yuan (2005) and Rosenbaum (2001) have found that gender differences in behavior are an important part of the explanation for gender differences in high school grades.

The gender gap in behavior and achievement may also arise from processes linked to social class. Using data from the Baltimore Beginning School Study (BSS), Alexander et al. (2003) determined that the gender gap in retention rates was larger for poor children (i.e. those eligible for free or reduced price lunch) than for non-poor children. Other scholars have also found a social class component to the gender gap in reading (Bianchi, 1984; Burbridge, 1991; Mickelson, 2003). Entwisle et al. (2007) report that significant gender gap in conduct marks, in retention, and in reading scores and reading score growth from first to fifth grade for poor children, though all these gaps are negligible for non-poor children. In their data, 44% of the female advantage in reading gain for poor children by fifth grade was explained by teacher conduct marks in years 2 and 4, even as conduct has no relationship with reading gain for non-poor children. Entwisle et al. explain the pattern of conduct marks as a consequence of favoritism by elementary school teachers who themselves are overwhelmingly middle class and female (Entwisle et al., 1997; Entwisle et al., 2007). Processes that link social class and gender in early childhood may be related to the class component in the growing female advantage in educational attainment in recent decades Buchmann and DiPrete (2006).

Finally, abundant evidence identifies a racial component to the gender gap, though its size (at least with respect to educational attainment) has changed considerably over time (DiPrete, McDaniel, Buchmann, and Shwed, 2009). Davis (2003) and Mandara (2006) draw attention to the large literature on the underachievement of black boys at all levels of education (see also Fan and Chen, 2001; Steinberg, Dornbusch, and Brown, 1992). Much of this literature is framed in terms of the presence or absence of an "oppositional culture" that differentially affects black youth, and particularly black males, though scholars disagree sharply as to whether black males experience more peer opposition to school effort than do white males

either in general or in specific school contexts (Davis, 2003; Farkas, 1996; Farkas et al., 2002; Ainsworth-Darnell, 1998; Flashman, 2008). Mandara has argued that family parenting styles in the African-American family concerning the form of discipline, racial socialization, and the level of parental involvement in education may also play a role in the black gender gap in academic performance.

A broad literature in sociology takes a social constructivist perspective on gender differences in education, particularly on the issue of social development (Davis, 2003). From a social constructivist perspective (which parallels in many respects the cultural capital tradition of Bourdieu, 1984 and more recently Lareau, 2003), differences in measured social and behavioral skills arise from parental and school environments that express different expectations for girls and boys, and perhaps for African-American boys in particular (Jackson and Moore, 2008). Entwisle et al. (2007), for example, see gender bias by teachers and parents in favor of girls as the main cause of the growth in the gender gap in disadvantaged children (as operationalized by the receipt of subsidized lunch). They argue that girls have better social and behavioral ratings not so much because of differences in maturation rates but rather because "they find the student role more compatible than boys do" (p. 134).[3] As further evidence of this bias, they find that social and behavioral skills affect academic achievement differently for boys and girls; in particular, they report that boys with poor conduct grades were more likely to be retained in first grade than were girls. This finding parallels Farkas et al. (1990), who reported from their Southwestern City School District data that boys apparently suffered lower course grades for being disruptive, while girls did not.

The social constructivist perspective is coherent, but inherent measurement problems make it difficult to fully evaluate its validity. For example, the findings from Entwisle et al's Beginning School Study support the conclusion that teachers evaluate girls more favorably than boys because of gender bias, but they are equally consistent with the contrary hypothesis that parents and teachers accurately observe gender differences in behavior, which affect both learning

[3]Some scholars go so far as to characterize school-based standards for behavior as "feminine" and irrelevant to the masculine sense of self of black youth (Holland, 1992; Noguera, 2003; Watson and Hodges, 1991).

itself and the production of materials (like homework, reports and presentations) that factor into the academic evaluation process. Similarly, class-based gender disparities in educational outcomes could imply that the environment of lower-class children — including parental socialization and neighborhood influences — differentially encourages boys to behave in ways that inhibit academic achievement. It could also imply that parents of lower-class children do not work as effectively to compensate for biologically-based gender differences in behavioral propensities that would otherwise disadvantage the performance of their boys. Entwisle et al. (2007) provide evidence that parents of poor children are more likely to have gender-traditional orientations toward sex roles than do non-poor children, which accords with a broader literature that shows lower-status adults to be more traditional in their sex-role orientations (Buchmann and DiPrete, 2006; Lackey, 1989; White and Brinkerhoff, 1981). However, other evidence suggests that the relationship between class and orientations towards sex roles may have changed during the latter decades of the 20th century (Brewster and Padavic, 2000).

A second challenge to our conceptions about the links between gender, class, behavior, and academic achievement comes from the recent and well publicized study by Duncan et al. (2007). Based on their re-analysis of multiple sources of data on children in early elementary school, Duncan et al. argue that cognitive attention problems are the main factor accounting for the correlation between aggression or other behavior problems and academic achievement (Barriga et al., 2002; Frick, 1991). Though the media characterized Duncan et al.'s findings to mean that "early behavior problems don't matter," Duncan et al. actually argued that "attention skills" were associated with subsequent achievement, but were weaker predictors than early reading and math skills. However, they also argued that the remainder of what they called "socioemotional" skills "were generally insignificant predictors of later academic performance, even among children with relatively high levels of problem behaviors" (Duncan et al. 2007, p. 1428). While not definitive, their results call for a reconsideration of the link between social and behavioral skills and early educational outcomes, and in particular whether behavioral differences constitute a plausible explanation for gender differences in early elementary school

performance.[4]

The next sections assess the role of behavior in producing an academic performance gap between boys and girls in elementary school with data from the ECLS-K. We examine whether the gender gap in social and behavioral skills is class-specific, and assess its impact on academic achievement over the first five grades of elementary school. We also reconsider the claim that gender differences in early academic outcomes stem from gender bias in the evaluation process that results from from the better conformity of girls than boys to the student role. In doing so, we contribute to the growing body of literature on the effects of social and behavioral skills on social stratification processes.

Data and Methods

The ECLS-K is a study of a nationally representative sample of 21,260 kindergartners that attended kindergarten in the 1998-1999 school year; 11,820 have now been followed through fifth grade.[5] These data provide parent reports on the socioeconomic and demographic characteristics of the children, teacher and parent reports of their social and behavioral skills, cognitive assessments, and measures of teacher and school characteristics. The ECLS-K began as a multilevel study, in which data were collected on multiple kindergarten children in the same school, some of whom share the same teacher. The first data collection was at the start of kindergarten. Major followups took place at the end of kindergarten, the end of first grade, the end of third grade, and the end of fifth grade, during which time the students have diffused into new schools and to different teachers in the same school. In each of these followups, information was obtained from the parents about the family situation and home behaviors of the children. Teachers were queried about classroom activities and the focal child's performance

[4]With the exception of the Early Child Longitudinal Study-Kindergarten (ECLS-K), the six datasets they considered have relatively small sample sizes and lack parallel measures of social and behavioral skills. The 1970 British cohort study has a large sample size, but Duncan et al. report analyses only for the 10% subsample that have prior measures of cognitive and social/behavioral skills.

[5]In keeping with NCES requirements when analyzing restricted data, all sample size numbers reported in this paper have been rounded to the nearest 10.

in academic subjects and on a variety of social and behavioral dimensions. School administrators provided information about a variety of school, community, and teacher characteristics. In addition, the sample children were given cognitive tests on reading, mathematics and general knowledge in each of these data collection waves.

Our analyses make use of students' test scores in reading and math at the beginning and end of kindergarten, the end of first grade, the end of third grade, and the end of fifth grade, plus teacher assessments of academic achievement and retention in grade after kindergarten, first grade, and third grade. Duncan et al's (2007) recent meta-analysis of six datasets included analyses of the impact of social and behavioral skills in kindergarten on academic outcomes in third grade with the ECLS-K sample using this same set of dependent variables. Their focus is neither on gender differences in social and behavioral skills nor of the impact of gender differences in social and behavioral skills on gender differences in academic outcomes. Nonetheless, it is important to note the distinctions between their models and the strategy that we employed. After describing our methodology, we briefly discuss the differences between our approach and their approach, and later return to a discussion of differences in results for those parts of the analysis that overlap.

The ECLS math and reading tests use item response theory (IRT) to place students on a common scale for mathematics and reading. 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. We therefore measure reading and math achievement using within-panel standard deviation scores, where the standardization is done relative to the estimated population distribution. The use of standardized measures also facilitates the interpretation of the effects of social and behavioral skills, which we also measure as within-panel standardized scores. It should be noted, however, that our use of standardized scores implies that "growth" in reading and math refers to changes in the distribution of scores at each grade, relative to the other students in the population corresponding to the ECLS-K sample. To test the robustness of our results, we have also estimated models using the IRT scores as dependent

variables and obtained similar results (which are available upon request).

Teachers in the ECLS-K study also rated student progress in language and literacy, general knowledge in science and social studies, and mathematical thinking in each year. According to the NCES (Westat and Educational Testing Service, 1998), the academic rating scales (ARS) are indirect cognitive assessments that differ in two principal respects from the direct cognitive assessments provided by the cognitive tests. First, the ARS measured both the "process" and the "products" of children's learning in school, where "process" included "the strategies they [the students] used to read, solve math problems, or investigate a scientific phenomenon." In contrast, the tests only measure the "products" of learning. Second, while the tests were constrained by a standardized testing format, the ARS was intended to "reflect a broader sampling of the most recent curriculum standards and guidelines" and a "broader curriculum content." They differed in a third obvious respect as well in that they are teacher ratings of academic progress as opposed to measures from standardized tests.

Teachers were asked to rate five dimensions of student social and behavioral skills at the beginning and end of kindergarten, the end of first grade, the end of third grade, and the end of fifth grade. 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 (National Center for Education Statistics, 2007). The Externalizing Problem Behaviors scale includes acting out behaviors such as the frequency with which a child argues, fights, gets angry, acts impulsively, and disturbs ongoing activities. The Internalizing Problem Behaviors Scale rates the student on the apparent presence of anxiety, low self-esteem, loneliness, and sadness. The internalizing behavioral measure is empirically less

stable from year to year, which may suggest that it is more sensitive to the temporary effects of shocks in the student's life. Supplementary analyses (available from the authors upon request) also demonstrate that externalizing and internalizing behaviors have a weaker relationship to academic outcomes than do approaches to learning, self-control, and interpersonal skills. For these reasons, we focus our attention in this paper on these three factors in particular.

Of the 11820 students still in the study in 5th grade, 90 students were added to the study in 1st grade to freshen the sample, and thus lacked any kindergarten measures; 430 students were not first-time kindergartners in 1998-99; 5390 students were missing at least one test score or social rating between K and 5; and 1010 were missing covariates.[6] Our complete data sample of 4910 students includes all students with non-missing data for the variables listed in Table 1 and our control variables. Because a considerable number of cases were dropped by these criteria, we used multiple imputation to fill in missing data for cases who have at least one kindergarten observation and who are still part of the study in 5th grade. The imputed sample size is 11300. 1690 (of the 11300 students total) lived in households whose home language was not English and were given a special "Oral Language Development Screener" (OLDS). For these students, we included the OLDS in the imputation model and performed analyses that alternately dropped and included them as described further below. We estimated models both using the complete data sample, and also using Rubin and Little's method for estimating confidence intervals with multiple imputed data (Little and Rubin, 2002; Carlin et al., 2008). Our analyses also took the complex sample design of the ECLS-K into account in the computation of standard errors. [7]

In order to establish the best way to measure social and behavioral skills with the three ECLS-K factors, we used covariance structure analysis. We specified a covariance structure

[6] We note again that all sample size numbers are rounded to the nearest 10 to conform to NCES requirements. As a result the subtotals may not sum to the grand total.

[7] Population sampling units (PSUs) were drawn within geographic clusters, and schools were drawn from these PSUs stratified on the basis of private and public status. Within sampled schools, up to twenty-four students were sampled with unequal probabilities based on race. We used information about the geographic strata, PSU, and probability sampling weights to estimate standard errors, facilitated by advice from NCES. In some cases, the ECLS-K sample had only one PSU within a given stratum for cases that fell within our sample. In these cases, we combined this stratum with an adjacent stratum in order to include these cases in our estimation.

model that treats the three social/behavioral scales (approaches to learning, self-control, and interpersonal skills) as indicators of a single latent factor, and specified reading at the end of first grade to be a function of the latent social factor, the reading score at the end of first grade, and a number of covariates.[8] A satisfactory fit for this model required the inclusion of a direct effect of the residual on the orientation to learning scale on the end of first grade reading score (see Figure 1). With this specification, both the social/behavioral skills factor and the residual effect of orientation to learning had significant effects on end of first grade reading. In an alternative specification, we allowed orientation to learning to be a separate factor, and specified self-control and interpersonal skills to be indicators of a second latent social development factor. This alternative specification required the inclusion of a covariance between orientation to learning and the latent social development factor, and the overall fit of the model was not as good as in the first case. Students' orientation to learning is clearly related to the other two social/behavioral scales even as it has an independent effect that cannot be fully captured by a single latent factor. Consequently, in the work that follows, we used two orthogonal social factors as our measures of social development in this paper: the "social/behavioral factor," which is indicated by all three scales,[9] and the orthogonal "approaches to learning residual" that was not accounted for by the common factor. We will refer to the two variables together as "social and behavioral skills" (equivalently, "social/behavioral skills") in the text below.[10]

[Figure 1 about here.]

We first determined the extent to which social background factors can account for gender differences in social and behavioral skills, and then used a variety of estimation strategies to estimate the impact of social and behavioral skills on the growth of academic skills. We began with OLS regressions of reading and math test scores on lagged reading and math test scores

[8] Because the underlying items used by NCES to construct its five scales of social development 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.

[9] The factor weights were 0.759 for approaches to learning, 0.832 for self-control, and 0.861 for interpersonal skills.

[10] Supplementary analyses which include the internalizing and externalizing problem behavior scales are available from the authors upon request.

and lagged social/behavioral skills for each wave of the ECLS-K. To address potential endogeneity issues (including measurement error), we used instrumental variables (IV) regressions with lagged (or, depending on the model, further lagged) test scores and social/behavioral skills ratings as the instruments. We also estimated these models separately for males and females, and estimated a joint model that included interaction effects between gender and social/behavioral skills. As a further control for unmeasured stable student-specific attributes, we estimated fixed effects models. Finally, we estimated the extent to which gender differences in social development from kindergarten through 5th grade can explain gender differences in math and reading over the early years of elementary education.

We control for variables that have been associated with students' academic and social and behavioral skills in previous research. These variables include race, gender, socioeconomic status, family structure and changes in family structure, the presence of a biological or non-biological father, and whether a student has been retained. Because "academic red-shirting" (the practice of delaying the start of school) is more common for boys than for girls (Graue and DiPerna, 2000; Malone et al., 2006), we also control for the child's age at the wave when the outcome variable was measured.[11]

The results presented in the paper are "analysis of covariance" models rather than "change score" models. As Morgan and Winship (2007) recently noted, these alternative approaches make different assumptions within a "causal modeling" framework: in the "change score" context, one implicitly assumes that the baseline ("untreated") difference between the "treated" and "control" samples (adjusted for observed covariates) does not vary by age, while in the "analysis of covariance" framework, one implicitly assumes that this baseline is shrinking with age. We think the assumption underlying the "analysis of covariance" model is reasonable in this case, i.e., it reasonable to assume that the counterfactual "untreated" differences in reading and math growth between a matched-on-observables treatment and control sample are

[11] In supplementary analyses, we also added mother and father's education, family income, mother and father's occupation, number of siblings, preschool child care, mother ever worked, maternal depression, parent expectations, public assistance and the racial and socioeconomic composition of the school. The inclusion of this larger set of controls did not alter our results.

becoming more similar at older ages.[12] For statistical reasons, we estimate the OLS and fixed effects models using one-panel lagged social and behavioral skills, though because the spacing of the panels is wide relative to the age of the respondents, we expect statistical estimates based on lags to underestimate the true effect net of other issues.[13] As noted above, we address potential endogeneity in the analysis of covariance models by using instrumental variables regression, and we estimate IV regression models using both instrumented contemporaneous and lagged measures of social/behavioral skills.

Duncan et al. (2007) also used the analysis of covariance strategy to estimate models for the effects of academic and social/behavioral outcomes on academic outcomes as of first and third grade, using both multiple-imputed and non-multiple imputed estimation strategies, as we did. Duncan et al. used OLS, reliability corrected OLS, and OLS with fixed effects at the teacher (not student) level. The use of teacher (as opposed to student) fixed effects is problematic to the extent that students are not randomly assigned to kindergarten classrooms (we would argue that students are not randomly assigned to kindergartens in the U.S.).[14] Duncan et al used a very large (over 100) number of covariates as control variables, including, in some cases, variables (such as parental educational expectations, or how often parents read to the child)

[12]The counterfactual untreated differences are the differences in reading or math score growth between otherwise matched samples if the "treated" sample had not experienced an additional increment of social/behavioral skills relative to the "control" sample.

[13]The spacing of the ECLS-K panels is large (one to two years) relative to the age of the children being studied. If the effects of changes in social/behavioral skills on changes in reading or math competencies occur with short lags, then the impact of "shocks" to social/behavioral within the course of a period as long as a school year would go undetected through the use of lags measured more than a year in the past. In addition, some of the ratings are imputed, which removes the ability of the statistical model to estimate the impact of developmental shocks. These facts, when combined with the short panels available for each student, reduce the power of the student-level fixed effects models to measure the potential impact of within-student changes in social/behavioral skills on changes in academic outcomes.

[14]Duncan et al. write in their appendix that "since the ECLS-K sample was clustered by classroom, and the same teachers often rated more than one child, we also control in these second models for teacher fixed effects." The problem that arises from clustered errors is taken into account by using estimates that take the complex survey sampling design into account. The clustering by kindergarten classroom in the ECLS-K breaks down as the children diffuse into different schools and classrooms as they get older, but continues to be dealt with appropriately by the use of the geographic clustering and stratification variables supplied by NCES for each wave of the panel. As a practical matter, the Duncan et al. fixed effects estimates did not differ much from their OLS estimates; using teacher fixed effects reduced the magnitude of the most important single dimension of social and behavioral skills – approaches to learning – on third grade reading test scores and increased its magnitude on third grade math scores.

that may be endogenous to the child's behavior. We instead estimated a student-level fixed effects model to take account of all unmeasured stable characteristics of the student. We also employed a different treatment of the five social/behavioral dimensions than did Duncan et al. As justified above, we used a two-dimensional measure of social and behavioral skills in the models we present in this paper. In contrast, Duncan et al. simultaneously entered all five social/behavioral factors into their models and report coefficients and standard errors for these coefficients for each of these scales, net of the effects of the other four.

Our analyses allow a reconsideration of the class pattern of gender differences that appear in the Baltimore BSS. The ECLS-K data have two major advantages over the BSS data, namely national representation and a much larger sample size (11,300 vs. an analysis sample size of 403 for the BSS). A third important difference between the ECLS-K and the BSS data concerns the historical context; the BSS data concern a sample of children who were in elementary school in the early 1980s, while the ECLS-K children are in elementary school in year 2000 and beyond. The profound change in the relative educational attainment of women and men (Buchmann et al., 2008) begs the important question of whether and how the relative educational experiences of females and males has changed at earlier ages.

Results

Gender Differences in Social/Behavioral Skills

In Table 1, we present the means of our social and behavioral measures by gender, race, and socioeconomic status for the multiple imputed sample. Girls lead boys by nearly 0.4 standard deviations at the start of kindergarten on the social/behavioral factor and by a similar amount on the approaches to learning scale.[15] From kindergarten to the end of fifth grade, boys fall further behind girls, lagging by 0.53 standard deviations on social/behavioral skills and 0.58

[15]Descriptive information about the approaches to learning scale refer to the scale itself, not the orthogonal residual to the social/behavioral factor that is used as a covariate in our statistical models.

on approaches to learning by the end of fifth grade. In every year, the rated gap in social and behavioral skills between girls and boys was considerably larger than was the gap between children in poverty vs. nonpoverty families, where poverty is measured based on the preliminary Census poverty thresholds for 1998 (Westat and Educational Testing Service, 1998). The black-white gap in social/behavioral skills was about the same size as the poverty gap and is smaller than the gender gap. Asian students received higher average ratings than did the other racial/ethnic groups; in particular, the Asian-black gap in rated social and behavioral skills is larger than the gender gap.

[Table 1 about here.]

To what extent is the large difference in social and behavioral skills explained by family background variables? Controlling for ethnicity, family background, age, and reading and math skills reduces the baseline gender gap by only a small amount. Table 2 shows that the female advantage in social and behavioral skills continues to grow from the end of kindergarten through fifth grade even with the additional controls for lagged social/behavioral and academic skills. Social and behavioral skills have a significant relationship with reading and math skills, socioeconomic status, and the presence of a biological father in the household. Net of other factors, Asian students and students from homes where English is not the primary language are rated as having relatively high social and behavioral skills.

Entwisle et al. (2007) only found a gender gap in conduct among poor children in the BSS data. In contrast to Entwisle et al's, we find no significant gender-socioeconomic status interaction effects on social/behavioral skills in the much larger and more samples available from the ECLS-K study. The estimated interactions remain insignificant regardless of whether socioeconomic status is modeled as a continuous variable, as SES quartiles, or as a dichotomous poverty variable (see Appendix Table A1).

[Table 2 about here.]

Academic Achievement

Mean reading and math achievement are presented in Table 1 for each panel of the ECLS-K. Overall, the female advantage on the reading test remains roughly constant at about .14 standard deviations from the beginning of kindergarten to the end of fifth grade.[16] Kindergarten boys have a slight lead on girls on the math test (.04 standard deviations) at the start of kindergarten, and this gap grows to about 1/4 of a standard deviation by the end of fifth grade. By way of comparison, Entwisle et al. (2007) report no gender difference in reading scores in their BSS sample in first grade and an average difference in fifth grade of about 1/4 of a standard deviation (18 points on the reading CAT relative to a standard deviation of 73; see Entwisle et al. (2007), Tables 1 and A1), which is 80% larger than what we find in the ECLS-K. They further report no gender gap in reading even in fifth grade for students who were not on lunch subsidy. In the ECLS-K, in contrast, there is a persistent gender gap in reading scores from kindergarten through fifth grade. Except at the start of kindergarten (where the gender gap is *smaller* for children from poverty families), there are no significant differences in the gender gap for either reading or math scores in the ECLS-K (see Appendix Table A2).

Table 3 reports the estimated effects of social and behavioral skills on reading and math growth based on four different modeling strategies: OLS models with lagged social/behavioral skills effects, IV regression with (instrumented) contemporaneous social/behavioral effects, and fixed effects regression with alternatively contemporaneous and lagged social/behavioral effects. For clarity, Table 3 only presents the coefficients for social and behavioral skills; the full set of OLS estimated model coefficients are presented in Appendix Table A3 (the same set of covariates is used in the IV regression and fixed effects models as well and the full set of estimates are available upon request). Net of background factors, the contemporaneously measured social/behavioral factor and the approaches to learning residual have a strong relation-

[16]The gender gap in reading is stable at .14 standard deviations regardless of whether we compare respondents who have nonmissing reading scores at the start of kindergarten and the end of fifth grade (using panel weights) or if we compare the full samples who have reading scores at the beginning of kindergarten with the full sample who have reading scores at the end of fifth grade (in each case using cross-sectional weights).

ship to reading and math performance at the beginning of kindergarten. The size of the effect is smaller in subsequent waves, which use one-panel lagged measures for social/behavioral skills and controls for lagged reading and math scores. However, even in these models, both the social/behavioral factor and the approaches to learning residual have a significant positive effect on both reading and math test performance. The general pattern of the coefficients is similar for the IV and OLS estimates. Unlike Entwisle et al. (2007), we find no significant difference between the academic returns to social and behavioral skills for girls and for boys. Appendix Table A4 shows statistical tests for gender differences in the effects of social/behavioral skills on reading and math test scores, academic rating scales, and retention. In every case, we cannot reject the hypothesis of no difference using the full set of dependent variables as in our other analyses. Because the effects do not vary significantly by gender, we restrict attention to main-effects models for the rest of this paper.

A more stringent test of the effects of social/behavioral skills on academic outcomes is afforded by the use of student-level fixed effects models. These models remove all stable individual characteristics including any stable relationship between social/behavioral skills and academic outcomes from the calculation under the (strong) assumption that the effect of growth in social/behavioral skills does not vary by grade. There is a highly significant contemporaneous relationship between (relative) growth in social/behavioral skills and growth in cognitive skills. This is doubtless an overestimate of the causal effect of social/behavioral skills on academic growth; the contemporaneous relationship might be due to effects of academic skill growth on improved social/behavioral skills, or something else about the student (biological events, the death of a loved one, etc.) which causes both social/behavioral and cognitive measures to change in the same direction. On the other hand, the one-period lagged fixed effects models probably underestimate the effects of social/behavioral skills on academic outcomes (see footnote 13). The contemporaneous fixed effect estimates are larger than the IV contemporaneous effect estimates in fifth grade but generally smaller than the effect estimates for other grades. The fixed effects lagged estimates are between 40% and 2/3 the magnitude of the

contemporaneous estimates for social/behavioral skills, with the effect remaining significant for math outcomes but not for reading.

[Table 3 about here.]

Next, we address the total contribution of social and behavioral skills to the gender gaps in math and reading between fifth grade and the beginning of kindergarten, the end of first grade, and the end of third grade, respectively.[17] The results that we obtain are very similar regardless of whether we use OLS or IV regression. Based on the OLS results, we obtained as a point estimate that the female advantage in social development at the start of kindergarten accounts for 46% of the female advantage in reading at the end of fifth grade, and that the math gap would be 28% larger but for the female advantage in social/behavioral skills. If we instead base the calculations on IV regression estimates from the end of kindergarten, we obtain similar but slightly smaller contributions of social and behavioral skills to cognitive achievement (34% for reading, 21% for math). The closer in time we move to fifth grade, the smaller is the contribution of social and behavioral skills as more of this effect becomes indirect through its impact on intermediate academic outcomes. These decomposition results, to repeat, are based on OLS and IV estimates. The fixed effects models concern the evolution of within-student trajectories, but there is no clear upward trend in reading test scores for girls relative to boys between kindergarten and fifth grade. The math test score gender gap, in contrast, develops between the start of kindergarten and the end of fifth grade. The lagged and contemporaneous fixed effects results imply the math gap would be 21% and 38% larger respectively but for the female advantage in social/behavioral skills between the start of kindergarten and the end of fifth; these results bracket the OLS estimates for the same period of time.

[Table 4 about here.]

[17] In light of the general lack of significant interactions between gender and the other variables in our models, we computed the decomposition based on a pooled regression over both genders (Neumark, 1988; Jann, 2008).

Social/Behavioral Skills, Retention, and Teacher Academic Ratings

Measures of social and behavioral skills are strongly related to other outcomes besides test scores, and they statistically account for a considerable portion of gender differences on these outcomes. One such important outcome is retention in grade. In the ECLS-K, 16.4% of boys vs. 12.2% of girls have been retained by the start of 5th grade, with particularly large gender differences in retention for kindergarten and first grade. We estimated instrumental variables probit regressions where we instrumented the spring social/behavioral measures and test scores based on measures from earlier points in time.[18] These results (see Table 6) show that low social and behavioral scores strongly predict retention. Net of social/behavioral and academic scores, girls are significantly less likely to be retained in kindergarten than are boys. However, at the end of first grade, the gender difference in retention rates is entirely explained by gender differences in social/behavioral scores and in reading. By the end of third grade, the male disadvantage in retention has disappeared, but social and behavioral skills continue to strongly predict the probability of retention.

[Table 5 about here.]

[Table 6 about here.]

A second teacher-rated set of academic outcome measures are the academic rating scales (ARS). Unlike with reading scores, the gender gap in reading ARS scores continues to grow between kindergarten and fifth grade (from .22 to .32 standard deviations), and as with math test scores, the math ARS trend is favorable to boys, though it only brings them from a deficit of .15 standard deviations in kindergarten to parity in fifth grade (results not shown). Table 7 shows the average outcomes of girls and boys in the ECLS on standardized math and reading tests, on standardized teacher evaluations of math and reading competencies, and on their standardized social and behavioral skills as reported two years earlier by their third grade teachers. While

[18] For statistical reasons, we estimated these models using multiple imputation on unweighted samples. The results are very similar to what we obtain when we estimated these models with instrumental variables regression using weights, stratification, and clustering information.

fifth grade teacher evaluations are not the same as formal grades, the results in Table 7 mirror other results (Entwisle et al., 1997; Entwisle et al., 2007) in showing that the gender gaps in teacher evaluations of reading and math achievement are notably larger (in favor of girls) than are the gender gaps in reading and math test scores. Table 7 also shows predicted teacher fifth grade evaluations based on a set of background variables, fifth grade reading and math test scores, and the evaluations two years earlier of the student's social and behavioral skills.[19] Finally, Table 7 reports the predicted evaluations that boys would have if they had received the same average social/behavioral ratings as girls two years later. The gender gap in social and behavioral skills is large enough to explain almost the entire additional gender gap in teacher reading evaluations over reading test scores, and it also explains most of the difference between the considerable male advantage in math test scores and the virtual gender tie on teacher evaluations of mathematics performance.

[Table 7 about here.]

Discussion

Our results demonstrate that social and behavioral skills are an important resource for school success in elementary school, both as measured on cognitive tests and even more so by teacher evaluations. Girls have a considerable lead over boys in these skills, and they extend this lead further over the first six years of schooling. This female advantage in social and behavioral skills accounts for an important component of the gender academic advantage in elementary school. Other research shows that the female advantage in academic achievement persists into middle school, high school, and college, and may be the single most important factor underlying the significant lead that women have over men in rates of college completion (Buchmann and DiPrete, 2006). The reason for the growing gender gap may lie in changes over the past forty years in labor market opportunities for women, in changing life course risks for marriage

[19] These predictions were made using instrumental variables regression with lagged instruments for both test scores and social/behavioral skills.

and divorce, and in the changing connection between these risks and education. But given the current environment, the production of female educational advantage appears to begin at the very start of the school career, when girls and boys enter the school systems with average differences in social and behavioral skills that are larger than the differences we find between children who live in poverty and those who do not. Thus, while social and behavioral skills used to function like other skills in creating a life course advantage for children born to upper middle class households, they now have a double effect, of preserving advantage for one population even as they allow another historically disadvantaged group – women – to overtake men in the acquisition of the single most important resource in the stratification system of a modern industrial country, namely education.

Duncan et al. (2007) recently argued that early test scores have much bigger effects on subsequent test scores than do social and behavioral skills. We agree with this conclusion, but this does not undermine the importance of these skills for the size of the gender gap. The apparent tension between our conclusions and those of Duncan et al partly stems from our focus on gender instead of individual-level differences and partly (we believe) from the way they interpret coefficients. As noted earlier, Duncan et al. make a strong distinction between what they call "attention" skills and what they call "socioemotional" skills. They find that "ability to pay attention" effect are moderate in size but that the effects of "socioemotional skills" are rarely significant. However, the ECLS-K does not have a pure measure of "attention" skills as opposed to "socioemotional" skills. Instead, the "approaches to learning" scale consists of a series of questions about "the child's attentiveness, task persistence, eagerness to learn, learning independence, flexibility, and organization" and two other scales (self-control and interpersonal skills) jointly concern "respecting the property rights of others, controlling temper, accepting peer ideas for group activities, responding appropriately to pressure from peers, 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." Several of the items in "approaches to learning" do not involve

"ability to pay attention," and some items within the "approaches to learning" scale do involve "socioemotional skills," as do items on the self-control and interpersonal skills scales. Even "ability to pay attention" is partly determined by one's level of emotional self-regulation. As a statistical matter, we find that approaches to learning is correlated with the other two scales and so we prefer the two-dimensional solution that we used in our models. As a theoretical matter, it is important to disentangle the skills that allow some children to bring a mental organization, an eagerness to learn (including to please the teacher through the quality of one's work), a drive to follow instructions, an ability to participate effectively in class and (in the process) to "get along" with the teacher as well as with the other students in the classroom. This broad set of skills certainly involves more than "cognitive attention," but establishing the full set of dimensions that underlie this complex of skills will require more research with better data.[20]

Our results are consistent with those of Entwisle et al. (2007) in demonstrating that behavior plays a strong role in producing gender differences in educational outcomes. Our results differ from theirs in two important ways. First, while Entwisle et al. found that the gender gap in reading test scores emerged late in elementary school and is characteristic only of poor children, we find gender gaps in both reading and math test scores across the socioeconomic distribution that are present as early as the beginning of kindergarten and that do not vary by socioeconomic status. Second, while Entwisle et al. report that gender gaps in social and behavioral skills were limited to poor children, we find gaps between male and female social and behavioral skills across the socioeconomic spectrum. The difference between our results and theirs may be a function of the BSS study's focus on Baltimore, or of the earlier time period (the 1980s) in which the data were collected. Certainly the gender-specific link between class and educational attainment has varied enormously in the past sixty years (Buchmann and DiPrete, 2006), and this historically-varying relationship might manifest itself in elementary school as well as in late adolescence.

The social constructivist perspective largely sees unequal social/behavioral scores by race,

[20]In this context, it is unfortunate that the NCES is not able to release the items underlying the five social/behavioral scales to allow a more thorough study of this issue.

class, and gender as evidence of teacher favoritism, that schools have different expectations for girls and boys, and that –to again quote Entwisle et al. (2007) – girls "find the student role more compatible than boys do" (p. 134). Based on our results, we conclude that the social constructivist treatment of social/behavioral skill differences primarily as evidence of differences in teacher evaluation criteria – i.e., teacher bias – needs to be questioned. Only a very small (about 5%) of the variance in rated social/behavioral skills is between gender, and gender, race/ethnicity and poverty status together account for 10% or less of the variance. Moreover, the effects of social/behavioral skills on teacher ratings are statistically indistinguishable between boys and girls (see Table A4) and (as we find in supplementary analyses) between poverty and nonpoverty children in the ECLS-K. In other words, students with higher social and behavioral skills than others of their same gender, class, and race generally score higher on achievement tests and receive higher teacher academic evaluations. Social and behavioral skills are not simply a proxy for gender, class, or race differences, even if the school environment itself is shaped in part by cultural forces related to gender, class, and race. Even within groups defined by gender, class, and race, children who find the (socially constructed) student role to be highly "compatible" seem to be placed in a more advantageous position to learn in school relative to their peers.

Our results imply the need to distinguish analytically between three theoretically distinct aspects of the education and evaluational process:

1. Conduct-dependent grading. Conduct-dependent grading would occur when teachers give better grades to students whose behavior conforms better to their expectations, net of their academic performance. This corresponds to what other scholars have termed "teacher bias" (Alexander et al., 1987; Farkas et al., 1990).

2. "Well-rounded" (as opposed to narrow) academic evaluation criteria. Well-rounded criteria involve academic evaluation that gives greater credit to neatly done homework that is turned in on time, to class participation, and to other aspects of performance that may be differentially enhanced through better social/behavioral skills. Narrow evaluation, in

contrast, gives greater or total weight to performance on tests.

3. A socially-enhanced (as opposed to socially neutral) learning environment. A socially-enhanced learning environment is one where the classroom is organized in such a way that learning (even as measured narrowly by objective tests) is materially enhanced for those who behave in a way that is maximally compatible with the institutionalized student role. Such an environment may involve the teacher focusing more attention on students who display a greater eagerness to learn or greater affection for the teacher or a greater willingness to obey the classroom conduct rules. It could instead involve the use of group-learning environments where a willingness to participate actively or otherwise show engagement in the group produces enhanced learning.

All three of these aspects of the education process – the question of conduct-dependent grading, the breadth of the academic evaluation criteria, and the nature of the learning environment– will strengthen the correlation between a student's conduct and that student's grades. All three aspects, moreover, can involve feedback loops. When the feedback runs from teacher bias to lowered self-evaluation, reduced effort and subsequent lower academic performance, the loop involves what Farkas et al termed a "self-fulfilling prophecy" and which in the more recent literature has been termed a "stereotype threat" (Spencer et al., 1999). When the feedback instead runs through a heightened ability to perform in a "socially-enhanced learning environment" that uses "well-rounded" academic evaluation criteria, the mechanism is the "cumulative exposure" form of a cumulative advantage process (DiPrete and Eirich, 2006). All three of these aspects, finally, factor into what Farkas et al. (1990) referred to as the "double reward" for school attendance and work habits: social/behavioral skills can factor directly into the evaluation process because grading is conduct-dependent, indirectly because teachers grade based on "well-rounded" criteria, and indirectly because the typical classroom learning environment produces higher learning for students who have requisite conduct and work habits.

Teacher academic ratings are even more strongly affected by social and behavioral skills than are test scores. Because social and behavioral skills are also "evaluated" by the teachers

(quite literally so in the ECLS-K), it is possible that the teacher's evaluations of academic achievement are biased upward for students that they evaluate as being well adjusted to the school environment. However, it is equally possible that educationally committed and well-behaved students gain an advantage from the use of "well-rounded" evaluation criteria as well as from the better fit of their skills with the learning environment of the classroom.

This advantage can readily be seen in the criteria that teachers are asked to use when constructing their academic rating in the ECLS-K. Fifth grade teachers were specifically asked to rate reading achievement on criteria that include the presentation of oral reports using logically organized outlines, the ability to use vocal inflection, facial expression and appropriate pacing to increase listener interest, the use of multiple sources to gain information, the taking of good notes when collecting information for reports, the writing of well-organized reports, and the revising of writing to improve organization, increase clarity, and correct errors. These behaviors would readily seem to be more consistently produced by students who have higher levels of commitment to learning, better organization, stronger interpersonal skills, and better ability to accept feedback without getting angry. More direct evidence is supplied from the literature on elementary school grading, which makes clear that elementary teachers typically take into account student effort, the production of homework, and broader types of performance assessment than multiple choice tests when assigning grades (McMillan et al., 2002; Brookhart, 1993).

In our opinion, the "pure bias" explanation was more plausible when the conduct penalty centered on boys of lower socioeconomic status. But in the ECLS-K data, class plays a comparatively minor role in the link between social/behavioral skills and academic outcomes, and the gender gap in performance is readily apparent for middle class children as well as disadvantaged children. The ECLS-K data also reveal a social/behavioral skill gap between Asian and other students, and even (net of other factors) between students whose language at home was not English and other factors. The parsimonious story that middle-class female teachers tend to favor students like themselves (i.e., middle class girls) does not carry over well to the pattern of

differences in rated social/behavioral skills found in the ECLS-K. We do not deny the existence of teacher bias, but read the results to suggest that the link between social/behavioral skills and academic outcomes (particularly teacher academic evaluations) is flowing largely through a direct connection between social/behavioral skills and learning, and through the link between social/behavioral skills and more diligent production of homework and other classroom exercises that factor into the teacher's evaluation. The superior social and behavioral skills of girls would therefore produce a stronger female advantage in course grades determined through the use of "well-rounded" academic evaluative criteria. Indeed, Hoxby (2000) used exogenous variation in classroom composition to show that boys as well as girls gain on both math and reading achievement from having more girls in the classroom, while Whitmore (2005) obtains similar findings for first and second grades using data from the Tennessee Project STAR experiment. If the greater social and behavioral skills of girls produce spillover effects on standardized tests for both girls and boys, it would seem that the gains that students (whether boy or girl) with high social and behavioral skills produce for themselves are something more than pure bias in teacher evaluation.

Should teachers use "well-rounded" as opposed to "narrow" criteria when they evaluate students? In some historical contexts, evaluative criteria have clearly been manipulated in order to produce an intended result; thus, the Harvard, Yale, and Princeton modified their admissions criteria early in the 20th century to favor "well-rounded" applicants in order to reduce the number of Jewish and other ethnic students who would gain admission (Karabel, 2005). Evaluation criteria may instead be shaped either consciously or unconsciously to match anticipated skill-demands on students in future roles. Thus (as noted above), Duncan, Featherman, and Duncan (1972) argued that the content of IQ tests was designed to closely approximate the cognitive skills needed to perform well in high status occupations. Specialized (and highly gendered) evaluation criteria may have been applied in highly sex-segregated high school classes in cooking or home economics early in the 20th century. Indeed, to the extent that teachers believe that the teaching of social and behavioral skills – especially in early elementary grades

– is an important part of their job, then social and behavioral skills would be expected to play an important role in the overall evaluation process. These considerations suggest that the impact of social and behavioral skills on academic performance as well as the size of the gender gap in academic performance is historically variable, a product of the particular institutional environment of the time. This does not make the connections between social/behavioral skills and academics any less real, but it does point to the importance of better understanding how and why these connections exist.

Our results also highlight the subtle interconnections between inequalities based on social class, race, and gender. The linkage between class and gender differences found in the Baltimore Beginning School Study are largely absent in the ECLS-K. This would seem to be a puzzle in light of the apparent connection between class and the gender gap in educational attainment (King, 2000). However, Buchmann and DiPrete (2006) found that a large social class component to the gender-specific *trend* in attainment did not imply that the gender gap was equally strongly structured by class at every cohort. The ECLS-K results could imply that when cohorts born in the middle 1990s finish their schooling, we may see (if current trends continue) even a larger gender gap in educational attainment than we see at present, but relatively modest differences in this gender gap across the socioeconomic spectrum. Alternatively, it could be that a relatively small gender gap at the top of the socioeconomic spectrum will be maintained through other mechanisms than class-specific gender differences in the production of social and behavioral skills. Additional data from cohort studies at older ages are needed to answer this question.

The large and growing gender gap in education is almost certainly lowering the level of gender inequality in American society, but at the same time, it may indicate a deficient cohort-level supply of educational skills, which would both retard economic growth and heighten economic inequality. To the extent that stagnant levels of educational attainment by successive cohorts of American males are related to their distribution of social and behavioral as well as cognitive skills, the determination of strategies by which both schools and families can increase

the prevalence of these skills should be an important goal for sociological research.

[Table 8 about here.]

[Table 9 about here.]

[Table 10 about here.]

[Table 11 about here.]

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Table 1: Means of Dependent Variables, Kindergarten through Fifth Grade

	Boys	Girls	Poor[a]	Not poor	Black	White	Hispanic	Asian
Reading								
Beginning of K	-0.078	0.080	-0.491	0.129	-0.208	0.193	-0.417	0.236
End of K	-0.082	0.085	-0.472	0.124	-0.251	0.160	-0.294	0.258
1st	-0.075	0.077	-0.520	0.141	-0.284	0.179	-0.307	0.209
3rd	-0.073	0.075	-0.680	0.197	-0.430	0.237	-0.327	0.091
5th	-0.061	0.063	-0.668	0.183	-0.480	0.244	-0.318	0.098
Math								
Beginning of K	0.005	-0.005	-0.537	0.141	-0.373	0.249	-0.421	0.131
End of K	0.033	-0.034	-0.512	0.135	-0.436	0.245	-0.367	0.133
1st	0.065	-0.067	-0.547	0.148	-0.486	0.241	-0.299	0.045
3rd	0.112	-0.116	-0.629	0.182	-0.555	0.252	-0.278	0.135
5th	0.114	-0.118	-0.609	0.167	-0.625	0.243	-0.208	0.265
Social/Behavioral Factor								
Beginning of K	-0.203	0.210	-0.241	0.063	-0.249	0.083	-0.039	0.026
End of K	-0.199	0.205	-0.247	0.065	-0.291	0.091	-0.042	0.116
1st	-0.193	0.199	-0.203	0.055	-0.266	0.075	-0.004	0.107
3rd	-0.203	0.209	-0.281	0.082	-0.334	0.077	0.016	0.313
5th	-0.247	0.255	-0.276	0.076	-0.323	0.058	0.056	0.402
Approaches to Learning								
Beginning of K	-0.209	0.215	-0.270	0.071	-0.247	0.075	-0.032	0.161
End of K	-0.219	0.226	-0.270	0.071	-0.252	0.073	-0.037	0.223
1st	-0.193	0.198	-0.250	0.068	-0.292	0.080	-0.024	0.197
3rd	-0.241	0.248	-0.314	0.091	-0.280	0.070	-0.035	0.387
5th	-0.279	0.287	-0.330	0.090	-0.331	0.074	0.001	0.451
N	5430	5440	1970[b]	8880	1210	6270	2000	900

[a]Measured against the U.S. Census Poverty Thresholds
[b]Sample size as of the beginning of kindergarten

Table 2: OLS Estimates of the Relationship between Demographic Factors and Social/Behavioral Skills: K-5th Grade

	Social/Behavioral Skills					Approaches to Learning				
	Beginning of K	End of K	1st	3rd	5th	Beginning of K	End of K	1st	3rd	5th
Female	0.398***	0.408***	0.145***	0.177***	0.240***	0.235***	0.261***	0.333***	0.360***	0.384***
	(.038)	(.035)	(.031)	(.03)	(.039)	(.035)	(.038)	(.039)	(.04)	(.042)
Black	-0.097	-0.021	-0.080	0.002	-0.011	-0.019	-0.091	0.021	-0.050	-0.070
	(.058)	(.057)	(.052)	(.057)	(.06)	(.063)	(.082)	(.073)	(.059)	(.067)
Hispanic	0.109*	0.170**	-0.006	0.026	0.050	0.048	0.051	0.051	0.117*	0.055
	(.054)	(.053)	(.046)	(.047)	(.065)	(.066)	(.079)	(.064)	(.056)	(.053)
Asian	-0.052	0.082	0.048	0.059	-0.036	0.002	0.170*	0.212**	0.208***	0.184**
	(.063)	(.059)	(.062)	(.049)	(.076)	(.076)	(.076)	(.063)	(.059)	(.057)
Home language is not English	-0.000	0.063	0.034	0.086	0.133*	0.129*	0.111	0.117	0.081	0.120*
	(.07)	(.069)	(.057)	(.047)	(.058)	(.059)	(.075)	(.064)	(.058)	(.054)
SES	0.036	0.015	-0.002	-0.017	0.046*	0.017	0.081**	0.093**	0.088**	0.075**
	(.021)	(.021)	(.015)	(.016)	(.021)	(.019)	(.024)	(.024)	(.025)	(.023)
No Biological Father Present	-0.191*	-0.150*	-0.059	0.004	-0.120	-0.127*	-0.160*	-0.147	-0.211**	-0.138
	(.078)	(.068)	(.059)	(.049)	(.073)	(.058)	(.066)	(.07)	(.072)	(.068)
No Father Present	0.063	0.035	-0.046	-0.103	0.001	-0.026	0.015	0.028	0.144	0.072
	(.085)	(.079)	(.066)	(.059)	(.078)	(.06)	(.068)	(.076)	(.076)	(.066)
Age	0.042*	0.063**	0.014	0.008	0.017	0.012	0.001	-0.004	0.001	-0.010
	(.019)	(.02)	(.015)	(.015)	(.017)	(.017)	(.018)	(.021)	(.019)	(.015)
Social/behavior factor (lagged)			0.625***		0.393***		0.393***		0.386***	
			(.018)		(.025)		(.022)		(.025)	
Approaches to Learning residual (lagged)				0.616***		0.371***		0.407***		0.414***
				(.016)		(.02)		(.025)		(.025)
Reading[a]	0.112***	0.114***	0.020	0.054**	0.027	0.044	0.060	0.081*	0.031	0.043
	(.026)	(.028)	(.021)	(.021)	(.028)	(.026)	(.03)	(.034)	(.033)	(.03)
Math	0.179***	0.312***	0.066**	0.127***	0.129***	0.213***	0.060*	0.105***	0.089**	0.111***
	(.031)	(.031)	(.022)	(.024)	(.029)	(.028)	(.022)	(.023)	(.027)	(.026)
Constant	-0.150***	-0.198***	-0.033	-0.082**	-0.099*	-0.087*	-0.087*	-0.151***	-0.162***	-0.173***
	(.037)	(.035)	(.029)	(.028)	(.036)	(.034)	(.037)	(.034)	(.039)	(.036)

[a]Reading and Math are measured contemporaneously for Beginning of K and lagged one period for other panels.

Table 3: Estimated Effects of the Social/Behavioral Factor and the Approaches to Learning Residual on Reading and Math Test Scores, Using Four Different Estimation Methods

	OLS		IV contemporaneous		Fixed Effects Contemporaneous		Fixed Effects Lagged	
	Reading	Math	Reading	Math	Reading	Math	Reading	Math
	End of kindergarten				(same for all panels)			
Social/Behavioral	0.029*	0.072***	0.044*	0.106***	.039***	.032***	.016	.021*
Learning Residual	0.019	0.051***	0.038	0.099***	.045***	.022*	.009	.009
	End of First Grade							
Social/Behavioral	0.047**	0.067***	0.057	0.106**	.039***	.032***	.016	.021*
Learning Residual	0.082***	0.094***	0.174**	0.228***	.045***	.022*	.009	.009
	End of Third Grade							
Social/Behavioral	0.073***	0.066***	0.119***	0.047	.039***	.032***	.016	.021*
Learning Residual	0.054***	0.080***	0.107*	0.135*	.045***	.022*	.009	.009
	End of Fifth Grade							
Social/Behavioral	0.034***	0.032**	0.026*	0.032**	.039***	.032***	.016	.021*
Learning Residual	0.026*	0.032**	0.043	0.094*	.045***	.022*	.009	.009

Table 4: Estimated Contribution of the Gender Gap in Social/Behavioral Skills to the Gender Gap in Reading and Math Test Scores

		OLS				IV			
		Start K-5th Grade		1st-5th Grade		End K-5th Grade		1st-5th Grade	
		Reading	Math	Reading	Math	Reading	Math	Reading	Math
Total Mean Difference (Male-Female)		-0.12	0.23	-0.12	0.23	-0.12	0.23	-0.12	0.23
Explained	Baseline	-0.001	-0.002	0.001	-0.000	-.003	-0.004	0.001	-0.004
	Social	-0.045***	-0.048***	-0.034***	-0.035***	-0.030**	-0.028***	-0.026**	-0.034***
	Learn	-0.012**	-0.018***	-0.010**	-0.014**	-0.012*	-0.020***	-0.009	-0.013*
	Read	-.024**	-0.008	-0.067***	-0.021**	-0.014*	.012	-0.043**	-0.0004
	Math	.004	.005	.030**	.070**	-.020	-.030	-.002	-.003
Proportion of Difference Explained By Social/Behavioral Skills		0.46	-0.28	0.36	-0.21	0.34	-0.21	.28	-0.20

Note: A positive sign in "proportion of difference explained" means that the female lead would be reduced by the indicated amount if social/behavioral skills were equalized across genders. A negative sign means that the male lead would be larger by the indicated amount if social/behavioral skills were equalized across genders.

Table 5: Estimated Effects of the Social/Behavioral Factor and the Approaches to Learning Residual on Reading and Math Academic Rating Scales, Using Four Different Estimation Methods

	OLS		IV contemporaneous		Fixed Effects Contemporaneous		Fixed Effects Lagged	
	Reading	Math	Reading	Math	Reading	Math	Reading	Math
	End of kindergarten				(same for all panels)			
Social/Behavioral	.213***	.246***	.296***	.349***	.297***	.285***	.054***	.041*
Learning Residual	.163***	.167***	.289***	.294***	.198***	.165***	.026*	.016
	End of First Grade							
Social/Behavioral	.116***	.112***	.221**	.199**	.297***	.285***	.054***	.041*
Learning Residual	.146***	.128***	.405***	.337**	.198***	.165***	.026*	.016
	End of Third Grade							
Social/Behavioral	.132***	.098**	.177***	.113	.297***	.285***	.054***	.041*
Learning Residual	.136***	.091***	.435***	.283*	.198***	.165***	.026*	.016
	End of Fifth Grade							
Social/Behavioral	.168***	.115***	.325***	.210***	.297***	.285***	.054***	.041*
Learning Residual	.121***	.118***	.340***	.318**	.198***	.165***	.026*	.016

Table 6: Probit Regression of the Probability of Retention at the End of Kindergarten, First Grade, and Third Grade, Conditional on Not having been Previously Retained.

	Kindergarten	First Grade	Third Grade
Social/Behavioral Skills	0.917	0.736***	0.790*
	(.047)	(.058)	(.082)
Approaches to Learning Residual	0.711***	0.475***	0.586***
	(.046)	(.052)	(.078)
Math Test Score	0.736*	0.799	0.767
	(.096)	(.12)	(.13)
Reading Test Score	0.844	0.509***	0.880
	(.11)	(.07)	(.17)
Female	0.750***	1.027	0.993
	(.052)	(.073)	(.1)
Black	0.684**	1.240*	1.265*
	(.067)	(.11)	(.14)
Hispanic	0.613***	0.901	0.884
	(.059)	(.08)	(.1)
Asian	0.850	0.783	0.671
	(.1)	(.11)	(.14)
Home Language Not English	0.898	0.866	0.975
	(.1)	(.087)	(.13)
SES	0.999	0.954	0.833***
	(.033)	(.037)	(.044)
No Biological Father Present	1.033	1.052	0.923
	(.11)	(.096)	(.12)
No Father Present	1.024	0.906	1.158
	(.12)	(.089)	(.17)
Age	0.789***	0.879***	0.914*
	(.025)	(.024)	(.033)
N	11300	10920	10330

Social/behavioral skills and academic test scores are measured as of the spring of the indicated year and are instrumented with lagged social/behavioral skills and lagged academic test scores.
Exponentiated coefficients; Standard errors in parentheses
* $p<0.05$, ** $p< 0.01$ *** $p < 0.001$

Table 7: Mean Differences between Girls and Boys on Fifth Grade Academic and Third Grade Social Outcomes

Variable		Females	Males	Male - Female
5th Grade Math Test Scores		-.118 (.041)	.114 (.036)	.232
5th Grade Reading Test Scores		.063 (.039)	-.061 (.038)	-.124
5th Grade Teacher Math Evaluations		.002 (.035)	-.002 (.032)	-.004
5th Grade Teacher Reading Evaluations		.160 (.036)	-.115 (.033)	-.275
3rd Grade Social Scale		.209 (.034)	-.203 (.030)	-.412
3rd Grade Learning Residual		.133 (.031)	-.129 (.033)	-.262
5th Grade Predicted Math Evaluation with Sample Means on Covariates	(Males with Own Means on Social /Behavioral Variables)	.104	.106	.002
	(Males with Female Means on Social/Behavioral Variables)		.243	.139
5th Grade Predicted Reading Evaluation with Sample Means on Covariates	(Males with Own Means on Social /Behavioral Variables)	.242	-.052	-.294
	(Males with Female Means on Social/Behavioral Variables)		.129	-0.113

Note: Covariates in the predicted evaluation models are spring reading and test scores, gender, race, age, whether ever retained a grade, SES, whether biological father lives in the household, whether any father lives in the household, third grade social scale and third grade learning-residual scale. The math and reading scores and the social and learning residual scores are treated as endogenous and all further lagged math and reading test scores and social and learning residual scores are used as instrumental variables.

Table A1. Estimates of Social/Behavioral Skills Measures as of the Start of Kindergarten on Gender and Poverty Status

	Social/Behavioral Factor	Approaches to Learning
Black	-0.098	-0.015
	(.058)	(.057)
Hispanic	0.107*	0.175***
	(.054)	(.053)
Asian	-0.045	0.085
	(.062)	(.059)
Home Language not English	0.003	0.075
	(.07)	(.07)
Female	0.398***	0.404***
	(.041)	(.039)
Poverty	-0.098	-0.109
	(.072)	(.079)
Female*Poverty	0.011	0.034
	(.1)	(.11)
No Biological Father Present	-0.192*	-0.147*
	(.079)	(.068)
No Father Present	0.074	0.049
	(.085)	(.079)
Age	0.041*	0.064**
	(.019)	(.02)
Reading Test Score	0.116***	0.115***
	(.027)	(.028)
Math Test Score	0.183***	0.311***
	(.03)	(.031)
Constant	-0.134***	-0.185***
	(.038)	(.036)
N	10870	10870

Standard Errors are in Parentheses. *=p < .05; ** = p < .01; ***=p < .001

Appendix Table A2. Gender Gap in Reading and Math Test Scores and Social Behavioral Skills, by Poverty Status

	Not Poor			Poor			Difference
Reading	Boys	Girls	Gap	Boys	Girls	Gap	
Start K	0.027	0.239	-0.213	-0.514	-0.471	-0.043	*
End K	0.022	0.234	-0.212	-0.519	-0.430	-0.088	No
End 1st	0.065	0.222	-0.157	-0.632	-0.418	-0.214	No
End 3rd	0.107	0.293	-0.187	-0.738	-0.626	-0.111	No
End 5th	0.124	0.246	-0.122	-0.769	-0.573	-0.196	No
Math							
Start K	0.127	0.156	-0.029	-0.506	-0.565	0.059	No
End K	0.146	0.123	0.023	-0.442	-0.575	0.133	No
End 1st	0.215	0.077	0.138	-0.532	-0.560	0.029	No
End 3rd	0.287	0.071	0.216	-0.536	-0.714	0.178	No
End 5th	0.274	0.054	0.220	-0.498	-0.715	0.217	No
Social/Behavioral Factor							
Start K	-0.146	0.288	-0.434	-0.445	-0.061	-0.384	No
End K	-0.137	0.282	-0.420	-0.456	-0.062	-0.394	No
End 1st	-0.131	0.254	-0.386	-0.438	0.011	-0.450	No
End 3rd	-0.138	0.315	-0.452	-0.445	-0.130	-0.315	No
End 5th	-0.177	0.341	-0.518	-0.514	-0.047	-0.467	No
Approaches to Learning							
Start K	-0.142	0.300	-0.442	-0.488	-0.077	-0.410	No
End K	-0.148	0.306	-0.454	-0.516	-0.052	-0.464	No
End 1st	-0.125	0.273	-0.399	-0.460	-0.057	-0.403	No
End 3rd	-0.167	0.366	-0.533	-0.513	-0.132	-0.382	No
End 5th	-0.192	0.387	-0.580	-0.610	-0.061	-0.549	No

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

Appendix Table A3 OLS Estimates of the Effects of Social/Behavioral Skills on Academic Achievement: K-5th Grade

	Reading					Math				
	Beg. of K	End K	1st	3rd	5th	Beg. of K	End K	1st	3rd	5th
Female	0.050	0.041	0.021	0.059*	0.026	-0.130***	-0.116***	-0.154***	-0.220***	-0.108***
	(.033)	(.023)	(.028)	(.026)	(.021)	(.032)	(.034)	(.026)	(.023)	(.02)
African-American	0.019	0.011	-0.018	-0.123*	-0.104*	-0.167***	-0.142***	-0.165***	-0.187***	-0.153**
	(.047)	(.043)	(.044)	(.047)	(.041)	(.048)	(.04)	(.038)	(.049)	(.044)
Hispanic	-0.127*	0.085	-0.021	-0.047	-0.038	-0.183***	-0.029	-0.039	-0.049	0.039
	(.057)	(.046)	(.044)	(.035)	(.029)	(.048)	(.04)	(.041)	(.049)	(.034)
Asian	0.212*	0.068	0.031	-0.072	-0.030	0.057	-0.007	-0.122*	-0.009	0.104**
	(.079)	(.046)	(.045)	(.044)	(.038)	(.058)	(.057)	(.047)	(.047)	(.033)
Home language not English	-0.260***	0.018	-0.109*	-0.095*	-0.034	-0.230***	-0.036	-0.017	0.001	0.008
	(.065)	(.047)	(.048)	(.041)	(.034)	(.048)	(.035)	(.038)	(.037)	(.036)
SES	0.329***	0.009	0.062***	0.140***	0.058***	0.319***	0.019	0.092***	0.118***	0.050***
	(.022)	(.014)	(.015)	(.013)	(.011)	(.019)	(.013)	(.014)	(.015)	(.01)
No Biological Father Present	-0.150***	0.016	-0.027	-0.033	0.024	-0.134**	-0.022	-0.002	-0.047	-0.032
	(.04)	(.04)	(.049)	(.039)	(.036)	(.048)	(.037)	(.041)	(.042)	(.034)
No Father Present	0.003	-0.083	-0.027	0.004	0.043	-0.041	-0.039	-0.005	0.028	0.039
	(.047)	(.042)	(.056)	(.05)	(.041)	(.054)	(.043)	(.044)	(.052)	(.044)
Age	0.154***	-0.003	-0.010	-0.014	-0.024*	0.204***	0.047**	0.002	-0.025*	-0.043***
	(.021)	(.012)	(.012)	(.013)	(.0094)	(.019)	(.014)	(.011)	(.012)	(.009)
Social/behavior factor[a]	0.193***	0.029*	0.047**	0.073***	0.034***	0.209***	0.072***	0.067***	0.066***	0.032**
	(.017)	(.011)	(.015)	(.015)	(.0099)	(.017)	(.012)	(.013)	(.013)	(.011)
Learning residual	0.178***	0.019	0.082***	0.054***	0.026*	0.243***	0.051***	0.094***	0.080***	0.032**
	(.016)	(.011)	(.017)	(.013)	(.011)	(.015)	(.011)	(.013)	(.016)	(.011)
Reading (t-1)		0.711***	0.545***	0.477***	0.698***		0.149*	0.041*	0.151***	0.118***
		(.022)	(.025)	(.018)	(.016)		(.061)	(.016)	(.019)	(.016)
Math (t-1)		0.148***	0.184***	0.194***	0.138***		0.642***	0.636***	0.543***	0.727***
		(.019)	(.02)	(.018)	(.016)		(.047)	(.018)	(.015)	(.015)
Retained			-0.616***	-0.243***	-0.132**			-0.459***	-0.163**	-0.031
			(.046)	(.057)	(.039)			(.069)	(.055)	(.036)
Constant	0.071*	-0.028	0.049	0.052	0.015	0.206***	0.106**	0.135***	0.175***	.072***

[a]The social/behavioral skills measures are contemporaneously measured for the beginning of K panel, and are lagged one period for the other panels.

Appendix Table A4. OLS Estimates of Gender Differences in the Effects of Social/Behavioral Skills on Academic Outcomes.

	Social/Behavioral Factor				Approaches to Learning Residual			
	Test Score		Teacher Rating		Test Score		Teacher Rating	
	Main Effect	Male-Female	Main Effect	Male-Female	Main Effect	Male-Female	Main Effect	Male-Female
	Reading							
Beginning of K	0.175***	-0.042	0.271***	-0.000	0.153***	-0.053	0.217***	-0.009
End of K	0.027	-0.006	0.220***	0.017	0.021	0.002	0.174***	0.024
End of 1st Grade	0.037*	-0.024	0.101**	-0.032	0.047*	-0.076**	0.139***	-0.016
End of 3rd Grade	0.058**	-0.033	0.123***	-0.018	0.052*	-0.005	0.138***	0.005
End of 5th Grade	0.045**	0.023	0.174***	0.012	0.028*	0.004	0.106***	-0.033
	Math							
Beginning of K	0.189***	-0.045	0.289***	-0.014	0.231***	-0.026	0.204***	0.012
End of K	0.084***	0.028	0.270***	0.052	0.060**	0.019	0.163***	-0.007
End of 1st Grade	0.060**	-0.016	0.080*	-0.068	0.081***	-0.029	0.134**	0.011
End of 3rd Grade	0.061**	-0.011	0.082*	-0.033	0.068**	-0.027	0.089**	-0.004
End of 5th Grade	0.018	-0.031	0.152***	0.079	0.019	-0.030	0.134**	0.033
	Retention							
End of K	-0.076	0.207			-0.165*	0.103		
End of 1st Grade	-0.169*	0.067			-0.154	0.111		
End of 3rd Grade	-0.108	0.099			-0.225*	-0.009		

Note: Control Variables are Identical with Models presented in Table A3.
The Main Effect is Specified with Female as the Reference Group.
*=p < .05; ** = p < .01; *** = p < .001

Figure 1: Covariance Structure Model for the Effects of Social/Behavioral Skills on Reading Test Scores