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The Contributions of Hard Skills and Socio-emotional Behavior to School Readiness

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Abstract

Children enter kindergarten with disparate abilities in reading and mathematics, capabilities for sitting still and making friends, mental health, and inclinations for aggressive behavior. The relative power of these characteristics to predict later school achievement is the subject of this paper. Data from the Early Childhood Longitudinal Study–Kindergarten Cohort are used to relate school-entry test scores on math, reading and general knowledge as well as both teacher and parent reports of self-control, sociability, mental health, and aggressive behavior to reading and mathematics achievement scores at the end of first grade. We also model the power of *increments* in these skills and behaviors across kindergarten to predict test scores at the end of first grade. We find much more predictive power for the "hard" skills than for the collection of "soft" skills both for the overall sample and for subgroups defined by race/ethnicity, socioeconomic status, and gender. By far the most powerful avenue for boosting first grade test scores appears to be improving the basic skills of low-achieving children upon entry into kindergarten.

I. Introduction

There is little agreement about what constitutes school readiness. A 1991 survey of kindergarten teachers found that when asked to name the most important determinants of readiness to learn, the most cited attributes were: being physically healthy, rested, and well nourished; being able to communicate needs, wants, and thoughts verbally; being enthusiastic and curious in approaching new activities; taking turns; and knowing how to sit still and pay attention (Lewit & Baker, 1995; National Center for Educational Statistics, 1993). Only 10 percent of kindergarten teachers thought that it was important that children starting school know the alphabet.

In contrast, President George W. Bush endorsed skill oriented Head Start reforms in 2002 with the words, "On the first day of school, children need to know letters and numbers. They need a strong vocabulary.... These are the building blocks of learning, and this nation must provide them."[1] Supporting the Bush position is a report from the National Research Council's Committee on the Prevention of Reading Difficulties in Young Children, which argued for the importance of the acquisition of certain pre-literacy skills before kindergarten and urged that all children be provided access to early childhood environments that promote language and literacy growth (National Research Council, 1998).

Given the increasing emphasis on school readiness, and the potential for preschool programs to promote school readiness skills, it is essential to understand what child abilities and behaviors at school entry are most likely to lead to later school success and adult achievement. We use data from a large and representative sample of kindergarteners -- the Early Childhood Longitudinal Study-Kindergarten Cohort – to estimate the relative power of both "hard" and "soft" skills to predict later school achievement. The survey tested the academic skills of entering kindergarteners and at the same time asked both teachers and parents about a host of children's socioemotional behaviors. We relate these reports to the children's subsequent reading and mathematics achievement. We begin with a review of the literature, followed in Section III by a description of our data source and its measures. Section IV presents our results, followed in Section V with a discussion and conclusion.

[1] http://www.edweek/we/newstory.crm?slug=30bush.h21

II. Background

In 1990, the National Governors Association along with the President listed as its first goal for education, "By the year 2000, all children in America will start school ready to learn"(Action Team on School Readiness, 1992). At the time, the concept of school readiness was poorly defined (Kagan, 1990; Crnic & Lamberty, 1994). Work since then has suggested five important elements of children's school readiness: cognition and general knowledge; approaches to learning; emotional well-being and social competence; communicative skills; and health and physical development (Kagan, Moore, & Bredekamp, 1995), although the relative importance of these elements has not been established.

Our own empirical work focuses on the importance to school success of: (i) school-entry cognitive skills as measured by test scores and (ii) socioemotional behaviors such as self-control, interpersonal skills, and both "internalizing" and "externalizing" behavior problems. It draws from a diverse array of literatures.

Links between early and later cognitive skills are documented in a broad literature on the "continuity" in such skills across time. Our interest is in going beyond correlations to understand to what extent, for example, early reading skills are causal building blocks for eventual reading proficiency. But we also have an interest in whether early reading skills "cross over" to benefit mathematics achievement, for example by enabling children to better understand word problems. The teacher survey results suggest a more profound form of "crossover" — from socioemotional behaviors to reading and math achievement. In this case the literature is quite sparse, since most longitudinal research on children's capabilities has been conducted *within* domain, linking, for example, early to later conduct disorder rather than early conduct disorder to later achievement.

In concentrating on school-entry skills, we ignore a large literature linking adolescent skills and behaviors to adult achievements. Research on labor market outcomes suggests that both cognitive and noncognitive skills developed by adolescence are important predictors of earnings and occupational attainment (Jencks et al., 1979; Farkas, 2003; Bowles, Gintis, & Osborne, 2001; Caneiro and Heckman, 2003), although there is little agreement on what noncognitive skills matter the most.

Continuity in cognitive skills: causal or spurious? Theory and evidence from psychology suggest that there is considerable continuity in cognitive skills across time. Early IQ test scores are highly correlated with later test scores, particularly when "early" is defined around age 6 (McCall, Applebaum, and Hogarty, 1973). In their meta-analysis of early-grade longitudinal studies, La Paro and Pianta (2000) report mean correlations of .43 in academic measures from preschool to either kindergarten or first grade and of .48 for academic measures between kindergarten and first or second

grade. Drawing national data from the Children of the Longitudinal Survey of Youth, Kowaleski-Jones and Duncan (1999) report that correlations between ages 6-7 and 12-13 were .54 and .51 for boys' and girls' respective PIAT reading scores and .43 and .53 for PIAT math scores.

Cross-time correlations in cognitive skills could reflect either causal or spurious effects. A causal story would be one in which achievement at older ages is the product of a sequential process of skill acquisition, with early-stage achievement being a causal prerequisite for later achievement. On the other hand, it could be that genetic endowments of cognitive skills are omnipotent and correlations observed among test scores at different ages are the spurious reflection of these unchanging endowments. In the first, but not second, case a cognitive skills intervention would likely have lasting impacts on achievement. Of course, both causal and spurious processes are likely to be at work but the concern of this paper is with the causal impacts of early achievement and of increments to that achievement on later academic success.

Continuity and crossover in socioemotional behaviors. Continuity in socioemotional domains is less certain. La Paro and Pianta (2000) report mean correlations of about .30 social/behavioral measures from preschool to either kindergarten or first grade, which is about one-third less than mean correlations for academic measures. In terms of behavior problems, Kowaleski-Jones and Duncan (1999) estimate that age 6-7 to age 12-13 correlations in a composite behavior problems index (.38 for boys and .43 for girls), which are only slightly less than achievement correlations. Caspi (2000) uses data from the Dunedon longitudinal study to classify children at age 3 into temperament groups. He finds that undercontrolled 3-year-olds grew up to be impulsive, unreliable and antisocial, while inhibited 3-year-olds were more likely to be unassertive and depressed.

Personality psychologists find considerable continuity in the 'big five' personality traits: neuroticism, extraversion, openness, agreeableness and conscientiousness (Costa & McRae, 1994), at least from early adulthood through the rest of the life course. In their meta-analysis of personality trait consistency, Roberts and DelVecchio (2000) find that while traits are consistent over time, consistency increases with age. Arguing against lock-step continuity, Moffitt (1993) identifies two distinct categories of antisocial behavior -- adolescent-limited and life course persistent. While a small proportion of individuals exhibit antisocial behaviors throughout the life course, the majority of people who behave antisocially experience a more temporary involvement in antisocial activities, typically during adolescence. Thus, the development and persistence of some behavioral aspects of noncognitive skills may be more episodic than continuous for some children.

Given that teachers emphasize the importance of emotional, social and other noncognitive skills for school readiness, it might be expected that early socioemotional behaviors have "cross-over" effects on later achievement outcomes. The preferred approach to estimating linkages between early socio-emotional behavior and later achievement is to ask whether interventions directed toward changing behavior have a beneficial effect on subsequent school achievement. Very few random-assignment behavioral interventions estimate impacts on academic outcomes. An exception is Dolan et al. (1993), who report results from a behavioral intervention targeted to both aggressive and shy behaviors among first graders. A random-assignment evaluation showed short-run impacts on both teacher and peer reports of aggressive and shy behavior, but no cross-over impacts on reading achievement. They also test a reading intervention and find within-domain impacts on reading achievement but no cross-over effects on behavior.[2]

[2] A comprehensive approach to addressing conduct problems identified in first grade, the Fast Track prevention program concentrated its resources on the first two years of elementary school, and adopted a random assignment research design (Conduct Problems Prevention Research Group, 1992).

Hinshaw (1992) reviews the nonexperimental literature on links between early externalizing behavior problems and subsequent academic underachievement and notes that while a number of studies have found significant correlations, few have controlled for baseline achievement. This raises the possibility that the correlations are the spurious result of SES, other family factors (psychopathology, coercive parenting, maternal depression), or child speech and language difficulties.

The most noteworthy addition to the nonexperimental literature since the Hinshaw review is based on the Beginning School Study (BSS), which began following a cohort of 790 first-grade Baltimore public school children in the fall of 1982. Alexander, Entwisle and Horsey (1997) use the BSS to examine the effect of first grade school performance on high school dropout. Their scale of noncognitive skills, labeled 'engagement behaviors,' includes items that measure student work habits and teacher ratings of externalizing behaviors and adaptability. Cognitive measures include achievement test scores and grades. Models include a number of additional school-related and demographic controls. They find that the engagement measure and grades are equally predictive of high school dropout. Alexander, Entwisle and Dauber (1993) estimate both short (end of first grade) and longer term (end of fourth grade) effects of three noncognitive skill clusters -- Interest-Participation, Attention Span-Restlessness and Cooperation-Compliance. They find that the first two are associated with short term achievement test score gains as well as grades in both the short and long term. Interestingly, they also find that the effects of noncognitive skills on achievement test scores appear larger in longitudinal than in cross-sectional models.

Our own analyses parallel the BSS studies, although they have the advantage of being drawn from a large and nationally representative sample of a recent cohort of kindergarteners. Another advantage is that we are able to examine the effects of cognitive and noncognitive skills measured at kindergarten entry as opposed to fall of first grade, when the vast majority of children have already been exposed to some schooling.

III. Models

We view school achievement as a product of the "hard" and "soft" skills children bring to kindergarten, children's own endowments of ability and temperament, and the enduring advantages and disadvantages of family background characteristics such as socioeconomic status:

$$(1) \quad ACH_{i1st} = a_1 + ß_1\, HARDSKILL_{iFK} + ß_2\, SOFTSKILL_{iFK} + ß_3\, FAM_i + ß_4\, CHILD_i + e_{it}$$

where ACH_{i1st} is the math or reading achievement of the i^{th} child at the end of first grade; $HARDSKILL_{iFK}$ is the collection of math, reading and general knowledge skills that child i has acquired at the point of entry into kindergarten as assessed by achievement tests in the fall of the kindergarten year; $SOFTSKILL_{iK}$ is the collection of social, regulatory and behavioral characteristics that child i has acquired as of the fall of the kindergarten year as assessed by both parents and teachers; and FAM_i and $CHILD_i$ are sets of family background and child characteristics that are likely to exert enduring influences on child achievement up to and after the point of school entry.[3]

However, the Fast Track intervention in grade 1 included direct tutoring in reading skills so it is not possible to disentangle impacts of the social-emotional and academic components of the program (Conduct Problems Prevention Research Group, 2002).

[3] We have intentionally omitted from this model influences between the start of kindergarten and the time of the achievement tests (the end of first grade in our data). Prominent examples include characteristics of schools, neighborhoods and family conditions that children are exposed to in their

Our interest is in estimating $ß_1$ and $ß_2$, which, in the absence of omitted-variable bias, can be interpreted as the causal impact of school-entry skills on subsequent achievement. Lacking experimental manipulation of these skills and behaviors, we are forced to rely on longitudinal models for estimating these impacts and adopt two strategies for doing so.

Our first strategy for unbiased estimation of $ß_1$ and $ß_2$ is to estimate an equation of the form of equation (1), including as many measures of FAM and CHILD as possible. Our data set provides us with nearly 100 such control variables, most of which measure family circumstances between birth and entry into kindergarten. Of course, one can never be certain that even large numbers of control variables capture all of the important dimensions of FAM and CHILD, which leaves open the possibility that this approach will still produce biased estimates of $ß_1$ and $ß_2$.

Our second strategy for estimating $ß_1$ and $ß_2$ is to relate *changes* in HARDSKILL and SOFTSKILL over the course of kindergarten to subsequent achievement. We do so with the following estimation model:

(2) $ACH_{i1st} = c_1 + \gamma_1 HARDSKILL_{iSK} + \gamma_2 SOFTSKILL_{iSK} + \gamma_3 HARDSKILL_{iFK} + \gamma_4 SOFTSKILL_{iFK} + \gamma_5 FAM_i + \gamma_6 CHILD_i + \varepsilon_{it}$

with ACH_{i1st}, $HARDSKILL_{iFK}$, $SOFTSKILL_{iFK}$, FAM_i and $CHILD_i$ defined as before. $HARDSKILL_{iSK}$ is the collection of math, reading and general knowledge skills that child i has acquired in the *spring* of kindergarten and $SOFTSKILL_{iSK}$ is the collection of social, regulatory and behavioral skills that child i has acquired as of the *spring* of the kindergarten year. With measures of HARDSKILL and SOFTSKILL at both the beginning and end of kindergarten in the equation, the coefficients on the end-of-kindergarten assessments (γ_1 and γ_2) amount to estimates of the impact of *changes* in these skills over the course of kindergarten on end-of-first grade reading and math scores.[4]

The more general logic of this change model is that if a skill or behavior affects long-run achievement, then short-run changes in that skill or behavior, controlling for starting position, ought to be predictive of eventual achievement. Indeed, much of the Head Start debate has been framed in those terms – e.g., Head Start should augment skill X because that will be beneficial for success in school. Our data do not measure skill augmentation in the preschool period, but they do provide a measure of

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early school years. We omit these since we seek a "reduced form" estimate of the role of skills and behaviors that constitute school readiness. Schools undoubtedly account for many of the achievement gains that students enjoy, and it is important to structure school experiences so that they reinforce or compensate for skills children bring with them into school. Accounting for the paths by which school, neighborhood, family and child-specific factors influence school achievement is undoubtedly important, but is beyond the scope of this paper. Leaving them out of the analysis does not bias our estimates of the total effects of kindergarten-entry skills and behaviors on subsequent achievement.

[4] Equation (2) is equivalent to a formulation in which ACH is a function of changes in and beginning levels of HARDSKILL and SOFTSKILL:

(3) $ACH_{i1st} = d_1 + \delta_1 \Delta HARDSKILL_i + \delta_2 \Delta SOFTSKILL_i + \delta_3 HARDSKILL_{iFK} + \delta_4 SOFTSKILL_{iFK} + \delta_5 FAM_i + \delta_6 CHILD_i + \eta_{it}$

with Δ indicating a difference between the beginning and end of kindergarten. Algebraic manipulation shows that the δ_1 and δ_2 parameters in (3) are identical to the γ_1 and γ_2 parameters of equation (2). As with Jencks and Phillips (1999), we prefer (2) to (3), since it is more amenable to the reliability adjustments we make.

augmentation over the course of kindergarten. If the latter matters, then perhaps the former does as well.

IV. Data

The Early Childhood Longitudinal Study-Kindergarten (ECLS-K) follows a nationally representative sample of 21,260 children who were in kindergarten in 1998-99. The study intends to collect six waves of data at the following time points: fall and spring of kindergarten and first grade, and spring of third and fifth grades. Only kindergarten and first grade data were available to us. Data are collected from multiple sources including direct cognitive assessments of children and interviews with parents and surveys of teachers and school administrators. The ECLS-K focuses on children's early school experiences and collects extensive data at the child, family, classroom and school levels.

The current study uses data from three waves of ECLS-K data collection: fall of kindergarten in 1998, spring of kindergarten in 1999 and spring of first grade in 2000. As described in Table 1, cognitive tests were administered in the fall and spring of kindergarten, and in the spring of first grade. Parent and teacher data were collected in the fall and spring of kindergarten.[5]

Although baseline data collection included over 21,000 children, our analyses include between 12,000 and 13,000 cases, due to missing data. Students were excluded from the analysis if their data were missing fall of kindergarten or spring of first grade test scores or if they were missing data on gender. We also excluded cases that were missing six or more of the parent and teacher social rating scales. The vast majority of our missing data, however, is due to missing test scores (e.g. there are a total of 17,622 reading IRT scores in the fall of kindergarten, and a total of 16,635 reading IRT scores in the spring of first grade).

The battery of cognitive tests given as part of the ECLS-K covered three subject areas: language and literacy, mathematical thinking, and general knowledge (Table 1). The children pointed to answers or gave verbal responses. They were not asked to write or explain their reasoning. The tests were administered using a computer assisted interviewing methodology. The cognitive assessment scores used in our analyses are IRT (item response theory) scores that are included in the ECLS-K data.

Descriptive statistics on the outcomes of interest are presented in Table 2, with comparable information on the control variables presented in Appendix Table 1. Sample sizes are quite large. All of the IRT test score averages increase substantially from the beginning to the end of kindergarten, and then by even larger increments over the 12-month period to the end of first grade. Sample averages on teacher and parent reports of self-control, social skills and problem behaviors change relatively little, with small gains in self-control and social skills but small increases in both internalizing and externalizing behaviors as well. Correlations in the final column of Table 2 show that although sample averages on the socio-emotional behaviors are changing little, individual scores are quite variable. Fall-to-spring correlations in parent reports range from .56 to .73 and are slightly higher than the cross-time correlations of kindergarten teachers, which range from .46 to .60.

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[5] Fall parent interviews were conducted between October 1998 and January 1999, and spring interviews were conducted between March and June of 1999. The vast majority (approximately 97%) were conducted by phone by field staff using a computer assistance program. Teacher questionnaires were administered between October and December 1998 for the fall and between March and June 1999 for the spring.

Correlations among the various skill and behavior measures taken at the beginning of kindergarten and end of first grade are shown in Table 3. The first two columns preview some of our regression results by showing strong correlations between a given test across time (e.g., .66 for reading and .69 for math), and a stronger correlation between initial math and 1st grade reading (.64) than between initial reading and 1st grade math (.53). Kindergarten-entry general knowledge test scores have respectable correlations with both subsequent math and reading scores.

Correlations between 1st grade test scores and parent-rated school-entry "soft" skills are all below .20, while correlations with teacher ratings are generally somewhat higher. Interestingly, teacher ratings of both social skills and internalizing mental health problems are considerably stronger correlates of subsequent achievement than are parent reports.

High correlations between parent and teacher reports of the various soft skills might create problems in our attempts include both in regression models of subsequent achievement. The correlations in Table 3 suggest that this is not likely to be the case. Concurrent parent and teacher report of child self-control, sociability, and internalizing and externalizing behavior problems range from .11 to .25. Higher correlations emerge across the various teacher reports, with self-control correlating with interpersonal skills at .78 and with externalizing behavior problems at -.70.

V. Results

Level models. Table 4 shows estimates of the reading achievement models represented by equations (1; first three columns) and (2; final column). Comparable results for mathematics achievement models are given in Table 5. All variables have been standardized by full-sample standard deviations so that coefficients are comparable with one another and with the correlations presented in Table 3. Scores on variables measuring undesirable characteristics – internalizing and externalizing behavior problems, feeling sad/lonely and impulsiveness – have been reversed so that positive coefficients are expected for all of the skills and socio-emotional measures. Standard errors have been adjusted using Huber-White methods to account for the lack of independence caused by classroom clustering of sample students. Columns (1) and (2) show coefficients and standard errors from regressions that include none and the full set of family and individual controls listed in Appendix Table 1. Model estimates given in the third column adjust coefficients on all of the skill measures for the reliabilities listed in the sixth column of Table 2.[6]

We first note that adjustments for our extensive set of control variables produce relatively few changes in the coefficients on the test scores and teacher reports of soft skills, which reduce our fears of lingering omitted-variable bias (Altonji et al., forthcoming). As might be expected, these family background controls produced more coefficient reductions in the case of parent reports of socio-emotional behaviors, in particular impulsivity/overactivity. A comparison of standard errors in columns 1 and 2 shows that the addition of the control variables introduced virtually no multicolinearity into these models.

Focusing on the full-control models in the second columns of Tables 4 and 5, it can be seen that beginning reading and math scores are highly predictive of subsequent reading achievement, while beginning math but not reading scores are highly predictive of subsequent math achievement. The general knowledge test is much more predictive of math than reading achievement, although highly significant in both models.

[6] We use the EIVREG procedure in STATA to secure these estimates. Since EIVREG does not allow for Huber-White clustering corrections, these adjustments were not made. In the case of the regular regression models, clustering adjustments increased standard errors minimally.

Turning to the coefficients on the soft skills, it can be seen that in no case are standard-deviation increments associated with more than a .034 standard-deviation increase in test scores. For end-of-first grade reading scores, parent reports of self-control, social interaction skills and impulsivity/overactivity are at least as predictive as the teacher reports. Curiously, the reverse-scaled parent report of the sad/lonely index has a negative and significant coefficient. In fact, internalizing behavior problems are the only significant teacher-reported assessments in the reading regression. In the case of math achievement, self-control is the only significant parent report, while internalizing problem behavior is the only significant teacher report. The reliability adjustments in the third column of Tables 4 and 5 increase most coefficients somewhat, but do little to alter the general conclusion that school-entry "hard" skills are much more predictive of later school achievement than are either the teacher or parent reports of the "soft" skills.

Change models. The final column of Tables 4 and 5 present estimates from change model (2). Recall that in the presence of beginning-of-kindergarten controls, the coefficients on the end-of-kindergarten measures can be interpreted as the effect of skill changes over the course of kindergarten. The story that emerges is remarkably consistent with that of the level models. Cross-kindergarten gains in math, reading and general knowledge are predictive of subsequent reading and math achievement. Changes in parent-reported self-control are modestly but significantly predictive of reading scores, while teacher reports of gains in interpersonal skills are predictive of math achievement.

Summary models. As an attempt to summarize the relative importance of the groups of hard and soft skills, we formed composite measures of test scores, and teacher and parent reports of soft skills using the regression coefficients in the second and fourth columns of Tables 4 and 5. In the models predicting reading achievement, we distinguished early reading skills and combined math and general knowledge. In the case of math achievement, we distinguished early math skills and combined reading and general knowledge. Weighting these composites in this way gives them their maximum explanatory power. Restandardizing these composites produces coefficients that are comparable to those in the previous tables.

Table 6 presents estimates of both level and change versions of these models. In all cases, the early math or reading scores are highly predictive of their corresponding outcomes, with standardized coefficients in the .35 to .50 range. Early scores on the "other hard skills" composite have coefficients in the .15 to .30 range. In contrast, teacher and parent reports of socio-emotional behaviors had much smaller standardized coefficients that ranged from .01 to .05. Teacher reports were consistently more powerful predictors of subsequent achievement than parent reports.

Subgroup models. We next estimated level models for several population subgroups: blacks, Latinos, Asians and whites (Table 7); and gender and low- vs. high-SES families (Table 8). We define low SES as being in the bottom 25% of the weighted distribution on the ECLS-K's SES composite and high SES as being in the top 25% of that distribution. We do not rescale any of the variables in these regressions. Thus, all are standardized according to full-sample standard deviations, with estimated coefficients reflecting fractions of whole-sample standard deviation changes in a given dependent variable associated with a whole-sample standard deviation change in a given independent variable.

Coefficients on test score variables are remarkably consistent across subgroups. Beginning-kindergarten math achievement is consistently predictive of subsequent reading achievement, particularly for the overlapping groups black and low-SES children. General knowledge but not reading is consistently predictive of subsequent math achievement.

Turning to the socio-emotional behaviors, there are few instances where a given measure is consistently predictive across teacher vs. parent reporter and for both reading and math achievement. The reverse-scaled teacher reports of internalizing behavior have the expected positive associations

with subsequent achievement for most groups, as do parent reports of self control. But rarely do any of these coefficients exceed .05.

Tables 9a and 9b use summary variables constructed in similar ways to those in Table 6. They confirm the much greater explanatory power of hard skills relative to socio-emotional behavior, with the latter never attaining coefficients as high as .10 and the former almost never attaining coefficients that low. There is some evidence that soft skills matter more for low-SES and Latino children and less for Asian children.

Nonlinear effects? Improving basic academic and socio-emotional skills may matter the most for children with very low levels of these skills. To test for this possibility, we reestimated our level models allowing for different coefficients for children in the bottom one-third of the skill and behavior scales and for children in the top two-thirds. We did this with piecewise linear (spline) functions. Shown in Tables 10 and 11 are the coefficients for the two segments, along with results from a significance test for whether the two slopes differ from one another. Taking the first "Math IRT" entries in Table 10 as an example, it can be seen that the association between beginning math and subsequent reading achievement is highly non-linear. Standard-deviation increases in beginning-kindergarten math achievement are associated with a .76 standard deviation increment in end-of-first-grade reading scores for low initial math achievers but only a .19 standard deviation increment for high initial math achievers. These coefficient differences are highly statistically significant ($p<.001$).

Looking down the first set of columns in Table 10 and 11, it can be seen that almost all of the associations between initial test scores and end-of-first-grade achievement are highly nonlinear, with gains for low-achievers mattering a lot more than gains for higher achievers. This is true both in the overall sample and, as shown in the remaining columns, for Blacks, Latinos and children in low-SES families.

Reports from kindergarten teachers cited in the introduction would suggest that improvements in noncognitive skills should also matter much more for children entering kindergarten with the most problems. But Tables 10 and 11 provide virtually no support for this idea. For the full sample, only in the case of teacher-reported internalizing problems are coefficients for the most problematic one-third of children statistically significant, and this holds for math but not reading scores. Nor do these coefficients become uniformly stronger among subgroups.

Table 12 provides a summary look at the explanatory power of hard and soft skills in models that allow for nonlinear effects. For reading scores, increasing the math and general knowledge scores of low achievers by one (full-sample) standard deviation is associated with a nearly one standard deviation increase in first-grade reading scores. Coefficients of low achievers are always at least twice those of high achievers. These patterns hold both for the overall sample and for Blacks, Latinos and low-SES subgroups. For end-of-first-grade math achievement, the associations are extremely high for prior math achievement among underachievers. Reading and general knowledge skills have standardized coefficients in the .35 to .45 range for low achievers and in the .10 to .20 range for higher achievers.

Coefficients on teacher and parent reports of soft skills rarely come close to these magnitudes. The most important soft skills appear to be those reported by the teachers for Black and Latino students scoring lowest on them. Coefficient estimates are in the .10 range in most of these cases and statistically significant at conventional levels. Note, however, in Tables 10 and 11 that none of the individual components that went into these teacher-reported composites had statistically significant coefficients for any of these subgroups. In virtually no case do soft skills matter for Black, Latino and low SES children scoring in the top two-thirds of the distributions of these summary variables.

VI. Discussion

ECLS-K data enable us to relate an exceptionally rich set of academic (reading, math and general knowledge) measurements in the fall of the kindergarten year, as well as a set of teacher- and parent-rated dimensions of socio-emotional behavior measured at the same time, to academic outcomes (math and reading test scores) measured at the end of first grade. We were surprised by the results.

Given the intensity of the debate over the importance of "soft skills" for children's school success, we had expected to find considerable evidence that being able to sit still in class or make friends upon school entry would consistently matter for early achievement. But we found little evidence that this was the case, either in the population as a whole, among disadvantaged population subgroups, or among children scoring the lowest on these soft-skill indicators.

More than the usual number of cautions apply at this point in our research on this topic. First, our data are longitudinal rather than experimental and thus subject to omitted-variable bias. Although we were able to control for a very large set of parent and family background factors, adjust for measurement error, and replicate our main findings in change models, it is still the case that we are unable to adjust for all possible sources of bias.

Second, our academic outcomes are measured early in elementary school. As with Alexander, Entwisle and Dauber (1993), we may find that some of the soft skills are more predictive of later than earlier academic outcomes. Data from the third-grade follow-up will provide some information about this, as will our attempts to replicate these findings with other longitudinal data sets.

Third, we have evaluated our collection of soft and hard skills solely on the basis of their ability to predict subsequent math and reading achievement. Policy conclusions regarding interventions require information on the relative costs of improving hard skills and socio-emotional behaviors. While our knowledge base on early reading and math skill interventions is growing, much less is known about the nature and costs of interventions targeting behavior, social and mental health problems. It is conceivable that "soft skill" interventions are warranted by our analyses if they are substantially less expensive than interventions targeting the "harder" early reading and mathematics skills.

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Table 1: Descriptions of child-level variables including test scores and teacher and parent social rating scales

Cognitive (hard skills) test scores	
Reading IRT score	A single test (with items varying by children's response patterns) was administered identically in the fall and spring of kindergarten and in the spring of first grade. Spring of first grade score is a dependent variable while spring and fall of kindergarten are independent variables in these analyses. The reading assessment included five proficiency levels. The five levels reflect a progression of skills and knowledge such that if a child has mastered a higher level, she is very likely to have mastered the items in the earlier levels as well. The five levels were: 1) identifying upper- and lower-case letters of the alphabet by name; (2) associating letters with sounds at the beginning of words; (3) associating letters with sounds at the end of words; (4) recognizing common words by sight; and (5) reading words in context.
Math IRT score	A single test (with items varying by children's response patterns) was administered identically in the fall and spring of kindergarten and in the spring of first grade. Spring of first grade score is a dependent variable while spring and fall of kindergarten are independent variables in these analyses. Although clusters of math items were less homogeneous than those for reading they can be grouped into five proficiency levels. These include: (1) identifying one digit numerals, recognizing geometric shapes and counting up to ten objects; (2) reading all one-digit numerals, counting beyond 10, recognizing a sequence of pattern and using nonstandard units of length to compare objects; (3) reading two-digit numerals, recognizing the next number in a sequence, identifying the ordinal position of an object, and solving a simple word problem; (4) solving simple addition and subtraction problems; (5) solving simple multiplication and division problems and recognizing more complex number patterns.
General knowledge IRT score	A single test (with items varying by children's response patterns) was administered identically in the fall and spring of kindergarten and in the spring of first grade. Although this test was administered in the spring of first grade, we use only fall and spring of kindergarten scores (as independent variables). The general knowledge test subject matter was too diverse to be divided into proficiency levels. The test assessed knowledge of science and social studies material. The test assessed children's conception and understanding of the social, physical, and natural world and of their ability to draw inferences and comprehend implications. It also measured children's skills in establishing relationships between and among objects, events, or people and to make inferences and to comprehend the implications of verbal and pictorial concepts.

Soft Skills Measures

Teacher Measures	Teachers rated students as part of a self-administered questionnaire. The items in the 4 measures below are measured on a scale of 1(never) to 4 (very often). Identical items were administered in both the fall and spring of kindergarten. Measures from both time-points are used as independent variables in these analyses.
Self-Control	The 4 items in this scale indicate a 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.
Interpersonal Skills	The 5 items in this measure rate a 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.
Externalizing Problem Behaviors	The 5 items in this scale rate the frequency with which a child argues, fights, gets angry, acts impulsively, and disturbs ongoing activities.
Internalizing Problem Behaviors	The 4 items in this scale ask about the apparent presence of anxiety loneliness, low self-esteem, and sadness.
Parent Measures	These items were administered as part of a telephone or in-person survey. Identical items were administered in both the fall and spring of kindergarten. Measures from both time-points are used as independent variables in these analyses.
Self-Control	The 5 items in this scale indicate the child's ability to control behavior (e.g. frequency with which the child fights, argues, throws tantrums, or gets angry).
Social Interaction	The 3 items in this scale address the child's ease in joining play, ability to make and keep friends, and positively interact (comfort, help) with peers.
Sad/Lonely	The 4 items in this scale ask about the child's problems with being accepted and liked by others, sadness, loneliness, and low self-esteem.
Impulsive/ Overactive	The 2 items in this scale ask about the child's impulsivity and activity level.

Variable descriptions are from the User's Manual for the ECLS-K Base Year Public-use Data Files and Electronic Codebook, chapter 2.

Table 2: Descriptive statistics for child outcomes							
Variable	n*	Mean	Std. Dev.	Min	Max	Reliability[+]	SpringK-FallK r[++]
FALL OF KINDERGARTEN							
Test Score							
Reading IRT Score	13002	22.755	8.559	10.078	69.655	.93	.81
Math IRT Score	13002	20.253	7.338	6.903	59.815	.92	.81
General Knowledge IRT Score	13002	22.804	7.405	7.3	46.164	.88	.86
Parent Report							
Self-Control	12968	2.845	.502	1	4	.74	.60
Social Interaction	12967	3.351	.542	1	4	.70	.50
Sad/Lonely	12960	1.541	.392	1	4	.60	.46
Impulsive/Overactive	12894	1.945	.671	1	4	.46	.57
Teacher Report							
Self-Control	12564	3.109	.606	1	4	.79	.63
Interpersonal Skills	12451	3.006	.623	1	4	.89	.62
Externalizing Problem Behaviors	12832	1.605	.623	1	4	.90	.73
Internalizing Problem Behaviors	12716	1.520	.515	1	4	.80	.56
SPRING OF KINDERGARTEN							
Test Score							
Reading IRT Score	12894	32.846	10.298	11.073	70.8	.95	
Math IRT Score	12894	28.572	8.707	7.541	59.339	.94	
General Knowledge IRT Score	12880	27.961	7.591	7.653	48.438	.89	
Parent Report							
Self-Control	12451	2.890	.487	1	4	.75	
Social Interaction	12457	3.451	.505	1	4	.68	
Sad/Lonely	12443	1.550	.387	1	4	.61	
Impulsive/Overactive	12367	1.922	.671	1	4	.47	
Teacher Report							
Self-Control	12510	3.200	.621	1	4	.80	
Interpersonal Skills	12450	3.147	.633	1	4	.89	
Externalizing Problem Behaviors	12518	1.652	.635	1	4	.90	
Internalizing Problem Behaviors	12486	1.553	.511	1	4	.78	
SPRING OF 1ST GRADE							
Test Score							
Reading IRT Score	13002	56.641	13.547	13.039	88.994	.97	
Math IRT Score	13002	44.060	8.900	8.461	60.537	.94	

*Sample sizes are based on the sample used for regression which predicts spring of 1st grade math scores using fall kindergarten test scores, teacher and parent report measures (Table 4). Sample sizes are not identical due to missing data.

[+]These reliabilities are reported in the ECLS-K user's manual

[++]Fall Kindergarten-Spring Kindergarten Correlation

Table 3: Correlation matrix for spring 1st grade test scores and fall kindergarten test scores, teacher and parent report measures													
	Spring of 1st Grade		*Fall Kindergarten*			*Fall Kindergarten Parent Report*				*Fall Kindergarten Teacher Report*			
	Reading IRT	Math IRT	Reading IRT	Math IRT	General Knowledge IRT	Self-Control	Social Interaction	Sad/ Lonely	Impulsive/ Overactive	Self-Control	Interpersonal Skills	Externalizing Problem Behaviors	Internalizing Problem Behaviors
Spring 1st Grade													
Reading IRT	1.00												
Math IRT	.69	1.00											
Fall Kindergarten													
Reading IRT	.66	.53	1.00										
Math IRT	.64	.69	.74	1.00									
General Knowledge IRT	.47	.57	.53	.62	1.00								
Parent Report													
Self-Control	.16	.15	.14	.14	.12	1.00							
Social Interaction	.09	.08	.07	.08	.11	.16	1.00						
Sad/Lonely	-.04	-.07	-.03	-.05	-.04	-.31	-.21	1.00					
Impulsive/Overactive	-.18	-.18	-.16	-.17	-.17	-.43	-.04	.28	1.00				
Teacher Report													
Self-Control	.21	.21	.18	.19	.20	.17	.06	-.07	-.22	1.00			
Interpersonal Skills	.24	.24	.22	.24	.24	.16	.13	-.08	-.19	.78	1.00		
Extern. Prob. Behaviors	-.18	-.17	-.14	-.15	-.14	-.17	-.03	.07	.25	-.70	-.56	1.00	
Intern. Prob. Behaviors	-.16	-.17	-.13	-.17	-.14	-.07	-.12	.11	.07	-.27	-.34	.26	1.00
All correlations in table are statistically significant at the 1% level													
n=11892													

Table 4: Coefficients and standard errors from various regression models of spring 1st grade reading test scores using independent variables measured in fall and spring kindergarten

Dependent Variable: Spring of 1st grade reading IRT				
Independent Variables	(1)	(2)	(3)	(4)
Independent variables measured in:		**FALL K**		**SPRING K**
Test Score				
Reading IRT	.367**	.346**	.371**	.492**
	(.009)	(.009)	(.012)	(.010)
Math IRT	.273**	.274**	.299**	.131**
	(.010)	(.010)	(.014)	(.010)
General Knowledge IRT	.057**	.064**	.051**	.026*
	(.008)	(.009)	(.012)	(.012)
Teacher Report				
Self-Control	.024	.022	.109	.021
	(.013)	(.013)	(.074)	(.012)
Internalizing Problem Behaviors	.025**	.022**	.035**	.006
(reverse scale)	(.007)	(.008)	(.010)	(.008)
Interpersonal Skills	.014	.005	-.061	.008
	(.011)	(.011)	(.049)	(.011)
Externalizing Problem Behaviors	.033**	.020	-.024	.007
(reverse scale)	(.010)	(.010)	(.031)	(.010)
Parent Report				
Self-Control	.026**	.021**	.001	.015*
	(.007)	(.007)	(.024)	(.008)
Social Interaction	.022**	.017*	.045**	.002
	(.007)	(.007)	(.013)	(.007)
Sad/Lonely	-.012	-.016*	-.059**	.005
(reverse scale)	(.007)	(.007)	(.019)	(.007)
Impulsive/Overactive	.036**	.018*	.096*	-.003
(reverse scale)	(.008)	(.008)	(.045)	(.007)
Control Variables[+]		X	X	X
Reliability Adjustment[++]			X	
Fall Kindergarten Measures				X
Constant	.063**	33.754*	-12.080**	28.081*
	(.009)	(16.641)	(1.539)	(14.297)
Observations	13004	12415	12415	12322
R-squared	.50	.53	.55	.63

* significant at 5%; ** significant at 1%

Standard errors in models (1), (2), (4) are corrected for classroom clustering using Huber-White metho

All variables are standardized by full sample standard deviation

All models include missing data dummies for parent and teacher report measures

[+]Control variables are listed in Appendix Table 1

[++]Reliability adjustment made using errors-in-variables regression and reliabilities reported in Table 2

Table 5: Coefficients and standard errors from various regression models of spring 1st grade math test scores using independent variables measured in fall and spring kindergarten

Dependent Variable: Spring of 1st grade math IRT				
Independent Variables	(1)	(2)	(3)	(4)
Independent variables measured in:		**FALL K**		**SPRING K**
Test Score				
Reading IRT	.021*	.032**	-.051**	.101**
	(.008)	(.008)	(.012)	(.010)
Math IRT	.477**	.454**	.569**	.446**
	(.009)	(.010)	(.013)	(.010)
General Knowledge IRT	.203**	.187**	.213**	.124**
	(.008)	(.009)	(.012)	(.012)
Teacher Report				
Self-Control	.026*	.022	.136	-.0002
	(.012)	(.012)	(.070)	(.011)
Internalizing Problem Behaviors	.038**	.034**	.042**	.003
(reverse scale)	(.007)	(.007)	(.009)	(.007)
Interpersonal Skills	.005	.004	-.082	.035**
	(.011)	(.011)	(.047)	(.010)
Externalizing Problem Behaviors	.017	.019	-.026	.008
(reverse scale)	(.010)	(.010)	(.030)	(.010)
Parent Report				
Self-Control	.026**	.028**	.038	.002
	(.007)	(.007)	(.023)	(.008)
Social Interaction	.005	.009	.015	.009
	(.007)	(.007)	(.013)	(.006)
Sad/Lonely	.019**	.007	.003	.006
(reverse scale)	(.007)	(.007)	(.018)	(.007)
Impulsive/Overactive	.019**	.009	.009	.003
(reverse scale)	(.007)	(.007)	(.043)	(.007)
Control Variables[+]		X	X	X
Reliability Adjustment[++]			X	
Fall Kindergarten Measures				X
Constant	.055**	5.657	-12.897**	-5.629
	(.008)	(16.279)	(1.462)	(14.060)
Observations	13002	12413	12413	12320
R-squared	.51	.54	.57	.64

* significant at 5%; ** significant at 1%

Standard errors in models (1), (2), (4) are corrected for classroom clustering using Huber-White meth

All variables are standardized by full sample standard deviation

All models include missing data dummies for parent and teacher report measures

[+]Control variables are listed in Appendix Table 1

[++]Reliability adjustment made using errors-in-variables regression and reliabilities reported in Table 2

Table 6: Coefficients and standard errors for composite measures constructed from Tables 4 and 5 for spring and fall of kindergarten for 'hard skills' and parent and teacher reports of 'soft skills'

Dependent Variable:	**Spring 1st Grade Reading IRT**		**Spring 1st Grade Math IRT**	
Independent Variables	(1)	(2)	(3)	(4)
Independent variables measured in:	**FALL K**	**SPRING K**	**FALL K**	**SPRING K**
Reading IRT Score	.346**	.491**		
	(.009)	(.009)		
Math IRT Score			.454**	.446**
			(.009)	(.009)
Other Hard Skills	.317**	.148**	.206**	.199**
	(.010)	(.011)	(.009)	(.009)
Soft Skills Teacher Report	.052**	.031**	.059**	.037**
	(.008)	(.008)	(.007)	(.006)
Soft Skills Parent Report	.037**	.013*	.039**	.014*
	(.007)	(.006)	(.007)	(.006)
Fall of Kindergarten Composites		X		X
Observations	12415	12322	12413	12320
R-squared	.53	.63	.54	.64
* significant at 5%; ** significant at 1%				

Composite measures for model (1) were constructed using coefficients from Table 4 model (2), composite measures in model (2) were contructed using coefficients from Table 4 model (4)

Composite measures in model 3 were constructed using coefficients from Table 5 model (2), composite measures for model (4) were constructed using coefficients from Table 5 model (4)

Models (1) and (2) hard skills composite includes math and general knowledge, models (3) and (4) hard skills composite includes reading and general knowledge

All models include control variables listed in Appendix Table 1

All standard errors are corrected for classroom clustering using Huber-White methods.

All variables are standardized

All models include missing data dummies for parent and teacher report measures

Table 7: Coefficients and standard errors from various regression models for subgroups of spring 1st grade test scores using independent variables measured in fall kindergarten								
Dependent Variable:	**Spring 1st Grade Reading IRT**				**Spring 1st Grade Math IRT**			
	Black	Latino	Asian	White	Black	Latino	Asian	White
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Test Score								
Reading IRT	.385**	.360**	.209**	.353**	.061*	.001	-.020	.041**
	(.035)	(.031)	(.033)	(.010)	(.027)	(.029)	(.033)	(.010)
Math IRT	.426**	.290**	.293**	.251**	.586**	.476**	.431**	.435**
	(.039)	(.035)	(.039)	(.012)	(.035)	(.032)	(.037)	(.011)
General Knowledge IRT	.048	.075**	.039	.064**	.222**	.171**	.108*	.183**
	(.028)	(.026)	(.046)	(.011)	(.028)	(.026)	(.047)	(.011)
Teacher Report								
Self-Control	.025	-.038	.049	.018	.016	.040	.015	.014
	(.032)	(.034)	(.052)	(.016)	(.030)	(.036)	(.053)	(.015)
Internalizing Problem Behaviors	.029	.025	-.007	.020*	.051**	.040*	-.029	.033**
(reverse scale)	(.019)	(.020)	(.037)	(.010)	(.019)	(.020)	(.038)	(.009)
Interpersonal Skills	.016	.032	-.066	.008	.015	.020	-.018	-.003
	(.028)	(.032)	(.050)	(.014)	(.027)	(.032)	(.048)	(.014)
Externalizing Problem Behaviors	.010	.070**	.026	.009	.005	.004	.029	.024
(reverse scale)	(.025)	(.025)	(.053)	(.013)	(.026)	(.026)	(.057)	(.012)
Parent Report								
Self-Control	.018	.052*	-.010	.012	.030	.053**	-.084*	.023*
	(.017)	(.021)	(.043)	(.010)	(.017)	(.020)	(.040)	(.009)
Social Interaction	.014	.038	.045	.018*	.032	-.007	.010	.006
	(.018)	(.020)	(.034)	(.009)	(.018)	(.019)	(.032)	(.009)
Sad/Lonely	.002	-.038*	-.020	-.017	.023	-.003	.019	.003
(reverse scale)	(.014)	(.019)	(.036)	(.009)	(.015)	(.021)	(.034)	(.009)
Impulsive/Overactive	.042*	-.001	-.015	.016	.011	.003	.053	.009
(reverse scale)	(.019)	(.021)	(.045)	(.010)	(.019)	(.021)	(.040)	(.009)
Constant	-10.636	65.831	114.845	39.758	-15.151	40.375	-2.498	10.446
	(28.896)	(42.885)	(84.127)	(23.457)	(27.472)	(44.676)	(75.836)	(20.672)
Observations	1748	1516	529	7902	1747	1516	529	7901
R-squared	.53	.50	.60	.50	.53	.47	.60	.51
* significant at 5%; ** significant at 1%								
All models include control variables listed in Appendix Table 1								
All standard errors are corrected for classroom clustering using Huber-White methods								
All variables are standardized								

Table 8: Coefficients and standard errors from various regression models for subgroups of spring 1st grade test scores using independent variables measured in fall kindergarten								
Dependent Variable:	**Spring 1st Grade Reading IRT**				**Spring 1st Grade Math IRT**			
	Female	Male	High SES	Low SES	Female	Male	High SES	Low SES
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Test Score								
Reading IRT	.351**	.345**	.334**	.407**	.042**	.029**	.056**	.066*
	(.013)	(.012)	(.012)	(.033)	(.012)	(.011)	(.011)	(.031)
Math IRT	.274**	.272**	.210**	.416**	.441**	.460**	.342**	.578**
	(.013)	(.014)	(.014)	(.033)	(.014)	(.013)	(.013)	(.032)
General Knowledge IRT	.070**	.057**	.040*	.073**	.184**	.190**	.150**	.247**
	(.013)	(.012)	(.016)	(.024)	(.013)	(.012)	(.014)	(.025)
Teacher Report								
Self-Control	.036*	.008	.003	.028	.043**	.003	.029	-.008
	(.017)	(.017)	(.023)	(.028)	(.016)	(.017)	(.021)	(.029)
Internalizing Problem Behaviors	.019	.025*	.022	.019	.038**	.029**	.021	.040*
(reverse scale)	(.010)	(.011)	(.014)	(.016)	(.009)	(.010)	(.013)	(.016)
Interpersonal Skills	.013	-.002	.001	.003	.014	-.008	-.009	.015
	(.014)	(.016)	(.020)	(.027)	(.015)	(.015)	(.018)	(.027)
Externalizing Problem Behaviors	.009	.031*	.040*	.036	-.008	.044**	.024	.032
(reverse scale)	(.014)	(.013)	(.019)	(.021)	(.014)	(.013)	(.018)	(.022)
Parent Report								
Self-Control	.012	.029**	-.002	.021	.028**	.028**	-.013	.041*
	(.010)	(.010)	(.014)	(.016)	(.010)	(.011)	(.014)	(.016)
Social Interaction	.015	.019*	.006	.031*	.016	.004	.003	.047**
	(.010)	(.010)	(.013)	(.016)	(.009)	(.010)	(.012)	(.017)
Sad/Lonely	-.012	-.018	-.009	-.009	.005	.010	.017	.009
(reverse scale)	(.009)	(.010)	(.013)	(.014)	(.009)	(.010)	(.013)	(.014)
Impulsive/Overactive	.014	.023*	.028	.016	.009	.010	.031*	.030
(reverse scale)	(.011)	(.011)	(.015)	(.016)	(.010)	(.010)	(.014)	(.017)
Constant	14.894	44.476	-.960	36.553	12.399	-10.450	-18.718	42.569
	(23.861)	(22.782)	(27.023)	(38.307)	(25.841)	(21.329)	(31.060)	(39.423)
Observations	6118	6297	3518	2296	6118	6295	3518	2294
R-squared	.53	.52	.50	.48	.54	.55	.49	.50
* significant at 5%; ** significant at 1%								
All models include control variables listed in Appendix Table 1								
All standard errors are corrected for classroom clustering using Huber-White methods								
All variables are standardized								

Table 9a: Coefficients and standard errors for composite measures constructed from Table 7 for fall of kindergarten for 'hard skills' net of math or reading IRT score and parent and teacher reports of 'soft skills'

Dependent Variable:	Spring 1st Grade Reading IRT				Spring 1st Grade Math IRT			
	Black	Latino	Asian	White	Black	Latino	Asian	White
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Reading IRT Score	.385**	.360**	.209**	.353**				
	(.035)	(.030)	(.033)	(.010)				
Math IRT Score					.585**	.476**	.430**	.435**
					(.032)	(.027)	(.028)	(.010)
Other Hard Skills	.455**	.341**	.317**	.295**	.260**	.172**	.098*	.208**
	(.037)	(.033)	(.038)	(.012)	(.030)	(.027)	(.041)	(.011)
Soft Skills Teacher Report	.060**	.075**	.048	.042**	.067**	.079**	.038	.051**
	(.018)	(.020)	(.030)	(.009)	(.018)	(.021)	(.035)	(.009)
Soft Skills Parent Report	.056**	.067**	.051	.030**	.064**	.053**	.077*	.031**
	(.016)	(.019)	(.031)	(.009)	(.017)	(.018)	(.035)	(.009)
Observations	1748	1516	529	7902	1747	1516	529	7901
R-squared	.53	.50	.60	.50	.53	.47	.60	.51

Table 9b: Coefficients and standard errors for composite measures constructed from Table 8 for fall of kindergarten for 'hard skills' net of math or reading IRT score and parent and teacher reports of 'soft skills'

Dependent Variable:	Spring 1st Grade Reading IRT				Spring 1st Grade Math IRT			
	Female	Male	High SES	Low SES	Female	Male	High SES	Low SES
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Reading IRT Score	.351**	.345**	.334**	.407**				
	(.013)	(.012)	(.012)	(.033)				
Math IRT Score					.441**	.460**	.342**	.578**
					(.012)	(.011)	(.012)	(.029)
Other Hard Skills	.322**	.310**	.236**	.463**	.210**	.207**	.186**	.287**
	(.015)	(.014)	(.015)	(.032)	(.013)	(.013)	(.015)	(.028)
Soft Skills Teacher Report	.060**	.048**	.051**	.067**	.068**	.055**	.051**	.060**
	(.010)	(.010)	(.014)	(.018)	(.009)	(.009)	(.012)	(.016)
Soft Skills Parent Report	.026**	.046**	.027*	.045**	.041**	.039**	.035**	.085**
	(.010)	(.010)	(.013)	(.015)	(.010)	(.009)	(.012)	(.017)
Observations	6118	6297	3518	2296	6118	6295	3518	2294
R-squared	.53	.52	.50	.48	.54	.55	.49	.50

* significant at 5%; ** significant at 1%

Composite measures for Table 9a were constructed using coefficients from Table 7. Composite measures for Table 9b were constructed using coefficients from Table 8.

All models include control variables listed in Appendix Table 1

All standard errors are corrected for classroom clustering using Huber-White methods.

All variables are standardized

Table 10: Coefficients and standard errors for full sample and subgroup splines of spring 1st grade reading test scores

	Dependent Variable: Spring of 1st grade reading IRT											
	Full Sample			Black			Latino			Low SES		
	(1)			(2)			(3)			(4)		
Independent Variables	Bottom 1/3	Top 2/3	p-value[1]	Bottom 1/3	Top 2/3	p-value[1]	Bottom 1/3	Top 2/3	p-value[1]	Bottom 1/3	Top 2/3	p-value[1]
Test Score												
Reading IRT	.577**	.325**	.000	.525**	.373**	.141	.503**	.329**	.081	.517**	.355**	.065
	(.038)	(.009)		(.089)	(.038)		(.089)	(.032)		(.072)	(.037)	
Math IRT	.760**	.186**	.000	.846**	.192**	.000	.744**	.135**	.000	.842**	.184**	.000
	(.035)	(.010)		(.078)	(.044)		(.087)	(.040)		(.060)	(.039)	
General Knowledge IRT	.136**	.027*	.000	.079	.045	.670	.126*	.048	.309	.124**	.020	.109
	(.025)	(.011)		(.054)	(.041)		(.059)	(.035)		(.044)	(.037)	
Teacher Report												
Self-Control	.009	.025	.622	.047	.041	.932	-.075	-.019	.544	.036	.038	.974
	(.025)	(.015)		(.053)	(.043)		(.073)	(.043)		(.052)	(.038)	
Internalizing Problem Behaviors	.024	.010	.527	.066	.001	.285	.057	-.013	.201	.047	-.004	.285
(reverse scale)	(.017)	(.011)		(.045)	(.027)		(.039)	(.027)		(.035)	(.024)	
Interpersonal Skills	.002	-.008	.736	.027	-.032	.443	.055	-.007	.459	-.001	-.019	.806
	(.023)	(.015)		(.053)	(.042)		(.062)	(.044)		(.051)	(.038)	
Externalizing Problem Behaviors	.003	.031*	.250	-.008	.010	.774	.100*	.052	.469	.011	.054	.417
(reverse scale)	(.018)	(.014)		(.040)	(.039)		(.047)	(.036)		(.035)	(.032)	
Parent Report												
Self-Control	.012	.020	.678	.002	.028	.565	.068*	.031	.489	.011	.031	.635
	(.013)	(.012)		(.029)	(.027)		(.034)	(.034)		(.023)	(.031)	
Social Interaction	-.002	.024*	.248	.018	.011	.911	.045	.027	.778	.042	.017	.570
	(.017)	(.009)		(.045)	(.026)		(.047)	(.028)		(.032)	(.023)	
Sad/Lonely	.014	-.023**	.115	-.053	.035	.059	.040	-0.06*	.095	.010	-.019	.552
(reverse scale)	(.019)	(.008)		(.035)	(.021)		(.046)	(.025)		(.035)	(.021)	
Impulsive/Overactive	.037*	.009	.236	.090*	.010	.149	.064	-.038	.151	.023	.006	.749
(reverse scale)	(.019)	(.010)		(.039)	(.027)		(.055)	(.030)		(.036)	(.024)	
Observations	12415			1748			1516			2296		
R-squared	.55			.56			.53			.51		

* significant at 5%; ** significant at 1%

All models include control variables listed in Appendix Table 1

All standard errors are corrected for classroom clustering using Huber-White methods

All variables are standardized

[1]P-value is for the null hypothesis that the coefficient for the top 2/3 equals the coefficient for the bottom 1/3.

Table 11: Coefficients and standard errors for full sample and subgroup splines of spring 1st grade math test scores

Dependent Variable: Spring of 1st grade math IRT												
	Full Sample			Black			Latino			Low SES		
	(1)			(2)			(3)			(4)		
Independent Variables	Bottom 1/3	Top 2/3	p-value[1]	Bottom 1/3	Top 2/3	p-value[1]	Bottom 1/3	Top 2/3	p-value[1]	Bottom 1/3	Top 2/3	p-value[1]
Test Score												
	.140**	.029**	.004	.099	.075*	.800	.086	-.012	.337	.176**	.009	.054
Reading IRT	(.036)	(.008)		(.083)	(.031)		(.091)	(.030)		(.070)	(.037)	
Math IRT	.940**	.372**	.000	1.03**	.355**	.000	.818**	.356**	.000	.945**	.376**	.000
	(.035)	(.009)		(.074)	(.039)		(.091)	(.035)		(.061)	(.036)	
General Knowledge IRT	.427**	.102**	.000	.376**	.110**	.000	.339**	.093**	.002	.365**	.140**	.001
	(.025)	(.010)		(.051)	(.039)		(.064)	(.034)		(.047)	(.036)	
Teacher Report												
Self-Control	.021	.021	.990	-.020	.071	.227	.113	.018	.318	-.046	.028	.313
	(.024)	(.015)		(.056)	(.039)		(.079)	(.043)		(.054)	(.038)	
Internalizing Problem Behaviors	.040*	.020*	.337	.029	.051*	.688	.032	.029	.952	.014	.047	.491
(reverse scale)	(.016)	(.010)		(.041)	(.026)		(.042)	(.028)		(.033)	(.025)	
Interpersonal Skills	.004	-.011	.593	.070	-.065	.080	.059	-.025	.338	.065	-.040	.151
	(.023)	(.013)		(.056)	(.037)		(.069)	(.041)		(.053)	(.037)	
Externalizing Problem Behaviors	.010	.021	.645	.005	-.014	.752	-.047	.013	.415	.020	.034	.805
(reverse scale)	(.018)	(.013)		(.038)	(.039)		(.055)	(.037)		(.038)	(.034)	
Parent Report												
Self-Control	.013	.033**	.327	.005	.050	.353	.066*	.031	.515	.014	.076*	.189
	(.012)	(.012)		(.030)	(.028)		(.033)	(.034)		(.024)	(.033)	
Social Interaction	.007	.004	.874	.116*	-.015	.031	-.025	-.008	.783	.090**	.016	.114
	(.016)	(.009)		(.046)	(.025)		(.045)	(.029)		(.034)	(.024)	
Sad/Lonely	.035	-.001	.119	.000	.033	.487	-.005	.002	.910	.067	-.023	.070
(reverse scale)	(.020)	(.008)		(.036)	(.020)		(.055)	(.026)		(.038)	(.02)	
Impulsive/Overactive	.014	.005	.692	.014	.004	.855	.026	-.016	.560	.050	.014	.488
(reverse scale)	(.018)	(.009)		(.039)	(.026)		(.057)	(.028)		(.037)	(.025)	
Observations	12415			1747			1516			2294		
R-squared	.57			.56			.50			.53		

* significant at 5%; ** significant at 1%

All models include control variables listed in Appendix Table 1

All standard errors are corrected for classroom clustering using Huber-White methods

All variables are standardized

[1] P-value is for the null hypothesis that the coefficient for the top 2/3 equals the coefficient for the bottom 1/3.

Table 12: Coefficients and standard errors for composite measures constructed from Tables 10 and 11 for fall of kindergarten for 'hard skills' net of math or reading IRT scores and parent and teacher reports of 'soft skills'

Dependent Variable: Spring of 1st grade reading IRT												
	Full Sample			Black			Latino			Low SES		
	(1)			(2)			(3)			(4)		
Independent Variables	Bottom 1/3	Top 2/3	p-value[1]	Bottom 1/3	Top 2/3	p-value[1]	Bottom 1/3	Top 2/3	p-value[1]	Bottom 1/3	Top 2/3	p-value[1]
Reading IRT Score	.583**	.326**	.000	.511**	.375**	.183	.523**	.331**	.054	.526**	.354**	.049
	(.038)	(.009)		(.089)	(.038)		(.088)	(.032)		(.071)	(.037)	
Other Hard Skills	.809**	.214**	.000	.864**	.220**	.000	.754**	.171**	.000	.861**	.211**	.000
	(.034)	(.010)		(.075)	(.042)		(.081)	(.039)		(.058)	(.039)	
Soft Skills Teacher Report	.032*	.039**	.753	.090*	.009	.177	.106**	-.001	.076	.059	.064	.914
	(.014)	(.013)		(.036)	(.034)		(.035)	(.037)		(.029)	(.034)	
Soft Skills Parent Report	.041**	.023*	.376	.073**	.029	.393	.100**	.035	.257	.053*	.019	.441
	(.014)	(.011)		(.028)	(.033)		(.037)	(.032)		(.025)	(.029)	
Observations	12415			1748			1516			2296		
R-squared	.55			.56			.53			.51		
Dependent Variable: Spring of 1st grade math IRT												
	Full Sample			Black			Latino			Low SES		
	(1)			(2)			(3)			(4)		
Independent Variables	Bottom 1/3	Top 2/3	p-value[1]	Bottom 1/3	Top 2/3	p-value[1]	Bottom 1/3	Top 2/3	p-value[1]	Bottom 1/3	Top 2/3	p-value[1]
Math IRT Score	.966**	.381**	.000	1.018**	.377**	.000	.859**	.355**	.000	.969**	.376**	.000
	(.032)	(.008)		(.068)	(.035)		(.075)	(.030)		(.056)	(.033)	
Other Hard Skills	.472**	.119**	.000	.437**	.149**	.000	.337**	.089**	.002	.428**	.156**	.000
	(.027)	(.010)		(.058)	(.040)		(.063)	(.033)		(.050)	(.039)	
Soft Skills Teacher Report	.057**	.032**	.224	.066*	.042	.662	.121**	.010	.086	.058*	.045	.801
	(.013)	(.012)		(.033)	(.033)		(.044)	(.033)		(.028)	(.032)	
Soft Skills Parent Report	.025	.036**	.586	.058	.060*	.967	.062	.035	.607	.089**	.061	.593
	(.013)	(.010)		(.033)	(.029)		(.034)	(.030)		(.028)	(.032)	
Observations	12413			1747			1516			2294		
R-Squared	.57			.56			.50			.52		

* significant at 5%; ** significant at 1%

All models include control variables listed in Appendix Table 1

All standard errors are corrected for classroom clustering using Huber-White methods.

All variables are standardized

[1]P-value is for the null hypothesis that the coefficient for the top 2/3 equals the coefficient for the bottom 1/3.

Appendix Table 1: Summary Statistics for Control Variables (sample size is 12,413).				
Variable	Mean	Std. Dev.	Min	Max
Baseline child characteristics				
Race				
Black	.141	.348	0	1
Hispanic	.122	.327	0	1
Asian	.043	.202	0	1
Other	.057	.231	0	1
Female	.493	.500	0	1
Age (in months at Fall K assessment)	68.577	4.279	54	79
Age (squared)	4721.154	590.540	2916	6241
Age (cubed x 1000)	3.26E+08	6.14E+07	1.57E+08	4.93E+08
Birth weight (in pounds)	7.195	1.787	0	13.688
Missing birth weight	.028	.164	0	1
Premature (child over 2 weeks early)	.166	.372	0	1
Parent report of overall child health (1=excellent, 5=poor)	1.631	.790	0	5
Geographic controls				
West	.200	.400	0	1
Midwest	.273	.446	0	1
Northeast	.198	.398	0	1
Rural	.229	.420	0	1
Suburban	.320	.466	0	1
Home Environment				
Number of siblings	1.425	1.111	0	11
Number of siblings (squared)	3.264	5.670	0	121
Number of siblings (cubed)	10.208	37.322	0	1331
Child part of multiple birth	.025	.155	0	1
Adopted	.014	.116	0	1
Live with guardian	.021	.144	0	1
Single biological parent	.202	.401	0	1
Biological parent and other parent	.073	.261	0	1
Two biological parents (not continuously married)	.098	.297	0	1
English not primary home language	.066	.249	0	1
Missing primary home language	.0003	.018	0	1
Four or more moves pre-school	.107	.309	0	1
Parent reads to child (days/week)	5.160	2.030	0	7
Missing read to child	.0002	.013	0	1
Parent tells stories to child (days/ week)	3.747	2.391	0	7
Missing tell stories to child	.001	.025	0	1
Number of children's books in the home	79.341	59.971	0	200
Missing number of books	.010	.098	0	1
Watched Sesame Street pre-school	.591	.492	0	1

Appendix Table 1 (continued)				
Variable	Mean	Std. Dev.	Min	Max
Parental Characteristics				
Mother's age at child's birth	27.465	7.377	-5.336	71.875
Missing mother's age at child's birth	.018	.132	0	1
Mother's age at first birth	22.852	7.851	0	46
Missing mother's age at first birth	.061	.239	0	1
Mother's education (in years)	13.765	2.745	0	20
Missing mother's education	.014	.118	0	1
Father's education (in years)	9.351	5.894	0	20
Missing father's education	.179	.384	0	1
Mother worked between birth and kindergarten	.738	.440	0	1
Missing whether mother worked between birth and kindergarten	.036	.187	0	1
Income	48652.550	37145.060	0	150000
Missing income	.077	.267	0	1
Mother's occupation (prestige score)	30.370	22.478	0	77.5
Mother's occupation (squared)	1427.536	1339.482	0	6006.25
Mother's occupation (cubed x 1000)	7.17E+07	8.71E+07	0	4.65E+08
Missing mother's occupation	.311	.463	0	1
Father's occupation (prestige score)	33.441	21.034	0	77.5
Father's occupation (squared)	1560.698	1320.563	0	6006.25
Father's occupation (cubed x 1000)	7.80E+07	9.09E+07	0	4.65E+08
Missing father's occupation	.236	.425	0	1
WIC	.407	.491	0	1
Missing WIC	.004	.066	0	1
Food Stamp	.265	.441	0	1
Missing Food Stamp	.001	.036	0	1
AFDC	.178	.382	0	1
Missing AFDC	.002	.042	0	1
Child care arrangements (pre-K)				
Relative pre-school care	.135	.342	0	1
Center-Based pre-school care	.453	.498	0	1
Non-Relative pre-school care	.109	.311	0	1
Head Start	.082	.274	0	1
Varied pre-school care	.049	.217	0	1
Missing pre-school care	.010	.097	0	1
Child ever in center-based pre-school care	.789	.408	0	1

Appendix Table 1 (continued)				
Variable	Mean	Std. Dev.	Min	Max
Neighborhood characteristics (1="Big Problem", 3="No Problem"				
Neighborhood safety	2.708	.506	1	3
Neighborhood litter	2.878	.369	1	3
Neighborhood drug use	2.885	.384	1	3
Neighborhood burglary	2.873	.364	1	3
Neighborhood violence	2.967	.206	1	3
Neighborhood vacancies	2.946	.260	1	3
Parental expectations at baseline				
Years of education parent expects child to complete	16.107	2.335	0	20
Missing education expectation	.003	.057	0	1
How important is it that your child does the following by kindergarten? (1="Essential", 5="Not Important")				
Count	2.349	.905	0	5
Missing count	.00	.020	0	1
Share	1.712	.576	0	5
Missing share	.0003	.018	0	1
Draw	2.079	.775	0	5
Missing draw	.0002	.016	0	1
Be calm	1.945	.690	0	5
Missing calm	.001	.024	0	1
Knows letters	2.204	.840	0	5
Missing knows letters	.0003	.018	0	1
Communicates well	1.704	.594	0	5
Missing communicates well	.0005	.022	0	1
Missing Dummies for parent/teacher measures				
Missing teacher report self control	.034	.180	0	1
Missing teacher report Internalizing	.022	.145	0	1
Missing teacher report externalizing	.014	.116	0	1
Missing teacher report interpersonal skills	.043	.202	0	1
Missing parent report self control	.0005	.022	0	1
Missing parent report sad/lonely	.001	.030	0	1
Missing parent report social interaction	.0005	.022	0	1
Missing parent report impulsive/overactive	.006	.076	0	1

Appendix Table 2: Regression Coefficients and Standard Errors for Independent and Control Variables from Table 4 and Table 5 (column 2)				
	Spring 1st grade reading IRT		Spring 1st grade math IRT	
	Coefficient	Standard Error	Coefficient	Standard Error
Test Score				
Reading IRT	.346**	.009	.032**	.008
Math IRT	.274**	.010	.454**	.010
General Knowledge IRT	.064**	.009	.187**	.009
Teacher Report				
Self-Control	.022	.013	.022	.012
Internalizing Problem Behaviors	-.022**	.008	-.034**	.007
Interpersonal Skills	.005	.011	.004	.011
Externalizing Problem Behaviors	-.020	.010	-.019	.010
Parent Report				
Self-Control	.021**	.007	.028**	.007
Social Interaction	.017*	.007	.009	.007
Sad/Lonely	.016*	.007	-.007	.007
Impulsive/Overactive	-.018*	.008	-.009	.007
Race				
White (omitted category)				
Black	-.056*	.025	-.158**	.023
Hispanic	0.006	.023	-.017	.022
Asian	.116**	.036	.016	.032
Other	-.004	.030	-.054*	.027
Female	.099**	.013	-.076**	.013
Male (omitted category)				
Age (in months at Fall K assessment)	-1.673*	.723	-.454	.707
Age (squared)	.027*	.010	.010	.010
Age (cubed x 1000)	0	0	0	0
Birth weight (in pounds)	.008	.005	.012*	.005
Missing birth weight	.019	.057	.084	.055
Premature (child over 2 weeks early)	.011	.018	.004	.018
Parent report of overall child health (1=excellent, 5=poor)	-.019*	.008	-.013	.008
Geographic controls				
South (omitted category)				
West	-.005	.026	-.065**	.021
Midwest	-.047*	.021	-.043*	.019
Northeast	-.074**	.024	-.142**	.021
Urban (omitted category)				
Rural	-.017	.023	-.012	.020
Suburban	.003	.019	.017	.016
Home Environment				
Number of siblings	.024	.020	.064**	.020
Number of siblings (squared)	-.009	.007	-.013	.007
Number of siblings (cubed)	.001	.001	.001	.001
Child part of multiple birth	-.005	.043	.002	.043
Adopted	.034	.086	.014	.077
Two biological parents, continuously married (omitted category)				
Live with guardian	.080	.102	.168	.102
Single biological parent	-.047	.041	.046	.039
Biological parent and other parent	-.035	.027	.014	.027
Two biological parents (not continuously married)	-.053*	.022	.003	.022
English not primary home language	.066*	.030	.147**	.029
Missing primary home language	-.582**	.167	-.639	.426

Appendix Table 2 (continued)				
	Spring 1st grade reading IRT		Spring 1st grade math IRT	
	Coefficient	Standard Error	Coefficient	Standard Error
Four or more moves pre-school	.045*	.021	.062**	.020
Parent reads to child (days/week)	.005	.003	-.004	.003
Missing read to child	.427	.558	-0.13*	.051
Parent tells stories to child (days/ week)	-.002	.003	-.004	.003
Missing tell stories to child	.356	.190	.395	.227
Number of children's books in the home	0	.0001	0	.00012
Missing number of books	.016	.063	.034	.062
Watched Sesame Street pre-school	-.014	.012	-.048**	.012
Parental Characteristics				
Mother's age at child's birth	-.003	.001	-.002	.001
Missing mother's age at child's birth	.197	.121	.233	.119
Mother's age at first birth	0	.002	0	.002
Missing mother's age at first birth	-.014	.081	-.111	.071
Mother's education (in years)	0	.004	.003	.004
Missing mother's education	-.076	.137	-.171	.124
Father's education (in years)	-.002	.002	-.003	.001
Missing father's education	.034	.051	-.024*	.049
Mother worked between birth and kindergarten	.037*	.017	.021	.016
Missing whether mother worked between birth and kindergarten	-.105	.094	-.045	.095
Income	0	.0000002	0	0
Missing income	-.055*	.025	-.003	.025
Mother's occupation (prestige score)	.012	.044	-.009	.042
Mother's occupation (squared)	0	.001	0	.001
Mother's occupation (cubed x 1000)	0	0	0	0
Missing mother's occupation	.243	.741	-.084	.702
Father's occupation (prestige score)	.038	.034	.030	.032
Father's occupation (squared)	-.001	.001	-.001	.001
Father's occupation (cubed x 1000)	0	0	0	0
Missing father's occupation	.557	.573	.474	.532
WIC	.010	.018	-.034	.018
Missing WIC	.040	.117	-.009	.099
Food Stamps	-.047*	.022	.001	.022
Missing Food Stamps	-.440	.356	.240	.256
AFDC	-.026	.024	-.041	.023
Missing AFDC	.166	.314	-.181	.211
Child care arrangements (pre-K)				
No reported childcare (omitted category)				
Relative pre-school care	-.008	.026	-.044	.024
Center-Based pre-school care	-.022	.025	-.031	.022
Non-Relative pre-school care	-.018	.028	-.024	.025
Head Start	-.081*	.034	-.092**	.031
Varied pre-school care	-.028	.035	-.051	.032
Missing pre-school care	.048	.059	-.086	.062
Child ever in center-based pre-school care	-.024	.021	.002	.020

Appendix Table 2 (continued)				
	Spring 1st grade reading IRT		Spring 1st grade math IRT	
	Coefficient	Standard Error	Coefficient	Standard Error
Neighborhood characteristics (1="Big Problem", 3="No Problem"				
Neighborhood safety	-.006	.013	.010	.013
Neighborhood litter	.035	.020	.045*	.021
Neighborhood drug use	.041	.022	-.006	.021
Neighborhood burglary	-.014	.019	-.024	.019
Neighborhood violence	-.013	.034	-.019	.033
Neighborhood vacancies	.003	.026	-.003	.028
Parental expectations at baseline				
Years of education parent expects child to complete	.012**	.003	.005	.003
Missing education expectation	.089	.111	.066	.118
How important is it that your child does the following by kindergarten? (1="Essential", 5="Not Important")				
Count	.003	.009	-.024**	.008
Missing count	-.234	.224	-.264	.247
Share	.007	.013	0	.012
Missing share	.048	.313	-0.702*	.278
Draw	.018	.010	-.008	.009
Missing draw	.370	.295	.521**	.171
Be calm	-.027*	.011	-.005	.010
Missing calm	.166	.214	.052	.174
Knows letters	-.021*	.010	.009	.009
Missing knows letters	-.175	.180	-.246	.306
Communicates well	-.013	.012	.010	.011
Missing communicates well	-.874**	.189	-.825**	.225
Missing Dummies for parent/teacher measures				
Missing teacher report self control	-.038	.039	-.026	.041
Missing teacher report Internalizing	.035	.053	.062	.050
Missing teacher report externalizing	.089	.061	.054	.054
Missing teacher report interpersonal skills	.023	.032	-.016	.033
Missing parent report self control	-.469	.279	-.903*	.377
Missing parent report sad/lonely	.060	.170	.450*	.210
Missing parent report social interaction	.177	.160	-.185	.206
Missing parent report impulsive/overactive	.038	.080	.025	.073
Constant	33.754*	16.641	5.657	16.279
Number of observations	12415		12413	
R-squared	.53		.54	
* significant at 5%; ** significant at 1%				
All standard errors are corrected for classroom clustering using Huber-White methods				