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The Longitudinal Relations of Teacher Expectations to Achievement in the Early School Years

J. Benjamin Hinnant, **Marion O'Brien**, and **Sharon R. Ghazarian**
The University of North Carolina at Greensboro

Abstract

There is relatively little research on the role of teacher expectations in the early school years or on the importance of teacher expectations as a predictor of future academic achievement. The current study investigated these issues in the reading and mathematic domains for young children. Data from nearly 1,000 children and families at first, third, and fifth grades were included. Child sex and social skills emerged as consistent predictors of teacher expectations of reading and, to a lesser extent, math ability. In predicting actual future academic achievement, results showed that teacher expectations were differentially related to achievement in reading and math. There was no evidence that teacher expectations accumulate but some evidence that they remain durable over time for math achievement. Additionally, teacher expectations were more strongly related to later achievement for groups of children who may be considered to be at risk.

Keywords

teacher expectations; teacher perceptions; self-fulfilling prophecy; academic achievement

The early school years are important building blocks for later academic success. It is during this time that children develop the reading, writing, and mathematics tools essential for later academic work. The trajectories of children's academic success have been shown to be influenced by many factors including parenting beliefs and behaviors and socioeconomic resources (e.g., Burchinal, Roberts, Zeisel, Hennon, & Hooper, 2006; Englund, Luckner, Whaley, & Egeland, 2004; Jacobs & Harvey, 2005). During the school years, however, teachers are considered to be a major conduit through which children's academic development is facilitated (Hamre & Pianta, 2005). Thus, the importance of teachers' expectations for children's abilities above and beyond what can be accounted for by actual achievement is a topic that has received considerable attention from researchers (see Jussim & Harber, 2005, for a recent review). To date, however, relatively little longitudinal research has been conducted in this area. As a result, we know very little about how teacher assessments of ability relate to children's actual performance in the early school years or the relation of teacher assessments early in children's schooling to long-term academic achievement.

At the heart of this issue is the idea of the self-fulfilling prophecy. As originally defined by Merton (1948), the self-fulfilling prophecy is a situation in which beliefs lead to their fulfillment; a person becomes or exemplifies what it is he or she was believed to be. Frequent

evidence for the effect of self-fulfilling prophecies has been found (see Rosenthal and Rubin, 1978, for a meta-analysis of 345 experimental studies on self-fulfilling prophecies). Similar results have been found in non-experimental studies of teacher expectations (see Jussim & Eccles, 1995, or Jussim & Harber, 2005, for a review). Overall, research consistently indicates that the self-fulfilling prophecy is a real phenomenon although its statistical effects have been consistently small to moderate (effect sizes generally between .1 and .3; Jussim & Eccles, 1995).

An examination of effects of teacher over- and underestimation of children's academic abilities requires both teacher reports of children's abilities *and* an objective measure of child performance (usually standardized tests). From these, discrepancy scores can be calculated by regressing teacher perceptions of children's ability on children's actual achievement and using the resulting residual scores as an index of the accuracy of teacher perceptions (Cooper, Findley, & Good, 1982). These residuals, commonly referred to in the literature as teacher expectations, represent the discrepancies between teacher estimates of ability and children's actual achievement. These residuals can be used to predict other factors such as future academic performance in order to estimate the effect of the self-fulfilling prophecy. In this report we also refer to these discrepancies as teacher expectations.

It has been hypothesized that the academic outcomes for children may be different when teachers over- versus underestimate children's abilities. Indeed, in testing the competing hypotheses of whether teacher over- or underestimations of ability have greater predictive ability to future academic performance, Madon, Jussim, and Eccles (1997) found that teacher overestimations of sixth-grade children's academic ability were more strongly related to future performance than were teacher underestimations of children's actual ability. Alvidrez and Weinstein (1999), on the other hand, found that teacher underestimations of children's abilities at age 4 were more strongly linked to high school GPA than early overestimations. Given the ambiguous evidence for either positive self-fulfilling prophecies (i.e., overestimations) or negative self-fulfilling prophecies (i.e., underestimations) being stronger, we test both possibilities by including an examination of potential non-linear relations between teacher expectations and child performance.

In this paper we explore the extent to which teachers' expectations of children's early academic abilities, particularly in the first crucial years of school, play a role in shaping future academic success over and above children's prior performance on standardized achievement tests. In addition, we examine how child characteristics are linked to teacher expectations and also whether child characteristics moderate the relation between teacher expectations and later child performance. As Jussim, Smith, Madon, and Palumbo (1998) and Jussim and Harber (2005) note, there are relatively few studies that include measures of both teacher perceptions of student ability and objective indices of student achievement. There are none that do so both longitudinally and with a focus on the early school years, although Alvidrez and Weinstein (1999) found that discrepancies between preschool teacher ratings of academic ability and actual achievement were related to students' grades in high school.

It is our primary hypothesis that mismatches between teachers' estimations of children's academic ability and children's actual academic performance, particularly at the time of school entry, will be an important factor in children's academic achievement in future years of school. It is our belief that these first years of formal education are formative and that teacher expectations based on factors beyond academic achievement will have a particularly strong influence on children's later success. We also examine the potential accumulation of expectancy effects. If underestimations of achievement compound and "snowball" to have even stronger relations to future performance then this could clearly become a handicap for children. Extant research is equivocal on this point. Some investigators have found that self-fulfilling

prophecies do not accumulate but rather dissipate over time (West & Anderson, 1976; Smith, Jussim, & Eccles, 1999). However, Raudenbush (1984) found that expectancy effects upon entering a new environment (in this case, high school) were particularly durable and long lasting. The present study allows an investigation of the possibility that teacher expectancy effects may be especially important at the time of school entry and that these effects may accumulate over time or be especially durable.

Prior research has indicated that most teacher assessments of children's academic ability are fairly accurate when compared with children's performance on standardized tests (Brophy, 1983; Doherty & Conolly, 1985; Egan & Archer, 1985; Hoge & Coladarci, 1989; Jussim, 1989; Jussim & Eccles, 1992). Still, some child characteristics may make it more likely that children's abilities will be over- or underestimated by teachers. It is likely that teachers sometimes unwittingly help to create or propagate self-fulfilling prophecies in their students through perceptual biases (Jussim & Eccles, 1992; Jussim et al., 1998). Biases may arise because of social stereotypes (e.g., boys are better at math than girls; children from more advantaged families are smarter) or be based on experiences with particular children. For example, teachers may view socially competent children as being also academically competent whereas they perceive troublesome children to be less academically competent than their performance warrants. Several demographic and child factors have been implicated as moderating the relation between teacher expectations and subsequent academic achievement; these include child sex, ethnicity, family socioeconomic status, and social competence. It is particularly important to study these moderators because stigmatization may result in stronger teacher expectancy effects for some groups. The correlates of teacher expectations have not been studied extensively, but Alvidrez and Weinstein (1999) found 4-year-old children's social skills to be related to teacher overestimations of their academic ability. No evidence has been found for stronger self-fulfilling prophecy effects based on child sex, but effects have been shown to be more robust for African American children and for low income children and these moderators were independent of one another (Jussim et al., 1996; Madon et al., 1998). For certain groups of children (e.g., low income, racial minority) teacher expectations of academic ability may be more strongly related to academic success; effect sizes much larger than typical (in the range of .4 to .6) have been found with these groups (Jussim et al., 1996).

In this paper, we explore the possibility that child sex, ethnicity, family income, and child social skills moderate the relation between teacher expectations and children's subsequent academic achievement in the early school years. We anticipate that teacher expectations will be more highly related to later academic performance in children from groups perceived to be more at risk: minority children, those from low income families, and those with poor social skills. In addition, we anticipate teacher expectations to be more highly related to later performance in reading for boys and in math for girls.

This paper expands on current research in teacher expectation effects or self-fulfilling prophecies in several important ways. We investigate the child characteristics that are related to teacher expectations at the early school period. It is our hypothesis that teachers will overestimate girls' competence in reading and boys' competence in math, underestimate the academic abilities of minority children and those from low income families, and overestimate the academic abilities of children they perceive as socially competent. Controlling for academic achievement measured prior to school entry, we assess the possibility that teacher expectations may have an influence on subsequent child achievement for years to come (through third and fifth grades). Finally, we investigate the role of child characteristics as moderators in the relation between teacher expectations and later child academic performance, testing the question of whether teacher expectations are more highly related to later child performance for vulnerable children. The data used for these analyses come from the NICHD Study of Early

Child Care and Youth Development, a large national study of more than 1,000 children tracked longitudinally from birth.

Method

Overview of Study Design

Children at 10 different geographic sites were followed from birth to fifth grade. From 1 month through the preschool years, children and families were visited at home on six occasions, mothers and children came to the laboratory on four occasions, and the children who were in nonmaternal care were observed in the child care setting. Once children entered school, they were observed in their first, third, and fifth grade classrooms as well as at home, their cognitive skills were assessed in the laboratory, and their teachers completed questionnaires about the children's academic and social functioning as well as their own education and experience. Further documentation about measures and data collection procedures can be found in the Manuals of Operation on the NICHD Study of Early Child Care website (http://secc.rti.org).

Participants

Families were recruited through hospital visits to mothers shortly after the birth of a child in 1991 in ten locations in the U.S.: Little Rock, AR; Irvine, CA; Lawrence/Topeka, KS; Wellesley, MA; Morganton/Hickory, NC; Philadelphia, PA: Pittsburgh, PA; Charlottesville, VA; Seattle, WA; and Madison, WI. During selected 24-hour intervals, all women giving birth were screened for eligibility and willingness to be contacted again. Of the 8,986 mothers who gave birth during the sampling period, 5,416 (60%) agreed to be telephoned in two weeks and met the eligibility requirements (mother over 18, spoke English; mother healthy, baby not multiple birth or released for adoption, live within an hour of research site, neighborhood not too unsafe for teams of researchers to visit). Of that group, a conditionally random sample of 3,015 was selected (56%) to be contacted at two weeks; the conditioning assured diversity in terms of family income, maternal education status, and ethnicity. The resulting enrolled sample included 1,364 families with healthy newborns who completed a home interview when the infant was 1 month old. These 1,364 families were very similar on years of maternal education, percent in different ethnic groups, and presence of partner in home to the eligible hospital sample. The resulting sample was diverse, including 24% ethnic minority children, 11% mothers not completing high school, and 14% single-parent mothers.

School observations were carried out for 966 children in first grade, 971 in third grade, and 955 in fifth grade. Because of the nature of this data set, children were not nested within classrooms (i.e., it was highly unusual to have a teacher report on more than one child). Children were included in each analysis reported here if they had complete data on the study variables at each grade; thus, because of missing data on teacher and parent questionnaires, the actual study samples vary with each analysis. At each grade, the participants differed from the children who were recruited but not included in this analysis sample. The participating children were less likely to be members of minority ethnic groups, and the families had significantly ($p<.001$) higher family incomes as determined by their average income/needs ratio between birth and 54 months. Average family income-to-needs ratio for the participants included in the analyses at first grade was 4.01 (SD = 3.08); at third grade 4.36 (SD = 3.62); and at fifth grade 4.61 (S.D. = 4.01). (The income-to-needs ratio is an annually adjusted, per capita index comparing household income to federal estimates of minimally required expenditures for food and shelter. An income-to-needs ratio of 1.0 is the U.S. government definition of poverty, so a ratio of 3.0 represents a per capita income three times the poverty level.) Eighty-three percent of the participating children were European American, non-Hispanic, and 17 percent were members of minority ethnic groups.

Measures

Child Characteristics—Demographic characteristics of children and families were collected by mother report. Child sex and ethnicity (scored as white and non-white for analyses) were recorded at one month; family income was obtained at each measurement point and an income-to-needs ratio was calculated in grades 1, 3, and 5.

To assess teacher perceived social competence, teachers in first, third, and fifth grades completed the Social Skills Questionnaire from the Social Skills Rating System: Grades K-6 (SSRS; Gresham & Elliott, 1990). This instrument is composed of 38 items describing child behavior, each rated on a 3-point scale reflecting how often the child exhibited each behavior. Items are grouped into four areas: cooperation (e.g., follows your direction), assertion (e.g., makes friends easily), responsibility (e.g., asks permission before using someone else's property), and self-control (controls temper when arguing with other children). The total score used in this report represents the sum of all 38 items, with higher scores reflecting higher levels of perceived social competence (alpha range from .86–.94). The SSRS was normed on a diverse, national sample of children and shows high levels of internal consistency (median = .90) and test-retest reliability (.75 to .88) and moderate concurrent and predictive validity to other indices of social competence.

Child academic performance—Two measures of children's academic abilities were collected in the spring of the children's first, third, and fifth grade years: teacher report of classroom performance in reading and math and children's scores on standardized measures.

Teacher report: At first, third, and fifth grade, teachers rated children's reading and math ability using the Academic Skills questionnaire adapted for the NICHD SECC from the Early Childhood Longitudinal Study. The Language and Literacy scale deals with skills related to listening, speaking, and early reading and writing and interest in engaging in those activities. A sample item from the first grade questionnaire is "Reads first grade books fluently, for example, easily reads words in meaningful phrases rather than reading word by word." The Mathematical Thinking scale deals with the child's ability to perceive, understand, and utilize skills in solving mathematical problems and interest in math-related activities. A sample item from the first grade questionnaire is "Uses strategies to add and subtract two digit numbes, for example, by doubling, or knowing number families." Depending on the year of administration, the Language and Literacy scale and the Mathematical Thinking scale had from 10 to 15 items each. Children's performance was rated on a 5-point scale, ranging from 1 = "Not Yet" to 5 = "Proficient." (Teachers could also respond "Not Applicable" if the skill had not been introduced in the classroom; these scores were recoded as "Not Yet" unless they made up more than 60% of the responses in which case the data were missing [approximately 1% of all questionnaires]). The scale was designed to reflect the degree to which a child had acquired and/or chose to demonstrate the targeted skills, knowledge, and behaviors. At each time point, scale scores were computed by averaging across the items making up each scale. Internal consistency was excellent at all time points, ranging from 0.94 to 0.96 for Language and Literacy and from 0.91 to 0.94 for Mathematical Thinking.

Standardized assessment: In the spring of first, third, and fifth grades children were administered two subtests from the Woodcock-Johnson Psycho-Educational Battery—Revised (Woodcock & Johnson, 1989): Letter-Word Identification, which assesses pre-reading skills in identifying isolated letters and words, and Applied Problems, which measures skill in analyzing and solving practical problems in mathematics. Typically, raw scores are converted to standard scores with a mean of 100 and a standard deviation of 15, (McGrew, Werder, & Woodcock, 1991), but for this study we relied upon W achievement scores which are transformations of the Rasch raw achievement scores designed to eliminate the need for

decimal fractions and negative values. With W scores "statistical values, such as standard deviations and standard errors of measurement, have the same mathematical meaning at any level and in any area of measurement" (McGrew et al., 1991, p. 52). Thus, for example, a 10-point increase between Kindergarten and first grade indicates the same increase in level of success on a sub-test as does a 10-point increase between second and third grade.

Teacher Expectancy Score—A discrepancy score between teacher report of child academic performance and children's observed performance on standardized tests was calculated following the work of Jussim and colleagues (e.g., Madon et al., 1997) by regressing teacher perceptions of children's ability on children's Woodcock-Johnson scores for both reading and math in each grade; these residual scores are referred to as teacher expectations. The resulting six residual scores (a reading and a math score at each of three grades) provide an index of the extent to which teacher expectations vary from a child's observed performance. A negative residual score represents teacher under-estimation, a positive residual score represents teacher over-estimation; the closer a residual score is to zero, the more accurate the prediction of student achievement (Madon et al., 1997). These residuals were then used to predict achievement in future years of school.

Results

Descriptive statistics and correlations for the teacher expectancy scores and standardized measures of academic achievement in reading and math can be found in Tables 1 and 2. The standardized residuals indicating teacher over- and under-estimations of children's academic performance for reading ranged from −4.29 to 2.99 in first grade (median = 0.02), −3.36 to 2.94 in third grade (median = 0.05), and −3.28 to 2.29 in fifth grade (median = 0.12); for math the ranges were −3.06 to 2.48, −3.14 to 3.10, and −3.04 to 3.34 and the medians were 0.02, 0.09, and 0.02 in grades 1, 3, and 5 respectively. Teacher expectations are created by regressing teacher ratings of academic ability on objectively measured achievement; they are in effect residuals or error and thus it is not meaningful to correlate them with the variables that were used to create them. All correlations were in expected directions and, given the large sample size, most were significant. Not surprisingly, children's observed performance on the Woodcock-Johnson reading and math subscales were correlated over time with themselves (see Tables 1 and 2) and with each other within time points (r = .58, .61, and .60 for grades 1, 3, and 5, respectively). Prior to calculating teacher expectations, we gauged the accuracy of teacher reports of academic ability by correlating them with more objectively measured WJ scores. Teachers' ratings of academic ability (as reported using the Academic Skills questionnaire) at each grade were highly related to Woodcock-Johnson scores for both reading (r = .64, .67, and .53 for grades 1, 3, and 5, respectively) and math (r = .54, .57, and .56 for grades 1, 3, and 5, respectively); teachers tended to estimate children's abilities with a fairly high degree of accuracy.

After calculating teacher expectations we gauged their relations across domains and over time. Teacher expectancy scores (i.e., teacher discrepancies, inaccuracy, or residuals) in reading and math from first and third grades were highly correlated within the grade, r = .58, .54, and .48 for grades 1, 3, and 5 respectively, indicating significant overlap in teachers' expectations across academic domains at each time point. Reading expectancy scores were also correlated across grades, but first grade teacher math expectancy scores were not correlated with those from third and fifth grades, indicating that teachers' expectations for reading may have greater continuity over time and from teacher to teacher than do teachers' expectations for math. It is also of note that WJ measures of academic achievement prior to school entry were positively correlated with later teacher expectations (for all but first grade math expectations); teachers tended to overestimate the abilities of children who had higher preschool academic achievement.

Correlates of Teacher Expectations

Following preliminary examination of the data, two sets of hierarchical regression analyses were conducted. The first set of analyses identified the relations between child characteristics (demographics and social competence) and teacher expectancy scores at first, third, and fifth grade. Regression analyses, controlling for child Woodcock-Johnson performance at 4.5 years, were run to examine the extent to which child demographics and social competence were related to teacher expectancy scores in reading and math. Results are shown in Table 3. In first grade, reading expectancy scores were related to children's earlier performance on the Woodcock-Johnson, indicating actual child performance is a significant predictor of teacher expectations in this domain; however, earlier performance on the Applied Problems subtest of the Woodcock-Johnson was not related to teachers' expectations of math performance. Child social competence was linked to teacher expectations in both reading and math, with more socially competent children being viewed as more academically skilled. The set of demographic factors was not linked to teacher expectancy scores although child sex was significantly related to teacher expectations of reading ability. Teachers tended to overestimate girls' reading ability and underestimate the reading ability of boys.

The third grade results showed a significant relation between preschool performance on the Woodcock-Johnson and teacher expectations of children's abilities in both reading and math. For reading, there was a significant relation for demographics, attributable to child sex; that is, teachers tended to perceive girls as more academically skilled than their test scores suggested. For both reading and math, there was also a significant relation between child social competence and teacher expectations; again, teachers had more positive perceptions of the academic competence of children they report as socially skilled. A similar pattern was found for reading in fifth grade, and the child sex result was similar; girls were perceived as having higher reading ability and boys were perceived as having lower reading ability than their performance indicates. The results for fifth grade teacher math expectancy scores indicated that demographic factors other than child sex were linked to teacher expectations by this age; ethnicity as well as child sex was significantly related to teacher expectancy scores. As with reading, girls were more likely to be perceived as more academically competent than their test scores indicate, whereas children from minority families were perceived as less competent at math. Teacher-rated social competence was again related to teacher expectations of academic skills.

Relation of Teacher Expectations to Later Child Performance

Our second set of analyses predicted later child achievement from earlier teacher expectations. Thus, teacher expectancy scores from Grade 1 were used to predict child observed performance at Grade 3 after accounting for the effects of prior academic performance, demographic characteristics, and social competence; and teacher expectancy scores from both Grade 3 and Grade 1 were used to predict child observed performance at Grade 5. The squared teacher expectancy score was also entered to detect possible curvilinear effects in that some have proposed teacher underestimates of child ability to be more influential than teacher overestimates (Madon et al., 1997). To address the question of whether child characteristics moderate the relation between teacher expectations and later child academic performance, interaction terms were also included in the models. Analyses were conducted separately for reading and math achievement. Results of the regression analyses examining child academic performance are shown in Table 4. Different patterns of results were found for reading and math.

Reading—In both third and fifth grades, children's reading performance was linked to demographics and to social competence, but not to teacher expectations from earlier grades. The positive association of income and ethnicity with third and fifth grade reading scores

indicates that non-minority children as well as students from higher income families were more likely to demonstrate higher reading achievement in both grades. Additionally, children rated as having higher social skills also performed better on tests of reading competence.

In predicting children's reading performance in third grade we found some evidence supporting previous research findings that teacher expectations may have a stronger relation to later performance specifically for groups of children who may be seen as disadvantaged or marginalized in the classroom (Jussim & Harber, 2005). Analyses of third grade reading performance showed a significant three-way interaction between first grade teacher expectations, child sex, and child ethnicity (Table 4). These interactions indicate that the relation between first grade teacher expectations and children's third grade reading achievement differs based on children's sex and ethnicity. To further explore these findings we tested the simple slopes in these interactions using procedures outlined by Aiken and West (1991), Bauer and Curran (2005), and Preacher, Curran, and Bauer (2006). First grade teacher expectations were reliably linked to children's third grade reading performance only for minority boys. This relation was positive and marginally significant ($\beta = .19$, $p = .088$) while for other groups of children there were no significant links between first grade teacher expectations and third grade reading performance ($\beta = .004$, $p = .92$, for white boys; $\beta = .038$, $p = .42$, for white girls; $\beta = -12$, $p = .21$, for minority girls). None of the interactions between teacher expectations and child characteristics were significant in the analysis of fifth grade reading performance.

Math—Results for math performance indicated an effect of earlier teacher expectations over and above the associations with demographic factors and social competence. At third grade, first grade teachers' expectancy scores were significantly associated with child performance, but that these findings were tempered by a significant interaction with the income of the child's family. This interaction indicated that the link between first grade teacher expectations and children's third grade math performance depends to some extent on family income. The simple slopes were tested to clarify these findings. We found that for children from families with low and average incomes, teacher expectations were significantly and positively related to later math performance ($\beta = .20$, $p < .001$; $\beta = .12$, $p < .01$, respectively) whereas teacher expectations were unrelated to later math performance for high income children ($\beta = .04$, $p = .38$).

At fifth grade, both first and third grade teachers' expectations predicted child math performance. These associations were linear, as indicated by the lack of significance of the squared expectancy score. Thus, when teachers have a more positive view of children's abilities in math than their test scores suggest is accurate, children tend to perform better in math in future years; when teachers have a more negative view than the child's actual math performance warrants, the children tend to perform less well in future years. These effects, although small in magnitude, appear to be long-lasting in that first grade teachers' expectancy scores were still related to child math performance four years later, over and above the third grade teacher's expectations. As with the results for reading, none of the interactions between teacher expectations and child characteristics were significant for fifth grade math performance.

Discussion

This study contributes to research in this area in several important ways: (1) we focus on the early school years and the role of teacher expectations of academic ability during this time, (2) we analyze longitudinal relations between teacher expectations and children's academic performance two and fours years distant (at third and fifth grades), and (3) we differentiate reading and math as discrete domains in which teacher expectations may have unique roles in the early school years.

Consistent with prior research (e.g., Jussim & Eccles, 1992), we found that teachers' reports of children's academic ability are highly related to objective measures. We also found, however, that teachers' expecations (i.e., inaccuracy) can be predicted. Several child characteristics were consistently significant in predicting teachers' expectations of children's academic abilities. Child sex emerged as a consistent predictor of teacher expectations for reading at all time points, and girls were always more likely to be overestimated. Child sex was related to teacher expectations in math only at fifth grade, and, contrary to our hypothesis, girls were again more likely to be overestimated. Also, children's social skills were significantly and positively related to teacher expectations for both reading and math at all time points. It may be that teachers tend to overestimate the academic competence of children they like and find easy to manage in the classroom. Overall, child characteristics accounted for more variance in teachers' expectations for children's reading ability than for math ability.

Given that prior research has shown teacher expectancy effects to dissipate rather than accumulate over time (Smith et al., 1999), we expected only small main effects for teacher expectations on future academic achievement but larger effects for certain groups of children, particularly those who can be viewed as vulnerable. In terms of main effects of teacher expectations on later child academic performance, our results were mixed. We found no effect of teacher expectations in the reading domain; teacher expectations in first and third grades were unrelated to later child reading performance. It appears that in the early school years teacher expectations do not accumulate or have very long lasting impacts in the domain of reading.

In investigating the role of child characteristics as moderators we found a significant three-way interaction between child sex, ethnicity, and first grade teacher expectations in reading. This interaction accounted for only a small portion of variance in third grade reading performance but was consistent with prior research with older children (e.g., Jussim et al., 1996; Madon et al., 1998) and so was interpreted. Our analyses indicated that teacher expectations of children's reading abilities were related to later performance for one potentially vulnerable group of children, minority boys. Minority boys had the lowest performance when their abilities were underestimated and the greatest gains when their abilities were overestimated.

In the math domain, we found small but significant main effects for teacher expectations on future math performance over and above that which could be accounted for by prior achievement or child characteristics. First grade teacher expectations of children's math abilities were related to both third and fifth grade math performance, and third grade teacher expectations were marginally related to fifth grade math performance. Moreover, at third grade a significant interaction between first-grade teacher expectations and child characteristics was found. For children from low-income families and, to a lesser extent, even average-income families, first grade teacher expectations were related to third grade math performance, whereas the performance of children from high-income families was not linked to earlier teacher expectations.

Our results did not suggest a more important role for teachers' under- versus overestimation of children's abilities. Earlier research has presented mixed findings on this topic (e.g., Alvidrez & Weinstein, 1999; Madon et al., 1997). The present study involved a large number of different teachers and classrooms. It is possible that in some situations teachers communicate positive expectations clearly and invest time and energy in children they perceive to be more able, whereas other teachers may be more likely to communicate negative expectations in a way that discourages children. More detailed observations of the processes by which teachers may convey differential expectations to children are needed to fully understand this process.

Several limitations of the current study must also be noted. In the NICHD study, teacher expectations and child achievement were both measured in the spring of the school years. Thus, we were not able to evaluate the relation of teacher expectations at the beginning of the school year to year-end academic performance, the period of time when teacher misestimations likely have their strongest relation to academic performance. Also, the sample of children in this study differed from the one originally recruited; it included more children from high income backgrounds and fewer children from minority families. Given the widespread finding that boys from minority ethnic backgrounds are at particular risk for school failure (Davis, 2005; Tutwiler, 2007), the potential links between teacher expectations for these boys, the boys' beliefs about themselves, and their trajectories of school performance are especially important topics for further study. Another limitation of the present study was that the sample of teachers was almost all female and predominantly white, making it impossible to examine differences in teacher expectations, or the outcomes of teacher expectations, based on the match or mismatch of gender and ethnic background between teachers and children. It is possible that our measure of reading achievement, the letter-word subtest of the Woodcock-Johnson scales, did not capture the complexities of reading performance, especially by third and fifth grades. Additionally, teacher reports of academic ability were based on teachers' comparisons of the participant student to other students in the same class whereas WJ achievement scores are normed with a national sample.

A final limitation of the study is that our measures of teacher perceptions of child reading and math ability includes an item assessing motivation to participate in reading or math activities along with items assessing ability or skill. Therefore, our index of teacher expectations is not based entirely on perceived ability but also in part on interest and engagement. It is possible that WJ scores predict teacher-rated ability and the residual (teacher expectations) is comprised primarily of teacher-rated motivation. This implies that it is possible that teacher-rated motivation is actually accounting for variance in future academic achievement. We acknowledge this possibility but also note that our overall results do not support this interpretation. We found that social skills were a strong predictor of teacher expectations and that teacher expectations had stronger effects for only certain groups of children; we think it unlikely that these results would have emerged if teacher expectations were merely a proxy for teacher-rated motivation.

The present study provided several unique advantages and found evidence for the potential importance of teacher expectations to children's later academic achievement. First, it used a large multi-site sample of children and teachers, rather than a limited number of schools or classrooms within a single region. Secondly, it focused on the period of school entry, which can be seen as a time children may be particularly susceptible to teacher influence. Third, it found some evidence that research into teacher expectations should take into consideration differing academic domains. In fact, at least in the math domain, it appears that teacher expectations can have long-lasting effects on children's performance. Fourth, it investigated which child characteristics may moderate the relation between teacher expectations and academic achievement over time.

In conclusion, the evidence presented here indicates that child characteristics, especially child sex and social skills, are related to teachers' expectations of children's academic skills in the early years of school. The relation between teacher expectations and children's later academic performance appears to be complex, in that teacher expectations play a larger role for some groups of children than others. The children whose later performance appears to be most influenced by teacher expectations are those who can be seen as marginalized in the classroom, i.e., children from low-income families and minority boys. These results were especially evident between first and third grade and differed by area of academic achievement. Given the potential importance of children's early school experiences in setting the trajectory for later

performance, further research into teacher expectations and misperceptions of children's academic abilities is warranted.

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Table 1

Descriptive Statistics and Correlations for Reading Variables

	M (SD)	2	3	4	5	6	7
1. Teacher expectations -- reading G1		**.24**	**.20**	**.14**	--	**.11**	**.13**
2. Teacher expectations -- reading G3		--	**.30**	**.17**	.11	--	.10
3. Teacher expectations -- reading G5			--	**.18**	**.14**	**.13**	--
4. W-J Letter-word 4.5 yr	369.36 (21.41)			--	**.56**	**.51**	**.49**
5. W-J Letter-word G1	452.59 (23.99)				--	**.75**	**.67**
6. W-J Letter-word G3	493.86 (18.73)					--	**.86**
7. W-J Letter-word G5	510.12 (17.52)						--

Note: Bold entries are significant at $p < .001$. W-J = Woodcock-Johnson; G1 = first grade; G3 = third grade; G5 = fifth grade. Because the calculation of teacher expectations includes the W-J scores, correlations between the two measures at the same grade are not meaningful; those three cells are left blank in the correlation table.

Table 2

Descriptive Statistics and Correlations for Math Variables

	M (SD)	2	3	4	5	6	7
1. Teacher expectations -- math G1		.10	.10	.06	--	**.18**	**.13**
2. Teacher expectations -- math G3		--	**.19**	**.18**	**.26**	--	**.16**
3. Teacher expectations -- math G5			--	**.17**	**.15**	**.15**	--
4. W-J Applied problems 4.5 yr	424,62 (19.27)			--	**.60**	**.56**	**.56**
5. W-J Applied problems G1	470.05 (15.54)				--	**.69**	**.69**
6. W-J Applied problems G3	497.33 (13.19)					--	**.78**
7. W-J Applied problems G5	509.82 (12.85)						--

Note: Bold entries are significant at $p < .001$. W-J = Woodcock-Johnson; G1 = first grade; G3 = third grade; G5 = fifth grade. Because the calculation of teacher expectations includes the W-J scores, correlations between the two measures at the same grade are not meaningful; those three cells are left blank in the correlation table.

Table 3

Hierarchical Regressions Predicting Teacher Expectations in Children's Reading and Math Abilities

a. Grade 1

	Reading				**Math**			
	B	***SE***	***β***	**Δ*R*²**	***B***	***SE***	***β***	**Δ*R*²**
W-J 4.5 years	.003	.002	.068*	.021***	−.001	.002	−.023	.004
Demographic characteristics				.006				.002
Child sex	.160	.061	.080**		.027	.065	.014	
Ethnicity	−.036	.087	−.013		.050	.095	.018	
Family income/needs G1	−.016	.011	−.049		.001	.011	.002	
Child social skills – teacher G1	.031	.002	.427***	.171***	.022	.003	.293***	.078***
Adj. R^2 = .192, F (5, 866) = 42.61, p < .001					Adj. R^2 = .079, F (5, 862) = 15.85, p < .001			

b. Grade 3

	Reading				Math			
	B	*SE*	*β*	Δ*R*²	*B*	*SE*	*β*	Δ *R*²
W-J 4.5 years	.003	.002	.068*	.028***	.005	.002	.084*	.031***
Demographic characteristics				.018**				.006
Child sex	.185	.064	.094**		.099	.067	.050	
Ethnicity	.059	.089	.022		−.018	.097	−.007	
Family income/needs G3	.008	.010	.030		.011	.010	.038	
Child social skills – teacher G3	.028	.002	.400***	.150***	.022	.002	.311***	.089***
Adj. R^2 = .187, F (5, 785) = 38.26, p < .001					Adj. R^2 = .120, F (5, 774) = 22.26, p < .001			

c. Grade 5

	Reading				Math			
	B	*SE*	*β*	Δ *R*²	*B*	*SE*	*β*	Δ *R*²
W-J 4.5 years	.003	.002	.067*	.038***	.007	.002	.140***	.031***
Demographic characteristics				.040***				.013*
Child sex	.293	.062	.150***		.178	.070	.090*	

a. Grade 1

	Reading				Math			
	B	***SE***	***β***	**Δ*R*²**	***B***	***SE***	***β***	**Δ*R*²**
Ethnicity	.037	.088	.014		−.242	.101	−.089*	
Family income/needs G5	.012	.009	.049		.000	.010	−.001	
Child social skills – teacher G5	.029	.002	.426***	.164***	.014	.003	.204***	.037***
Adj. R^2 = .237, F (5, 755) = 48.20, p < .001					Adj. R^2 = .072, F (5, 747) = 13.31, p < .001			

* p < .05,

** p < .01,

*** p < .001

W-J = Woodcock Johnson; G1 = Grade 1; G3 = Grade 3; G5 = Grade 5

Table 4

Hierarchical Regressions Predicting Third and Fifth Grade Reading and Math Achievement

a. Grade 3

	Reading				**Math**			
	B	***SE***	***β***	**Δ*R*²**	***B***	***SE***	***β***	**Δ*R*²**
W-J 4.5 years	.376	.029	.433***	.260***	.340	.022	.492***	.317***
Demographic characteristics				.030***				.039***
Child sex	1.552	2.897	.043		−2.132	1.98	−.083	
Ethnicity	7.021	2.317	.139**		2.099	1.605	.059	
Family income/needs G1	.344	.166	.068*		.429	.111	.122***	
Child social skills – teacher G1	.212	.041	.166***	.026***	.093	.028	.103**	.012***
G1 Teacher expectancy score	2.542	2.076	.138	.000	4.575	1.692	.356**	.014***
G1 Tchr expectancy score squared	−.543	.417	−.040	.002	.554	.316	.051+	.003
Interactions				.011				.009
G1 Tchr expectancy × sex	−5.881	2.676	−.232*		−3.179	2.098	−.181	
G1 Tchr expectancy × ethnicity	−2.725	2.258	−.133		−3.014	1.792	−.217	
G1 Tchr expectancy × income	−.209	.180	−.038		−.258	.116	−.068*	
G1 Tchr expectancy × social skills	−.08	.042	−.062		.013	.026	.014	
G1 Tchr expectancy × sex × ethnicity	6.939	2.960	.245*		2.86	2.246	.149	
Adj. R^2 = .318, F (13, 725) = 27.42, p < .001					Adj. R^2 = .395, F (13, 720) = 36.13, p < .001			

b. Grade 5

	Reading				Math			
	B	*SE*	*β*	Δ*R*²	*B*	*SE*	*β*	Δ*R*²
W-J 4.5 years	.341	.030	.413***	.239***	.283	.022	.457***	.298***
Demographic characteristics				.044***				.034***
Child sex	−1.109	1.121	−.033		−2.441	.719	−.108**	
Ethnicity	7.132	1.627	.151***		2.205	1.083	.068*	
Family income/needs G5	.431	.159	.097**		.268	.101	.090**	

a. Grade 3

	Reading				Math			
	B	***SE***	***β***	**Δ*R*²**	***B***	***SE***	***β***	**Δ*R*²**
Child social skills – teacher G5	.106	.042	.088*	.007**	.091	.027	.113**	.013***
G3 Teacher expectancy score	−.141	.600	−.008	.000	.693	.390	.060*	.006*
G3 Tchr expectancy score squared	.218	.401	.019	.000	−.345	.281	−.041	.001
G1 Teacher expectancy score	.743	.575	.045	002	1.012	.357	.091**	.008**
Adj. R = .284, F (8, 648) = 33.47, p < .001					Adj. R = .351, F (8, 638) = 45.01, p < .001			

* p < .05,

** p < .01,

*** p < .001

W-J = Woodcock Johnson; G1 = Grade 1; G3 = Grade 3; G5 = Grade 5