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Effects of Peer Academic Reputation on Achievement in Academically At-Risk Elementary Students

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Abstract

Participants were 664 relatively low achieving children who were recruited into a longitudinal study when in first grade. Measures of peer academic reputation (PAR), peer acceptance, teacher-rated academic engagement and achievement, and reading and math achievement were obtained in Year 2, when the majority of students were in second grade, and 1 year later. Measures of academic self concept were obtained in Year 1 and in Year 3. As young as second grade, children's perceptions of classmates' academic competence are distinct from their perceptions of peers' other social and behavioral characteristics. SEM analyses found that Year 2 PAR predicted Year 3 teacher-rated academic engagement and reading (but not math) achievement test scores, above the effects of prior scores on these outcomes and other covariates. Furthermore, the effect of PAR on academic engagement and achievement was partially mediated by the effect of PAR on children's academic self concept. Implications of these findings for educational practice and future research are discussed.

Keywords

peer academic reputation; peer relations; academic achievement; elementary students; academic self concept; developmental changes; academic engagement

Children's peer relationships in the early grades have consequences for children's short-term and long-term school adjustment, including academic achievement (for reviews see Bierman, 2004; Ladd, 1990). The most frequently studied aspects of peer relations are peer acceptance/rejection and friendships. Low peer acceptance (or high peer rejection) forecasts school avoidance and disaffected patterns of engagement from kindergarten through the middle grades (Buhs & Ladd, 2001; Furrer & Skinner, 2003; Ladd, Birch, & Buhs, 1999; Wentzel, 1998). Longitudinal studies with elementary students have clarified processes responsible for the impact of peer acceptance on achievement, highlighting the mediating roles of both classroom participation (Buhs, Ladd, & Herald, 2006) and self-perceived academic competence (Flook, Repetti, & Ullman, 2005). With respect to the role of friends on achievement, having a close friend may promote academic achievement due to the buffering effect of friendships on

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children's feelings of loneliness, which predicts lower academic motivation and achievement (Kochenderfer & Ladd, 1996).

Peer Academic Reputation

An aspect of peer relations that has received relatively little research attention and which is the focus of this study is a child's academic reputation within the classroom. A student's peer academic reputation (PAR) refers to a student's relative status in a peer group (e.g., the classroom) in terms of peer evaluations of academic competence (Gest, Domitrovich, & Welsh, 2005). Students develop reputations among their classmates based on their behaviors, traits, and interactions with other students (Hamm & Faircloth, 2005). Peer nomination inventories are typically used to assess a child's reputation within a peer group on various dimensions, such as aggression, popularity, rejection, prosocial, and academic ability (Coie, Dodge, & Kupersmidt, 1990; Hughes & Zhang, 2007; Masten, Morison, & Pellegrini, 1985). In this approach, all children in a classroom or other social grouping are asked to nominate members of the group who best fit specific behavioral descriptors. Children's reputation within a class or other group on a particular dimension is indexed by the number of times group members nominate them for that dimension's descriptor.

Gest and colleagues (2005) pointed out that few researchers have investigated children's peer reputations for academic achievement, perhaps because more objective measures of achievement, such as grades and performance on tests, are usually readily available. In contrast, peers are considered to offer privileged, valid information regarding individuals' social and behavioral functioning; thus, their perceptions are sought as valid measures of children's functioning. An extensive body of literature documents the reliability and validity of peer evaluations of students' behavioral characteristics (Hughes, 1990; Terry & Coie, 1991). Children's peer reputations across different social and behavioral dimensions differentially predict social, academic, and behavioral outcomes (Cole & White, 1993; Masten et al., 1985; Realmuto, August, Sieler, & Pessoa-Brandao, 1997).

Researchers have attempted to determine if peer reputations influence behavior or are merely reflections of differences in children's behaviors. If peer reputations influence development, peers should react differently to classmates on the basis of differences in classmates' peer reputations. Indeed, researchers have documented such differential student reactions to students with different peer reputations (Dodge & Frame, 1982; Hymel, 1986; Hymel, Wagner, & Butler, 1990). The view that peer reputation impacts development is also supported by longitudinal research that demonstrates that children's peer reputations for social and behavioral characteristics predict future academic and psychosocial adjustment above previous adjustment (Risi, Gerhardstein, & Kistner, 2003; Rubin, Chen, McDougall, & Bowker, 1995).

Effect of peer academic reputation on achievement

Gest et al. (2005) argued that peer academic reputation (PAR) may influence children's academic motivation and achievement, even if it is not veridical. This argument is consistent with research on the effect of teacher expectations on achievement, which demonstrates that teacher perceptions of children's academic ability, whether accurate or not, affect students' grades and scores on standardized achievement tests (for reviews see Brophy, 1983; Jussim, Eccles, & Madon, 1996; Jussim & Harber, 2005). The teacher expectancy research has identified ways in which teachers treat high and low expectation students differently that may account for the expectancy-confirming impact of teacher expectations. For example, relative to low expectancy students, teachers demonstrate a positive bias in evaluating the work of high expectancy students (Jussim,1986; Jussim et al., 1996); provide more response opportunities

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and praise and less criticism (Brophy, 1983); provide more challenging instruction (Brophy, 1983; Jussim, 1986), and interact in ways that are warmer and more accepting (Babad, 1992).

In a similar fashion, peers' perceptions of classmates' academic competencies may influence their interactions with classmates in ways that impact their achievement. The limited research on peer perceptions of classmates' academic ability is consistent with such a view. Studies with older elementary and middle school students found that students prefer to work with students whom they perceive as more academically capable on school-related tasks, but this preference does not extend to non-academic tasks (Droege & Stipek, 1993; Plummer & Graziano, 1987), suggesting that peers' perceptions of children's abilities may influence peer interactions in the classroom. It is likely that classmates discuss among themselves the relative abilities of classmates. Through such shared discourse, individual members of the class develop a reputation that is largely shared by and reinforced by members of the class (Filby & Barnett, 1982). Peers may give children with reputations as academically capable more response opportunities when working in groups and may approach them more often for help with academic problems. They also may offer more support and acceptance to children perceived as academically competent. Indeed, peer perceptions of ability are associated with their liking for classmates (Ladd et al., 1999), especially in classrooms in which cues regarding students' performance are more available (Hughes & Zhang, 2007).

PAR may also affect a child's friendships. Children tend to select friends and social networks based on similar levels of academic achievement and achievement motivation (Kindermann, 1993; Kiuru, Aunola, Murmi, Leskinen, & Salmela-Aro, 2007). Thus, children with reputations as academically capable may be more likely to affiliate with high achieving peers. Longitudinal studies suggest that the academic characteristics of one's friends may influence a child's academic engagement and achievement (Altermatt & Pomerantz, 2003; Berndt, Laychak, & Park, 1990; Kiuru et al., 2007).

Effect of peer academic reputation on academic self efficacy

PAR may also indirectly affect achievement through its direct effect on students' academic self efficacy, as is the case for teacher expectancy effects (Kuklinski & Weinstein, 2001). According to symbolic interactionist theory (Mead, 1934), others' (both particular important others and one's social group as a whole) opinions of us shape our self-concept through social interaction (Harter, 1998; Tice & Wallace, 2003). As the self develops, it incorporates others' views into the self concept; others' appraisals of us and their responses to our behavior are incorporated into our self views. Thus, children's competence beliefs are "reflections of children's actual abilities and internalization of the feedback obtained from significant others" (Cole et al., 2001, p. 1723). Consistent with the symbolic interactionist perspective, during grades 3-6 peers' evaluations of the academic ability of students uniquely contribute to the prediction of children's self-perceived academic competence, above that of teachers' evaluations of academic ability (Cole, 1991; Cole, Maxwell, & Martin, 1997).

Gest and colleagues (2005) investigated the longitudinal effect of PAR in grades 3, 4, and 5 on both academic self-concept from the beginning of the year to the end of the year and on teacher-rated academic skills and academic effort from Fall of one year to Fall of the following year. Children with higher PAR in the Fall reported higher perceived cognitive competence in the Spring, controlling for Fall peer evaluations of aggression and peer acceptance, teacher ratings of academic and social behaviors, and child-reported general self-concept. Furthermore, Year 1 PAR predicted Year 2 teacher-rated academic effort and academic skills, controlling for prior levels of these variables as well as prior levels of peer liking and aggression.

The Gest et al. (2005) findings support the conclusions that 1) peers make meaningful distinctions between classmates' social behaviors, including likeability, and their academic

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skills and that 2) PAR uniquely predicts academic outcomes above peer liking. Although they expected that the effect of PAR on academic effort and skills would be mediated by the effect of PAR on perceived academic competence, this hypothesis was not supported, leaving them to speculate about possible mechanisms by which PAR exerts its effect on academic skills and effort.

It is possible that the relative stability of children's perceived academic competence during grades 3-5 compared to grades 1-3 (Cole et al., 2001), limited Gest et al.'s ability to find a mediating role for perceived academic competence. Because children's self-perceptions of competence are undergoing fairly rapid revision during grades k-3, this period may represent a time of increased susceptibility of self-perceptions to external input. Unfortunately, most research on the role of environmental inputs on changes in children's perceived competence has been conducted with children in 3rd grade and older (Cole, 1991; Cole et al., 1997; Cole et al., 2001).

Academic Self Efficacy

Developmental issues

An extensive research documents developmental change in children's perceived competence from the preschool years through middle school (Cole et al., 2001; Eccles, Wigfield, Harold, & Blumenfeld, 1993; Marsh, 1989; Marsh, Craven, & Debus, 1998; Wigfield et al., 1997). The self-concepts of children younger than about age 7 tend to be more global and optimistic than those of older children (Eccles et al., 1993; Wigfield, 1994). Beginning around first grade, children's self perceptions of academic competence decline before leveling off in grades 3 or 4 (Marsh, 1989; Wigfield et al., 1997). Thus, during grades kindergarten through third grade, students' self perceptions of academic competence are undergoing downward revision before a period of relative stability in grades 4-6 (Cole et al., 2001; Marsh, 1989).

Researchers speculate that growth in social cognitive skills, including the capacity and motivation to use social comparison information to shape self-evaluations, account for the trend toward more negative and more differentiated self-perceptions in grades K-3 (Kuklinski & Weinstein, 2001; Markus & Wurf, 1987). Also, as children make the transition from kindergarten to the more formal academic setting of grades 1-3, more social comparison cues may be available, and feedback on one's academic performance may be based more on comparison to others versus improvement over one's prior performance (Eccles et al., 1993; Ruble & Frey, 1987; Ruble, Grosovsky, Frey, & Cohen, 1992).

Effect of academic self efficacy on achievement

An extensive body of research with older elementary and middle school students documents longitudinal associations between students' academic self concept, or academic self-efficacy, and achievement. Students who are more confident of their academic abilities select more challenging learning environments, persist longer in the face of challenge, seek academic assistance from knowledgeable others, take greater responsibility for their learning strategies and processes, place a higher value on academic achievement, and gravitate to peers who share their academic values (for reviews see Bandura, Barbaranelli, Caprara, & Pastorelli 1996; Schunk & Zimmerman, 2006; Zimmerman, 2002). Importantly, as young as first grade, children who report higher perceptions of academic competence are more academically engaged in school (Hughes & Zhang, 2007; Valeski & Stipek, 2001). It is reasonable, therefore, to expect that children's self efficacy beliefs may partially mediate the effect the PAR on children's engagement and achievement.

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Study Purpose and Research Hypotheses

The current student extends the literature on effects of peer academic reputation in several ways. It is the first longitudinal study to investigate the unique contribution of PAR on second grade children's perceived cognitive competence and academic performance, above prior performance and above children's peer acceptance. Because these grades represent a time of greater cross-year changes in academic skills, relative to grades 4 and above (Miles & Stipek, 2006; Skinner, Gembeck-Zimmer, & Connell, 1998), they offer a relative window of opportunity for affecting children's achievement trajectories. Thus, it is critical to identify classroom factors that may affect children's achievement in grades 1-3.

This is the first study to investigate the direct and indirect effects of PAR on academic outcomes among an academically at-risk sample. The current sample was selected into a larger longitudinal study on the basis of scoring below the school district's median on a measure of literacy at entrance to first grade (see participants, below). Because children who begin their formal schooling with low literacy skills are at increased risk for long-term academic and social difficulties in school (Alexander, Entwisle, & Horsey, 1997; Entwisle & Alexander, 1988; Finn, 1989), they represent a population of special concern to educators. At-risk samples tend to be more responsive to variations in the quality of their educational experiences than are low risk samples (Gill & Reynolds, 1999; Hamre & Pianta, 2005; Jussim et al., 1996). Thus, the current sample offers a propitious opportunity to contribute to an understanding of processes that explain why initial differences in school readiness skills are often magnified rather than minimized with additional years of school (Shonkoff & Phillips, 2000; Weiher & Tedin, 2006).

We also extend previous research by using measures of children's performance on standardized tests of achievement in addition to teacher ratings of academic performance and effort. The use of objective performance-based measures of achievement avoids possible bias in teacher reported achievement that is the result of teachers' observation of peer interactions in the classroom. Finally, unlike previous research on PAR using OLS regression (Gest et al., 2005), we use structural equation modeling to test for mediation effects of PAR on academic outcomes via the direct effect of PAR on perceived academic competence, using statistical methods that are appropriate for analyzing non-independent observations (e.g., student-level data when students are clustered, or nested, in classrooms).

Specifically, we expect that second grade students' peer academic reputation will predict students' perceived effortful engagement in the classroom, teacher-rated academic skills, and measured math and reading achievement the following year, above the prior year's performance and above teacher appraisals of children's academic competence and peer-rated liking. Furthermore, we expect the effect of peer academic reputation on the following year's outcomes will be partially mediated by the effect of peer academic reputation on children's perceived cognitive competence.

Previous researchers have reported sex differences in levels of perceived academic competence and in the relative importance of different sources of appraisals of competence to different dimensions of perceived competence. For example, among fourth grade students, peer reputation for being a good student predicted self-reported scholastic and conduct competence for both girls and boys but predicted social competence and global self-worth only for girls (Cole & White, 1993). From as early as first grade through high school, girls' competence self perceptions are higher than boys' in the domains of reading and music and lower than boys' in the domains of math and sports (Eccles et al., 1993; Marsh, 1989). Based on these findings, we also investigate whether our results are moderated by sex, although we have no *a priori* hypotheses related to sex moderation.

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Methods

Participants

Participants were drawn from a larger sample of children participating in a longitudinal study examining the impact of grade retention on academic achievement. Participants for the longitudinal study were recruited from three school districts in Texas (1 urban and 2 small city) across two sequential cohorts in first-grade during the fall of 2001 and 2002. The composition of first grade classrooms in these three school districts was 42% Caucasian, 25% African American, 27% Hispanic, and 5% Other; 44% were eligible for free or reduced lunch, and 50.4 % were male. Children were eligible to participate in the larger longitudinal study if they scored below the median score for their school district on a state approved, district-administered measure of literacy administered at the beginning of first grade. Texas requires each school district to assess all first grade children's early literacy skills three times during the year with one of several tests approved by the Texas Education Agency. Each of the districts in the current study used a different test, but each test was administered in the child's dominant language (if English or Spanish) and assessed phonological awareness, letter recognition, letter-sound associations, concepts of print, and oral language skills. A total literacy score for each child was computed (alpha for each district >.83) and transformed to z scores within each district. Children with a z score under 0 were eligible for the study. Additional eligibility criteria were spoke either English or Spanish, were not receiving special education services, and had not been previously retained in first grade.

School records identified 1,374 children as eligible to participate. Because teachers distributed consent forms to parents via children's weekly folders, the exact number of parents who received the consent forms can not be determined. Incentives in the form of small gifts to children and the opportunity to win a larger prize in a lottery were instrumental in obtaining 1200 returned consent forms, of which 784 (65%) provided consent and 416 declined.

Analyses on a broad array of archival variables including performance on the district-administered test of literacy (standardized within district, due to differences in test used), age, sex, ethnicity, eligibility for free or reduced-price lunch, bilingual class placement, cohort, and school context variables (i.e., % ethnic/racial minority; % economically disadvantaged), did not indicate any difference between the 784 children with consent and the 590 children without consent.

With one exception, data for the current study were collected during participants' second and third years in the study (when most children were in grades 2 and 3). The exception is a measure of cognitive competence, which was administered in Year 1 and in Year 3. Of the 784 recruited children, 664 (85%) were active at Year 3 and had data on at least one study variable at each assessment phase. These students were located in 60 schools in 222 classrooms. No evidence of selective attrition was found. The overall rate of missingness for the 664 non-attrited participants was 8.7%. All participants had demographic variables; for measured variables, missingness ranged from 3.8% for the Woodcock Johnson Tests of Achievement at Year 2 to 22% for teacher ratings of achievement and engagement at Year 3. Based on the relatively small percentage of missing data and the equivalence of children with and without data on study and demographic variables, we imputed the missing values based on these 664 children using SAS PROC MI (SAS Institute Inc., 2000). For simplicity, the sample statistics are reported only for the first dataset. To increase the stability of parameter estimates for the hypothesized models, estimates are average estimates across 10 imputed data sets.

Of these 664 participants, 350 (52.7%) were male, and the racial/ethnic composition was 34.8% White, 38.1% Hispanic, 23.5% African American, and 3.7% Other. At the beginning of Year 2, children's mean age was 7.57 (*SD* = .38) years. Children's mean score for intelligence at

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entrance to first grade, as measured with the Universal Nonverbal Intelligence Test (Bracken & McCallum, 1997), was 92.92 (*SD* = 14.43). Based on family income, 60.9% of participants were eligible for free or reduced lunch. For 34.8%, the highest educational level in the household was a high school certificate or less. At Year 2, 14.2% of participants were enrolled in bilingual classrooms, 527 children were in second grade (137 children had been retained in first grade). At Year 3, 503 children were in third grade and 161 children were in second grade.

Design Overview

Year 2 was the first assessment wave in which peer academic reputation was assessed. Classmates' perceptions of the child's academic competencies as well as their liking for the child were obtained via individual interviews conducted at school, between February and May of Years 2 and 3. Research staff individually administered tests of reading and math achievement in Years 2 and 3, between October and March, with the constraint that at least 8 months separated each assessment. Research staff individually administered self-concept questionnaires to children in the Spring of Year 1 and again in the Spring of Year 3. In years 2 and 3, teachers were mailed a questionnaire packet for each study participant. This packet included the measures of the teacher's perception of the child's academic achievement and effortful engagement in the classroom. Teachers received compensation for completing and returning the questionnaires.

Materials

Teacher perception of academic achievement—Teachers were asked to describe participants' academic performance on 3 items using a Likert type scale ranging from 1 (almost never) to 6 (almost always). The items include "Performing academically at grade level", "Able to read grade level material and answer questions about what he/she has read", and "Able to solve grade level math problems". The internal consistency of the scale was .94 for this sample.

Teacher perception of effortful engagement—Teachers were also asked to describe participants' engagement in the classroom. This 10 item scale is comprised of 8 items from the Conscientiousness scale from the Big Five Inventory (BFI, John & Srivastava, 1999) and 2 items from the Social Competence scale (Conduct Problems Prevention Research Group, 2004). Example items from the BFI include: "Is a reliable worker", "Perseveres until the task is finished", and "Is easily distracted". The two items from the Social Competence Scale include "Sets and works toward goals", and "Turns in homework." The items from the BFI use a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). The two Social Competence Scale items use 6-point Likert-type scale ranging from 1 (almost never) to 6 (almost always). After recoding the two social competence items into a 5-point scale, a composite score was calculated as the mean item score across the 10 items (alpha = .86).

Peer Academic Reputation—Peer nomination procedures were used to assess peers' perceptions of children's academic, social, and behavioral competencies (Masten et al., 1985; Realmuto et al., 1997). Consent for participation in the peer nominations was requested from parents of all children in classrooms in which a child participating in the longitudinal study was enrolled. An average of 13 students (SD = 3.09) provided nominations in each classroom. The mean classroom percentage of students participating in the sociometric administrations was .70 (SD = .14; range = .40-1.0).

Child participants were asked to name classmates who best fit each of several behavioral descriptors (e.g., aggressive, prosocial, hyperactive). Scores obtained using procedures similar to those in this study have provided good evidence of reliability and validity (Realmuto, August, Sieler, & Pessoa-Brandao, 1997; Terry, 2000), and children as young as first grade are reliable reporters of classmates' behavioral and academic performance (Hughes, Zhang, &

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Hill, 2006; Stipek, 1981; Wasik, 1987). Of interest to this study are three academic descriptors: best at school work ("These kids are best at schoolwork. They almost always get good grades and teachers often use their work as examples for the rest of the class"); best at math ("These kids are best in math. They almost always get good grades in math and the teacher calls on them to work hard math problems"); and best at reading ("These kids are best in reading. They usually get good grades in reading, and the teacher calls on them to read aloud or read hard words"). Children were told they could list as few or as many classmates as they wanted for each descriptor. A child's score for each item was obtained by summing all nominations received for that item. Although only children with written parent consent to participate in the sociometric assessment provided ratings and nominations, all children in the class were eligible to be nominated. Scores were standardized within classrooms. A composite score, Peer Academic Reputation, was computed as the average standardized score on the three academic items (best at school work, best at reading, and best at math) (alpha = .84).

Peer-rated liking—In individual sociometric interviews, children also were asked to indicate their liking for each child in the classroom on a 5-point scale. Specifically, the interviewer named each child in the classroom and asked the child to point to one of five faces ranging from sad (1 = don't like at all) to happy (5 = like very much). A child's mean liking score was the average rating received by classmates. An extensive literature provides evidence of good validity and short-term stability for liking ratings for elementary grade children (Hughes, 1990).

Academic achievement—The Woodcock Johnson Tests of Achievement (WJ-III, Woodcock, McGrew, & Mather, 2001) is an individually administered measure of academic achievement for individuals ages 2 to adulthood. For our purposes we used the WJ-III Broad Reading scores (Letter-Word Identification, Reading Fluency, Passage Comprehension subtests) and the WJ-III Broad Math scores (Calculations, Math Fluency, and Math Calculation Skills subtests). Extensive research documents the reliability and construct validity of the WJ-III and its predecessor (Woodcock, & Johnson, 1989; Woodcock et al., 2001). The 1-year stability for this age group ranges from .92 to .94 (Woodcock et al., 2001). Analyses were conducted with the Woodcock Johnson W scores, which are especially well suited to assessing change in achievement.

The Batería Woodcock-Muñoz: Pruebas de aprovechamiento - Revisada (Batería-R, Woodcock & Muñoz-Sandoval, 1996) is the comparable Spanish version of the Woodcock-Johnson Tests of Achievement—Revised (WJ-R; Woodcock & Johnson, 1989), the precursor of the WJ-III. If children or their parents spoke any Spanish, children were administered the Woodcock-Munoz Language Test (Woodcock & Munoz-Sandoval, 1993) to determine the child's language proficiency in English and Spanish and selection of either the WJ-III or the Batería -*R*. The Woodcock Compuscore (Woodcock & Munoz-Sandoval, 2001) program yields scores for the Batería -*R* that are comparable to scores on the WJ-R.

Self Perceived Cognitive Competence—In individual interviews, children completed the sex-appropriate version of the Pictorial Scale of Perceived Competence and Social Acceptance for Young Children (Harter & Pike, 1981) in Year 1 and the sex-appropriate version of the Self Perception Profile for Children (Harter, 1985) in Year 3. Only the Cognitive Competence (younger version) or the Scholastic Competence (older version) scale of each test was used in this study.

In the younger version (Harter & Pike, 1981), the interviewer presents children with pictures of two children who are described in contrasting ways (e.g., "This girl is good at spelling; this girl is not good at spelling") and asks the child to indicate which child is more like him or her. After making their choice, the interviewer asks the child if the selected child is a little or a lot

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like him or her. This procedure yields a 4-point scale for each item. A total score for the cognitive competence scale is obtained by summing the 6 items. Example items are “good at numbers”, “knows a lot in school”, and “can read alone.” The internal consistency of these 6 items for our sample was .78.

Each of the six items on the Scholastic Competence Scale of the Self Perception Profile for Children also consists of two opposite descriptions, e.g. “Some children do very well in their classwork” but “Other children don’t do very well in their classwork”. Unlike the younger version, no pictures accompany the statements. Children choose the description that is more like them and then indicate whether the description is somewhat true or very true for them. Accordingly, each item is scored on a 4-point scale with a higher score reflecting a more positive view of one’s self. The internal consistency for our sample was .76

Results

First descriptive and preliminary analyses are reported, including an analysis of sex differences on the major variables. Next the within-wave correlations between Peer Academic Reputation (PAR) and other peer-rated variables at each time period are reported to assess the correlates and distinctiveness of peers’ perceptions of classmates’ academic competences. Next results of the tests of the hypothesized direct effects of Year 2 PAR on Year 3 dependent variables are reported, followed by results of the tests of indirect (mediation) effects.

Descriptive and Correlational Analyses

Descriptive statistics were conducted and the means and standard deviations for the major variables (for the overall sample and by sex) are presented in Table 1. The variables that were included in the hypothesized regression models were screened for normality and outliers. No outliers were identified, and no analysis variables had values that exceeded the recommended cutoff values of 2 for skewness and 7 for kurtosis (West, Finch, & Curran, 1995). As expected, cognitive competence scores declined from year 1 to year 3 [$t(663) = 22.00$, $p < .001$].

Significant sex differences were found on the measured variables based on the results of one-way MANOVA [$F(15, 648) = 6.79$, $p < .001$]. Table 1 reports results. Girls performed better than boys on Year 2 and 3 teacher-rated engagement, Year 2 liking, Year 3 reading and PAR. Boys performed better than girls on Year 2 math.

Table 2 reports the magnitude of the within-wave associations between PAR and the other peer-rated variables at Year 2 and Year 3. Results are highly similar across the two periods (grades 2 and 3 for most of the students). As expected, PAR is moderately and positively correlated with positive nominations (liked most, prosocial, teacher-support). With the exception of depression, the correlations between PAR and negative nominations are of small but statistically significant magnitude. These data are similar to those reported by Gest et al. (2005) and support the criterion-related validity of this measure of PAR.

Table 3 presents the within- and cross- time zero order correlations for study variables. PAR is moderately stable across school grades (one year stability = .45), even though different classmates were involved in the sociometric procedures. On average 17% of a child’s classmates in Year 3 were also classmates in Year 2. Within times, PAR is statistically significantly and positively associated with all all dependent variables. PAR at Year 2 predicted all Year 3 variables. The magnitude of the association between PAR and children’s academic achievement scores are in the low range (.077 and .097 for reading and math at Year 2, respectively and .184 and .144 for reading and math at Year 3, respectively). Fisher’s z coefficients were used to compare the magnitude of PAR with achievement scores at Year 2 to Year 3 (N=664). The results showed that the correlation of Year 3 PAR and reading is

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significantly higher than that of Year 2 (χ^2 = 3.924 with 1 *df*). No significance difference was found between the correlation of Year 3 PAR and math and that of Year 2 (chi-square= .752, *p* =.386).

Direct Effects

To account for the dependency among the observations (students) within clusters (classrooms), structural equation analyses were conducted using the "complex analysis" feature in Mplus (v. 3.13, Muthén & Muthén, 2004), which accounts for the nested structure of the data by adjusting the standard errors of the estimated coefficients. The models were estimated by using the maximum likelihood estimation method with robust standard errors (MLR; Muthén & Muthén, 2004). Each of the hypothesized models from ten multiple imputed data sets, based on the 664 participants, were estimated using the "type = imputation" feature of Mplus. This procedure produces average parameter estimates and standard errors across the ten imputed data sets, resulting in more stable estimates.

The direct effects model posits an effect of Year 2 PAR on the four Year 3 outcomes (i.e., Teacher-Rated Engagement, Teacher-rated Achievement, WJ Broad Reading, and WJ Broad math), controlling for the effect of the previous (Year 2) score on the outcome as well as Year 2 Peer-rated Liking. The original hypothesized model specified correlated residuals for the two teacher-rated outcomes and for the two achievement scores. Although each of the direct effects from PAR to Year 3 outcomes was significant, the fit of the original model was marginal to poor [$\chi^2(12) = 172.96$, $p<.001$; CFI = .919; RMSEA = .142). Modification indices suggested fit would be improved by adding paths from Year 2 Read and Year 2 Math to Year 3 Teacher-Rated Achievement, a path from Year 2 Teacher-Rated Achievement to Year 3 Reading, and a path from Year 2 reading to Year 3 math. Because these modifications were consistent with theory and did not alter the significance or direction of the direct effects paths of interest, the modifications were deemed appropriate (Benter, 2000, September 2). Additionally, because the paths from Year 2 Peer-Rated Liking to Year 3 Reading and Year 3 Math were not significant, these paths were constrained to be zero in the modified model, resulting in a more parsimonious model.

The fit of the modified model was good [χ^2 (10) =22.852, p = .01; CFI = .994; RMSEA = .043). Figure 1 reports results. For ease of presentation, correlations among the exogenous variables are not shown. Solid lines indicate significant paths and dotted lines indicate non-significant paths. Controlling for the prior year's score, Year 2 PAR made a unique contribution to Year 3 Teacher-Rated Engagement ($\gamma^{\wedge}_{\text{standardized}}$ = .19, p (one tail) <.001), Teacher-Rated Achievement ($\gamma^{\wedge}_{\text{standardized}}$ = .11, p (one tail) <.01), and WJ Reading ($\gamma^{\wedge}_{\text{standardized}}$ = 0.06, p (one tail) <.05). Effect size index f^2 (Cohen, 1988) for the effect of Year 2 PAR on Year 3 Teacher-Rated Engagement, Teacher-Rated Achievement, and WJ Reading was .06, .04, and .02, respectively. According to Cohen (1988), f^2 effect size indexes of .02, .15, and .35 indicate small, medium, and large effects, respectively. Accordingly, these effects are in the small range.

Indirect Effects

According to Baron and Kenny's (1986) procedure (updated in Kenny, Kashy, and Bolger, 1998), the first step in testing the mediation effect is to establish a significant relation between the predictor and outcomes variable, controlling for prior level of the outcome. The direct effects model found that Year 2 PAR was a significant predictor of all outcomes except Math. Because this first step is no longer viewed as required for proceeding to the test of indirect effects (MacKinnon, Krull, & Lockwood, 2000; MacKinnon et al., 2002; Shrout & Bolger, 2002), we tested indirect effects for all outcomes. The second and third steps are to establish a significant relation between the predictor and mediator variable and a significant relation between the mediator and outcome variables.

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The indirect model was identical to the revised direct effects model with the addition of direct effects from PAR2 to perceived cognitive competence at Year 3 and direct effects of perceived cognitive competence on each of the four dependent variables. Additionally, we included the effect of perceived cognitive competence at Year 1 on perceived cognitive competence at Year 3. Thus, we were able to examine the effect of PAR at Year 2 on perceived cognitive competence at Year 3 controlling for the child's previous level of cognitive competence. We selected Year 1 cognitive competence as the covariate in order to maintain temporal precedence of the independent variable (PAR) on the mediator (cognitive competence). Results of the indirect (mediational) effects model is shown in figure 2. The mediation model provided a good fit to the data [χ^2 (19) = 39.351, p <.001; CFI = .991; RMSEA = .040]. The path from the predictor (Year 2 PAR) to the mediator (Year 3 Cognitive Competence) was significant [$\gamma^{\wedge}_{\text{standardized}}$ = 0.148, p (one tail) <.001, effect size = .02]. The paths from Cognitive Competence to teacher-rated engagement [$\gamma^{\wedge}_{\text{standardized}}$ = 0.10, p (one tail) <.001, effect size = .01], teacher rated achievement [$\gamma^{\wedge}_{\text{standardized}}$ = 0.07, p (one tail) <.03], effect size = .01), and WJ reading [$\gamma^{\wedge}_{\text{standardized}}$ = 0.04, p (one tail) <.01, effect size = .003], were each significant. The path Cognitive competence to Math was not significant. Thus, steps 2 and 3 were met for Teacher-Rated Engagement, Teacher-Rated Achievement, and WJ Reading but not for WJ Math.

The final step in testing mediation involves testing whether the relation between the predictor and outcome variables is substantially reduced when the mediator variable is included in the model. This step was accomplished by examining the product of estimates multiplying the non-standardized path coefficients from Baron and Kenny's second and third steps (Sobel, 1982). The Mplus analytic feature "model = indirect" provides the Sobel test of indirect effects (which were then averaged across the ten imputed data sets). The average indirect effect was significant for each outcome variable with the exception of WJ Math (see Table 4). The effects of PAR on Teacher-rated Engagement, Teacher-rated Achievement, and WJ Reading remained significant when cognitive competence was included in the model, a finding consistent with partial versus full mediation. Thus, cognitive competence partially mediates the effect of PAR on subsequent Teacher-Rated Achievement (11% of the total effect is indirect), Teacher-Rated Engagement (11% of the total effect is indirect), and WJ Reading (8.2% of the total effect is indirect).

Because the mediator, cognitive competence, and the academic outcomes were assessed in the same year (Year 3), we also tested an alternative model in which we reversed the order of Year 3 Cognitive Competence and Year 3 academic outcomes. The average AIC of the reverse model was 32912.684 with the standard deviation of 48.368. The average BIC of the reverse model was 33232.062 with the standard deviation of 48.368. The average chi-square of the reverse model with 19 degrees of freedom is 40.30 with the standard deviation of 5.35. Using AIC and BIC as criteria for comparing non-nested models, the reversed model fit the data equally well as the original model (Average AIC of the original model = 32911.649, *SD*.=47.851; average BIC of the original model = 33231.027, *SD* = 47.851). However, only the specific indirect effect via Year 3 Teacher-rated Engagement was significant.

Tests for Sex Moderation

Next we tested whether sex moderated the mediation effects in the indirect model. Specifically, we constrained all coefficients involved in the indirect effects model to be equal across sex in one model and in another permitted the coefficients to vary across sex. Due to the use of robust estimator, Satorra-Bentler adjusted Chi-square difference test (Satorra, 2000) was adopted to examine the possible group differences on the mediation effects. The constrained and unconstrained models differed in fit (χ^2_{diff} (9) =6.47, p = .692), indicating that the indirect

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effects of perceived cognitive competence on the relation between PAR and academic outcomes does not vary across boys and girls.

Discussion

The current study replicates and extends the findings of Gest et al. (2005) on the effects of peer academic reputation (PAR) on children's academic outcomes. Because the sample and the methods in the current study differ in important ways from those of the Gest et al. study, it provides important evidence of the robustness of the conclusion that children's PARs are more than markers of their ability and have significance for their future academic engagement and achievement. Of special note is the finding of an effect of PAR on changes in children's performance on a standardized test of reading achievement. The results confirm that as young as 2nd grade, children have established peer reputations for academic competence that are related to but distinct from their level of peer acceptance or peer reputations for other social and behavioral characteristics. This study is the first to report cross-year stability of peer nominations of academic ability. The one year stability of PAR (r = .45) falls within the moderate range and is comparable to the stability of nominations of "like most" and "like least" (Terry & Coie, 1991) for grades 3 to 6.

Children who enter first grade with below average literacy skills are at increased risk of low academic performance throughout their school careers (Alexander, Entwisle, & Horsey, 1997; Entwisle & Alexander, 1988; Finn, 1989). Minority and low socioeconomic status children are generally over-represented among students with low academic readiness skills (Evans, 2004; Stipek, 1997). Furthermore, many of these children continue along low performance pathways throughout their school careers [National Center for Educational Statistics (NCES), 2004]. Results of this study indicate that being perceived by peers as low in competence adds to these children's risk for school failure. Specifically, among a sample of children with relatively low literacy skills, peer academic reputation made a unique contribution to a child's risk for lower academic competence, less effortful engagement, and lower achievement, above the effects of both peer liking and teacher perceptions of ability.

It is important to note that the observed significant effects of PAR on outcomes are small (effect sizes range from .02 for Reading to .06 for Teacher-rated Engagement). We believe our small effects have both theoretical and practical importance. As expected, the cross-year stability coefficients for our dependent measures were large, ranging from .51 for teacher-rated engagement to .84 for reading. The finding that PAR made a contribution to these outcomes in the presence of such strong stability supports the causal hypothesis that social processes in the classroom influence achievement and engagement. Furthermore, even small effects may be of practical importance because such effects not only accumulate over time but also impact development over time through reciprocal causal processes and through cascading effects. Through such processes, small differences often become magnified over time (Hamre & Pianta, 2001; NICHD Early Child Care Research Network, 2005).

This study provides evidence consistent with the view that the effect of PAR on teacher-rated achievement and effortful engagement and on an individually administered test of reading achievement is partially mediated by the effect of PAR on students' academic self concepts. The larger sample size in the current study relative to the sample size in Gest et al. (2005) study and the use of statistical procedures that adjust standard errors based on the grouping structure of the data may account for our obtaining statistically significant mediation effects when Gest et al. did not. The mediation effects, though statistically significant, account for only between 8.2% and 11% of the total effect of PAR on outcomes. Future research should investigate other theoretically relevant processes by which PAR may effect academic engagement and achievement. For example, if students with higher PAR are more likely to interact with

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academically capable students (due either to selection effects or to teacher instructional practices such as grouping), they may increase their valuing of academic achievement or experience higher teacher expectations for achievement, which may partially mediate the effect of PAR on outcomes.

The finding that the effect of PAR on achievement is independent of the effect of peer liking is of particular interest. Because peer ratings of liking and peer perceptions of academic competence are moderately related (r = .46 and r = .38 in grades 2 and 3, respectively), the association between peer liking and achievement found in previous studies may be due, in part, to the co-morbidity of these two aspects of peers' classroom reputations. Indeed, we found that although both liking and PAR were predictive of teacher-rated effortful engagement and achievement, only PAR made a unique contribution to reading achievement. These findings suggest that peer liking and PAR have somewhat different effects on children's achievement. Future longitudinal research is needed to clarify the joint and unique contribution of these two aspects of peer relatedness to children's academic trajectories. It may be that both are important to achievement but through different processes.

Both PAR and teacher ratings of academic competence were related to changes in reading, whereas only PAR predicted changes in teacher-rated effortful engagement. This finding is consistent with previous studies with older elementary students documenting that different sources of appraisals are differentially related to outcomes (Cole, 1991; Cole et al., 1997). Perhaps children who are perceived by their peers as more academically capable feel a greater sense of school belonging, which leads to greater classroom persistence and effort.

In contrast to changes in reading achievement, neither PAR, peer liking, nor teacher-rated achievement predicted changes in math achievement. Only prior math and prior reading skills predicted year 3 math scores. This finding can not be explained only by the high cross-year stability of Math achievement (.76), because reading achievement is also highly stable across this period (.84). Because children were selected based on relatively low literacy skills, their reading performance may have been more susceptible to the effect of classroom contextual features. Also, the nature of reading instruction differs in important ways from that of math instruction, and these differences may make individual differences in reading skills more salient to students than are individual differences in math skills. Not only is more time spent in the primary grades in reading instruction than in math instruction, reading instruction typically involves round robin or turn-taking (Blanton & Wood, 2007; Rasinski & Hoffman, 2003). If this is the case, there are more opportunities for classmate to interact with each other around reading than around math and for children's academic reputations and self-perceptions of academic competence to be based more on reading skills than on math skills.

As expected, PAR in grade 2 had an effect on children's perceived cognitive competence the following year, above the child's cognitive competence in first grade.

This finding is consistent with the view that as early as second grade the appraisals of one's classmates shape one's self-concept. When the effects of PAR on children's cognitive competence and the effect of children's cognitive competence on the dependent variables are included in the model, the indirect effect of PAR on outcomes is statistically significant for all outcomes except math achievement. In the indirect model, PAR continues to exert a statistically significant direct effect on teacher-rated engagement and achievement and on reading achievement. This pattern of findings is consistent with partial mediation of the effect of PAR on outcomes via its direct effect on children's perceived cognitive competence.

Consistent with previous research on sex differences in academic engagement and achievement in the early grades, sex differences were observed on many of the variables in the hypothesized

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indirect model. However, multi-group analyses indicated that the model fit was invariant across sex. Thus, the effect of PAR on outcomes appears to be similar across boys and girls.

Developmental Issues

The period from grade 2 to 3 is one of rapid revision of self-concept, as children's self concepts become less optimistic and more consistent with objective criteria. The stability of cognitive competence between years 1 and 3 was relatively low (r = .20), and mean levels of cognitive competence declined over this period. Perhaps this period of relative instability in academic self-concept provides heightened sensitivity to the effect of feedback from peers. Between second and third grade there appears to be a developmental shift in the accuracy in students' perceptions of classmates' academic competence, based on the stronger association between PAR and performance on a standardized test of reading in Year 3, relative to Year 2. Future research with children from kindergarten through middle grades is needed to better understand the links among PAR, achievement, and self-concept at different developmental periods.

Limitations and implications for future research

These findings need to be interpreted in the context of characteristics and limitations of the current study. First, study participants were selected on the basis of scoring below their school district's median on a test of literacy administered in kindergarten or first grade. Thus, the sample is not representative of the full range of achievement. It is quite possible that the academic self concepts and motivated patterns of engagement of children with relatively low literacy skills are especially susceptible to the effects of peers' perceptions of their abilities on their self-concepts and motivation. Previous research has found that children who are at risk for educational failure due to family demographic variables or child characteristics are more susceptible to the quality of educational experiences, including quality of relationships at school (Chen, Liew, & Hughes, 2007; Silver, Measelle, Armstrong, & Essex, 2005) and the social-emotional climate of the classroom (Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; Hamre & Pianta, 2005). However, the lack of a high achieving group in this sample does not permit testing whether risk moderates the influence of PAR on academic engagement and achievement.

The fact that the hypothesized mediator, academic self concept, and the outcomes are assessed concurrently, in year 3, does not permit conclusions regarding the direction of effects. Specifically, changes in self concept could be the result of changes in children's engagement and achievement. The study design offers a rigorous test for the effect of PAR on the hypothesized mediator (academic self concept) and on outcomes (engagement and achievement). However, the design does not maintain the temporal precedence necessary to establish an effect of self concept on engagement and achievement. Consistent with a reciprocal causal relationship between cognitive competence and academic engagement and achievement, an alternative model with the paths between Year 3 cognitive competence and Year 3 academic engagement and achievement fit the data as well as the hypothesized model. However, only the indirect effect of via Year 3 teacher-rated engagement was statistically significant in the alternative model. Future research with a minimum of three waves of data will permit a more rigorous test of the reciprocal effects between cognitive competence and academic outcomes and will also test the stability of relations across the elementary grades.

Future research is also needed to identify the mechanisms by which PAR might influence children's self appraisals and academic engagement and achievement. Naturalistic or experimental observational studies could identify how children in a classroom interact differently with children with high versus low academic reputations. Just as peers may react differently to classmates on the basis of their reputation for aggressiveness (Dodge & Frame, 1982), peers may treat classmates differently based on their reputation for academic

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competence. For example, peers may be more likely to attribute a correct answer given by a high PAR student versus a low PAR student to the child's ability rather than to luck or the difficulty level of the question (Dweck, 1986; Ames & Felkner, 1979). Students may more frequently approach high PAR classmates for assistance with academic work or to work together on a school assignment (Plummer & Graziano, 1987).

It is also important to identify classroom environments and teacher practices that contribute to children's PAR. The fact that the within time associations between PAR and both reading and math scores are small (.077 and .097 for reading and math at Year 2, respectively, and .184 and .144 at Year 2, respectively) suggests that peers' reputations within classrooms for academic competence are not merely a reflection of their actual abilities. It is also likely that teacher practices contribute to individual children's academic reputations and to the structure of peers' perceptions of competence. Classrooms differ in the degree to which peers' perceptions of academic competence tend to be shared by students and to focus on relatively few children (Hughes & Zhang, 2007). Furthermore, children with lower ability are at increased risk of being peer rejected and less engaged in learning, relative to children of similar ability, in classrooms in which peers' perceptions of ability are more centralized versus diffuse (Hughes & Zhang, 2007). It is reasonable to expect that in classrooms where social cues are more available, peer academic reputations are more salient and shared by students and, potentially, more potent.

These findings add to a body of research on the role of others' appraisals on children's academic self-concept, engagement, and achievement and suggest that peers' appraisals may affect children's engagement and achievement at an earlier age than previously thought, and that the effect may be partially mediated by children's academic self concepts. Understanding the mechanisms by which peers' ability appraisals exert their effects and classroom practices or environments that contribute to children's peer academic reputations across development would have implications for minimizing the potential negative effects of peer academic reputations on lower achieving children's achievement.

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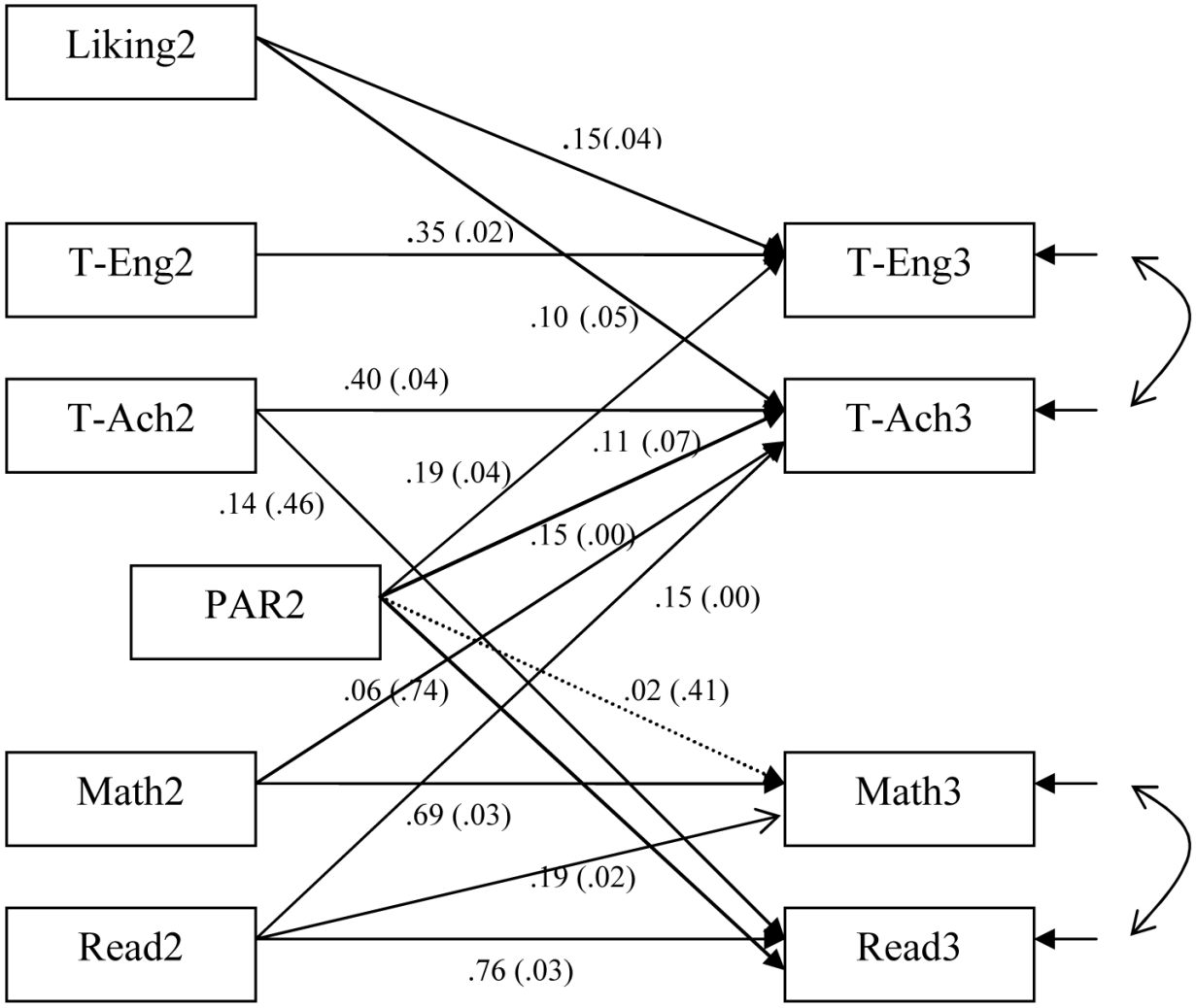

Figure 1.
Revised direct effects model.
All coefficients are standardized (N = 664); coefficients in parentheses are standard errors. All coefficients are average coefficients across the 10 imputed datasets. Except for dotted paths, all coefficients are significant. For ease of presentation, correlations between predictor variables are not included in figure. T-rated Engage = Teacher-rated effortful engagement; T-rated Achieve = Teacher-rated academic achievement; PAR = Peer academic reputation.

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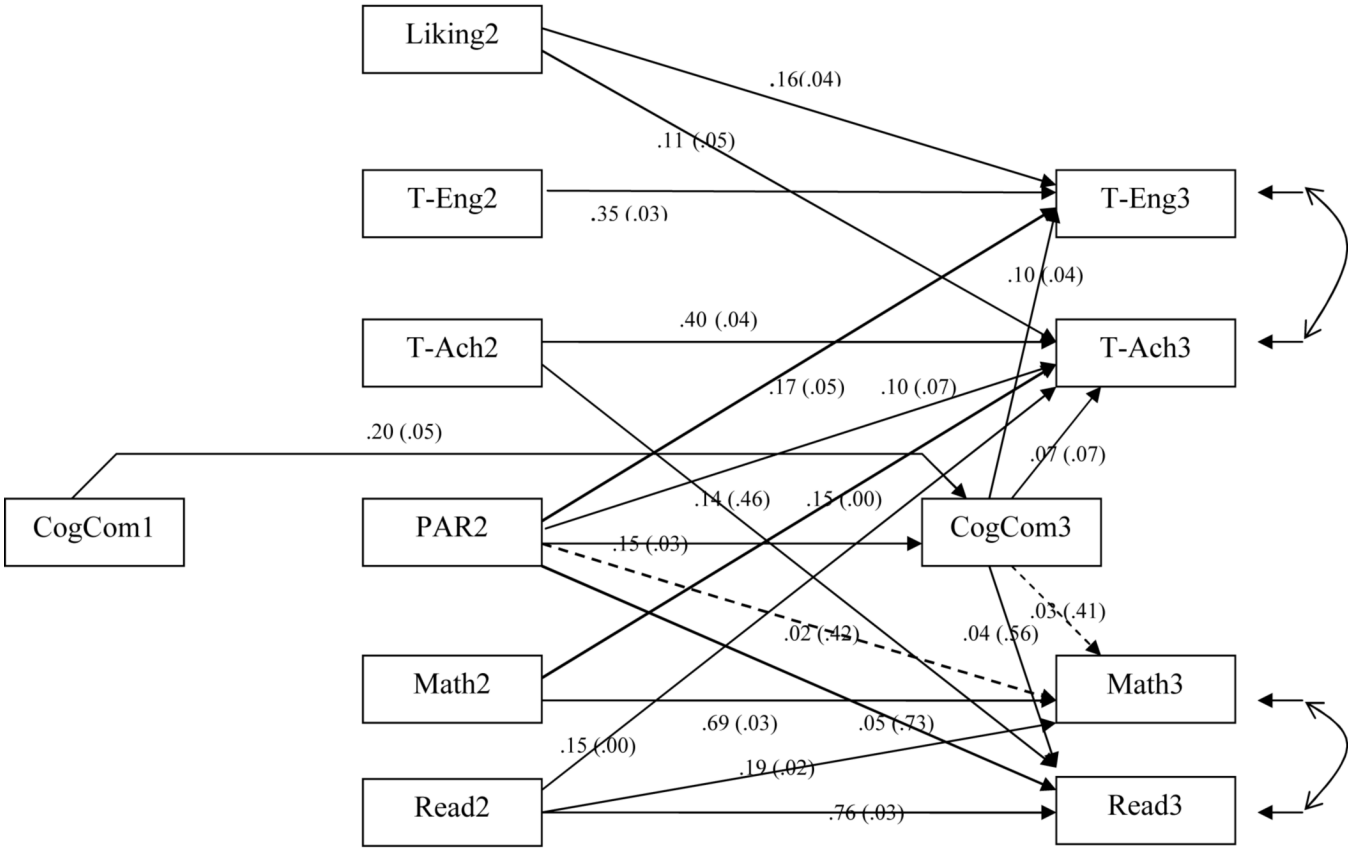

Figure 2.
Indirect effects model.
All coefficients are standardized (N = 664); coefficients in parentheses are standard errors. All coefficients are average coefficients across the 10 imputed datasets. Except for dotted paths, all coefficients are significant. For ease of presentation, correlations between predictor variables are not included in figure. T-rated Engage = Teacher-rated effortful engagement; T-rated Achieve = Teacher-rated academic achievement; PAR = Peer academic reputation.

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Table 1

Means and Standard Deviations for Major Variables

Variable	Total Sample (*N* = 664)		Boys (*N* = 350)		Girls (*N* = 314)		F
	Mean	SD	Mean	SD	Mean	SD	
Cognitive Competence 1	3.43	.54	3.46	.53	3.40	.55	1.77
Reading 2	461.66	22.58	460.25	23.37	463.22	21.59	2.86
Math 2	475.91	11.15	476.95	11.92	474.75	10.13	6.47*
T rated Ach 2	4.23	1.33	4.20	1.38	4.27	1.29	.38
T rated Eng 2	4.06	1.35	3.85	1.38	4.30	1.26	19.11***
Liking 2	-.14	.82	-.21	.79	-.06	.84	5.36*
PAR 2	-.06	.99	-.11	1.03	.00	.94	1.94
Reading 3	477.57	19.72	475.54	20.89	479.84	18.08	7.98**
Math 3	486.64	11.15	487.02	11.44	486.21	10.81	.88
T rated Ach 3	4.02	1.39	3.93	1.45	4.12	1.32	3.21
T rated Eng 3	3.36	.80	3.20	.79	3.55	.76	34.47***
Cognitive Competence 3	2.77	.68	2.81	.67	2.71	.70	3.53
Liking 3	-.22	.73	-.26	.71	-.18	.74	2.14
PAR 3	-.13	.97	-.20	1.02	-.05	.92	4.14*

T rated Ach = Teacher-rated achievement; T rated Eng = Teacher-rated effortful engagement; Cognitive Competence = Perceived Cognitive Competence; PAR = Peer Academic Reputation; the numbers “2” and “3” in variable name refers to time of assessment.

* Note: $p < .005$

** $p < .01$

*** $p < .001$.

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Table 2

Correlations between Peer Academic Reputation and other peer nominations at each wave (N=664)

	Time 2	Time 3
Liked Most	.513	.385
Prosocial	.620	.564
Teacher Support	.588	.450
Liked least	-.324	-.251
Trouble	-.254	-.167
Aggression	-.165	-.10
Hyperactive	-.257	-.163
Depressed	*-.032*	*-.083*

Note: All correlations are significant at $p < .01$ except those in italics.

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Table 3

Within- and Cross- Wave Zero Order Correlations for Study Variables (N = 664)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Cog. Compet 1	--												
2. Reading 2	.119	--											
3. Math 2	*.010*	.367	--										
4. T Ach 2	**.084**	.460	.367	--									
5. Liking 2	.105	.195	.158	.469	--								
6. T-rated Eng 2	**.086**	.325	.291	.678	.475	--							
7. PAR 2	*.060*	**.077**	**.097**	.333	.464	.405	--						
8. Reading 3	.108	.835	.393	.506	.279	.371	.125	--					
9. Math 3	*.027*	.433	.762	.359	.173	.318	**.099**	.514	--				
10. T-rated Ach 3	**.093**	.426	.413	.610	.394	.500	.290	.535	.459	--			
11. Cog.Compet 3	.205	**.085**	**.081**	.153	.171	.145	*.004*	.136	**.100**	.190	--		
12. PAR 3	*.039*	.146	.111	.212	.258	.339	.454	.184	.144	.300	*.074*	--	
13. T-rated Eng 3	**.080**	.190	.196	.412	.411	.514	.359	.285	.250	.651	.210	.372	--
14. Liking 3	.051	.184	.216	.436	.582	.411	.339	.316	.301	.541	.237	.379	.460

All significant $p < .01$, except in bold significant $p < .05$, and in italics, p =ns.

Numbers in variable column refers to time of assessment; Cog. Compet = Perceived Cognitive Competence; PAR = Peer Academic Repuation; T-rated Eng = Teacher-rated effortful engagement; T-rated Ach = Teacher-rated academic achievement.

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Table 4

Results of Tests of Mediation for Each Outcome Variable

Outcome Variable	Path	Unstand. Estimate	S.E.	p (1 tail)	β
T-Rated Engage					
Step 2[a]	PAR2→CogCom3	.123	.030	<.001	.148
Step 3[b]	CogCom3→T -Eng3	.124	.041	<.001	.104
Indirect Effect		.015	.006	<.05	.015
T-Rated Achieve					
Step 3[b]	CogCom3→T -Ach3	.134	.073	<.05	.066
Indirect Effect		.017	.010	<.05	.010
WJ Read					
Step 3[b]	CogCom3→Read3	1.212	.558	<.05	.042
Indirect Effect		.143	.077	<.05	.006
WJ Math					
Step 3[b]	CogCom3→Math3	.483	.407	ns	.030
Indirect Effect		.054	.052	ns	.004

CogCom3 = perceived cognitive competence time3; T-rated Engage = Teacher-rated effortful engagement; T-rated Achieve = Teacher-rated academic achievement. All coefficients are average coefficients across the 10 imputed datasets.

[a] Because step 2 is the same for each outcome model, it is not repeated for each model.

[b] In step 3 the outcome variable is the Year 3 variable controlling for the Year 2 score.