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Joint Contributions of Peer Acceptance and Peer Academic Reputation to Achievement in Academically At Risk Children: Mediating Processes

Qi Chen[a], **Jan N. Hughes**[b], **Jeffrey Liew**[b], and **Oi-Man Kwok**[b]

Jan N. Hughes: jhughes@tamu.edu; Jeffrey Liew: jeffrey.liew@tamu.edu; Oi-Man Kwok: omkwok@neo.tamu.edu

[a]Department of Educational Psychology, University of North Texas, 1155 Union Circle #311335, Denton, Texas 76203

[b]Department of Educational Psychology, College of Education and Human Development, Texas A&M University, College Station, TX 77843-4225

Abstract

The longitudinal relationships between two dimensions of peer relationships and subsequent academic adjustment were investigated in a sample of 543 relatively low achieving children (M = 6.57 years at Year 1, 1st grade). Latent variable SEM was used to test a four stage model positing indirect effects of peer acceptance and peer academic reputation (PAR) assessed in Year 2 on academic achievement in Year 5, via the effects of the peer relationships variables on perceived academic competence in Year 3 and effortful engagement in Year 4. As expected, the effect of PAR on engagement was partially mediated by perceived academic competence, and the effect of perceived academic competence on achievement was partially mediated by engagement. In the context of PAR, peer acceptance did not contribute to the mediating variables or to achievement. Findings provide a clearer understanding of the processes by which early peer-relationships influence concurrent and future school-related outcomes. Implications for educational practice and future research are discussed.

Keywords

peer academic reputation; peer acceptance; perceived academic competence; academic engagement; academic achievement

Children's academic achievement in the early grades forecasts academic and mental health outcomes throughout their school years and beyond (Alexander, Entwisle, & Horsey, 1997; Roeser, Eccles, & Freedman-Doan, 1999). Given the importance of early achievement to long-term adjustment, researchers have sought to identify factors that impact children's early achievement (for review see Shonkoff & Phillips, 2000). Peer relationships have emerged as an important aspect of the elementary classroom context that has implications for children's academic and social adjustment (for reviews see Bierman, 2004; Furrer & Skinner, 2003).

Researchers investigating linkages between peer relationships and academic outcomes have investigated different dimensions of students' peer relationships, including the characteristics of one's friends (Altermatt & Pomerantz, 2003; Berndt, Laychak & Park,

Corresponding Author:, Qi Chen, Phone: 940-565-3398, Fax: 940-565-2185, qi.chen@unt.edu.

1990), provision of peer acceptance or rejection (Buhs, 2005; Ladd, Birch, & Buhs, 1999; Ladd, Kochenderfer, & Coleman, 1997), and one's reputation within the peer group on various social or behavioral dimensions such as popularity (de Bruyn & Cillessen, 2006), academic competence (Gest, Domitrovich, & Welsh, 2005), and aggression (Risi, Gerhardstein, & Kistner, 2003). Recently researchers have simultaneously investigated the effects of multiple dimensions of classroom peer relationships on students' classroom engagement and achievement. For example, Ladd and colleagues (1997) studied the relationship between four dimensions of peer relationships (peer acceptance, number of friends, reciprocated best friend, and victimization) and changes in several indices of school adjustment, including school involvement and academic readiness. When the dimensions were considered simultaneously, many findings reported in studies that examined the dimensions independently were not replicated. Furthermore, the dimensions differed in the specific benefits they offered children. The authors concluded that peer relationships are multi-faceted and complex and that different dimensions make both shared (redundant) and non-shared (unique) contributions to specific outcomes. They recommended that future research expand on the dimensions studied and test processes responsible for effects of peer relationships on school adjustment.

The primary purpose of this study is to investigate the joint contribution of two related but distinct aspects of classroom social relationships, peer acceptance and peer academic reputation (PAR), to academically at-risk elementary students' perceived academic competence, effortful engagement, and achievement. PAR refers to the collective judgment of one's classmates regarding one's academic competence (Gest et al., 2005). We expect both dimensions of peer relationships will uniquely contribute to subsequent effortful engagement via perceived academic competence, and that effortful engagement will, in turn, affect academic achievement. Because both dimensions of peer relationships are predicted to affect subsequent engagement and achievement via perceived academic competence, we first review theoretical and empirical evidence for the effect of perceived academic competence on engagement and achievement. Next we review research supporting the hypothesized indirect effect of each dimension of peer relationships on subsequent engagement and achievement via that dimension's effect on perceived academic competence.

Effect of Perceived Academic Competence on Engagement and Achievement

Self-efficacy beliefs refer to whether a person believes himself or herself as capable of exercising influence over what they do and over achieving a goal (Bandura, 1991). A large body of research has shown that general and domain-specific self-efficacy beliefs are important for self-regulated learning and achievement (Denissen, Zarret, & Eccles, 2007; Pajares, 1996). Overall, the literature indicates that self-efficacy serves as one of the self-regulatory mechanisms that impact a person's motivation, action, and cognitive processing (Wigfield & Eccles, 2000; Pajares, 1996) as well as emotion or affective processes, such as anxiety, that can hinder achievement (Bandura, Caprara, Barbaranelli, Gerbino, & Pastorelli, 2003). An extensive body of research with elementary and middle school students documents longitudinal associations between students' perceived academic competence and changes in achievement (for review see Eccles, Wigfield, & Schieffle, 1998). Furthermore, accumulated evidence supports the view that academic self concept or self efficacy beliefs, although partly based in actual academic performance, also have motivating properties that propel improved academic outcomes (Guay, Larose, & Boivin, 2004; Trautwein, Lüdtke, Koller, & Baumert, 2006). Students who are more confident of their academic abilities prefer more challenging learning environments, are more persistent in the face of challenges, seek academic assistance from knowledgeable others, place a higher value on academic

mastery, and gravitate to peers who share their academic values. Importantly, from as early as first grade, children who report higher perceived academic competence beliefs are not only rated by teachers as more cooperatively and effortfully engaged in the classroom (Hughes & Zhang, 2007; Valeski & Stipek, 2001), but also demonstrate greater effortful control or self-direct their attention and behavior (Liew, McTigue, Barrois, & Hughes, 2008).

Pathway from Peer Acceptance to Engagement and Achievement

Effect of peer acceptance on engagement and achievement

A child's provision of social acceptance from classmates is the most frequently studied aspect of classroom peer relationships. The construct of peer group acceptance or rejection refers to the valence of the collective sentiment of one's peer group and is distinct from friendships, which are defined in terms of dyadic relationships (Buhs, Ladd, & Herald, 2006). Whether measured in terms of the number of nominations received from classmates as "most liked" and/or "least liked" or in terms of the mean rating on a scale of "liking" received from one's classmates, children who are more accepted and less rejected by their classmates are likely to also perform better academically (Buhs & Ladd, 2001; Ladd et al., 1999; Ladd et al., 1997; Furrer & Skinner, 2003). The strong associations between peer acceptance and academic skills is likely the result of reciprocal processes, as higher achieving students may be viewed by peers as more desirable social partners (Hughes & Zhang, 2007; Steinberg, Dornbusch, & Brown, 1992). However, researchers investigating bidirectional effects between achievement and peer acceptance have found stronger support for the effect of acceptance on achievement than for achievement on peer acceptance (Ladd, Buhs, & Seid, 2000). Furthermore, longitudinal studies that statistically control for prior levels of achievement or cognitive ability find that high peer acceptance (or low peer rejection) predicts subsequent academic achievement (Buhs, 2005; Buhs et al., 2006; Wood, 2007).

Drawing from social motivational theory (Connell & Wellborn, 1991), researchers have found support for the hypothesis that students who are liked and accepted by their classmates experience a greater liking for and commitment to school, which presumably leads to greater effort and participation in classroom learning activities and subsequent achievement (Furrer & Skinner, 2003; Ladd et al., 1999). Studies with elementary students have found that the effect of peer acceptance or rejection on achievement is partially mediated by the effect of peer acceptance or rejection on students' liking for (Ladd et al., 1997) and engagement in school (Buhs & Ladd, 2001; Buhs et al., 2006; Ladd et al., 1999).

Based on empirical findings that students' level of acceptance or rejection in the classroom predicts how their classmates respond to them (Dodge & Frame, 1982; Hymel, 1986), Buhs and Ladd (2001) posited that peer negative treatment mediated the effect of peer rejection on students' achievement, via its effect on classroom participation. In a short-term longitudinal study with kindergarten students, they found that classmates directed more positive behaviors toward students who were well-liked and more aversive behaviors toward students who were disliked. In reaction to aversive treatment by peers, rejected students developed negative attitudes toward school and declined in classroom participation and achievement. In a subsequent study spanning kindergarten to grade 5, Buhs et al. (2006) refined their earlier model by demonstrating a specific effect of peer rejection on classroom participation and achievement via peer exclusion.

Effect of peer acceptance on perceived academic competence

Some researchers have suggested that students who are rejected by their classmates develop a more negative self concept, which extends to views of the self as not worthy or capable

(Flook, Repetti, & Ullman, 2005; Harter, 1998). For example, Juvonen, Nishina, and Graham (2000) found that the effect of negative peer treatment on school adjustment was mediated by the effect of negative peer treatment on global self worth. In a 3-year longitudinal study of elementary students, Guay, Boivin, and Hodges (1999) found support for the view that self-perceived academic competence mediated the effect of peer acceptance on achievement. In a longitudinal study with 4–5th graders, Flook et al. (2005) found an indirect effect of peer acceptance on achievement via the direct effect of peer acceptance on perceived academic competence. A short-term longitudinal study with fifth graders found that students' self-reported peer exclusion and victimization predicted students' changes in achievement from the beginning to the end of the year, and that students' perceived academic competence partially mediated this effect (Buhs, 2005). In a sample of 6th grade children, Thijs and Verkuyten (2008) found that academic self concept mediates the effect of negative peer interactions on achievement above the effect of depression or global self esteem. Importantly, none of these studies investigated the role of peer acceptance in the context of peer academic reputation, nor did these studies follow recommendations for testing mediation by maintaining the temporal sequence of causation and by controlling for prior levels of mediators and outcomes (Cole & Maxwell, 2003).

Pathways from Academic Reputation to Engagement and Achievement

Definition of peer academic reputation (PAR)

Recently, researchers have suggested that another aspect of classroom peer relationships, a student's academic reputation within the classroom, may affect students' academic achievement, above levels of peer liking (Gest et al., 2005; AUTHOR, 2009a). Peer academic reputation (PAR) refers to a student's relative status in a peer group in terms of peer evaluations of academic competence. PAR represents one of many possible reputations a student may have within a peer group. Students develop reputations among their classmates based on their behaviors, traits, and interactions with students and teachers (Hamm & Faircloth, 2005). Peer nomination inventories are often used to assess a child's reputation within a peer group on various dimensions, such as aggression, prosocial behavior, or perceived popularity (e.g., Realmuto, August, Sieler, & Pessoa-Bran, 1997). Peers are asked to nominate classmates who best fit descriptors of various behavioral or social dimensions of interest. A student who is frequently nominated for items characterizing a particular social or behavioral dimension is said to have a high reputation for that dimension. Peer reputations on different dimensions evidence good convergent and discriminant validities (Realmuto et al., 1997). PAR is assessed by asking students to nominate classmates who meet one or more descriptors of an academically competent student (Gest et al., 2005; Gest, Rulison, Davidson, & Welsh, 2008; AUTHOR, 2009a). Students are expected to make inferences about students' academic competencies based on a wide variety of cues including ability grouping practices in the classroom, teachers' selection of students to demonstrate a concept or skill, teachers' public feedback to students regarding their performance, and the difficulty of questions asked of students (Hughes & Zhang, 2007). Students' direct interactions with students in academic settings, such as working together on a project, and observations of classmates' contributions to class discussions are also likely to influence their perceptions of classmates' abilities.

Conceptual basis for expecting an effect of PAR on engagement and achievement

We draw from the teacher expectancy research in positing an effect of PAR on engagement and achievement. The extensive research on teacher expectancy effects documents that teachers' expectations for students' achievement, whether consistent with objective measures of ability or not, affect students' subsequent achievement (for review see Jussim & Harber, 2005). Teacher expectancy research has identified ways teachers treat high and low

expectation students differently that may account for the expectancy-confirming impact of teacher expectations. An early study (Firestone & Brody, 1975) found that selection by the teacher to demonstrate a skill for the rest of the class was the strongest predictor of gains in achievement from kindergarten to first grade, above IQ. In general, relative to low expectation students, teachers demonstrate a positive bias in evaluating the work of high expectancy students, provide more response opportunities, challenging instruction, and praise, and interact in ways that are warmer and more accepting (Babad, 1993; Jussim & Harber, 2005).

Just as teachers form expectations for students' achievement, students also form expectations for their classmates' academic competence (Droege & Stipek, 1993). Presumably these expectations are based on observations of teacher-student interactions, observations of student performance in class, and direct interactions with students (Hughes, Cavell, & Willson, 2001; Weiner, Graham, Stern, & Lawson, 1982),

An effect of PAR on perceived academic competence is based on the premise that peers respond differently to classmates whom they perceive as more or less academically capable, and that students are aware of these differences. Research on peer reputations find that peers react differently to classmates on the basis of classmates' peer reputations (Hymel, 1986; Dodge & Frame, 1982; also see Hymel, Wagner, & Butler, 1990 for review). The premise that students are aware of others' perceptions of their abilities is consistent with symbolic interactionist theory (Harter, 1998; Mead, 1934), which posits that as the self develops, it incorporates others' views into the self concept. According to this view, 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)." Furthermore, during the elementary grades, students increasingly rely on some sources more than others in forming self-evaluations of competence in different domains (Cole, 1991). Consistent with such a perspective, during grades 3–6 peers' evaluations of the academic ability of students uniquely contributed to the prediction of students' self-perceived academic competence, above that of teachers' evaluations of their academic ability (Cole, 1991).

Effect of PAR on academic outcomes

Only recently have investigators studied the effect of PAR on academic self-efficacy, engagement, and achievement. In a sample of 400 students in grades 3, 4, and 5, Gest et al. (2005) assessed PAR with four peer nomination items (good at reading, not very good at reading, almost always knows the right answer, almost never knows the right answer). The four items were significantly and moderately correlated with teacher ratings of students' academic abilities and were highly intercorrelated. Thus PAR was calculated as the average of the four items, after reversing the two negatively worded items ($\alpha = .83$). PAR was more strongly correlated with peer social preference ($r = .63$) than with peer reputation as aggressive ($r = -.29$). Evidence of discriminant validity was provided by the findings that the correlation between PAR and academic self-concept ($r = .26$) was stronger than the correlation between social preference and academic self concept ($r = .17$) and that the correlation between PAR and teacher ratings of academic skills ($r = .56$) was stronger than the correlation between PAR and teacher ratings of prosocial behavior ($r = .40$).

In the Gest et al. (2005) study and in a longitudinal extension with the same sample (Gest et al., 2008), PAR predicted cross-year changes in teacher ratings of students' effort in the classroom, grades, and perceived academic competence, above teacher rated academic skills. Contrary to expectations, there was little evidence that changes in self-concept mediated the association between PAR and efforts or grades.

Consistent with findings of Gest et al. (2005, 2008), in an ethnically diverse sample of 664 students that overlaps with the current sample, AUTHOR (2009a) found a direct effect of PAR in grade 2 on students' performance the following year on a nationally standardized measure of reading achievement and on teacher-rated classroom achievement and engagement, above students' prior performance and peer liking. Contrary to the Gest et al. studies, preliminary evidence suggested that students' perceived academic competence beliefs partially mediated these effects. Differences in findings between this study and the Gest et al. studies may be due to differences in the samples in each study; the Gest et al. sample was predominantly (99%) Caucasian and rural, whereas the AUTHOR sample was relatively low achieving, ethnically diverse, and non-rural. Students at risk for poor academic performance are often more affected by the classroom social context than are students with lower levels of risk (Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002).

Study Purposes

Hypothesized model

The purpose of the current study is to investigate the shared and unique effects of two dimensions of peer relationships on academic achievement and the mechanisms responsible for these effects in a sample of academically at-risk youth. The current study extends the AUTHOR (2009a) study in several important ways. First, with four years of data, the current study respects the temporal sequence of the mediating processes. That is, the measurement of each hypothesized cause precedes the measurement of its hypothesized effect (Cole & Maxwell, 2003). Furthermore, by controlling for prior levels of each mediating construct, in addition to prior levels of the outcome, we offer a strong- but not definitive -basis for arguing causal directionality. Finally, the current study is the first to examine the relative and unique effects of peer acceptance and PAR to students' long-term engagement and achievement and the role of perceived academic competence in accounting for these long-term effects. Thus, a more complete understanding of the processes by which peer relationships affect achievement trajectories can be obtained.

We expect PAR and peer acceptance will uniquely influence academic engagement and, subsequently, academic achievement. Furthermore, we expect perceived academic competence will partially mediate the effects of peer acceptance and PAR on subsequent engagement. We expect partial versus full mediation because we believe perceived academic competence is one of the multiple processes by which peer relationships impact engagement. For example, as suggested by several researchers (Furrer & Skinner, 2003; Ladd et al., 1997), student liking for school or general self concept may mediate the effect of peer relationships on effortful engagement. In addition to psychological mediation, peer variables may operate via changes in instructional context. For example, children who are liked by classmates or perceived as academically capable may have greater opportunities to work with classmates on school projects (Droege & Stipek, 1993; Plummer & Graziano, 1987) or greater access to higher achieving friendship groups. Thus our model includes direct effects from Year 2 Peer Acceptance and Year 2 PAR on Year 4 Engagement.

Academically at-risk sample

Children in this study are participants in a larger longitudinal study on academically at-risk youth. Specifically, children who scored below their school district's median score on a test of literacy skills administered at entrance to first grade were eligible to participate in this longitudinal study (see methods below). As stated above, children who enter school with lower levels of academic readiness skills are at increased risk for long-term academic failure. Of great concern is the fact that racial and ethnic minority children and children living in poverty are more likely to enter school with lower academic readiness skills

(Burchinal et al., 2002; Shonkoff & Philips, 2000). An understanding of how peer relationships at school contribute to the academic trajectories of children who begin school with lower readiness skills is important to efforts to prevent school failure and to reduce income and ethnic disparities in achievement.

Covariates

Previous research has found that IQ, gender, and family economic status are associated with many of the variables in our model. Higher IQ, being female, and having higher socioeconomic status are associated with more positive peer academic reputations (AUTHOR, 2009a), perceived literacy competence (Frome & Eccles, 1998; Wigfield et al., 1997), behavioral engagement in the classroom (Hughes, Luo, Kwok, & Loyd, 2008; Ladd et al., 1999), and achievement in the elementary grades (Institute of Education Sciences, 2006). Thus we included these variables as covariates in the structural model to remove their effects on the exogenous variables. We also investigated whether gender moderated the structural relationships in the model. Such moderation might be expected based on findings that girls value social relationships more so than boys, and that girls' sense of psychological well being is more influenced by their perceptions of peer acceptance than is the case for boys (for review see Underwood, 2003).

Method

Participants

Participants were 543 (53.2% male, 46.8% female) first-grade children attending one of three school districts (1 urban, 2 small city) in southeast and central Texas, drawn from a sample of 784 children participating in a longitudinal study examining the impact of grade retention on academic achievement. Participants were recruited 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 53 % 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, 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 cannot 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.

Of these 784 participants, 543 (69.3%) (ethnic composition was 118 African American, 211 Hispanic, and 189 Caucasian) met the following criteria for participation in the current study: (1) had complete data on Year 2 Peer Acceptance and PAR, and (2) were still active in the study at Year 5. According to attrition analyses, these 543 students did not differ from the 241 students who did not meet inclusion criteria on any demographic variables (i.e., age, sex, IQ, and economic adversity) or study variables at baseline (Year 1). At entrance to first grade, children's mean age was 6.57 (*SD* = 0.37) years. Children's mean score for intelligence as measured with the Universal Nonverbal Intelligence Test (Bracken &

McCallum, 1998) was 93.48 (*SD* =14.32). Participants' age-standard scores on the Woodcock–Johnson III Broad Reading and Broad Mathematics tests (Woodcock, McGrew, & Mather, 2001) at Year 1 were 97.23 (*SD* = 17.44) and 101.15 (*SD* = 12.46), respectively. On the basis of family income, 58.5% of participants were eligible for free or reduced lunch. In Year 2, these 543 children were located in 206 classrooms in 31 schools.

Design Overview

Assessments were conducted annually for five years, beginning when participants were in first grade (Year 1). With the exception of PAR, each variable was assessed each year; Year 2 was the first assessment wave in which PAR was assessed. Classmates reported on children's academic competencies and their liking for the child. Students reported on perceived academic competence and engagement. Teachers reported on the quality of the teacher-student relationship and on students' classroom engagement. Teachers received $25.00 for completing and returning each student questionnaire. Measures of math and reading achievement were individually administered at school.

Measures

Year 2 Peer Sociometric Procedures—Peer nomination and rating procedures were used to assess classmates' perceptions of children's academic competencies, liking for children, and social preference (Masten, Morison, & Pellegrini, 1985; Realmuto et al., 1997). In individual interviews, child participants were asked to name classmates who best fit each of several behavioral descriptors. Although only children with written parent consent provided nominations, all children in the class were eligible to be nominated for each descriptor. Children could name as few or as many classmates as they wanted for each descriptor. A child's peer nomination score for each item was obtained by summing all nominations received and standardizing the score within the classroom. Because reliable and valid sociometric data can be collected using the unlimited nomination approach when as few as 40% of children in a classroom participate (Terry, 2000), sociometric scores were computed only for children located in classrooms in which more than 40% of classmates participated in the sociometric assessment. The mean rate of classmate participation in sociometric administrations was .65 (range from .40 to .95), and the median number of children in a classroom providing nominations was 12.

Peer-rated liking: In individual sociometric interviews, children 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).

Peer academic reputation: Students were asked to nominate classmates for 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 as young as first grade are reliable reporters of classmates' behavioral traits (Hughes, Zhang, & Hill, 2006; Realmuto et al., 1997; Tremblay, LeBlanc, & Schwartzman, 1988) and academic performance (Stipek, 1981). Using similarly worded items, Gest et al. (2005, 2008) reported good convergent and divergent validities. In a sample of second graders overlapping with the current study

(AUTHOR, 2009a), these three items demonstrated good internal consistency (α = .84); a composite score formed by the three items demonstrated adequate convergent and discriminant validity (e.g., correlations between PAR and teacher rated achievement were . 30 and .33); and scores were moderately stable across years (*r* = .45).

Social preference: During the sociometric interview, children were also asked to name all the children in their classrooms whom they "liked the most." To avoid asking children to nominate disliked children, a rating of "1" on the peer-rated liking scale was considered equivalent to a "liked least" nomination score (Asher & Dodge, 1986). Following Coie, Dodge, and Coppotelli (1982), social preference scores were computed as the standardized liked most nomination score minus the standardized liked least nominations. All scores were standardized within classrooms. Remember that a rating of "1" on the peer rating of liking was treated as a nomination of "liked least" for purposes of computing social preference scores.

Year 3 Perceived Academic Competence

Perceived cognitive competence: In individual interviews, children completed the sex-appropriate version of the Self Perception Profile for Children (Harter, 1985) in Year 3. Only the Scholastic Competence scale was used. To administer the measure, the examiner presents each child with a pair of statements and asks the child to identify which statement is more like the child. Each of the six items on the Scholastic Competence Scale consists of two opposite descriptions. An example item states, "Some children do very well in their classwork" but "Other children don't do very well in their classwork". 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 four-point scale with a higher score reflecting a more positive self view. The internal consistency of these six items for our sample was .63.

Reading and math competency beliefs: Children's perceived reading and math competencies were assessed with the Competence Beliefs and Subjective Task Values Questionnaire (Wigfield et al., 1997). The math and reading scales consist of 5 items each. Specifically children were asked how good they were in that domain, how good they were relative to the other things they do, how good they were relative to other children, how well they expected to do in the future in that domain, and how good they thought they would be at learning something new in that domain. We followed Eccles, Wigfield, Harold, and Blumenfield's (1993) recommendation to provide graphic representation of the response scale for younger children. Specifically, children were asked to respond by pointing on a thermometer numbered 0 to 30. The end point and midpoint of each scale were also labeled with a verbal descriptor of the meaning of that scale point (e.g., the number 1 was labeled with the words "not at all good," or "one of the worst"; the number 15 was labeled with the words "ok", and the number 30 was labeled with the words "very good" or "one of the best"). The internal consistency for the Reading and Math scales was .82 and .83, respectively, for our sample.

Year 4 Engagement

Teacher-rated student behavioral engagement: Teachers rated students' classroom engagement with an 18-item questionnaire. Items were adapted from both the teacher and the student ratings of students' engagement (Skinner, Zimmer-Gembeck, & Connell, 1998). Of these 18 items, 10 assess behavioral engagement (e.g., Tries hard to do well in school, concentrates on doing work, participates in class discussion), 4 items assess interest (e.g., tries to look busy (reverse coded), pays attention to things that interest him/her) and 4 items assess emotional engagement (feels happy, nervous, angry, and discouraged). Teachers were

asked to indicate the extent to which each statement was true of their student on a 1 (Not true at all) to 4 (Very true) scale. An exploratory factor analysis on the larger sample in Year 3 extracted four factors with eigenvalues greater than 1. The first eigenvalue accounted for 43.37% of the variance and was the only factor that met the dual criteria of interpretability and a minimum of three items (Kline, 2004). A second EFA restricted the number of factors to two, but the second factor had only two items. Based on these results, a behavioral engagement score was calculated as the mean item score on 11 items that loaded on the behavioral engagement factor ($\alpha = .93$ for the current sample). The items assess effort, persistence, concentration, and interest.

Student perception of engagement: Student engagement was measured by a student-report, 18-item scale based on Skinner et al. (1998). Items are rated on a 1–5 Likert-type scale. An exploratory factor analysis on the randomly selected half (392) of fourth-grade participants from the two cohorts of the larger study suggested three factors (one item was dropped due to low loading on all three factors). Based on Skinner, Furrer, Marchand, and Kindermann (2008), these factors were labeled Behavioral Engagement (7 items), Behavioral Disaffection (6 items), and Emotional Engagement (4 items). Results of confirmatory factor analysis on the other half (392) participants from the larger study found that the three-factor model provided an adequate fit for the data, $\chi^2(112) = 189.402$, $p < .001$, comparative fit index (CFI) = .924, root-mean-square error of approximation (RMSEA) = .047, standardized root mean square residual (SRMR) = .061. Example Behavioral Engagement scale items include “When I am in class, I work as hard as I can” and “I try to learn as much as I can about my school subjects.” Example Behavioral Disaffection scale items include “When I am in class, I just act like I am working” and “When I am in class, I just try to look busy.” Example Emotional Engagement scale items include “When I am in class, I feel angry” (reverse scored) and “When I am in class, I feel happy.” Mean item scores were calculated for each scale. The internal consistency for our sample was .72 for the Behavioral Engagement, .75 for the Disaffected Engagement, and .58 for the Emotional Engagement. Because dropping an item assessing feeling anxious in class increased the internal consistency of the Emotional Engagement scale to .63, the composite scale was based on 3 items. For purposes of creating a latent engagement variable the Behavioral Disaffection items were reverse-scored.

Year 5 Achievement—The WJ-III Tests of Achievement (Woodcock et al., 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 (Woodcock et al., 2001). Analyses were conducted with Rasch-based “W” scores, which are especially well suited to assessing change in achievement. Children who had ever been in bilingual classrooms or who had ever been identified by the schools as Limited English Proficient or Spanish speaking were administered the *Woodcock-Munoz Language Test* (Woodcock & Munoz-Sandoval, 1993) to determine if they were more proficient in Spanish than in English. Children more proficient in Spanish were administered the Bateria III (Muñoz-Sandoval, Woodcock, McGrew, & Mather, 2005), which yields W scores for Reading and Math that are comparable to those of the WJ-III. A latent achievement construct was created with WJ reading and WJ math as the indicators.

Child IQ, Familial Economic Background, and Year 1 Baseline Scores— Information about children’s IQ, familial economic adversity, and Year 1 baseline scores

were collected as factors that might be associated with the other variables in the study. Each measure is described below.

Cognitive ability (IQ): Children were individually tested at school at 1st grade with the Universal Nonverbal Intelligence Test (UNIT; Bracken & McCallum, 1998). The UNIT is a nationally standardized non-verbal measurement of the general intelligence and cognitive abilities of children and adolescents. The UNIT assesses general intelligence by measuring complex memory and reasoning abilities using culturally and linguistically universal hand and body gestures rather than receptive or expressive language. We used the Abbreviated version of the UNIT that yields a full scale IQ which is highly correlated with scores obtained with the full battery (r = .91) and has demonstrated good test-retest and internal consistency reliabilities as well as construct validity (Hooper, 2003; Bracken & McCallum, 1998).

Economic adversity: Children's eligibility for free or reduced lunch at 1st grade was used as an indicator of children's economic adversity (0 = not eligible, 1 = eligible). Information on eligibility was provided by school records and based on children's family income.

Baseline score measures: Year 1 baseline scores for perceived academic competence, engagement, and achievement were obtained by using the same or a developmentally appropriate and comparable measure as those used for Year 3 to Year 5. Perceived academic competence was assessed with the Scholastic Competence Scale of the Pictorial scale of Perceived Competence and Social Acceptance for Young Children (Harter & Pike, 1981, 1984). Classroom engagement was assessed with a 10-item teacher-report scale (α = .95) that has been equated to the Year 5 measure of teacher-rated engagement and that has good evidence of predictive validity (Hughes et al., 2008). Achievement was assessed with the same measure as at Year 5 (i.e., WJ-III Broad Reading scores and the WJ-III Broad Math scores).

Results

Descriptive Statistics

Descriptive statistics were conducted and the means and standard deviations for the observed variables in the hypothesize model (including Year 1 baseline scores and indicators for the latent factors) are presented in Table 1. The variables were screened for normality and outliers. All variables were within the normal range according to the cutoff values of 2 for skewness and 7 for kurtosis (West, Finch, & Curran, 1995).

Measurement Model

We tested a measurement model with five latent factors. Specifically, we expected the two affective measures of peer acceptance (peer liking and social preference) would load on the latent factor of Peer Acceptance. We expected the three sociometric academic items would load on the latent factor of PAR. We expected the three measures of perceived academic competence would load on the latent factor of Perceived Academic Competence. We expected that the three student-rated engagement scales and the teacher-rated engagement scale would load on the Engagement factor, and that the WJ-III reading and math scores would load on the Achievement factor. The bivariate correlations (Table 1) were consistent with this model. The measurement model had an adequate fit, χ^2 (67) = 249.409, $p < .001$, RMSEA = 0.071, SRMR = 0.068. The factor loadings were presented on the left side of Table 2. All loadings were adequate, ranging from .38 to .93 (Crocker & Algina, 1986). The correlation matrix between the five latent factors in the hypothesized model is presented on the right side of Table 2. Overall, the bivariate correlations between latent factors were

generally consistent with previous literature and with the hypothesized pathways (i.e., positively correlated). The only exception was that Year 2 Peer Acceptance was not correlated with Year 3 Perceived Academic Competence.

The zero order correlations between the demographic variables and all latent factors are also reported at the bottom of Table 2. Overall, the pattern of correlations indicated that girls had higher Year 2 PAR and Year 4 Engagement; higher economic status was positively correlated with Year 5 Achievement; and higher IQ was positively correlated with Year 2 Peer Acceptance, Year 2 PAR, and Year 5 Achievement. Thus, these variables were included as covariates in the subsequent SEM analyses that were conducted to test study hypotheses.

SEM Model

Based on the non-significant zero order correlation between latent variables Year 2 Peer Acceptance and Year 3 Perceived Academic Competence, we tested a modified model that omitted the structural path from Year 2 Peer Acceptance to Year 3 Perceived Academic Competence (Figure 1). The direct effect of Year 2 Peer acceptance on Year 4 Engagement was retained. There were two targeted mediation pathways: 1) Year 2 PAR was hypothesized to affect Year 3 Perceived Academic Competence, which, in turn, was expected to influence Year 4 Engagement; Year 4 Engagement was hypothesized to mediate the effects of Perceived Academic Competence at Year 3 on Achievement at Year 5; 2) Year 2 Peer Acceptance was hypothesized to affect Year 4 Engagement, which, in turn, was hypothesized to influence Year 5 Achievement. All these effects controlled for the corresponding Year 1 baseline score as well as sex, IQ, and economic status. There were a total of 543 active participants in the analysis and 4.8% of data on variables in the analysis was missing at random according to attrition analyses. Therefore, the hypothesized structural model was examined by using maximum likelihood estimation with robust standard errors and a mean-adjusted chi-square statistic test (MLR; v.5.21, Muthén & Muthén, 1998–2009). To address the missingness, we analyzed the model using the full information maximum likelihood (FIML) method under Mplus, which applies the expectation maximization algorithm described in Little and Rubin (1987). To account for the dependence among the observations (students) within clusters (classrooms), analyses were conducted using the "complex analysis" feature in Mplus (v.5.21, Muthén & Muthén, 1998–2009); this accounts for the nested structure of the data by adjusting the standard errors of the estimated coefficients.

The hypothesized model was tested, and the fit statistics were χ^2 (149) = 524.193, RMSEA = .068, SRMR = .066. The model was modified by adding two paths correlating residual variances between: 1) WJ reading scores at Year 1 and Year 5; 2) Student-rated Behavior Disaffection and Emotion Engagement at Year 3. They were allowed to correlate because these measures were completed by the same source, and allowing the errors to correlate significantly improved model fit (Bentler, 2000).

The revised model provided an adequate fit to the data according to suggested criteria (Browne & Cudeck, 1993; Hu & Bentler, 1999; Kline, 2004), χ^2 (147) = 432.799, $p < .001$, RMSEA = .060, SRMR = .056. As shown in Figure 1, both paths in the hypothesized indirect path from Year 2 PAR to Year 3 Perceived Academic Competence and from Year 3 Perceived Academic Competence to Year 4 Engagement were significant (*Z*s = 2.70 and 2.32, *p*s = .007 and .02 respectively). The direct effect of Year 2 PAR on Year 4 Engagement was also significant ($Z = 2.37$, $p = .02$). Contrary to study hypotheses, the effect of Year 2 Peer Acceptance on Year 4 Engagement was not significant ($Z = 1.33$, $p = .18$). The effect of Year 4 Engagement on Year 5 Achievement was significant ($Z = 3.68$, $p < .001$).

The mediation effects for the PAR pathway to achievement were tested by using the program PRODCLIN, which implements the asymmetric distribution of products method described by MacKinnon, Fritz, Williams, and Lockwood (2007). This method is preferred because it is more powerful and provides more accurate confidence intervals than the traditional Sobel's test for indirect effects (MacKinnon, 2008; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Essentially, the asymmetric distribution of products method uses an asymmetric confidence interval to demonstrate that an indirect/mediation effect is significantly different from zero. Because PRODCLIN can only be used to test pathways with one mediator, the mediation effects for the PAR pathway to achievement were tested in two steps, first in Year 2 PAR→ Year 3 Perceived Academic Competence→Year 4 Engagement, then in Year 3 Perceived Academic Competence→Year 4 Engagement→Year 5 Achievement.

The indirect effect of Year 2 PAR upon Year 4 Engagement, through Year 3 Perceived Academic Competence, was significant. Specifically, the indirect effect's lower and upper bounds of the 95% confidence interval were 0.002 and 0.126; because the confidence interval did not include zero, it was consistent with a statistically significant mediation effect. Similarly, the indirect effect of Year 3 Perceived Academic Competence upon Year 5 Achievement, through Year 4 Engagement, was significant (lower and upper bounds for the 95% confidence interval were 0.010 and 0.178, respectively). To test whether the effect of Year 2 PAR on Year 5 Achievement was fully or partially mediated, we added a direct effect from Year 2 PAR to Year 5 Achievement. This path was not significant ($Z = 1.11$, $p = .27$), indicating full mediation from Year 2 PAR to Year 5 Achievement, via Perceived Academic Competence and Engagement.

The effects of the demographic variables on the endogenous latent variables were examined. Economic adversity and IQ were not significantly related to the endogenous latent variables. Sex was significantly related to Engagement at Year 4 ($Z = -3.43$, $p = .001$), meaning that male students tended to have lower levels of Engagement than female students. Multiple group analysis was conducted to examine sex differences on the significant paths. The Chi-Square difference test using the Satorra-Bentler scaled Chi-Square (Satorra & Bentler, 1999) were used, and results showed no sex difference on any of the four paths (χ^2 (4) = 3.115, $p = .54$).

In addition, we tested three alternative models. First, in order to rule out the possibility that the obtained results were due to the effect of earlier achievement, we controlled for Y1 Achievement as a predictor for Y2 PAR and Y3 Perceived Academic Competence (PAC) in the SEM model. Results indicated that Y1 Achievement had significant effect on Y2 PAR ($Z = 4.354$, $p < .001$), but not on Y3 PAC ($Z = 1.295$, $p = .20$). Furthermore, all the significant mediational paths shown in Figure 1 remained statistically significant. In model two the order of Perceived Academic Competence (PAC) and Engagement was switched (i.e., use Y3 Engagement and Y4 PAC). We found that Y3 engagement did not have significant effect on Y4 PAC ($Z = 1.125$, $p = .26$), above Y2 PAR and Y1 PAC. In model three the order of PAC and peer variables was switched. We found Y2 PAC did not have a significant effect on Y3 Peer Acceptance ($Z = 1.018$, $p = .31$), or Y3 PAR ($Z = 1.251$, $p = .21$). These results further support the hypothesized model.

Discussion

This study simultaneously tested two pathways by which different dimensions of peer relationships affect future classroom engagement and achievement. Whereas previous research established predictive associations between both peer acceptance and PAR and future engagement and achievement, this study is the first to test the unique contributions of

each dimension of peer relationships to engagement and achievement and the mediating role of perceived academic competence. Our findings provide a clearer understanding of how early peer-related processes could influence concurrent and future school-related outcomes. We found that a student's reputation within the classroom for academic competence, but not peer acceptance, made a unique (non-shared) contribution to future perceived academic competence, classroom engagement, and achievement (indexed by standardized test scores). Furthermore, the effect of PAR on subsequent engagement was mediated by perceived academic competence. Although these results are correlational and cannot prove causal connections, the longitudinal nature of the study and statistical controls for prior levels of perceived academic competence, engagement, and achievement as well as relevant IQ and demographic variables increase confidence in the conclusion that PAR influences students' perceptions, which have motivating properties that lead to achievement.

Role of Peer Acceptance

The lack of a zero order correlation between the latent peer acceptance construct at year 2 and perceived academic competence at year 3 was unexpected. Previously, Flook and colleagues (2005) found that peer acceptance was linked to academic self-concept. However, rather than using peers' reports to assess peer acceptance, Flook and colleagues used teachers' reports. Thus, their measure of peer acceptance might also tap teachers' perceptions of academic competence or reputation, if teachers conflate perceptions of peer acceptance and perceptions of peer academic competence. Other investigators reporting positive associations between measures conceptually similar to peer acceptance, such as peer victimization or peer exclusion, and perceived academic competence employed student perceptions of victimization or exclusion, rather than sociometric measures (Buhs, 2005; Juvonen et al., 2000; Thijs & Verkuyten, 2008). Thus, the association could be the result of source effects. Differences in findings could also be due to sample differences. In a relatively low achieving sample, associations between peer acceptance and perceived academic competence may be weaker than in a sample more representative of the entire achievement spectrum.

It would be a mistake to conclude from this study that peer acceptance is unimportant to academic success. Despite the lack of a significant effect for peer acceptance on perceived academic competence or engagement, one cannot conclude that peer acceptance is inconsequential to these outcomes. Peer acceptance and PAR were moderately, positively correlated at 2nd grade (r = .56). The magnitude of the correlation suggests that they are overlapping but distinct constructs. It is possible that students' liking for classmates influences their perceptions of students' academic competence. Because both measures were assessed at the same time, one cannot assess the reciprocal effects between them. Previous empirical studies support the conclusion that students' liking for classmates influences their perceptions of classmates' social behaviors. For example, Hymel (1986) found that elementary students' liking for a child influenced their attributions for peers' behaviors. Students attributed positive behaviors to stable causes when performed by a liked peer rather than by a disliked peer, and they attributed negative behaviors to stable causes when performed by disliked peers than by liked peers. Future longitudinal studies that repeatedly assess both dimensions are needed to determine the reciprocal relationships between them.

As expected, the influence of peer perceptions of a child's academic competencies at 2nd grade on a child's classroom engagement at 4th grade was partially mediated through a child's academic self-beliefs at 3rd grade. Thus, PAR has a direct, as well as an indirect effect (through perceived academic competence), on classroom engagement (see Figure 1).

The proportion of the effect of PAR on engagement mediated by perceived academic competence is 16% using the method (i.e., $\frac{\widehat{ab}}{\widehat{c}}$) suggested by MacKinnon (2008).

Additional Mechanisms by which PAR May Influence Engagement

One can only speculate on additional processes that may account for the effect of PAR on subsequent engagement. It is possible that other self system beliefs, such as general self concept, loneliness, or liking for school might mediate the effect of PAR on engagement, and previous research documents associations between these constructs and engagement (Ladd et al., 2000; Ladd et al., 1997). However, because social acceptance is generally viewed as an important basis for these psychological benefits (Furrer & Skinner, 2003), the lack of a significant effect of peer acceptance on engagement would seem to weaken this argument. Drawing from teacher expectancy research (Jussim & Harber, 2005), PAR may affect engagement indirectly through differential learning opportunities provided to high and low PAR students (e.g., more opportunities to work with high achieving students, more challenging classroom assignments, and more response opportunities in the classroom for high PAR students) or differences in access to high achieving friends. 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 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 & Leggett, 1988). Students may more frequently approach high PAR classmates for assistance with academic work or as partners on school assignments (Plummer & Graziano, 1987).

High PAR children may also have greater access to higher achieving friendship networks. Children tend to affiliate with peers who have similar academic orientations and performance levels (Chen, Chang, & He, 2003). These similarities have been explained by reference to peer influence and selection processes (Kindermann, 2007). Over time, members of peer networks tend to become more similar in terms of academic orientation and performance, a finding consistent with the view that peer network characteristics influence members' academic motivation and performance. Children with higher PAR may be more likely to select (or be selected into) higher achieving groups which, in turn, may shape their academic self-views, engagement, and achievement.

Total Indirect Effect

Although each mediating pathway from PAR to Achievement was statistically significant, the total indirect effect from PAR to achievement was small (.086). Results by Thijs and Verkuyten (2008) may help explain these effects. They found that the effect of perceived academic competence on achievement was stronger for a measure of achievement that is more classroom based, in which one compares his or her performance to one's classmates, than for a normative measure of achievement, such as performance on a standardized achievement test. It is possible that the effect would have been stronger on a measure of students' or teachers' reports of students' achievement relative to classmates.

Gender Moderation

Consistent with other researchers (Buhs, 2005), we found evidence that the model pathways were equivalent for boys and girls. Other researchers, however, have found that certain aspects of peer relationships are stronger predictors of school adjustment for boys than for

girls (Cole & White, 1993; Underwood, Scott, Galperin, Bjornstad, & Sexton, 2004). Differences across studies in finding support for sex moderation of pathways from peer relationship variables to school adjustment may be due to differences in the specific dimensions of peer relationships investigated and the outcome (e.g., academic achievement versus psycho-social adjustment).

Educational Implications

To our knowledge, this study is the first to document a long-term effect of being perceived by one's classmates as academically capable on achievement. Among a sample of academically at-risk youth, a student's reputation in the classroom for academic competence in Grade 2 predicted Grade 5 performance on standardized achievement tests, above prior performance on the same tests. This finding raises the importance of identifying aspects of the classroom environment that contribute to students' peer academic reputations. We expect that in classrooms where teachers engage in practices that make relative differences amongst students salient, students will be aware of classmates' abilities and will demonstrate a high degree of consensus in their perceptions of classmates' abilities (Filby & Barnett, 1982; Rosenholtz & Simpson, 1984). For example, teacher practices that make relative ability differences highly salient include ability grouping, grading students in reference to comparison with other students rather than in relation to personal improvement, granting special privileges to high achievers, directing criticism and direction to low achievers, asking high achievers to demonstrate in front of the class, and providing public performance feedback (Jussim & Harber, 2005; Mac Iver, 1988; Urdan, Midgley, & Anderman, 1998). In classrooms where peer academic reputations are more apparent and there is higher consensus about classmates' abilities, children with lower ability are at an increased risk of being peer rejected and less engaged in learning (Hughes & Zhang, 2007).

Previous research has found a negative association between the use of differentiating teacher practices and student self esteem, especially among lower achieving students (Dweck & Leggett, 1988; Lüdtke, Köller, Marsh, & Trautwein, 2005). Future research is needed to determine if PAR mediates the effect of teacher differentiating practices and students' academic self esteem. Preliminary support for this reasoning is provided by a study with a sample overlapping with the current study in which an effect of teacher-student relationship quality on changes in students' academic self esteem was mediated by changes in students' PARs (AUTHOR 2009b). Teacher professional development efforts that reduce practices that emphasize relative performance differences and promote practices that emphasize individual task mastery are expected to be especially beneficial to the academic motivation and engagement of lower ability students.

Limitations and Future research

By including four waves of data, our design maintains the temporal precedence of the hypothesized causal model and controls for prior performance on each mediator and dependent variable. Such a design provides a strong (but not conclusive) basis for the direction of effects. The year-long interval between assessments of the exogenous variables, mediators, and outcomes, however, may not be the optimal interval to identify the hypothesized effects. A combination of within year and across year assessments might provide a more nuanced understanding of how these processes operate across time. Because the study is correlational, we cannot rule out the possibility that variables correlated with study variables but omitted from our model, such as peer victimization, may be responsible for the observed relationships. For example, one might expect teachers' expectations for students' achievement might influence students' perceptions of classmates' competence. Students' and teachers' perceptions of achievement are moderately related, and teachers' perceptions of achievement have been found to predict changes in students' own perceived

academic competence (Weinstein, Marshall, Sharp, & Botkin, 1987). However, preliminary analyses with our sample (AUTHOR, 2009a) demonstrated that PAR has a unique effect on future academic outcomes, including standardized achievement test scores, above the effects of previous performance and teachers' perceptions of children's abilities. Indeed, teacher perceptions of children's abilities made no unique contribution to cross-year changes in academic outcomes, above PAR.

The current sample is not representative of the full range of achievement. It is quite possible that the academic self concepts and motivation 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 (Liew, Chen, & Hughes, 2010) and the social-emotional climate of the classroom (Burchinal et al., 2002; Hamre & Pianta, 2005). Future studies are needed to determine if the effect of PAR on perceived academic competence and engagement is comparable across levels of achievement.

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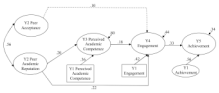

Figure 1.

Tested mediational model with academic self-efficacy as mediators (adjusted for dependence). χ^2 (147) = 432.799, $p < .001$; root-mean-square error of approximation = .060; standardized root-mean-square residual = .056. We controlled for sex, economic adversity, and IQ for each endogenous construct. To reduce the complexity of the figure, the demographic variables and indicators of the latent variables were not included. All coefficients are standardized (N = 543) and based on the full information maximum likelihood (FIML) procedure using the maximum likelihood estimator. The dashed paths indicate non-significant effects.

Table 1

Correlation Matrix of Observed Variables

	Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Belong1	–																		
2	CogCmp1	.29	–																	
3	T-Eng1	.19	.19	–																
4	WJ-Read1[a]	*−.01*	.16	.33	–															
5	WJ-Math1[a]	*−.06*	*.05*	.17	.36	–														
6	Liking2	*.04*	*.04*	.35	.12	.10	–													
7	Prefer2	*.08*	*.05*	.36	*.08*	*.04*	.84	–												
8	P-Work2	.10	.09	.42	.19	*.08*	.47	.50	–											
9	P-Math2	*.03*	.09	.35	.22	.11	.41	.43	.76	–										
10	P-Read2	*.04*	*.07*	.36	.20	*.08*	.39	.43	.69	.75	–									
11	CogCmp3	.16	.22	.11	.10	*.05*	*.00*	*.01*	.16	.14	.17	–								
12	ReadCmp3	.11	.12	*.06*	.11	*.03*	*−.04*	*.00*	.11	*.07*	.14	.24	–							
13	MathCmp3	.14	.26	.09	*.07*	*.06*	*.03*	*.02*	.10	*.09*	*.07*	.35	.27	–						
14	T-Eng4	.12	*.05*	.47	.15	.22	.30	.28	.38	.33	.29	*.07*	*.05*	*.06*	–					
15	S-BEng4	.18	.15	.20	*.00*	*−.06*	.14	.13	.13	.10	.11	.16	.16	*.08*	.15	–				
16	S-BHDA4	.11	*.09*	.14	*.02*	.19	.12	.10	.16	*.08*	.16	*.05*	*−.01*	*.03*	.21	.29	–			
17	S-Emo4	.19	.13	.19	*.04*	*.07*	*.09*	*.06*	.15	.09	.15	.12	*−.03*	.15	.25	.33	.51	–		
18	WJ-Read5[a]	*−.01*	.12	.31	.55	.34	.16	.14	.23	.24	.29	.14	.18	*.01*	.26	*−.03*	.12	*.06*	–	
19	WJ-Math5[a]	*−.02*	.09	.32	.36	.48	.19	.17	.21	.23	.23	*.09*	*.00*	.16	.33	*.01*	.18	.10	.59	–
	M	4.16	3.43	3.25	435.68	463.38	−0.09	−0.09	−0.14	−0.16	−0.13	2.75	22.25	22.43	2.81	3.47	3.22	3.29	499.48	504.83
	SD	0.80	0.54	1.05	25.81	12.98	1.01	0.98	0.87	0.89	0.93	0.67	6.16	6.34	0.67	0.43	0.66	0.68	18.13	10.33

Note. $N = 543$. Non-italicized correlations are significant at $p < .05$ (two-tailed).

Variable naming convention:

1. Numbers at the end of each variable indicate the time period when the variable was collected, i.e., Belong1 was collected at Year 1.
2. T- = Teacher-rated; P- = Peer-nominated; S- = Student-rated; WJ- = Woodcock–Johnson III; Eng = Engagement; Cog = Cognitive; Cmp = Competence; Liking = = Mean Student Rating; Prefer = Preference Score; BEng = Behavioral Engagement, BHDA = Behavioral Disaffection; Emo = Emotional Engagement;

[a]The Woodcock–Johnson scores are *W* scores; the more interpretable corresponding reading and math age-standard scores for Year 1 are 97.23 (*SD* = 17.44) and 101.15 (*SD* = 14.06), for Year 5 are 95.52 (*SD* = 12.46) and 100.28 (*SD* = 11.19), respectively.

Table 2

Measurement Model Factor Loading and Correlation Matrix

Factor	Factor Loadings		PAccept2	PAR2	PAC3	Engage4	Achieve5
	Indicator	**Loading**					
PAccept2	Liking2	0.90	1.00				
	Prefer2	0.93					
PAR2	P-Work2	0.86	0.56	1.00			
	P-Math2	0.89					
	P-Read2	0.83					
PAC3	CogCmp3	0.61	*0.00*	0.24	1.00		
	ReadCmp3	0.56					
	MathCmp3	0.44					
Engage4	T-Eng4	0.38	0.19	0.26	0.21	1.00	
	S-BEng4	0.44					
	S-BHDA4	0.67					
	S-Emo4	0.73					
Achieve5	WJ-Read5	0.77	0.23	0.36	0.23	0.22	1.00
	WJ-Math5	0.78					
Sex			*−0.03*	−0.11	*0.06*	−0.26	*−0.06*
Economic Adversity			*−0.03*	*−0.03*	*0.04*	*−0.07*	−0.28
IQ			0.11	0.10	*0.00*	*0.06*	0.38

Note. $N = 543$.

[1] Variable naming convention:

- **a.** Numbers at the end of each variable indicate the time period when the variable was collected;
- **b.** PAccept = Peer Acceptance; PAC = Perceived Academic Competence; PAR = Peer Academic Reputation; Engage = Engagement; Achieve = Achievement.

[2] All factor loadings are standardized estimates;

[3] $\chi^2(67) = 249.409$, RMSEA = 0.071, SRMR = 0.068, Estimation method: MLR;

[4] Non-italicized correlations are significant at $p < .05$ (two-tailed).