

A Reputation for Success (or Failure) : The Association of Peer Academic Reputations With Academic Self-Concept, Effort, and Performance Across the Upper Elementary Grades

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Studies of the socialization of achievement-related beliefs and academic skills typically focus on the influence of teachers and parents (Eccles, Wigfield, & Schiefele, 1998; Guay, Boivin, & Hodges, 1999; Guay, Marsh, & Boivin, 2003; Harter, 1998), but peer experiences may also play a role. For example, friends provide distinctive patterns of reinforcement for achievement-related attitudes and behaviors (Altermatt & Pomerantz, 2003; Kandel, 1978; Kindermann, 1993; Ryan, 2001; Sage & Kindermann, 1999), classmates provide evaluative feedback that predicts changes in children's academic self-concept (Altermatt, Pomerantz, Ruble, Frey, & Greulich, 2002), and peer tutoring may provide unique learning opportunities (Greenwood, Carta & Kamps, 1990). The present study builds on a prior analysis of children's academic reputations among their peers (Gest, Domitrovich, & Welsh, 2005) by testing for possible bidirectional associations between peer academic reputations (PARs) and measures of academic self-concept, effort, and performance across 3 school years.

The Developmental Significance of Peer Reputations

Developmental theorists have long held that peer reputations for social behavior and overall levels of peer acceptance have special significance as predictors of future adaptation (Hartup, 1970; Kohlberg, LaCrosse, & Ricks, 1972). Same-age peer interactions require children to balance cooperation and conflict with equal-status others (Hartup, 1996; Rubin, Bukowski, & Parker, 1998), so the aggregated judgments of peers regarding a child's skills and likeability are seen as important indicators of how a child is faring in these important developmental tasks according to her peers. This view evolved as a result of numerous longitudinal studies documenting the predictive power of children's peer acceptance and reputation for social behavior (Bagwell, Newcomb, & Bukowski, 1998; Cowen, Pedersen, Babigian, Izzo, & Trost, 1973; Morison & Masten, 1991; Parker & Asher, 1987). Early research on children's behavioral reputations focused on broad patterns of sociability, aggression, and withdrawal (Masten, Morison, & Pellegrini, 1985; Pekarik, Prinz, Liebert, Weintraub, & Neale, 1976), but more recent research underscores the highly differentiated nature of behavioral reputations among children in the upper elementary grades. For example, children can distinguish multiple domains of psychopathology (Weiss, Harris, & Catron, 2002) and several subtypes of social withdrawal (Gest, Sesma, Masten, & Tellegen, 2006; Younger, Schneider, Wadson, Guirguis, & Bergeron, 2000).

There are two possible explanations for the predictive power of children's social reputations. One possibility is that peers have unique and predictive insights into their classmates' behavior. Because peers are participant observers in the very social settings and interactions that researchers are trying to understand, their aggregated views may contain unique information that is unavailable to parents, teachers, or observers (Rubin, Bukowski,

& Parker, 1998). For example, in the school environment, peers may have a uniquely close vantage point on their classmates' behavior in classrooms, lunchrooms, hallways, and the playground, and they may be direct participants in many of those interactions. Their knowledge of peer norms may also make them uniquely sensitive to subtle variations in their classmates' behaviors.

A second possibility is that peer reputations serve as markers of everyday patterns of peer interaction (Hymel, Wagner, & Butler, 1990) in which peers play an active role in shaping each other's adaptation. For instance, hostile intent is ascribed to the hypothetical negative acts of classmates with a reputation as aggressive (Dodge, 1980; Dodge & Frame, 1982), whereas liked classmates are held less accountable for such acts (Hymel, 1986). More generally, peer rejection is a marker of numerous problematic day-to-day interactions with classmates (e.g., being rebuffed by peers; Asher & Coie, 1990), and predicts declines in self-perceptions of social competence (Boivin & Hymel, 1997; Harter, 1990) and increases in loneliness, internalizing distress, and externalizing behavior problems (Ladd & Troop-Gordon, 2003). These findings suggest that behavioral reputations may serve as markers of everyday patterns of peer interactions that shape how children view themselves and constrain future adaptations.

Ironically, research conducted almost entirely in school settings, where academic learning is the primary goal, has focused primarily on the significance of children's social reputations among peers. There has been little research on the existence, validity, and developmental correlates of children's academic reputations. However, it is conceivable that children develop PARs that reflect unique insights into each other's skills and that serve as markers of meaningful differences in peer interaction experiences. For example, children use increasingly adultlike social comparisons based on inferred academic dispositions to predict others' behavior and to inform self-evaluations and efficacy beliefs (Butler, 1989, 1998; Dweck, 2002; Ruble, Eisenberg, & Higgins, 1994; Schunk, 1987). When 3rd and 6th graders select teammates for a hypothetical academic competition, they choose classmates whom teachers regard as relatively academically skilled (Droege & Stipek, 1993).

PARs and Changes in Academic Self-Concepts, Effort, and Performance

For the same reasons that social reputations predict changes in social adaptation, children's academic reputations may predict changes in their academic self-concept, effort, and performance. This may reflect that peers are expert observers with unique knowledge of classmates' motivation and skills. Daily school routines may provide numerous observable clues that inform children's attributions about classmates' academic abilities (Gilbert & Malone, 1995). In the case of academic effort, for example, peers may hear classmates comment on their interest or disinterest in academic activities, experience classmates' work habits during collaborative learning tasks, or observe which classmates forego social opportunities to pursue academic interests. In the case of academic performance, peers may notice the speed with which different classmates finish assignments, the usefulness of academic help offered by various classmates, or variations in classmates' contributions to cooperative learning tasks. These insights may not be captured by tests or teacher ratings and may, therefore, make unique contributions to predictions of future engagement and performance.

A corollary of the idea that peers are active, expert observers is that children's positive or negative PARs should be sensitive to changes over time in their observable academic functioning. In other words, changes in PARs should be predicted by recent academic functioning. Consistent with social psychological research on attributions (Gilbert & Malone, 1995), observable features of academic functioning such as grades and behavioral signs of academic effort should be more predictive of changes in academic reputations than unobservable, "under the skin" phenomena such as academic self-concepts. Though peers may attend to children's emotional responses when publicly getting an answer "wrong" or the confidence with which children participate in class—clues potentially indicative of a child's academic self-concept—these indicators are more ambiguous and may be considered less relevant in judging classmates' skills than tangible evidence of grades and work habits.

PARs may also predict changes in academic self-concept, effort, and performance because they are markers for distinctive patterns of peer interactions that actively shape children's academic functioning. As noted above,

peers evaluate, recall, and react to classmates' behavior in ways that are consistent with their level of peer acceptance or reputation for aggressive behavior (Dodge & Frame, 1982; DeLawler & Foster, 1986; Hymel, 1986; Hymel et al., 1990). Less is known about how peers respond to each other's academic performances (Altermatt et al., 2002; Sage & Kindermann, 1999), but it is plausible that these processes could be indexed by children's PARs. For example, having a positive academic reputation may be associated with having academic successes recognized and remembered by peers, being approached more often for academic help, and affiliating with other classmates perceived as high achieving. Conversely, having a negative academic reputation may be associated with having academic failures noticed, being pointedly excluded from tasks requiring academic expertise, and affiliating with other classmates perceived as low achieving.

These variations in peer interactions, which could be indexed by PARs, could actively shape children's academic functioning. Self-concepts, for example, emerge from performance feedback (e.g., tests, grades; Thomas, 1997) and the expressed views of "important others" (e.g., teachers; Guay et al., 2003; Harter, 1998). To the extent that peers provide performance feedback and collectively function as an important "generalized other" (Mead, 1934), then their expressed views (Altermatt et al., 2002) could lead to changes in academic self-concepts. Similarly, peer encouragement or discouragement for academic efforts, perhaps in the context of selective peer affiliations (Ryan, 2001; Sage & Kindermann, 1999), could enhance or undermine children's interest in academic pursuits (Eccles et al., 1998) and thereby produce changes in effort. Lastly, opportunities to provide informal peer tutoring (Greenwood et al., 1990) could enhance academic performance, whereas exclusion from such activities may reduce opportunities to practice academic skills. In each of these processes, PARs per se do not play a causal role in changing academic outcomes, but they serve as markers of peer experiences that may play a causal role. The long-term significance of PARs may derive from the cumulative consequences of transactional processes (Sameroff & MacKenzie, 2003) in which real differences in academic functioning are noticed by peers and are associated with differences in socialization experiences in the peer group; in turn, these experiences constrain opportunities for future academic adaptations.

It is also possible that PARs indirectly predict changes in effort and performance. Consistent with expectancy-value theories suggesting that competence beliefs are an important determinant of whether students choose to engage in a task (Eccles et al., 1998), there is a substantial literature documenting that academic self-concepts predict changes in academic performance (Marsh & Hau, 2003; Skaalvik & Hagtvet, 1990). It follows that the association between PAR and changes in academic self-concept may mediate its association with changes in academic effort and performance. Similarly, because effort can predict changes in academic performance (DiPerna & Elliott, 1999), it is possible that any association between PAR and changes in performance is mediated by changes in effort.

The Present Study

The current study builds on an earlier report documenting the reliability and predictive validity of PAR measured at a single point in time (Gest et al., 2005). In the current study, we extended that work by examining the unique predictive significance of positive versus negative peer nominations and of PARs versus teacher-rated skills. We also obtained three additional assessments of PAR and obtained students' school grades at all assessments, permitting tests of bidirectional associations and mediation effects across 2.5 school years. Our hypotheses were based on the research reviewed above suggesting that PARs may contain unique information about children's academic adjustment and may serve as markers of peer interactions that could shape that adjustment, including perceptions of academic competence, academic effort, and performance. Both possibilities suggested that positive and negative peer nominations would be equally important and that PAR would display unique predictive power even after taking into account other indicators of academic competence such as teacher ratings. Specifically, we expected that PARs would display bidirectional associations with academic self-concept, teacher-rated effort, and performance. We expected that associations with performance would be mediated by changes in academic self-concept and effort and that associations with effort would be only partly mediated by changes in academic self-concept.

Method

Participants

Participants were enrolled in Grade 3, 4, or 5 at an elementary school serving a small, working-class community in the northeastern United States in the fall of 2001. Assessments were conducted in the fall and spring of 2 consecutive school years and in the fall of a 3rd school year. In the fall of each year, parents provided consent for their children to participate in the fall and spring assessments. Ninety-six percent (427/443) of the students who were enrolled in the targeted grades in the fall of 2001 received parental consent and provided data on at least two of the five assessment occasions. These 427 students (193 girls, 234 boys; 146 3rd graders, 146 4th graders, 135 5th graders) comprised the longitudinal sample we analyze for this article. (The larger number of boys was representative of the overall school population.) Eighty-eight percent of these students participated in at least four of the five assessments; 75% participated in all five.

Almost all students at the school (99%) were Caucasian, reflecting the demographics of the larger community served by the school district. On statewide assessments of reading and math, the distribution of scores for 5th graders at the school closely matched the distribution for the overall population of 5th graders in the state. However, rates of many social problems (e.g., poverty, school drop out) exceeded state averages. This community profile is typical for rural areas, where nearly one third of all U.S. children attend public school (Johnson & Strange, 2007).

Procedure

This project originated as a component of a Safe Schools/Healthy Students grant obtained by the school district. Students and teachers completed surveys in late October and May each school year. Several weeks prior to the October survey date, parents were sent a letter describing the project with a form to sign and return if they did not wish their child to participate. Students whose parents did not return a form exempting them from the project were asked to complete a group-administered survey lasting approximately 45 min. Students were free to decline to participate in the survey.

Measures

Peer nominations

Students identified classmates whom they liked most and liked least and identified classmates matching 12 additional behavioral descriptors. (Students in the oldest cohort moved to the middle school for 6th grade in the 2nd year of the study and were instructed to nominate anyone in their entire grade, but for simplicity we refer to classmates throughout this article.) At each assessment, we sought parental consent to participate for any new students who had not been enrolled at the previous assessment. This ensured very high participation rates at each assessment. Students were provided with a roster containing the names of children in their class (or grade) and were free to list as many or as few classmates as they wished in response to each item. Both same-sex and other-sex nominations were tallied. Raw scores were standardized within sex and classroom to account for varying class size and sex distribution. Key analyses for PAR were repeated with scores standardized only within classroom (as was done for teacher ratings): These analyses produced the same substantive findings. Four items described classmates' Peer Academic Reputation: "good at reading," "not very good at reading," "almost always knows the right answer when the teacher asks a question," and "almost never knows the right answer when the teacher asks a question." Scores on each item could range from zero (no nominations received) to the total number of nominators in a given classroom (typically around 20). Across all four assessments, students received more positive nominations than negative nominations. For positive nominations, the mean ranged from 3.91 to 5.30, the median was always 3, and the maximum ranged from 20 to 37. For negative nominations, the mean ranged from 2.34 to 3.38, the median was always 1, and the maximum ranged from 21 to 31. Positive and negative academic reputations were moderately negatively correlated ($-.58 < r < -.48$). When the two negatively worded items were reverse-scored at each of the four assessments, these four items formed a composite score that was internally consistent ($\alpha = .80$ to $.82$ across the four peer nomination assessments) and normally distributed (skew = $-.16$ to $.08$). The unique predictive utility of the positively and negatively worded items is explored in the Results. Social Preference was computed as the standardized difference between standardized "liked most" scores and standardized "liked least" scores (Asher & Coie, 1990). We include this variable in some analyses to clarify the unique contributions of PAR as distinct from being liked by classmates.

Across the four peer nomination assessments, data were available for 95%, 95%, 91%, and 90% of the longitudinal sample.

Self-reports

Students responded to items drawn from the Self-Perception Profile for Children (Harter, 1982) to assess academic and social self-concept and global self-worth. Following the standard format for this measure, we asked students to choose which of two statements was more true for them, then to indicate whether that statement was “sort of true” or “really true” for them. The four statements corresponding to positive Academic Self-Concept (ASC) were “feel they are very good at their school work,” “feel like they are just as smart as other kids their age,” “almost always figure out the answers,” and “do very well in their class work.” Across the five assessments examined in the present study, these items formed an internally consistent composite scale ($\alpha = .62, .70, .72, .79, .75$). Across the five assessments, means for academic self-concept ranged from 3.1 to 3.3 on the 4-point scale, suggesting that on average students had moderately positive academic self-concepts. In our prior report (Gest et al., 2005), we documented domain-specific linkages between peer reputation and self-concept: PAR was uniquely associated with changes in academic self-concept, while peer social preference was uniquely associated with changes in social self-concept. Consequently, the present analyses focus only on changes in academic self-concept. Across the five assessments of self-concept, data were available for 93%, 93%, 81%, 74%, and 81% of the longitudinal sample.

Teacher ratings

Teachers rated the degree to which they agreed or disagreed with each of 32 statements describing multiple aspects of student adaptation (1 = strongly disagree, 5 = strongly agree). Items were drawn from existing, well-validated rating scales, including the Social Health Profile (Conduct Problems Prevention Research Group, 1999). We focus here on three scales derived from a factor analysis. Academic Effort summarized the teacher's judgment of how hard the student worked (four items: “works hard at school,” “shows poor effort” [reversed], “does best s/he can at schoolwork,” “does not try hard at schoolwork” [reversed]). Across the five assessments, $\alpha = .92$ to $.93$, and mean ratings ranged from 3.9 to 4.1 on the 5-point scale. Academic Skills focused on competence in four academic subjects (good at math, reading, science, writing) and formed an internally consistent composite scale ($\alpha = .88$ to $.91$, $M = 3.4$ to 3.7). Social Engagement described constructive and well-regulated social contact with peers (six items: e.g., “initiates interactions with others,” “friendly,” “resolves peer problems on his/her own”; $\alpha = .90$ to $.91$, $M = 4.0$ to 4.1). We include academic skills and social engagement scales to document the convergent and discriminant validity of PAR. Across the five teacher rating assessments, data were available for 95%, 95%, 90%, 89%, and 85% of the longitudinal sample.

Teacher ratings were standardized within classroom prior to analyses for two reasons. First, children likely focus their social comparisons on students in their own classroom so that standardizing captures the psychologically meaningful frame of reference for children's social comparisons. Second, differences in teachers' central rating tendency introduce error that reduces the year-to-year stability of teacher ratings: Standardized teacher ratings have stronger year-to-year stability and thus provide a more conservative test of whether alternative predictors (e.g., PAR) predict changes in those teacher ratings.

Grade point average (GPA)

Children's report card grades were obtained to compute GPA as the mean of grades in language arts, math, science, and social studies. When separate grades were awarded for English and Reading, the mean of these grades was calculated to create a language arts composite grade prior to computing GPA. Letter grades were converted to numerical values, ranging from 1 (F) to 13 (A+). Scores were then averaged across the four subject areas and divided by three to arrive at the more familiar GPA scale that ranged from .33, indicating grades of F in all four subject areas, to 4.33, indicating grades of A+ in all four subject areas. Because peer nominations and teacher ratings were obtained near the end of the 1st and 4th grading periods of each school year, we analyzed GPA from these reporting periods. Across the five assessments, grades were available for 86%, 85%, 84%, 85%, and 87% of the longitudinal sample. GPA was not standardized within classroom prior to analyses because, unlike teacher ratings, grades were directly available to students and provided a common metric and

evaluative language that could inform self-evaluations, social comparisons, and peer reputations. Across assessments, observed values of GPA ranged from .33 to 4.33, with mean values ranging from 3.2 to 3.5.

Results

Analyses Proceed in Three Steps

First, we build on our initial description of the validity of the PAR scores (Gest et al., 2005) by documenting their stability and convergent/discriminant validity, clarifying the unique predictive power of the positive versus negative academic reputation items that comprise the overall composite score, and documenting the unique predictive utility of PAR relative to teacher-rated academic skills. Second, we use path-analytic models to test for bidirectional associations between PAR and academic self-concept, teacher-rated effort, and grade point average. Third, we test whether changes in self-concept mediate the associations between PAR and effort and GPA or whether changes in effort mediate the associations between PAR and GPA.

Missing Data

The data set comprised 427 participants, five waves of data, and the six measures described above. Overall, 11.8% of all data points were missing. Missing data were addressed in the context of the full information maximum likelihood (FIML) estimation procedure, which takes into account all observed data points from all cases and provides more efficient and less biased estimates than listwise deletion or mean imputation under a wide range of conditions (Wothke, 2000).

The Validity and Uniqueness of PARs

Stability and construct validity

PAR displayed strong temporal stability across all adjacent assessments (range: $r = .76$ to $r = .83$; see Table 1). PAR's moderate to strong concurrent correlations with GPA (range: $r = .55$ to $r = .64$) and teacher-rated academic skills (range: $r = .62$ to $r = .69$) provided evidence of convergent validity. Discriminant validity was demonstrated by PAR's weaker correlations with teacher-rated prosocial engagement (range: $r = .43$ to $r = .50$) and peer social preference (range: $r = .33$ to $r = .35$). For example, at Time 2, PAR's correlation with teacher-rated academic skills ($r = .69$) was significantly larger than its correlation with teacher-rated prosocial behavior ($r = .48$), $t(402) = 5.98$, $p < .001$ (McNemar, 1969). These patterns support the construct validity of PAR as an indicator of academic competence.

Table 1

Pearson Product–Moment Correlations Among Peer Academic Reputation, Academic Self-Concept, Teacher-Rated Academic Effort, and Grade Point Average Across Five Assessments

Variable across assessments	Sex	Cohort	Peer academic reputation				Academic self-concept					Teacher-rated academic effort					Grade point average						
			1	2	3	4	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5		
Sex	—																						
Cohort	<i>-.04</i>	—																					
Reputation																							
1	.01	.03	—																				
2	.00	<i>-.01</i>	.80	—																			
3	.01	.01	.72	.76	—																		
4	.02	.02	.67	.72	.83	—																	
Self-concept																							
1	.09	<i>-.04</i>	.29	.32	.27	.25	—																
2	.05	<i>-.05</i>	.36	.38	.38	.37	.49	—															
3	<i>-.02</i>	<i>-.11</i>	.33	.40	.39	.39	.43	.52	—														
4	.07	.02	.30	.36	.34	.41	.39	.46	.59	—													
5	.01	.03	.36	.37	.41	.45	.36	.43	.56	.66	—												
Effort																							
1	<i>-.08</i>	.00	.56	.54	.55	.50	.19	.34	.29	.29	.28	—											
2	<i>-.14</i>	<i>-.01</i>	.50	.56	.53	.49	.20	.35	.28	.31	.23	.75	—										
3	<i>-.17</i>	.01	.50	.53	.56	.52	.17	.31	.29	.25	.35	.60	.62	—									
4	<i>-.12</i>	.03	.44	.49	.52	.52	.20	.27	.29	.36	.37	.54	.60	.76	—								
5	<i>-.12</i>	.00	.40	.41	.44	.45	.12	.32	.30	.28	.32	.51	.53	.63	.61	—							
Grades																							
1	<i>-.02</i>	<i>-.06</i>	.55	.55	.51	.48	.31	.42	.38	.27	.32	.52	.57	.43	.44	.37	—						
2	<i>-.07</i>	<i>-.06</i>	.49	.60	.59	.57	.35	.43	.38	.28	.37	.56	.68	.59	.56	.49	.74	—					
3	<i>-.06</i>	.06	.55	.61	.64	.63	.27	.36	.48	.33	.42	.55	.59	.69	.65	.55	.60	.69	—				
4	<i>-.07</i>	.23	.53	.55	.55	.59	.29	.38	.41	.39	.49	.51	.54	.62	.66	.62	.53	.63	.74	—			
5	<i>-.04</i>	.10	.52	.56	.53	.58	.26	.42	.33	.37	.46	.49	.56	.59	.66	.67	.55	.62	.70	.75	—		
N	427	427	408	406	390	383	391	396	343	315	342	404	405	384	377	360	365	364	358	360	373		

Note. All correlations were statistically reliable at $p < .05$ unless italicized. Sex was dummy-coded with girls = 0.

Pearson Product–Moment Correlations Among Peer Academic Reputation, Academic Self-Concept, Teacher-Rated Academic Effort, and Grade Point Average Across Five Assessments

Predictive utility of positive and negative nominations

We calculated separate scores for positive and negative academic reputation items and used multiple regression models to examine how each contributed to the prediction of change in academic self-concept, teacher-rated effort, and GPA. First, each dimension was entered in separate models: Positive reputation scores predicted positive changes in self-concept (median $\beta = .17$ across the four assessment intervals), effort (median $\beta = .12$), and performance (median $\beta = .16$; all effects at least $p < .05$); conversely, negative reputation scores predicted negative changes in these dimensions (median $\beta = -.20, -.14, -.17$, respectively; all effects at least $p < .05$).

Next, both dimensions were entered as simultaneous predictors so that standardized betas represent each dimension's unique predictive power after taking into account the other dimension (see Table 2). Very similar patterns emerged: Positive reputations uniquely predicted positive changes in self-concept, effort, and GPA (median $\beta = .10, .11, .12$, respectively), and negative academic reputations uniquely predicted negative changes in these same constructs (median $\beta = -.14, -.10, -.13$, respectively). The diminished effect sizes in the models that included both positive and negative scores were expected given the moderate negative correlation between the two dimensions (median $r = -.49$ across the five assessments). The key points are that considered separately each dimension predicted changes in academic functioning and that considered together neither dimension clearly predominated. This suggests it is appropriate to combine the two dimensions into a single bipolar PAR composite score and to interpret predictive associations as reflecting the variance associated with both positive and negative academic reputations.

Table 2
Clarifying the Meaning of Peer Academic Reputations: Unique Variance of Positive Versus Negative Peer Academic Nominations in Relation to Changes in Self-Concept, Effort, and Grade Point Average (GPA)

Dependent variable	Assessment interval				Mdn
	T1 → T2	T2 → T3	T3 → T4	T4 → T5	
Δ Self-concept					
Positive	.11*	.09	.07	.12*	.10
Negative	-.15*	-.17**	-.09	-.14**	-.14
Δ Effort					
Positive	.11**	.17**	.11*	.07	.11
Negative	-.05	-.20***	-.06	-.15**	-.10
Δ GPA					
Positive	.09*	.15**	.06	.15***	.12
Negative	-.08	-.24***	-.13**	-.12**	-.13

Note. $N = 427$ for each model. Positive nominations were the average standardized score for “good at reading” and “usually knows the answer when the teacher asks a question”; negative nominations were the average of “not very good at reading” and “usually doesn’t know the answer when the teacher asks a question.”

* $p < .05$. ** $p < .01$. *** $p < .001$.

Clarifying the Meaning of Peer Academic Reputations: Unique Variance of Positive Versus Negative Peer Academic Nominations in Relation to Changes in Self-Concept, Effort, and Grade Point Average (GPA)

Distinctiveness of PAR and teacher-rated academic skills

To clarify the extent to which the predictive utility of PAR was distinct from the predictive power of teacher-rated academic skills, we ran another series of multiple regression models in which PAR and teacher-rated academic skills were entered as simultaneous predictors of changes in self-concept, effort, and GPA (see Table 3). PAR emerged as a statistically reliable predictor in 10 of these 12 models, with similar effect sizes across dependent variables: median $\beta = .15$ for self-concept, effort, and GPA. Teacher-rated academic skills were less consistent in demonstrating unique predictive variance: for ASC, its unique variance was similar to PAR (median $\beta = .14$); for teacher-rated effort, its unique variance was generally weaker (median $\beta = .05$); and for GPA, its unique effects were somewhat stronger (median $\beta = .21$). These models suggest that despite the moderately strong correlations between PAR and teacher-rated academic skills, PAR retained unique predictive variance with respect to all three dependent variables.

Table 3
Clarifying the Meaning of Peer Academic Reputations: Unique Variance of Peer Academic Reputations and Teacher-Rated Academic Skills in Relation to Changes in Self-Concept, Effort, and Grade Point Average (GPA)

Dependent variable	Assessment interval				Mdn
	T1 → T2	T2 → T3	T3 → T4	T4 → T5	
Δ Self-concept					
Peer	.12*	.18**	.19**	.12*	.15
Teacher	.19**	.09	-.05	.18**	.14
Δ Effort					
Peer	.07	.26***	.14**	.17**	.15
Teacher	.16***	.04	.00	.05	.05
Δ GPA					
Peer	.07	.20***	.14**	.15**	.15
Teacher	.21***	.27***	.10	.21***	.21

Note. $N = 427$ for each model.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Clarifying the Meaning of Peer Academic Reputations: Unique Variance of Peer Academic Reputations and Teacher-Rated Academic Skills in Relation to Changes in Self-Concept, Effort, and Grade Point Average (GPA)

Taken together, the analyses thus far indicate that PAR is a valid indicator of academic competence, that its predictive utility derives from both the positive and negative dimensions of academic reputations, and that its predictive associations are at least partly distinct from those of teacher-rated academic skills.

Bidirectional Associations With Self-Concept, Effort, and GPA

The next set of analyses tested path-analytic models of the bidirectional associations between PAR and self-concept, effort, and GPA. As with the previous analyses, these models estimated the extent to which PAR predicted changes in self-concept, effort, and GPA (pathways a in Figure 1), but they built on previous results by testing the extent to which self-concept, effort, and GPA predicted changes in PAR (pathways b in Figure 1). They also considered possible grade-cohort and sex differences and included lag-2 stability coefficients (e.g., ASC1 → ASC3, ASC2 → ASC4), resulting in a more stringent test of the predictive utility of PAR (see Figure 1). We explored grade-cohort differences by comparing the fit of a base model in which all parameters were constrained to be equal across grades-cohorts to the fit of three nested alternative models. In these models, increasing numbers of parameters were estimated separately for each grade-cohort in the following order: (a) means and intercepts, (b) initial correlations and stability coefficients, and (c) the theoretically critical cross-lag coefficients. The likelihood ratio chi-square difference test and the root-mean-square error of approximation (RMSEA) indicated that the optimal solution was one in which means, intercepts, initial correlations, and stability coefficients were estimated separately for each grade-cohort. To maintain consistency, we report results for models in which these parameters were free to vary across grades-cohorts but cross-lag coefficients were constrained to be equal. The same set of model comparisons was used to test for sex differences, but model fits were not improved by allowing for sex differences in stability or cross-lag coefficients.

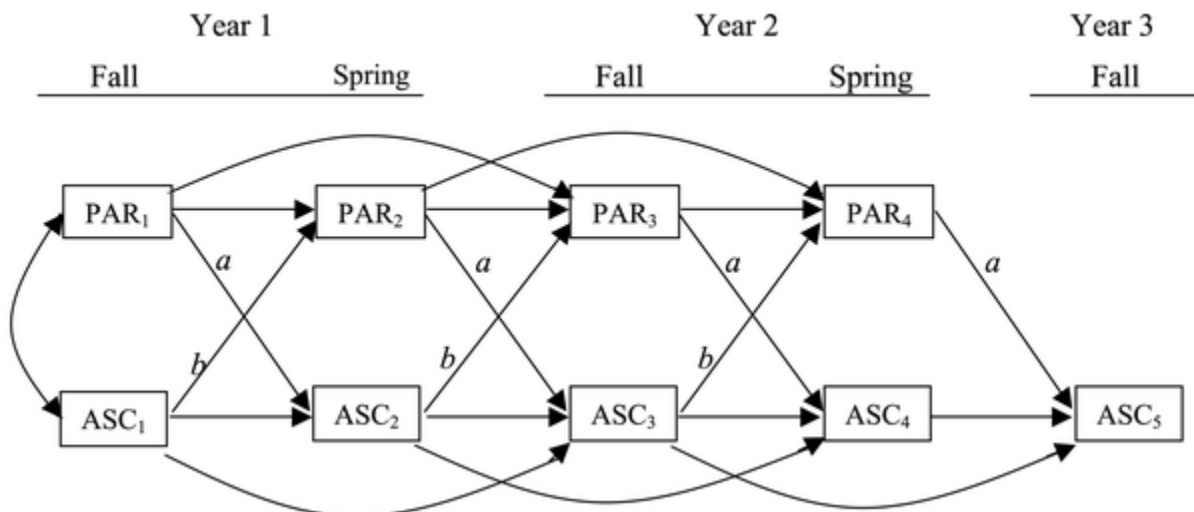


Figure 1. Path-analytic model testing bidirectional associations between peer academic reputation and academic self-concept across three school years. Key effects are cross-lag coefficients indicating peer academic reputation (PAR) predicting changes in self-concept (pathways marked a) and self-concept predicting changes in PAR (pathways marked b). Parallel models were constructed to estimate bidirectional associations between PAR and teacher-rated effort and between PAR and GPA. ASC = Academic Self-Concept.

In the model including PAR and ASC (see Table 4, first column), PAR reliably predicted changes in ASC across all four assessment intervals (median $\beta = .18$), while ASC predicted reliable changes in PAR across two of three intervals (median $\beta = .09$). This model fit the data closely (comparative fit index = .994, RMSEA = .024). In the model including PAR and teacher-rated effort, the pattern of reliable cross-lag effects was exactly the same, but the magnitude of effects was more even from EFF → PAR, median $\beta = .13$, and from PAR → EFF, median $\beta = .14$. This model also fit the data well (comparative fit index = .961, RMSEA = .038). The

parallel model including PAR and GPA produced the clearest evidence of robust bidirectional associations. All of the cross-lag pathways between PAR and GPA were statistically reliable, and the magnitudes of these effects were approximately equal in each direction (median $\beta = .17$ for both $\text{GPA} \rightarrow \text{PAR}$ and $\text{PAR} \rightarrow \text{GPA}$). This model also fit the data closely (comparative fit index = .987, RMSEA = .040). Taken together, these models underscore that PAR is a consistent predictor of changes in academic self-concept, effort, and GPA. They also suggest that the most robust predictor of changes in PARs are academic grades earned at the prior assessment, with progressively weaker predictions from prior teacher-rated effort and academic self-concept.

Table 4
Bidirectional Associations of Peer Academic Reputations (PAR) With Academic Self-Concept, Teacher-Rated Effort, and Grade Point Average (GPA) Across Five Waves of Assessment

Model parameter	Academic self-concept	Teacher-rated academic effort	Grade point average
	Self-concept $\rightarrow \Delta\text{PAR}$	Effort $\rightarrow \Delta\text{PAR}$	GPA $\rightarrow \Delta\text{PAR}$
T1 \rightarrow T2	.09**	.13**	.17***
T2 \rightarrow T3	.10**	.13**	.22***
T3 \rightarrow T4	.05	.05	.15***
<i>Mdn</i>	.09	.13	.17
	PAR $\rightarrow \Delta\text{Self-concept}$	PAR $\rightarrow \Delta\text{Effort}$	PAR $\rightarrow \Delta\text{GPA}$
T1 \rightarrow T2	.24***	.14***	.16***
T2 \rightarrow T3	.19***	.25***	.32***
T3 \rightarrow T4	.09*	.08*	.13*
T4 \rightarrow T5	.18***	.13**	.17***
<i>Mdn</i>	.18	.14	.17
χ^2	$\chi^2(170) = 211.88$	$\chi^2(170) = 000.00$	$\chi^2(170) = 285.62$
CFI	.994	.961	.987
RMSEA	.024	.038	.040

Note. $N = 427$ for each model.
 * $p < .05$. ** $p < .01$. *** $p < .001$.

Bidirectional Associations of Peer Academic Reputations (PAR) With Academic Self-Concept, Teacher-Rated Effort, and Grade Point Average (GPA) Across Five Waves of Assessment

Mediation Effects

We tested mediation models to determine whether PAR's associations with self-concept, effort, and GPA were interrelated (see Figure 2A). If academic self-concept mediates the association between PAR and effort, for example, this would suggest that PAR predicts changes in effort only to the extent that it predicts changes in self-concept.

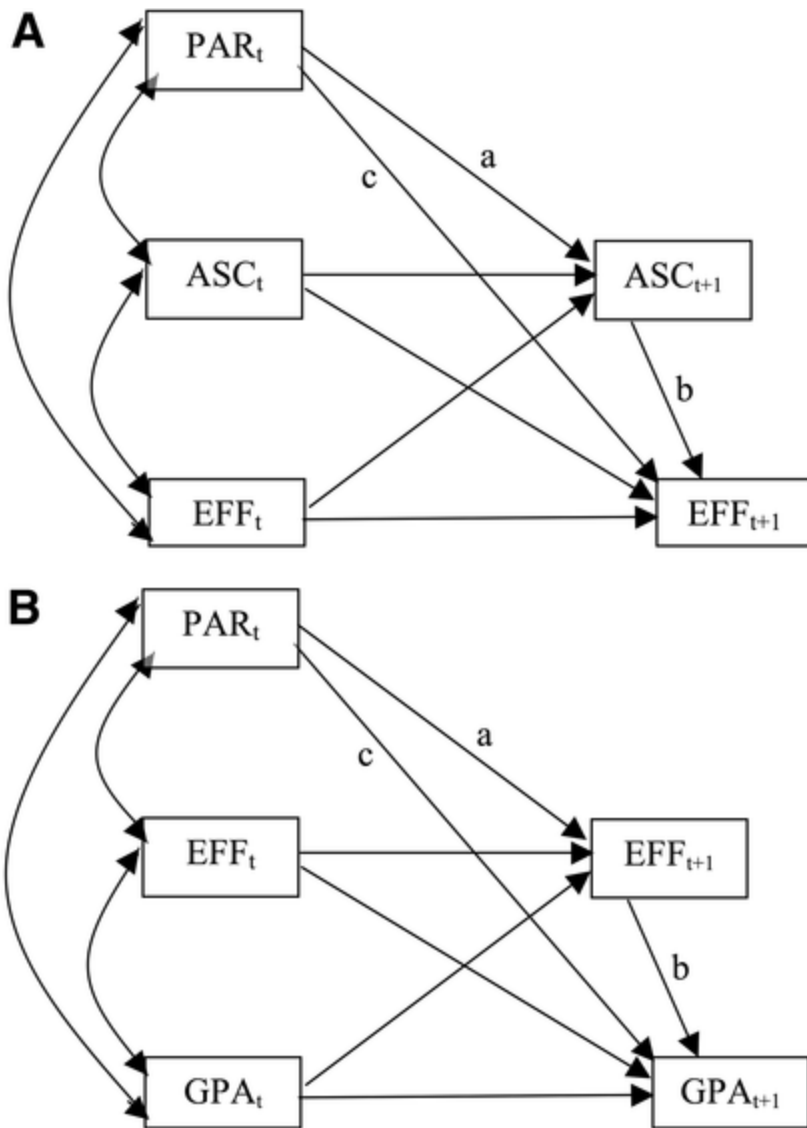


Figure 2. A: Form of path-analytic model testing whether the association between peer academic reputation (PAR) and teacher-rated effort is mediated by its association with academic self-concept. Coefficients for pathways a, b, and c are presented in Table 5. B: Form of path-analytic model testing whether the association between PAR and GPA is mediated by its association with teacher-rated effort. ASC = Academic Self-Concept; EFF = teacher-rated academic effort; t = assessment time.

For the models testing whether ASC mediates the link between PAR and effort, each model allowed for the stability of ASC and effort, as well as the bidirectional associations between those constructs. Mediation would be demonstrated to the degree that estimating the indirect path linking PAR to effort (a and b) reduced the magnitude of the direct path c linking PAR to effort. Mediation effects were tested with Sobel's t test (MacKinnon, Warsi, & Dwyer, 1995). Results provide inconsistent and weak evidence that changes in ASC mediated PAR's association with effort. Table 5 contains estimates for the final mediation models, with the unmediated effects of PAR on effort (i.e., path c when path b was fixed at zero) indicated in parentheses. The only reliable mediation effect came between T3 and T4 ($t = 2.15, p < .05$), but the indirect path through ASC (.017) was very weak in comparison to the direct path from PAR to effort ($\beta_{34} = .09, p < .05$). At other time periods, the conditions for mediation did not exist (T2 \rightarrow T3, T4 \rightarrow T5) or mediation effects were not reliable (T1 \rightarrow T2). In contrast, the direct effects of PAR were reliable at each interval.

Table 5

Academic Self-Concept (ASC) as a Mediator of the Association Between Peer Academic Reputation (PAR) and Teacher-Rated Effort

Model parameter	Assessment interval				Mdn
	T1 → T2	T2 → T3	T3 → T4	T4 → T5	
Bidirectional associations					
Effort _(t) → ASC _(t + 1)	.19***	.02	.02	.08	.05
ASC _(t) → Effort _(t + 1)	.01	.05	-.01	.00	.00
Mediation effects					
a. PAR _(t) → ASC _(t + 1)	.13*	.22***	.15**	.18***	.16
b. ASC _(t + 1) → Effort _(t + 1)	.08*	.06	.17***	.08	.08
c. PAR _(t) → Effort _(t + 1)	.12** (.13**)	.25*** (.27***)	.09* (.11*)	.16** (.17**)	.14 (.15)
Sobel <i>t</i> test for mediation	1.64, <i>ns</i>		2.15*		
Indirect effects of PAR			.017		

Note. All models took the general form illustrated in Figure 2A, with entries in mediation rows *a*, *b*, and *c* corresponding to pathways *a*, *b*, and *c* in Figure 2A. Entries in parentheses are for the unmediated effect of PAR (i.e., when pathway *b* was fixed at zero). Tests for mediation were only conducted when pathways *a*, *b*, and the unmediated effect of PAR, *c*, were statistically reliable. *t* = assessment time.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Academic Self-Concept (ASC) as a Mediator of the Association Between Peer Academic Reputation (PAR) and Teacher-Rated Effort

Parallel models tested whether changes in ASC mediated PAR's association with GPA. Again, evidence of mediation was weak and inconsistent. Mediation was statistically reliable at two intervals (T2 → T3, T3 → T4), but in both cases the indirect path was substantially weaker than the direct path: At T2 → T3, indirect effects = .04 vs. direct effects = .25; and at T3 → T4, indirect effects = .02 vs. direct effects = .13.

Finally, parallel models were tested to determine whether PAR's associations with teacher-rated effort accounted for its associations with GPA (see Figure 2B). Mediation was statistically reliable from T2 to T3 (Sobel's $t = 4.32$, $p < .001$), but the direct path between PAR and GPA ($\beta_{23} = .18$, $p < .001$) remained stronger than the indirect path (.09). Taken together, these models provide weak evidence of mediation effects: PAR's associations with changes in self-concept do not account for its associations with effort and GPA; nor do its associations with effort account for its associations with GPA.

Discussion

Results supported the hypothesis that children's academic reputations among peers in the upper elementary grades predicted changes in children's academic self-concept, effort, and performance. These predictive associations derived from both positive and negative aspects of PAR and remained reliable after the effects of teacher-rated skills were taken into account. Furthermore, changes in PARs were predicted most consistently by recent academic performance. There was little evidence that changes in self-concept mediated the association between academic reputations and effort or grades. These findings expand on an earlier report from this longitudinal study (Gest et al., 2005) by clarifying the role of positive and negative academic reputations, examining associations with scholastic grades, and documenting bidirectional associations across 2.5 school years. The predictive validity of PARs could derive from either or both of two processes: Academic reputations could capture peers' unique insights into each other's academic functioning, or they might serve as markers of a variety of peer experiences that actively shape self-concepts, effort, and performance.

Most broadly, these results add to the accumulating evidence that peer reputations in middle childhood are highly differentiated and predictive of changes in important indices of adaptation. Recent work suggests that peers distinguish among multiple dimensions of symptoms (Weiss et al., 2002), social withdrawal (Coplan, Prakash, O'Neil, & Armer, 2004; Younger et al., 2000), prosocial behavior (Chen, Li, Li, Li, & Liu, 2000), and roles in bully-victim dynamics (Salmivalli, Lagerspetz, Bjorkqvist, Osterman, & Kauklainen, 1996). These reputations can predict changes in adaptation over multiple years (Chen et al., 2000; Gest et al., 2006; Morison & Masten, 1991). It should not be surprising, then, that children also develop academic reputations among their

peers that are predictive of change in important indicators of academic functioning.

The present measure of PAR reflected the unique contributions of both positive and negative academic reputations and was psychometrically robust. Specifically, when positive and negative academic reputations were both entered as predictors of change in self-concept, effort, and grades, each made unique predictions of roughly the same magnitude but opposite valence. This provided a clear justification for combining the two dimensions into a single PAR index and interpreting that index as reflecting the contributions of both positive and negative academic reputations. The high stability of these PAR scores was comparable to those of teacher-rated skills, academic grades, and other broad dimensions of social reputation (Masten et al., 1985) and is notable because the reassignment of students across multiple classrooms meant that academic reputations were defined by largely different sets of peers each year. PARs correlated more strongly with teacher-rated academic skills than with teacher-rated prosocial behavior, and they correlated much more strongly with grades than with peer social preference. In sum, by the upper elementary grades, children had robust reputations among peers for strong and weak academic skills, and these reputations were distinctively associated with independent indicators of academic skills.

As expected, PARs predicted changes over time in children's academic self-concepts, teacher-rated effort, and scholastic grades. In multiple regression models that controlled for teacher-rated academic skills, PAR typically retained unique predictive power and predicted future grades even after we controlled for prior grades and prior teacher-rated skills. These results demonstrate that the predictive validity of the PAR measure is not fully explained by its covariation with measures of teacher-rated academic skills or academic grades.

As described in the introduction, there are two, nonmutually exclusive explanations for these unique predictive associations. One possibility is that academic reputations capture peers' unique insights into each other's functioning that predict future academic adjustment. This is consistent with the broader recognition that peers have unique perspectives on classmates' behavior (Rubin et al., 1998), largely due to their closer vantage point for observing peers' behavior and first-hand participation in interactions with these peers. For example, daily school routines put youth in close proximity to each other during academic work tasks, and peers may interact directly during joint learning activities such as small-group assignments and informal academic helping. This proximity to and direct interaction with peers may permit unique observations about the speed and ease (or difficulty) with which classmates complete tasks, give or receive help, or expend effort on tasks. To the extent that these phenomena are less accessible to teachers and are not fully indexed by graded assignments, peer reputations may contribute uniquely to the prediction of future performance.

This possibility is further supported by the fact that PARs changed over time as a function of recent report card grades. That academic reputations were less responsive to changes in teacher-rated effort and academic self-concept suggests that they emerge most strongly from publicly available information about academic performance (i.e., grades). This is consistent with the idea that people make inferences about behavior based on observable constructs such as words or actions (e.g., Gilbert & Malone, 1995), rather than on unobservable constructs, such as self-perceptions. In this case, individuals' grades could have provided tangible information that contributed to the academic reputations that were maintained (or adjusted) by their peers. The apparent malleability of academic reputations stands in contrast to evidence that reputations for aggressive behavior often persist despite observed behavioral changes (Hymel et al., 1990). This could reflect differences in the base rates of academic and aggressive behaviors: Daily academic performances allow academic reputations to adjust relatively quickly, whereas the low base rate of aggressive behavior means that salient events in the distant past may still inform reputations for aggression.

An alternative explanation for the predictive validity of PARs is that they serve as markers of patterns of peer interaction that support or undermine academic functioning. Research on children's social reputations provides a clear precedent for this interpretation: Peers evaluate, recall, and interpret classmates' behavior in ways that are correlated with their peer acceptance or reputation for aggressive behavior (DeLawler & Foster, 1986; Dodge & Frame, 1982; Hymel, 1986; Hymel et al., 1990). In the academic domain, peers engage in numerous interactions

that, if correlated with academic reputations, may account for the ability of academic reputations to predict changes in self-concept, effort, and performance. Three forms of such interactions are achievement-related discourse, informal peer tutoring, and selective peer affiliations.

Altermatt and colleagues (2002) observed achievement-related discourse among peers even in kindergarten, 1st grade, and 2nd grade and found that some features of that discourse predicted changes in academic self-concepts. The null effects they found for direct peer criticism contrast with the significant effects we identified for negative academic reputations, but they could reflect the less evaluative nature of the early primary grade curriculum or the difficulty of using direct observations to measure low base rate phenomena such as direct criticism. Similarly, Sage and Kindermann (1999) observed patterns of teacher and peer approval and disapproval in response to students' active-on-task and off-task behavior. Students received higher rates of approval from peers than from teachers, and they received higher rates of disapproval from peers outside their informal peer group than from teachers. Theoretical accounts suggest that such evaluative feedback and selective reinforcement for academic efforts should predict changes in self-concept and task engagement (Eccles et al., 1998; Harter, 1998). It is possible that academic reputations are correlated with such patterns of evaluative feedback and reinforcement provided by classmates, thus accounting for some of the predictive validity of those reputations.

In addition, peers may engage in informal peer tutoring experiences as students seek help from classmates whom they regard as highly skilled. There is evidence that providing peer tutoring can promote academic skills (Greenwood et al., 1990): So, to the extent that peers' decisions about whom to approach (or avoid) for such tutoring is indexed by PARs, this could contribute to the link between such reputations and changes in performance. Finally, children select friendships and informal peer groups partly on the basis of academic skills (Kandel, 1978), and these informal peer groups tend to become more similar over time with respect to academic engagement and motivation (Kindermann, 1993; Ryan, 2001). To the extent that the selection of friends and informal peer groups is associated with perceptions of classmates' academic skills, then academic reputations may contribute uniquely to the prediction of changes in motivation and engagement.

Contrary to expectations, mediation models provided little evidence that changes in effort were mediated by changes in self-concept, or that changes in grades were mediated by changes in self-concept or effort. We expected to find these mediated pathways because of past theoretical and empirical research suggesting that competence beliefs affect choices about task engagement (Eccles et al., 1998), that academic self-concept predicts changes in academic performance (Marsh & Craven, 2006), and that academic effort leads to improved performance over time (DiPerna & Elliott, 1999). One possibility is that an alternative mediator, such as a child's interest in or enjoyment of schoolwork as suggested by expectancy-value theory (Eccles et al., 1998), would have produced stronger effects. Limited time for classroom surveys precluded inclusion of a measure of interest in academic work in the first four waves of data collection, but a scale was added in subsequent assessments and future reports will examine whether it mediates ongoing associations between academic reputations and effort. It is also possible that mediation processes occur over short time frames or on an ongoing basis, so that assessments spaced 6 months apart are unable to detect them.

We found no evidence for significant sex differences in the links between PAR and students' academic self-concept, effort, or performance. In our prior report (Gest et al., 2005), academic reputations were significant predictors of changes in teacher-rated effort for both boys and girls, but the effect was stronger for boys. The absence of similar effects in the current models suggests that those sex differences did not extend across the subsequent four assessments. This is consistent with the absence of systematic sex differences in the broader literature describing links between achievement and academic self-concept. It is important to test for sex differences, however, because they exist in other closely related domains, as in the stronger link between achievement patterns and internalizing distress for girls (e.g., Kellam, Rebok, Mayer, Ialongo, & Kalonder, 1994; Pomerantz, Altermatt, & Saxon, 2002).

This study has several strengths that contribute to the literature on peer relations and academic functioning in

middle childhood. The longitudinal design with high participation rates across 3 school years allowed us to examine bidirectional processes within and across school years, including analyses of the antecedents of change in academic reputations. Method variance can be ruled out as a cause of key associations because the major constructs were assessed with independent methods: self-report for self-concept, peer nominations for academic reputation, teacher ratings of academic effort, and report card grades of academic performance. Finally, longitudinal attrition was limited and the maximum likelihood estimation procedures provided efficient and unbiased estimates based on all of the observed data (Wothke, 2000).

This study also has several limitations. Differences in the wording of the specific items on the PAR and teacher rating scales preclude a definitive conclusion that peers possess unique knowledge that teachers lack: An alternative explanation for the unique variance of the two measures is that they capture slightly different facets of academic functioning. To test whether peers have unique knowledge, one should ensure that the wording of items for the peer and teacher measures are identical. The rural, racially homogenous community setting of this sample limits the generalizability of results, but many U.S. youth reside in similar communities (e.g., one third of all U.S. children attend school in a small town or rural area; Johnson & Strange, 2007). Nonetheless, the meaning of academic reputations likely varies across school contexts. Among older children attending high-risk urban schools, for example, academic achievement may not be viewed positively by most students (Luthar & McMahan, 1996) and thus may have different relationships with self-concept, effort, and academic performance.

Several lines of research could begin to clarify the nature of PARs and whether they are best considered as marker variables or as part of a causal process. The emergence and meaning of children's academic reputations would be clarified by developmental studies examining the validity and correlates of academic reputations among younger children, by using a larger pool of items to determine whether distinct academic reputations in different subject areas can be identified (Ashley & Perry, 2003), and by observational studies examining how peer discourse and interaction in learning situations relate to academic reputations (Altermatt et al., 2002). Observational studies would be useful in clarifying the particular ways in which peer nominations capture facets of academic adaptation that differ from teacher ratings or grades and in identifying the particular patterns of interactions (e.g., evaluative feedback, peer tutoring, selective affiliation) that may be correlated with academic reputations. It is also worth exploring other processes that may account for the association between PARs and changes in academic effort and performance: Changes in academic interests are one plausible process. Across these different lines of work, it may be useful to identify youth whose academic reputations are discrepant with other indicators of achievement to clarify the unique features of peer reputations. Another alternative would be to clarify causal processes by conducting experimental-lab studies in which the PARs of hypothetical peers can be manipulated.

More broadly, research on PARs should be integrated with research on processes by which peers may influence each other's academic progress. It is important to clarify how general patterns of peer interaction (Altermatt et al., 2002) and overall peer reputations (present findings) may relate to dynamics at the level of friendships or informal peer groups (Altermatt & Pomerantz, 2003; Kindermann, 1993; Ryan, 2001; Sage & Kindermann, 1999). For instance, if a child has an above-average academic reputation but is lower achieving than her closest friends, which frame of reference does she use when making social comparisons that may influence her own self-concept? Determining the processes by which academic reputations emerge and change over the course of development and relate to other aspects of peer experiences will lead to a more complete understanding of the social context of children's school adjustment and performance.

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