

The Development of Competence-Related and Motivational Beliefs: An Investigation of Similarity and Influence Among Friends

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This research examined the degree to which children's achievement-related beliefs could be predicted from their friends' beliefs, both concurrently and over time. For 3 semesters, 4th-, 5th-, and 6th-grade students ($N = 929$) completed measures of their competence-related beliefs, motivational beliefs, and friendship choices. Concurrent analyses indicated that friends showed consistent, albeit modest, similarities with regard to their self-perceptions of competence, academic standards, importance of meeting standards, and preference for challenge. During the academic year, friends appeared influential with regard to children's ability attributions for success and the importance they placed on meeting academic standards. Over a grade-level transition, friends appeared influential with regard to children's ability attributions for failure. Overall, associations were stronger among reciprocated than among unilateral friends.

Research suggests that only 25% of the variability in children's achievement outcomes can be accounted for by their scores on tests of intelligence (Neisser et al., 1996). A likely source of some of the additional variability is the specific achievement-related beliefs that children bring to the learning context: How talented am I in science? Am I a poor reader because I'm not trying hard enough, or am I just not very smart? How well do I want to perform in math and how hard will I strive to meet this standard? Indeed, considerable empirical evidence exists to support the claim that children's beliefs about their intellectual competencies and views about the importance of school success have a powerful impact on their academic behaviors and outcomes (see Eccles, Wigfield, & Schiefele, 1998, for a review).

In exploring the development of children's achievement-related beliefs, researchers have begun to focus on how these beliefs are socialized by the significant others in children's lives. Much of this research has been directed toward parents and teachers as the key socializers (e.g., Eccles Parsons, Kaczala, & Meece, 1982; Frome & Eccles, 1998; Grolnick & Ryan, 1989; Skinner & Belmont, 1993), while neglecting the role that peers may serve in influenc-

ing children's beliefs (see Eccles et al., 1998). This lack of attention is surprising given that the amount of time children spend with peers increases dramatically once they begin school (e.g., Ellis, Rogoff, & Cromer, 1981) and may account for more time than that spent with parents, siblings, or other agents of socialization as children approach adolescence (e.g., Larson & Richards, 1991; Medrich, Rosen, Rubin, & Buckley, 1982). Peers have, moreover, been recognized as an important source of influence in other domains, including adolescent delinquency and drug use (e.g., Kandel, 1973; Vitaro, Tremblay, Kerr, Pagani, & Bukowski, 1997).

The purpose of the present study was to address this gap in the achievement socialization literature. Our central goal was to examine the degree to which children and their friends hold concordant achievement-related beliefs and the extent to which these similarities can be explained by friends' apparent influence on children's beliefs over time. We examined these relations for both reciprocated and unilateral friendship dyads over the course of three semesters. Our focus was on two classes of psychological constructs that have been identified as important predictors of children's academic behaviors and school success (see Eccles et al., 1998).

First, we examined similarity and influence among friends with regard to children's *competence-related beliefs*—that is, beliefs related to the question, Can I do this task? Within this category, we were particularly concerned with children's evaluations of their intellectual abilities, both generally (e.g., Am I good at math?) and in the context of personal success and failure (e.g., Did I fail my math test because I'm not smart?). Prior research has shown that children who view themselves as intellectually competent (e.g., Frome & Eccles, 1998; Harter, 1982; Phillips, 1984; Pokay & Blumenfeld, 1990) and who attribute their successes, but not their failures, to ability (e.g., Ames, 1978; Berndt & Miller, 1990; Diener & Dweck, 1978, 1980; Stipek & Gralinski, 1991) tend to perform well academically and to remain engaged in academic tasks, even in the context of failure. When examining children's attributional styles, we chose to focus on children's ability attributions, given that these attributions have received considerable

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attention in a variety of models of achievement motivation. Moreover, research based on these models provides clear and fairly consistent evidence that ability attributions for success are adaptive, whereas ability attributions for failure are maladaptive (e.g., Dweck & Leggett, 1988; Eccles et al., 1998; Weiner, 1985). Although research has also focused on the implications for children of attributing their successes and failures to other factors (especially effort), the consequences of making these alternative attributions are not entirely clear (see Berndt & Miller, 1990; Eccles et al., 1998; Eccles Parsons et al., 1982; Stipek & Gralinski, 1991).

Although competence-related beliefs are thought to play a fundamental role in motivating students' academic behavior (e.g., Frome & Eccles, 1998; Harter, 1982; Phillips, 1984), researchers have suggested that they are not sufficient to ensure school success: Even if a child feels confident in her ability to succeed at a given academic task, she may decide that she does not want to pursue it (Eccles et al., 1998; Harter, 1981). In keeping with the notion that children's decisions about whether to become engaged in academic tasks are important predictors of success in the academic context, our second aim was to investigate friends' similarity and influence with regard to children's *motivational beliefs*—that is, beliefs related to the question, Do I want to do this task and why? Within this category, we focused on the academic standards that children set for themselves, their beliefs regarding the importance of meeting these standards, and their self-reported preferences for challenging academic work. Like positive competence-related beliefs, positive motivational beliefs have been associated with desirable achievement outcomes. Specifically, children who set and strive to meet challenging academic standards and who view school as important tend to implement effective learning strategies and to set high expectations for future success (e.g., Eccles Parsons, Adler, & Meece, 1984; Harter, 1981; Meece, Wigfield, & Eccles, 1990; Phillips, 1984; Pintrich & de Groot, 1990; Pokay & Blumenfeld, 1990; Ryan, 2001).

Similarity Among Friends

Interest in the degree to which friends are similar has yielded a plethora of research. This research has generally focused on demographic variables such as children's gender, ethnicity, and religion (e.g., Hamm, 2000; Kandel, 1978b; Tuma & Hallinan, 1979) and on behavioral indices, including children's engagement in aggressive and prosocial behaviors (e.g., Haselager, Hartup, van Lieshout, & Riksen-Walraven, 1998; Kupersmidt, DeRosier, & Patterson, 1995) and adolescents' use of alcohol, drugs, and cigarettes (e.g., Fisher & Bauman, 1988; Hamm, 2000; Kandel, 1978a). With regard to these constructs, friends generally appear more similar than nonfriends.

Although there is considerable evidence to suggest that similarities in attitudes, ideals, and values are associated with interpersonal attraction among adults (e.g., Byrne & Nelson, 1965), the degree to which children's friendships are characterized by concordances on these types of abstract, psychological characteristics has received relatively little attention. Still, evidence is beginning to emerge that children's friendships are based, in part, on psychological similarity. In one recent study, Haselager et al. (1998) reported small to moderate associations between friends on measures of shyness and depression. In another, Kurdek and Krile (1982) reported moderate to strong correlations between reciprocated friends on measures of interpersonal understanding and self-perceptions of social competence.

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Similar evidence for friends' psychological similarity has not yet been established in the academic domain. Although a host of studies have documented moderate correlations between friends on measures of achievement outcomes such as report card grades and standardized test scores (e.g., Berndt & Keefe, 1995; Kandel, 1978b; see Ide, Parkerson, Haertel, & Walberg, 1981, for a review) and at least one has examined concordances between close friends on a behavioral measure of classroom involvement and disruption (Berndt & Keefe, 1995), very little research has examined similarities among close friends with regard to achievement-related beliefs. The exceptions to this general rule are studies that have reported moderate correlations between friends on educational and occupational aspirations (e.g., Haller & Butterworth, 1960; Hallinan & Williams, 1990; Hanks & Eckland, 1976; Kandel, 1978a; see Ide et al., 1981, for a review). Although important, research that has examined concordances between friends with regard to aspirations is limited in its focus on a single achievement belief. Moreover, this research has almost exclusively relied on high school samples.

Influence Among Friends

Although establishing the degree to which friendships are characterized by psychological similarity is important in its own right, the practice of examining similarities among friends has been undertaken, in large part, to support claims that peers are influential agents of socialization. This practice has, however, received considerable criticism, as concurrent measures of similarity fail to distinguish between the processes of *selection* (i.e., individuals who are similar in certain attributes purposefully select each other as friends) and those of *influence* (i.e., individuals are socialized by their friends, thereby becoming more similar to them; see Ennett & Bauman, 1994). Concretely, friends may be similar not because they have influenced each other but because their friendships were formed on the basis of attraction due to similarity in the first place (Cohen, 1983; Epstein, 1983; Hallinan, 1983; Kandel, 1978a). In an attempt to sort out the relative weight of the processes of selection and influence in explaining similarity among friends, most recent work on peer socialization has turned to short-term longitudinal analyses. In general, this methodology has relied on regression analyses to predict changes in children's attitudes and behavior over time from the initial characteristics of children's friends (Kindermann, McCollam, & Gibson, 1996).

To date, only a handful of studies have examined peer influence in the academic domain. Results are promising, however, and suggest that friends not only perform in similar ways academically but that changes in children's academic outcomes (e.g., report card grades, standardized test scores) and educational aspirations can be predicted from those of friends and peer group members (e.g., Epstein, 1983; Kandel, 1978a). Recent research has extended these findings to behavioral indices of achievement motivation, specifically children's classroom involvement and disruption. In a study of fourth- and fifth-grade students, Kindermann (1993) reported that changes in a child's classroom involvement (e.g., diligent attention to academic tasks) at the end of the school year could be predicted from the average classroom involvement of the members of the clique to which the student belonged at the beginning of the school year. Similar results are reported by Berndt and Keefe

(1995) for seventh- and eighth-grade students. Specifically, children who perceived their group of friends to be involved (e.g., frequently participating in class discussions) and nondisruptive (e.g., infrequently misbehaving in class) at the beginning of the year became more involved and less disruptive themselves over the course of the academic year.

Whether friends play a similar role in influencing changes in children's achievement-related beliefs remains unclear. To date, research has examined only a few achievement-related beliefs and has yielded a complex set of results. In one study, Ryan (2001) predicted seventh graders' motivational beliefs in the spring from those of their selected peer group (i.e., their clique) in the fall. Changes in children's liking and enjoyment of school were positively related to peer group members' beliefs earlier in the academic year. Peer group beliefs were not, however, found to significantly predict changes in the extent to which children viewed school as useful (i.e., as having utility value) and appeared only marginally influential with regard to children's expectations for academic success. In another study, Berndt, Hawkins, and Jiao (1999) found that although adolescents' evaluations of their cognitive competence in the spring could be predicted from friends' perceptions in the fall, the relation was negative: Children who selected friends who felt confident in their academic capabilities early in the school year came to feel relatively less competent by year's end.

Although these studies offer insight into friends' influence, the number of beliefs so far investigated is quite limited. Moreover, findings have been both inconsistent (i.e., influence has been demonstrated for some variables but not for others) and potentially paradoxical (i.e., with some initial evidence that students may become less similar to their friends over time). Together, these results suggest that a good deal remains to be learned about friends' influence on children's achievement-related beliefs.

Children's Friendships

An important issue of discussion among peer socialization researchers is how children's friendships are best measured and whether children's friends or the larger peer group are likely to exert the most influence (see Rubin, Bukowski, & Parker, 1998). In reviewing this literature, Sage and Kindermann (1999) suggested that although the peer group has been shown to influence academic behaviors that are readily observable by classmates (e.g., children's engagement in classroom activities), the intimate nature of children's friendships renders them especially powerful socialization contexts for children's private achievement beliefs. Given that many of the achievement-related beliefs examined in the present study are both private (e.g., tapping children's personal perceptions of their abilities and standards for academic success) and sensitive (e.g., assessing children's reactions to school failures), we chose to investigate similarity and influence among close friends. We were especially interested in examining shared beliefs between children and their very best friends, paying particular attention to whether these friendships were reciprocated (i.e., nominations were mutual) or unilateral (i.e., nominations were nonreciprocated). This approach allowed us to explore the possibility that reciprocated friendships would yield stronger indices of similarity and influence because of the heightened levels of intimacy and trust that have been found to characterize this relationship (Hartup & Stevens, 1997; Newcomb & Bagwell, 1995). Stronger

associations among reciprocated than among unilateral friends would also offer some insight into the mechanisms of friends' influence, suggesting that the heightened levels of intimate discussion, information exchange, and advice-giving that characterize these relationships may play a prominent role.

The Role of Temporal Context

An important task confronting achievement socialization researchers is to document not only whether parents, teachers, and peers influence children's school attitudes and outcomes but to explore how changing social contexts impact the socialization process (see Eccles, Midgley, & Adler, 1984; Higgins & Parsons, 1983, for reviews). To date, most peer socialization research has focused on friend and peer group influences during the course of a single academic year. This approach is logistically simpler than examining influence as children move from one grade level to the next. In addition, it might be expected to yield stronger indices of influence, as children's friendships are less likely to be disrupted by changing classroom assignments (Neckerman, 1996) and the mechanisms of influence (e.g., modeling, discussion, shared experiences) remain uninterrupted by an intervening summer break. In the only other study to examine friends' influence across a grade-level transition, Berndt et al. (1999) provided support for the relative strength of friends' influence during the academic year as compared with the strength over the course of a transition. Specifically, although changes in children's perceptions of social and cognitive competence at the end of the school year were predicted by friends' perceptions at the beginning of the year, neither set of findings was replicated over a grade-level transition (i.e., from the spring of students' sixth-grade year to the fall of their seventh-grade year). We expected that similar findings would emerge in the present study. At the same time, the opposite prediction also seems plausible. Specifically, because children's beliefs are likely to be less stable over the course of a grade-level transition than during the course of a single academic year, there may be greater opportunity for friends to play a role in influencing the direction of the change during the transition time period.

Overview of the Present Research

Recent research suggests a growing interest in examining peers as socializers of children's achievement attitudes, behaviors, and outcomes. Despite new evidence that friends are both similar and influential with regard to children's academic behaviors and beliefs, there are still significant gaps in our knowledge. The present research examined friends' similarity and influence in the academic domain among a large sample ($N = 929$) of fourth-, fifth-, and sixth-grade students and, in so doing, extended prior research in three key ways.

First, the present study investigated both similarity and influence among close friends with regard to children's academic performance and a number of important competence-related beliefs (i.e., ability attributions for success and failure) and motivational beliefs (i.e., level of standards, importance of meeting standards, and preference for challenge) that have not been previously examined. Although friends' influence on children's self-perceptions of competence has been investigated in a prior study (see Berndt et al., 1999), the small sample size utilized and unanticipated findings (i.e., indicating potential dissimilarity over

time) suggest that replication of these results is needed. We were especially interested in examining competence-related and motivational beliefs given their prominence in a variety of theories of achievement motivation (e.g., Deci & Ryan, 1985; Weiner, 1985; Zimmerman, 1989; see Eccles et al., 1998, for a review) and, also, given that previous research provides clear evidence of their impact in influencing children's achievement outcomes (e.g., Frome & Eccles, 1998; Harter, 1981; Pokay & Blumenfeld, 1990; Stipek & Gralinski, 1991). Second, the present research examined whether indices of similarity and influence differ for reciprocated and unilateral friendship dyads. We anticipated that associations would be stronger among reciprocated than unilateral dyads, in part because of the heightened levels of intimacy and trust that characterize this relationship (Newcomb & Bagwell, 1995; Saxon, 1996). Third, the present study investigated associations between children's academic performance and beliefs and friends' academic performance and beliefs at different points during the academic year. This approach is important in determining whether indices of similarity and influence are stable and replicable across time and in determining whether changes in children's characteristics are better predicted by friends' characteristics during the course of a single academic year or over a grade-level transition.

Method

Participants

The data used in the present study were collected as part of the University of Illinois Self-Evaluation Project, a research program aimed at examining the development of children's achievement-related beliefs (see Pomerantz & Saxon, 2001; Pomerantz, Saxon, & Oishi, 2000). Participants were 929 children (463 boys, 466 girls) in the fourth ($n = 270$; mean age = 9.25 years), fifth ($n = 449$; mean age = 10.25 years), and sixth ($n = 210$; mean age = 11.25 years) grades.¹ The majority of participants were European American (95%), but the sample also included African Americans (4%) and other minorities (1%). Approximately 20% of the sample participated in free- or reduced-lunch programs. All students attended one of two school districts in the Midwest. Within these school districts, nine schools representing 58 classrooms participated. Letters describing the study were sent home to parents. Parents were asked to contact the school or investigators if they did not want their children to participate. Only 4% of parents did not permit their children to participate.

Procedure

Children participated in three waves of data collection approximately 6 months apart. The attrition rate was 11% (primarily because of children moving out of the school district), yielding the sample described previously. The first wave took place during the spring (Wave 1), the second wave took place during the following fall (Wave 2), and the third wave took place during the following spring (Wave 3). Hence, by the second wave, the fourth graders (fourth-grade cohort) were in fifth grade, the fifth graders (fifth-grade cohort) were in sixth grade, and the sixth graders (sixth-grade cohort) were in seventh grade. Children remained in these same grades during the third wave. In addition to the grade-level transition that all children experienced after the first wave of data collection, children in the sixth-grade cohort made a school transition (i.e., from elementary to middle school) at this time. Seventy-one percent of fourth graders also made a school transition at this time.² At each wave, children took part in two 45-min classroom sessions during which questionnaires were administered. A trained research assistant read each item to children who marked their responses on their own.

Measures

Table 1 provides an overview of the measures, including the number of items, the potential range, the internal reliability, and the stability over the three waves. Means and standard deviations for each of the measures are presented in Table 2. Bivariate correlations between the measures are presented in Table 3.

Academic Performance

Children's report card grades were obtained in six academic subject areas (English, math, reading, science, social studies, and spelling).³ Letter grades were converted to numerical values, ranging from 0 (F) to 12 (A+). The mean of the grades in the six subjects across the two academic quarters overlapping with each wave was used as an index of academic performance for each wave.

Achievement-Related Beliefs

Competence-Related Beliefs

Self-perceptions of competence. Self-perceptions of competence were assessed following Wigfield, Eccles, Mac Iver, Reuman, and Midgley (1991). Children rated how skilled they were in each of the six subjects for which they received grades (e.g., "How good at reading are you?") and their relative position in their class (e.g., "If you were to rank all of the students in your class from the worst to the best in reading, where would you put yourself?"). The mean of the two items across the six subjects was used, with higher numbers indicating more positive perceptions.

Ability attributions for success and failure. Following past research (e.g., Eccles Parsons et al., 1984; Eccles Parsons, Meece, Adler, & Kaczala, 1982; Pomerantz & Saxon, 2001), children were asked to imagine that they experienced an academic success (i.e., did well in school) or failure (i.e., did poorly in school). Children were provided with four possible causes for their imagined performance: ability (e.g., "You are smart"), effort (e.g., "You tried very hard"), luck (e.g., "You were lucky"), and task (e.g., "The work was easy"). Children indicated the first, second, and third best reason for their performance. The ranks were reverse scored so that higher numbers indicated that children were more likely to choose an ability attribution for their performance relative to other attributions.

¹ Only students who completed questionnaires at all three waves were included in the analyses. Three additional children were excluded because, although they completed most of the questionnaire measures at each of the three waves, they failed to complete the friendship assessment measures at any of the three waves.

² To determine whether indices of similarity and influence differed for children who experienced a school transition from those who experienced only a grade-level transition, "school transition" was entered as a dummy variable in our concurrent and longitudinal analyses, and interactions between school transition and friends' characteristics in predicting children's characteristics were examined. Cohort (and its interaction with friends' characteristics) was entered as a control variable in these analyses to ensure that any differences were not due to children's grade level. Few significant interactions emerged. Moreover, the direction of the effects was inconsistent. Future work will be important in examining the effects of school transitions versus grade-level transitions on friends' similarity and influence.

³ At Waves 2 and 3, children in the sixth-grade cohort received grades in four academic subjects only (English, math, science, and social studies). For these children, report card grades and self-perceptions of competence are based on 8 rather than 12 items. In addition, level and importance of standards are based on 4 rather than 6 items.

Table 1
Measure Characteristics

Variable	Number of items	Potential range	Internal reliability			Stability over time**		
			Spring (W1)	Fall (W2)	Spring (W3)	W1 to W2	W2 to W3	W1 to W3
Academic performance								
Report card grades	12	0–12	.95	.95	.95	.82	.92	.78
Competence-related beliefs								
Self-perceptions of competence	12	1–7	.88	.89	.90	.70	.76	.63
Ability attributions for success	1	1–4				.43	.54	.39
Ability attributions for failure	1	1–4				.37	.43	.25
Motivational beliefs								
Level of standards	6	0–9	.87	.92	.91	.70	.71	.62
Importance of meeting standards	6	1–7	.85	.89	.91	.57	.65	.51
Preference for challenge	5	1–4	.79	.79	.77	.57	.62	.47

Note. W = wave.

** $p < .01$.

Motivational Beliefs

Level of standards. A scale measuring the level of children's standards for academic performance was developed for this and related studies (see Nicholls, 1975; Phillips, 1984, for similar, single-item measures). Specifically, children were asked to indicate the grade they deemed to be personally acceptable in each of the subjects for which they received grades (e.g., "What is the lowest grade that would be OK for you to get in reading?"). Letter grades were converted to numerical values, ranging from 0 (D) to 9 (A+). The mean of children's standards across the six subject areas was computed, with higher numbers indicating a higher level of standards. In addition to being face valid, this measure is internally reliable ($\alpha > .87$; see Table 1), stable over time ($r_s > .62$, $p_s < .01$; see Table 1), and is related in predictable ways to children's academic performance and achievement-related beliefs (see Table 3).

Importance of meeting standards. A scale measuring the importance children assigned to meeting academic standards was developed for the purpose of this and related studies. Specifically, after children were asked to indicate the grade they deemed to be personally acceptable in each of the six subjects for which they received grades, they were asked to indicate how important it was to obtain that grade (e.g., "How important is it to you to get a grade at least this high in reading?"). The mean of children's responses across the six subject areas was used, with higher numbers indicating greater importance. In addition to being face valid, this measure is internally reliable ($\alpha > .85$; see Table 1), reasonably stable over time ($r_s > .51$, $p_s < .01$; see Table 1), and has been shown to be predictive of children's level of depression, anxiety, and self-esteem (Pomerantz et al., 2000; see also Table 3).

Preference for challenge. Preference for difficult over easy academic work was assessed with five of the six items of the Preference for Challenge Subscale of Harter's (1981) Intrinsic Orientation in the Classroom Scale. Children were presented with descriptions of two types of children differing in the type of academic work they prefer (e.g., "Some kids would rather just learn what they have to in school, but other kids would rather learn about as much as they can"). Children decided which they were more like and indicated if the given statement was *really* or *sort of* true for them. The mean of the five items was used, with higher numbers indicating greater preference for challenge.

Friendship Assessment

To gather information on children's friendships, we gave children a class roster and asked them to circle the names of their three "best friends."⁴ Children were instructed that they could circle fewer than three names but not more. From this list, children were asked to select their single, very best

friend. The percentage of children selecting a very best friend varied from 74% to 92% across the three waves of data collection. Two subsets of children who selected a very best friend were identified. A child was deemed to have a *reciprocated* very best friendship if his or her nominated very best friend also selected the child as a very best friend. Otherwise, the child's self-reported very best friendship was determined to be *unilateral* (i.e., nonreciprocated). The percentage of children whose very best friendship was reciprocated varied from 38% to 42% across the three waves of data collection. Children's scores on each of the academic outcome and achievement-related belief measures were matched to those of their single, very best friend. It is important to note that these analyses were also conducted by matching children with their very best friend using a less stringent criterion for reciprocation (i.e., a child's selected very best friend nominated the child as one of his or her three best friends) and by matching children with their three best friends. The results obtained from these analyses were, in general, similar to or weaker than those reported here. Because the percentage of children selecting a very best friend differed from wave to wave, the final sample for all analyses using friendship data ranged from 678 (285 reciprocated, 393 unilateral) to 851 (359 reciprocated, 492 unilateral) across the three waves of data collection. The sample for each analysis varies somewhat because children or friends sometimes failed to complete the majority of items for one of the measures included in the analysis.

⁴ At Waves 2 and 3, children in the sixth-grade cohort met with different teachers and classmates for each subject area. For these students, friendship nominations were limited to children's English classrooms. One concern with this procedure is that similarity and influence may be attenuated among seventh-grade students because they are forced to select friends from a subset of students that may not include their closest friends. This does not appear to be the case, however. Specifically, estimates of similarity and influence generally decreased rather than increased when seventh-grade students were excluded from the analyses. A second possible consequence of this procedure is that it may produce heightened estimates of similarity and influence among older students because of the greater homogeneity in student performance and achievement-related beliefs among seventh graders because of tracking. Again, however, this does not appear to be the case. Specifically, at Waves 2 and 3, standard deviations for academic performance and achievement beliefs did not differ significantly in seventh-grade classrooms from those obtained in fifth- and sixth-grade classrooms.

Table 2
Means and Standard Deviations

Variable	Spring (W1)		Fall (W2)		Spring (W3)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Academic performance						
Report card grades	7.85	2.31	7.90	2.52	7.79	2.58
Competence-related beliefs						
Self-perceptions of competence	5.06	1.00	5.14	1.03	5.17	1.06
Ability attributions for success	2.88	1.09	3.07	1.08	3.22	1.08
Ability attributions for failure	1.44	0.84	1.48	0.85	1.53	0.89
Motivational beliefs						
Level of standards	4.74	1.72	4.51	1.88	4.43	1.94
Importance of meeting standards	5.79	1.18	5.75	1.19	5.61	1.33
Preference for challenge	2.62	0.76	2.61	0.72	2.58	0.69

Note. W = wave.

Results

Two sets of central analyses were conducted. In the first set, we examined concurrent relations between children's academic performance, competence-related beliefs, and motivational beliefs and those of their very best friends. In the second set, we examined these relations longitudinally to determine whether children's performance and beliefs were predicted by friends' performance and beliefs over time. In describing the results of both sets of analyses, we highlight instances in which the findings varied by friendship type. In addition to these central analyses, two sets of supplementary analyses were conducted to explore alternative explanations for the findings obtained in our central analyses.

Central Analyses

Examining Similarities Among Friends

A series of hierarchical regression analyses was conducted to determine whether children and their very best friends performed similarly in school and held concordant achievement-related beliefs. Each academic outcome or achievement-related belief variable (e.g., children's standards at Wave 1) was entered as the dependent variable in a separate analysis. At Step 1, friends' characteristics at the same wave (e.g., friends' standards at Wave

1) were entered. If, at this step, the analyses reveal that friends' characteristics are a significant predictor of children's characteristics, it suggests that friends are similar with regard to their academic outcomes or achievement-related beliefs. The standardized beta coefficients from this step of our analyses are presented in Table 4.

To determine whether relations between children's characteristics and friends' characteristics differ by friendship type, a dummy variable representing friendship type (i.e., reciprocated versus unilateral) was entered at the second step in each analysis. At the third step, a term that reflected the interaction of friendship type and friends' characteristics was entered. If significant, the interaction term suggests that the degree of friends' similarity differs by friendship type. In such cases, correlation coefficients were calculated and are reported separately for reciprocated and unilateral friends.

Academic Performance

As demonstrated in prior research, children and their very best friends were similar with regard to their report card grades. Associations were significant at all three waves of data collection, β s = .27 to .34, $t(671-729) > 7.30$, $ps < .01$. A significant friendship type interaction emerged at the fall (Wave 2) time period, $\beta = .10$,

Table 3
Correlations Between Academic Performance, Competence-Related Beliefs, and Motivational Beliefs

Variable**	1	2	3	4	5	6	7
Academic performance							
1. Report card grades	—						
Competence-related beliefs							
2. Self-perceptions of competence	.60	—					
3. Ability attributions for success	.43	.53	—				
4. Ability attributions for failure	-.23	-.31	-.29	—			
Motivational beliefs							
5. Level of standards	.48	.57	.34	-.16	—		
6. Importance of meeting standards	.20	.41	.20	-.14	.29	—	
7. Preference for challenge	.30	.43	.34	-.16	.33	.20	—

Note. Values presented are correlations and *p* values averaged across the three waves of data collection.

***p* < .01.

Table 4
Predicting Children's Academic Performance and Achievement-Related Beliefs From Their Friends' Performance and Beliefs at the Same Wave

Variable	Spring (W1)	Fall (W2)	Spring (W3)
Academic performance			
Report card grades	.27**	.34*** ^a	.34**
Competence-related beliefs			
Self-perceptions of competence	.22*** ^a	.18*** ^b	.18**
Ability attributions for success	.20*** ^a	.06†	.07†
Ability attributions for failure	.03	.12**	.10**
Motivational beliefs			
Level of standards	.16**	.18*** ^a	.18**
Importance of meeting standards	.07* ^a	.05 ^b	.11*** ^a
Preference for challenge	.14*** ^a	.13*** ^a	.13**

Note. Values represent the standardized regression coefficients from hierarchical regression analyses predicting children's characteristics from friends' characteristics at the same wave (W).

^a Denotes a significant ($p < .05$) interaction between friends' characteristics and friendship type in predicting children's characteristics. ^b Denotes a marginal ($p < .10$) interaction between friends' characteristics and friendship type in predicting children's characteristics. Where significant or marginal interactions emerge, reciprocated friends appear more similar than unilateral friends.

† $p < .10$. * $p < .05$. ** $p < .01$.

$t(727) = 2.26, p < .05$. Follow-up analyses indicated that reciprocated friends were more similar with regard to their report card grades ($r = .46, p < .01$) than were unilateral friends ($r = .27, p < .01$).

Competence-Related Beliefs

Among the competence-related beliefs, very best friends were most similar with regard to their self-perceptions of competence. Associations were significant across all three waves of data collection, $\beta_s = .18$ to $.22, ts(593-823) > 4.50, ps < .01$. At the spring (Wave 1) semester, a significant friendship type interaction emerged, $\beta = .14, t(821) = 3.02, p < .01$. Follow-up analyses indicated stronger associations for reciprocated ($r = .34, p < .01$) than for unilateral ($r = .13, p < .01$) friends. A marginal effect in the same direction emerged during the fall (Wave 2) semester, $\beta = .08, t(654) = 1.68, p < .10$. This interaction again indicated a tendency for reciprocated friends to be more similar with regard to their self-perceptions of competence ($r = .27, p < .01$) than unilateral friends ($r = .13, p < .01$).

Friends appeared only modestly similar in the degree to which they attributed their successes and failures to their intellectual competencies. For success attributions, a significant association emerged only at the spring (Wave 1) semester, $\beta = .20, t(829) = 5.89, p < .01$. For failure attributions, associations were significant but weak at both the fall (Wave 2) and spring (Wave 3) semesters, $\beta_s = .12$ and $.10, ts(666$ and $636) > 2.60, ps < .01$. Only one significant friendship type difference emerged, $\beta = .13, t(827) = 2.94, p < .01$. Specifically, reciprocated friends were significantly more similar ($r = .32, p < .01$) than unilateral friends ($r = .12, p < .01$) with regard to attributions for success to ability during the spring (Wave 1) semester.

Motivational Beliefs

Very best friends showed small to moderate similarities with regard to their motivational beliefs. Here, the strongest effects across the three waves of data collection emerged for the level of

standards construct, $\beta_s = .16$ to $.18, ts(595-825) > 4.30, ps < .01$. A significant friendship type interaction emerged at the fall (Wave 2) semester, $\beta = .10, t(652) = 2.06, p < .05$, indicating that reciprocated friends ($r = .28, p < .01$) were more similar with regard to the level of their academic standards than were unilateral friends ($r = .12, p < .01$).

Concordances between children and their friends in the importance they assigned to meeting their academic standards were significant but weak at both the Wave 1 and Wave 3 spring semesters, $\beta_s = .07$ and $.11, ts(825$ and $592) > 1.95, ps < .05$. These effects were, however, qualified by significant friendship type interactions, $\beta_s > .12, ts(823$ and $590) > 2.50, ps < .01$. In both cases, reciprocated friends appeared similar ($rs = .16$ and $.25, ps < .01$), whereas unilateral friends did not ($rs = -.01, ns$). A marginal friendship type interaction also emerged at the fall (Wave 2) semester, $\beta = .09, t(649) = 1.81, p < .10$. Again, there was a tendency for reciprocated ($r = .14, p < .05$) but not unilateral friends ($r = -.01, ns$) to appear similar.

Friends also appeared somewhat similar across the three waves in their preference for academic challenge, $\beta_s = .13$ to $.14, ts(602-816) > 3.20, ps < .01$. Qualifying these effects, however, were two significant friendship type interactions, $\beta_s > .11, ts(814$ and $600) > 2.40, ps < .01$. Specifically, at both the spring (Wave 1) and fall (Wave 2) semesters, reciprocated friends appeared similar in their preference for challenge ratings ($rs = .23$ and $.25, ps < .01$), whereas unilateral friends did not ($rs = .07$ and $.05, ns$).

Summary

Similarity coefficients were, in all cases, positive in valence and, in general, small to moderate in size. Consistent with prior work on friends' psychological similarity in the social domain (e.g., Kurdek & Krile, 1982), there was some tendency for stronger associations to appear among reciprocated than among unilateral very best friend dyads. All significant differences were, in fact, in this direction.

Examining Friends' Influence

Our second set of analyses was longitudinal and was designed to examine the degree to which friends appear to influence children's achievement-related beliefs. Specifically, a series of hierarchical multiple regression analyses was conducted to predict changes in students' academic performance and achievement-related beliefs from the performance and beliefs of children's friends at an earlier wave. Relations were assessed over three time periods: spring (Wave 1) to fall (Wave 2), fall (Wave 2) to spring (Wave 3), and spring (Wave 1) to spring (Wave 3). Although each of the first two time periods represents an approximately 6-month lag, the fall (Wave 2) to spring (Wave 3) interval examines influence as it occurs during a single academic year, whereas the spring (Wave 1) to fall (Wave 2) interval examines influence as it occurs across a grade-level transition (e.g., fourth graders became fifth graders). The spring (Wave 1) to spring (Wave 3) time period allowed us to investigate influence as it occurs over a relatively longer, 1-year time period that also included a grade-level transition.

Following Berndt and Keefe (1995), each academic outcome or achievement-related belief variable (e.g., children's standards at Wave 2) was entered as the dependent variable in a separate hierarchical regression analysis. At Step 1, children's characteristics at the earlier wave (e.g., children's standards at Wave 1) were entered. This step is important, given the stability of the measures over time (see Table 1), and ensures that significant findings reflect a relation between children's and friends' characteristics over time, rather than a simple, concurrent association. At Step 2, friends' characteristics at the earlier wave (e.g., friends' grades at Wave 1) were entered. If, at this step, the analyses reveal that friends' characteristics at the earlier wave are a significant predictor of children's characteristics at the later wave, it suggests that friends may play a role in influencing changes in children's academic outcomes or achievement beliefs over time. Table 5 presents the standardized beta coefficients from this second step of our analyses.

To test for friendship type differences in friends' influence, we entered a dummy variable representing friendship type at the third step in each analysis. At the fourth step, we entered a term that reflected the interaction of friendship type and friends' characteristics. If significant, the interaction term suggests that friends' influence varies by friendship type. To clarify these interactions, we ran separate regression analyses for reciprocated and unilateral friends (i.e., predicting children's characteristics from friends' characteristics, controlling for children's earlier characteristics). The results of these analyses are reported in the text.

Academic Performance

Consistent with prior work, friends appeared influential with regard to children's academic performance. At all three waves, changes in children's report card grades were predicted by the previous academic performance of their very best friend, $\beta_s = .04$ to $.06$, $t_s(694-728) > 2.10$, $p_s < .05$. At the fall (Wave 2) to spring (Wave 3) time period, this relation was qualified by a significant interaction between friends' academic performance and friendship type, $\beta = .04$, $t(726) = 1.95$, $p = .05$. To clarify this interaction, we conducted regression analyses separately for reciprocated and unilateral friends. These analyses revealed that, during the course of the academic year, changes in children's academic performance were significantly predicted by the prior academic performance of reciprocated, $\beta = .10$, $t(275) = 3.57$, $p < .01$, but not unilateral, $\beta = .02$, $t(449) = 0.88$, ns , friends.

Competence-Related Beliefs

During the course of the academic year, very best friends appeared influential with regard to children's ability attributions for success. Specifically, from fall (Wave 2) to spring (Wave 3), changes in children's attributions for success to ability were positively related to the attributional styles of friends at the earlier wave, $\beta = .13$, $t(649) = 3.91$, $p < .01$. Friends also appeared

Table 5
Predicting Children's Academic Performance and Achievement-Related Beliefs From Their Friends' Performance and Beliefs at an Earlier Wave

Variable	Within the academic year	Across a grade-level transition	
	Fall (W2) to Spring (W3)	Spring (W1) to Fall (W2)	Spring (W1) to Spring (W3)
Academic performance			
Report card grades	.04** ^a	.05*	.06**
Competence-related beliefs			
Self-perceptions of competence	.04†	.02	.03
Ability attributions for success	.13**	.02	.00
Ability attributions for failure	.03	.08**	.08** ^a
Motivational beliefs			
Level of standards	-.02	-.01	-.01
Importance of meeting standards	.06*	-.01	.03
Preference for challenge	.01	.05†	.06†

Note. Values represent the standardized regression coefficients from hierarchical regression analyses predicting children's characteristics at the later wave from friends' characteristics at the earlier wave (controlling for children's characteristics at the earlier wave). W = wave.

^a Denotes a significant ($p < .05$) interaction between friends' characteristics and friendship type in predicting children's characteristics such that reciprocated friends appear influential, whereas unilateral friends do not.

† $p < .10$. * $p < .05$. ** $p < .01$.

influential with regard to children's ability attributions for failure. Here, however, significant associations emerged only across the two time intervals during which children experienced a grade-level transition. Specifically, during both the spring (Wave 1) to fall (Wave 2) and spring (Wave 1) to spring (Wave 3) time intervals, changes in children's failure attributions to ability were predicted by the attributional style of their very best friend, $\beta_s = .08$, $t_s(767 \text{ and } 780) > 2.30$, $p_s < .05$. During the spring (Wave 1) to spring (Wave 3) time period, the association between friends' attributions and children's attributions was qualified by a significant friendship type interaction, $\beta = .09$, $t(778) = 1.94$, $p < .05$. Analyses conducted separately by friendship type revealed that changes in children's tendency to attribute failure to ability were predictable from the attributional styles of reciprocated, $\beta = .17$, $t(328) = 3.16$, $p < .01$, but not unilateral, $\beta = .02$, $t(449) = 0.41$, ns , friends.

More modest evidence was found for friends' influence on children's self-perceptions of competence. Specifically, during the course of a single academic year, changes in children's competence perceptions were marginally predicted by the competence perceptions of their very best friends, $\beta = .04$, $t(597) = 1.61$, $p < .10$.

Motivational Beliefs

Some modest evidence also emerged for friends' influence on children's motivational beliefs. During the course of the academic year, changes in children's ratings of the importance of meeting academic standards were significantly predicted by the earlier ratings given by their very best friends, $\beta = .06$, $t(592) = 1.99$, $p < .05$. In addition, during both the spring (Wave 1) to fall (Wave 2) and spring (Wave 1) to spring (Wave 3) transitions, friends appeared marginally influential with regard to children's preference for challenge ratings, $\beta_s > .05$, $t_s(724 \text{ and } 749) > 1.60$, $p_s < .10$. Friends did not appear to influence the level of academic standards that children set, $\beta_s < -.01$, $t_s(596-762) < 1$, ns . In addition, no significant friendship type interactions emerged for any of the motivational variables.

Summary

Across the three waves of data collection, friends appeared most influential with regard to children's report card grades. During the course of a single academic year, friends also appeared influential with regard to the degree to which children made ability attributions for their successes and the extent to which they deemed it important to meet academic standards. Over the course of both grade-level transition time periods, friends appeared influential with regard to children's ability attributions for failure. More modest evidence was found for friends' influence on children's self-perceptions of competence and preference for challenge. In both cases, findings reached only marginal levels of significance. Only two significant friendship type differences emerged. However, both were in the predicted direction, with reciprocated friends appearing more influential than unilateral friends.

Supplementary Analyses

Two sets of supplementary analyses were conducted to examine alternative explanations for the findings reported thus far. In the

first set, we predicted children's beliefs from those of randomly selected, nonfriend classmates. These analyses help to ensure that findings reflect interpersonal selection rather than classroom selection effects. In the second set, we revisited our longitudinal analyses to determine whether evidence for friends' influence may be stronger among stable (as compared with unstable) friendship dyads.

Classroom Selection Effects as an Explanation for Similarity and Influence

Because children were limited to selecting friends from their classrooms, there is some possibility that our findings could represent tracking or classroom-selection effects rather than interpersonal-selection effects. That is, children could appear to be similar to their friends or influenced by their friends simply because they are placed into classrooms where even nonfriend classmates tend to be of similar levels of ability and hold similar school-related attitudes. This is, in fact, a potential problem with the broader peer socialization literature, given that even when children are permitted to select friends from outside of their own classrooms, they are more likely than not to select classmates (Parker & Asher, 1993).

To test this possibility, we matched each child with a randomly selected nonfriend from that child's classroom. Across the three waves of data collection, only two significant concurrent effects emerged ($r = .10$ for level of standards at spring [Wave 1] and $r = -.08$ for ability attributions for success at fall [Wave 2]). This is no more than would be expected by chance. Moreover, one of the correlations was negative (i.e., suggesting dissimilarity). Similar results emerged from our longitudinal analyses with randomly selected nonfriends. Across the three time periods, only one significant effect emerged ($\beta = -.06$ for ability attributions for success from fall [Wave 2] to spring [Wave 3]). Again, this is no more than would be expected by chance. Moreover, the beta coefficient was negative (i.e., indicating that children become less similar to nonfriends over time).

Influence in Stable Versus Unstable Friendship Dyads

Researchers have often suggested that the stronger and longer lasting the relationship between children and their friends, the more likely friends are to exert an influence on children's beliefs and behaviors (e.g., Berndt et al., 1999; Epstein, 1983; but see Berndt & Keefe, 1995; Ryan, 2001; Urberg, Degirmencioglu, & Pilgrim, 1997). Given this, a possible reason for the rather weak findings regarding friends' influence is that evidence of influence is attenuated when children's friendships are not stable from wave to wave. In the present study, very best friendships were generally unstable over the Wave 1 to Wave 2 and Wave 1 to Wave 3 grade-level transition time periods, with only 10% of students retaining a very best friend (i.e., only 10% of students who nominated a very best friend at Wave 1 selected this same student as one of their three best friends at Wave 2 or Wave 3). In contrast, 77% of students' very best friendships were stable over the Wave 2 to Wave 3 time period, when no grade-level transition took place. To test the hypothesis that indices of influence would be strongest among stable friendship dyads, a set of regression analyses was conducted. Specifically, as in the analyses examining differences between reciprocated and unilateral friends, friendship stability

was entered as a dummy variable in our longitudinal analyses, and interactions between stability and friends' characteristics were examined. These analyses were conducted only during the fall (Wave 2) to spring (Wave 3) time period, as the small number of stable friendships over the spring (Wave 1) to fall (Wave 2) and spring (Wave 1) to spring (Wave 3) time periods ($n_s = 80$ and 56 , respectively) precluded meaningful interpretation of the results.

The results of these analyses suggest that friendship stability may, indeed, foster greater influence. Specifically, significant stability interactions emerged for report card grades, $\beta = .09$, $t(726) = 3.77$, $p < .01$, self-perceptions of competence, $\beta = .15$, $t(595) = 2.90$, $p < .01$, and ability attributions for success, $\beta = .13$, $t(649) = 2.16$, $p < .05$. Follow-up analyses revealed that, in every case, friends' characteristics were predictive of a change in children's characteristics in stable friendship dyads, $\beta_s > .08$, $t_s(435-507) > 2.68$, $p_s < .01$, but not in unstable friendship dyads, $\beta_s < .02$, $t_s(159-218) < 1.50$, ns . The relation for the self-perceptions of competence measure, $\beta = .08$, $t(435) = 2.68$, $p < .01$, is particularly important, given that the association reached only marginal levels of significance when analyses were collapsed across stable and unstable friendship dyads. It is important to note that although these findings provide some support for the notion that influence may be stronger among stable friends, the results should be interpreted cautiously. Because so many children remained in stable friendships from Wave 2 to Wave 3 (77%) and so few friendships remained stable from Wave 1 to Wave 2 or from Wave 1 to Wave 3 (10%), we would expect consistently stronger influence coefficients at Wave 2 to 3. This was not, however, the case.

Discussion

A host of studies concerned with achievement motivation suggest that parents and teachers play a key role in influencing children's achievement attitudes and academic outcomes (e.g., Frome & Eccles, 1998; Skinner & Belmont, 1993; see Eccles et al., 1998, for a review). The present study extends this body of work by examining friendships as an additional, and potentially important, context for the development of children's competence-related and motivational beliefs.

Our results confirm that children's friendships are based, in part, on psychological similarity in the academic domain. In addition to corroborating prior research indicating that friends perform similarly in school, we found modest, yet consistent, concordances between friends (and, particularly, reciprocated friends) with regard to self-perceptions of competence and each of the motivational constructs examined. Although concordances between friends were somewhat less strong and less consistent for children's attributions than for the other achievement-related beliefs, there is little evidence that children base their friendship selections more on motivational factors than on competence-related factors or vice-versa. It appears that both how classmates evaluate themselves (e.g., "Can I do this task?") and the choices they make regarding the level of engagement they will dedicate to academic tasks (e.g., "Do I want to do this task and why?") are important to children when establishing close relationships with peers.

Evidence for friends' influence was, as in previous research, generally modest. However, the associations that were revealed are important. First, the present study replicates prior research showing that changes in children's academic performance are predict-

able from the academic performance of children's friends. It is important to note that this link held not only during the course of a single academic year but also over the course of two grade-level transition time periods. Second, the present study provides evidence that changes in children's self-perceptions of competence are positively related to the competence perceptions of children's friends. Notably, this finding reached significance only among stable very best friend dyads. Although this finding should be replicated in future research, it suggests that the negative associations reported by Berndt et al. (1999) may have been due, in part, to the instability of children's friendships over time (i.e., only 55% of children's friendship were stable in Berndt et al.'s, 1999, sample). Third, the present research provides novel evidence for friends' influence on children's reasoning about the causes of their academic successes and failures and children's ratings of the importance of meeting academic standards. The findings for the attributional indices are, we think, particularly important, given the subtlety of these beliefs and their demonstrated usefulness in predicting children's achievement outcomes. The attributional findings should be replicated in future research, particularly given our single-item measure. It is important to keep in mind, however, that the lower reliability typically associated with one-item measures should lead to underestimation of the effects of a variable. Thus, the present approach likely represents a conservative test of friends' influence on children's ability attributions (Kenny, 1979; Pedhazur, 1982).

Friends' apparent influence on children's competence-related and motivational beliefs varied across time periods. Specifically, friends appeared influential with regard to children's ability attributions for success, self-perceptions of competence, and ratings of the importance of meeting standards only during the course of a single academic year. In contrast, evidence for friends' influence on children's ability attributions for failure emerged only during the course of the two grade-level transition time periods. The first set of findings (i.e., indicating that friends exert an influence on children's beliefs during the academic year but not over the course of a grade-level transition) is consistent with prior research (Berndt et al., 1999) and with the notion that influence should be stronger during this time period because children's friendships may be more stable and because the mechanisms of influence are uninterrupted by an intervening summer break. The reasons for the second set of findings (i.e., indicating influence only over the course of a grade-level transition) are not entirely clear. As noted previously, one possibility is that, because children's beliefs are at least slightly less stable over the course of a transition (mean $r = .31$) than over the course of a single academic year ($r = .43$), there is greater room for friends to play a role in influencing the direction of any change in children's beliefs about the causes of their failures. Another possibility is that this finding is related to the achievement context in which children find themselves. Like the transition from elementary school to middle school or from middle school to high school, the transition from one grade level to the next may pose a number of challenges for students (see Eccles et al., 1984; Ruble & Seidman, 1996, for reviews). Children are likely to be confronted with novel standards for performance and to experience a temporary waning of social support as teachers and peer groups change. One consequence is that children may be particularly attentive to lessons learned from friends (particularly about failure) as they approach this novel social environment. Further research is needed to examine these and other alternative

possibilities. Future work will also be important in examining the effects of school transitions versus grade-level transitions on friends' similarity and influence.

A key question to be addressed in future studies of friends' influence on children's competence-related and motivational beliefs is why friends show at least modest similarities with regard to each of the beliefs examined in the present study, but strong, consistent, and pervasive evidence for friends' influence (particularly with regard to children's motivational beliefs) has not been demonstrated. Perhaps the simplest answer to this conundrum is that friends are not, in fact, very influential and that the similarities we see are based largely on children's tendency to select as friends students who share concordant achievement beliefs. Although we do not dispute that selection may play a major role in friends' similarity and that future research should address this possibility, we believe that other factors may have yielded these results.

First, the processes of influence may not be adequately captured in the time period examined. One possibility is that friends' influence occurs in much shorter time intervals than have previously been investigated. Specifically, it may be that children modify their beliefs to conform to those of friends very shortly after forming a friendship (or even as the friendship is forming), before assessments of students' initial characteristics are typically made. This possibility seems particularly plausible, given the early adolescent samples examined in most studies of peer influence in the academic domain. There is ample evidence that children are especially anxious to conform to the behaviors and beliefs of friends at this time (e.g., Berndt, 1979; Costanzo & Shaw, 1966). Children at this age also have the capabilities that are necessary to adequately assess the beliefs of their friends, make the appropriate social comparisons, and modify their beliefs accordingly (see Rholes, Newman, & Ruble, 1990). Research that assesses friends' influence very early in the school year just as friendship choices are being made for the first time might prove especially enlightening in examining this hypothesis. More research on developmental differences in friends' influence is also necessary. Although several studies have examined age-related differences in children's susceptibility to friends' influence (e.g., Epstein, 1983; Urberg, Cheng, & Shyu, 1991), clear trends have not yet emerged.

A second possibility is that research has not yet adequately considered the complexities of friends' influence. The present study, like most prior research, has adopted the theoretical framework that influence should cause children to become more like their friends over time (see Berndt et al., 1999). Alternative possibilities exist, however. Friends may, for example, play a role in encouraging and supporting characteristics that make each member of the dyad unique (e.g., "You're really good at math, but I'm a better basketball player"; see Tesser, Campbell, & Smith, 1984). In such cases, friends' beliefs may actually diverge rather than converge. Friends may also play a role in influencing children not to change (see Urberg, 1999). This possibility seems particularly likely among friendship dyads where initial similarity is very high and where achievement norms are clear (e.g., among highly talented or seriously challenged students).

One additional focus of future research will be to examine the mechanisms of influence more directly. Evidence to date is limited, but experimental work suggests that children and their friends may come to hold similar achievement beliefs through the processes of modeling (e.g., Hall & Cairns, 1984; Sagotsky & Lepper, 1982; Schunk & Hanson, 1985; Schunk, Hanson, & Cox, 1987) or

through the adoption of norms that are discussed, promoted, and reinforced by friends both within and outside of the classroom setting (e.g., Berndt, Laychak, & Park, 1990; see also Kurdek, Fine, & Sinclair, 1995; Steinberg, Dornbusch, & Brown, 1992; Wentzel & Caldwell, 1997). Two key findings from the present study suggest that communication about academic norms and discussion of achievement beliefs among friends may play a key role. First, a number of the beliefs examined (particularly children's competence-related beliefs) do not have clear behavioral representations. In consequence, it is unlikely that children pick up on these beliefs simply by watching and imitating the actions of classmates. Instead, we expect that children pick up on these beliefs either by observing or, more likely, by participating in conversations in which these achievement beliefs are discussed. Second, we provide evidence that children are more likely to share beliefs with and, perhaps, be influenced by the beliefs of reciprocated rather than unilateral best friends. This finding may result, in part, from the greater stability of reciprocated friendships. For example, in the present study, whereas 78% of children who had a reciprocated friend at Wave 2 maintained this friendship at Wave 3, only 49% of children with a unilateral friend did so. At the same time, our finding that associations are stronger among reciprocated friends than among unilateral friends provides at least preliminary evidence that the high levels of intimate discussion, information exchange, and advice-giving that characterize these relationships (see Newcomb & Bagwell, 1995; Saxon, 1996) may be key mechanisms of influence. This hypothesis is consistent with findings reported by Berndt et al. (1990) who demonstrated that children are most likely to change their achievement beliefs in discussions with friends when these friendships are characterized by high levels of harmony and low levels of conflict.

Despite this evidence, it is important to keep in mind that other mechanisms of influence (including many indirect mechanisms) likely play a role. In particular, given evidence that children and their friends may spend 25% to 40% of even their nonclass time together (see Larson & Richards, 1991), it seems quite plausible that shared time, shared experiences, and shared interactions with other agents of socialization (e.g., parents, mentors, siblings) are contributors. This last possibility (i.e., that persons and situations outside of the friendship dyad may contribute to friends becoming more like one another) points out the important caveat that although peer influence may be indicated in our longitudinal analyses, alternatives are possible. Consideration of the interactive role that parents, teachers, and peers likely play in contributing to changes in children's achievement-related beliefs will be especially valuable in future work (see Eccles et al., 1998; Steinberg et al., 1992).

In the end, the findings from the present study suggest that children and their friends are (at least modestly) psychologically similar in the academic domain and that, like parents and teachers, friends play a role in influencing children's achievement-related beliefs. At the same time, the results of this and other recent studies of peer influence highlight the importance of developing and empirically validating theoretical models that address the complexities of friends' influence on children's school attitudes and outcomes. A key feature of these models will be to address not only the ways in which children's beliefs change over time to match those of their friends but the ways in which children and their friends continually modify both their beliefs and their friendship choices to meet the myriad goals (e.g., school success, peer

acceptance, identity formation) that children confront in the academic setting.

References

- Ames, C. (1978). Children's achievement attributions and self-reinforcement: Effects of self-concept and competitive reward structure. *Journal of Educational Psychology, 70*, 345–355.
- Berndt, T. J. (1979). Developmental changes in conformity to peers and parents. *Developmental Psychology, 15*, 606–616.
- Berndt, T. J., Hawkins, J. A., & Jiao, Z. (1999). Influences of friends and friendships on adjustment to junior high school. *Merrill-Palmer Quarterly, 45*, 13–41.
- Berndt, T. J., & Keefe, K. (1995). Friends' influence on adolescents' adjustment to school. *Child Development, 66*, 1312–1329.
- Berndt, T. J., Laychak, A. E., & Park, K. (1990). Friends' influence on adolescents' academic achievement motivation: An experimental study. *Journal of Educational Psychology, 82*, 664–670.
- Berndt, T. J., & Miller, K. E. (1990). Expectancies, values, and achievement in junior high school. *Journal of Educational Psychology, 82*, 319–326.
- Byrne, D., & Nelson, D. (1965). Attraction as a linear function of proportion of positive reinforcements. *Journal of Personality and Social Psychology, 1*, 659–663.
- Cohen, J. (1983). Commentary: The relationship between friendship selection and peer influence. In J. L. Epstein & N. Karweit (Eds.), *Friends in school* (pp. 163–174). New York: Academic Press.
- Costanzo, P. R., & Shaw, M. E. (1966). Conformity as a function of age level. *Child Development, 37*, 967–975.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.
- Diener, C. I., & Dweck, C. S. (1978). An analysis of learned helplessness: Continuous changes in performance, strategy, and achievement cognitions following failure. *Journal of Personality and Social Psychology, 36*, 451–462.
- Diener, C. I., & Dweck, C. S. (1980). An analysis of learned helplessness: II. The processing of success. *Journal of Personality and Social Psychology, 39*, 940–952.
- Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*, 256–273.
- Eccles, J. S., Midgley, C., & Adler, T. (1984). Grade-related changes in the school environment: Effects on achievement motivation. In J. G. Nicholls (Ed.), *Advances in motivation and achievement* (pp. 283–331). Greenwood, CT: JAI.
- Eccles, J. S., Wigfield, A., & Schiefele, U. (1998). Motivation to succeed. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (5th ed., pp. 1017–1095). New York: Wiley.
- Eccles Parsons, J., Adler, T., & Meece, J. L. (1984). Sex differences in achievement: A test of alternate theories. *Journal of Personality and Social Psychology, 46*, 26–43.
- Eccles Parsons, J., Kaczala, C. M., & Meece, J. L. (1982). Socialization of achievement attitudes and beliefs: Classroom influences. *Child Development, 53*, 322–339.
- Eccles Parsons, J., Meece, J. L., Adler, T. F., & Kaczala, C. M. (1982). Sex differences in attributions and learned helplessness. *Sex Roles, 8*, 421–432.
- Ellis, S., Rogoff, B., & Cromer, C. C. (1981). Age segregation in children's social interactions. *Developmental Psychology, 26*, 399–407.
- Ennett, S. T., & Bauman, K. E. (1994). The contribution of influence and selection to adolescent peer group homogeneity: The case of adolescent cigarette smoking. *Journal of Personality and Social Psychology, 67*, 653–663.
- Epstein, J. L. (1983). The influence of friends on achievement and affective outcomes. In J. L. Epstein & N. L. Karweit (Eds.), *Friends in school* (pp. 177–200). New York: Academic Press.
- Fisher, L. A., & Bauman, K. E. (1988). Influence and selection in the friend-adolescent relationship: Findings from studies of adolescent smoking and drinking. *Journal of Applied Social Psychology, 18*, 289–314.
- Frome, P. M., & Eccles, J. S. (1998). Parents' influence on children's achievement-related perceptions. *Journal of Personality and Social Psychology, 74*, 435–452.
- Grolnick, W. S., & Ryan, R. M. (1989). Parent styles associated with children's self-regulation and competence in school. *Journal of Educational Psychology, 81*, 143–154.
- Hall, W. M., & Cairns, R. B. (1984). Aggressive behavior in children: An outcome of modeling or social reciprocity? *Developmental Psychology, 20*, 739–745.
- Haller, A. O., & Butterworth, C. E. (1960). Peer influence on levels of occupational and educational aspiration. *Social Forces, 38*, 289–295.
- Hallinan, M. T. (1983). Commentary: New Direction for research on peer influence. In J. L. Epstein & N. L. Karweit (Eds.), *Friends in school* (pp. 219–231). New York: Academic Press.
- Hallinan, M. T., & Williams, R. A. (1990). Students' characteristics and the peer-influence process. *Sociology of Education, 63*, 122–132.
- Hamm, J. V. (2000). Do birds of a feather flock together? The variable bases for African American, Asian American, and European American adolescents' selection of similar friends. *Developmental Psychology, 36*, 209–219.
- Hanks, M. P., & Eckland, B. K. (1976). Athletics and social participation in the educational attainment process. *Sociology of Education, 49*, 271–294.
- Harter, S. (1981). A new self-report scale of intrinsic versus extrinsic motivation: Motivational and informational components. *Developmental Psychology, 17*, 300–312.
- Harter, S. (1982). The Perceived Competence Scale for Children. *Child Development, 53*, 87–97.
- Hartup, W. W., & Stevens, N. (1997). Friendships and adaptation in the life course. *Psychological Bulletin, 121*, 355–370.
- Haselager, G. J. T., Hartup, W. W., van Lieshout, C. F., & Riksen-Walraven, J. M. A. (1998). Similarities between friends and nonfriends in middle childhood. *Child Development, 69*, 1198–1208.
- Higgins, E. T., & Parsons, J. E. (1983). Social cognition and the social life of the child: Stages as subcultures. In E. T. Higgins, D. N. Ruble, & W. W. Hartup (Eds.), *Social cognition and social development* (pp. 15–62). New York: Cambridge University Press.
- Ide, J. K., Parkerson, J., Haertel, G. D., & Walberg, H. J. (1981). Peer group influence on educational outcomes: A quantitative synthesis. *Journal of Educational Psychology, 73*, 472–484.
- Kandel, D. (1973). Adolescent marijuana use: Role of parents and peers. *Science, 181*, 1067–1070.
- Kandel, D. B. (1978a). Homophily, selection, and socialization in adolescent friendships. *American Journal of Sociology, 84*, 427–436.
- Kandel, D. B. (1978b). Similarity in real-life adolescent friendship pairs. *Journal of Personality and Social Psychology, 36*, 306–312.
- Kenny, D. A. (1979). *Correlation and causality*. New York: Wiley.
- Kindermann, T. A. (1993). Natural peer groups as contexts for individual development: The case of children's motivation in school. *Developmental Psychology, 29*, 970–977.
- Kindermann, T. A., McCollam, T. L., & Gibson, E. (1996). Peer networks and students' classroom engagement during childhood and adolescence. In J. Juvonen & K. R. Wentzel (Eds.), *Social motivation: Understanding children's school adjustment* (pp. 279–312). New York: Cambridge University Press.
- Kupersmidt, J. B., DeRosier, M. E., & Patterson, C. P. (1995). Similarity as the basis for children's friendships: The roles of sociometric status, aggressive and withdrawn behavior, academic achievement and demographic characteristics. *Journal of Social and Personal Relationships, 12*, 439–452.
- Kurdek, L. A., Fine, M. A., & Sinclair, R. J. (1995). School adjustment in

- sixth graders: Parenting transitions, family climate, and peer norm effects. *Child Development*, 66, 430–445.
- Kurdek, L. A., & Krile, D. (1982). A developmental analysis of the relation between peer acceptance and both intrapersonal understanding and perceived social self-competence. *Child Development*, 53, 1485–1491.
- Larson, R., & Richards, M. H. (1991). Daily companionship in late childhood and early adolescence: Changing developmental contexts. *Child Development*, 62, 284–300.
- Medrich, E. A., Rosen, J., Rubin, V., & Buckley, S. (1982). *The serious business of growing up*. Berkeley: University of California Press.
- Meece, J. L., Wigfield, A., & Eccles, J. S. (1990). Predictors of math anxiety and its influence on young adolescents' course enrollment intentions and performance in mathematics. *Journal of Educational Psychology*, 82, 60–70.
- Neckerman, H. J. (1996). The stability of social groups in childhood and adolescence: The role of the classroom social environment. *Social Development*, 5, 131–145.
- Neisser, U., Boodoo, G., Bouchard, T. J., Boykin, A. W., Brody, N., et al. (1996). Intelligence: Knowns and unknowns. *American Psychologist*, 51, 77–101.
- Newcomb, A. F., & Bagwell, C. L. (1995). Children's friendship relations: A meta-analytic review. *Psychological Bulletin*, 117, 306–347.
- Nicholls, J. G. (1975). Causal attributions and other achievement-related cognitions: Effects of task outcome, attainment value, and sex. *Journal of Personality and Social Psychology*, 31, 379–389.
- Parker, J. G., & Asher, S. R. (1993). Friendship and friendship quality in middle childhood: Links with peer group acceptance and feelings of loneliness and social dissatisfaction. *Developmental Psychology*, 29, 611–621.
- Pedhazur, E. J. (1982). *Multiple regression in behavioral research: Explanation and prediction* (2nd ed.). New York: Holt, Rinehart, & Winston.
- Phillips, D. (1984). The illusion of incompetence among academically competent children. *Child Development*, 55, 2000–2016.
- Pintrich, P. R., & de Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82, 33–40.
- Pokay, P., & Blumenfeld, P. C. (1990). Predicting achievement early and late in the semester: The role of motivation and use of learning strategies. *Journal of Educational Psychology*, 82, 41–50.
- Pomerantz, E. M., & Saxon, J. L. (2001). Children's conceptions of ability as stable and self-evaluative processes: A longitudinal examination. *Child Development*, 72, 152–173.
- Pomerantz, E. M., Saxon, J. L., & Oishi, S. (2000). The psychological tradeoffs of making it personally important: Implication for anxiety and depressive symptoms. *Journal of Personality and Social Psychology*, 79, 617–630.
- Rholes, W. S., Newman, L. S., & Ruble, D. N. (1990). Understanding self and other: Developmental and motivational aspects of perceiving persons in terms of invariant dispositions. In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (Vol. 2, pp. 369–407). New York: Guilford Press.
- Rubin, K. H., Bukowski, W., & Parker, J. G. (1998). Peer interactions, relationships and groups. In N. Eisenberg (Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (5th ed., pp. 619–700). New York: Wiley.
- Ruble, D. N., & Seidman, E. (1996). Social transitions: Windows into social psychological processes. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 830–856). New York: Guilford.
- Ryan, A. M. (2001). The peer group as a context for the development of young adolescent motivation and achievement. *Child Development*, 72, 1135–1150.
- Sage, N. A., & Kindermann, T. A. (1999). Peer networks, behavior contingencies, and children's engagement in the classroom. *Merrill-Palmer Quarterly*, 45, 143–171.
- Sagotsky, G., & Lepper, M. R. (1982). Generalization of changes in children's preferences for easy or difficult goals induced through peer modeling. *Child Development*, 53, 372–375.
- Saxon, J. L. (1996). *Distinguishing between the behavioral features and the affective features of children's friendships*. Unpublished master's thesis, University of Illinois at Urbana-Champaign.
- Schunk, D. H., & Hanson, A. R. (1985). Peer models: Influence on children's self-efficacy and achievement. *Journal of Educational Psychology*, 77, 313–322.
- Schunk, D. H., Hanson, A. R., & Cox, P. D. (1987). Peer-model attributes and children's achievement behaviors. *Journal of Educational Psychology*, 79, 54–61.
- Skinner, E. A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effects of teacher behavior and student engagement across the school year. *Journal of Educational Psychology*, 85, 571–581.
- Steinberg, L., Dornbusch, S. M., & Brown, B. B. (1992). Ethnic differences in adolescent achievement: An ecological perspective. *American Psychologist*, 47, 723–729.
- Stipek, D. J., & Gralinski, J. H. (1991). Gender differences in children's achievement-related beliefs and emotional responses to success and failure in mathematics. *Journal of Educational Psychology*, 83, 361–371.
- Tesser, A., Campbell, J., & Smith, M. (1984). Friendship choice and performance: Self-evaluation maintenance in children. *Journal of Personality and Social Psychology*, 46, 561–574.
- Tuma, N. B., & Hallinan, M. T. (1979). The effects of sex, race, and achievement on school children's friendships. *Social Forces*, 57, 1265–1285.
- Urberg, K. A. (1999). Some thoughts on the investigation of peer influence. *Merrill-Palmer Quarterly*, 45, 1–12.
- Urberg, K. A., Cheng, C. H., & Shyu, S. J. (1991). Grade changes in peer influence on adolescent cigarette smoking: A comparison of two measures. *Addictive Behavior*, 16, 21–28.
- Urberg, K. A., Degirmencioglu, S. M., & Pilgrim, C. (1997). Close friend and group influence on adolescent cigarette smoking and alcohol use. *Developmental Psychology*, 33, 834–844.
- Vitaro, F., Tremblay, R. E., Kerr, M., Pagani, L., & Bukowski, W. M. (1997). Disruptiveness, friends' characteristics, and delinquency in early adolescence: A test of two competing models of development. *Child Development*, 68, 676–689.
- Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review*, 92, 548–573.
- Wentzel, K. R., & Caldwell, K. (1997). Friendships, peer acceptance, and group membership: Relations to academic achievement in middle school. *Child Development*, 68, 1198–1209.
- Wigfield, A., Eccles, J. S., Mac Iver, D., Reuman, D. A., & Midgley, C. (1991). Transitions during early adolescence: Changes in children's domain-specific self-perceptions and general self-esteem across the transition to junior high school. *Developmental Psychology*, 27, 552–565.
- Zimmerman, B. J. (1989). A social cognitive view of self-regulated learning. *Journal of Educational Psychology*, 81, 329–339.

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