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Effects of Naturally Existing Peer Groups on Changes in Academic Engagement in a Cohort of Sixth Graders

Thomas A. Kindermann
Portland State University

This study examined the effects of peer groups on changes in academic engagement in 11- to 13-year-old children. From the entire cohort of 366 sixth graders in a town, 87% participated at the beginning and end of the school year. Peer groups were assessed using socio-cognitive mapping; as an indicator of motivation, teachers reported on students' classroom engagement. Peer groups were homogeneous in terms of engagement, and despite considerable member turnover across time, their motivational composition remained fairly intact. Peer group engagement levels in the fall predicted changes in children's motivation across time. Although the magnitude of effects was relatively small, evidence for group influences persisted when controlling for peer selection and the influence of teacher and parent involvement.

Recent reviews of the concept of school engagement have revealed its potential as a target in research and interventions aimed at improving children's academic achievement and resilience and preventing school drop-out and delinquency (Fredricks, Blumenfeld, & Paris, 2004; Jimerson, Campos, & Greif, 2003). A core feature of many models are the behavioral manifestations of engagement, sometimes called participation or academic involvement, that refer to student's energized, enthusiastic, emotionally positive, cognitively focused interactions with academic activities. Such involvement is the wellspring of high-quality learning and, over time, is hypothesized to lead to the kind of commitment to academic goals and identification with school (Finn, 1989) that allows children to maintain participation in the face of difficulties and setbacks, and eventually to take responsibility for their own learning.

Most researchers agree that supportive relationships with adults and peers are critical to children's engagement in school. However, although decades of research have shown that warm and supportive relationships with parents and teachers benefit students' academic motivation, their self-perceptions, engagement, and performance (e.g., Englund, Luckner, Whaley, & Egeland, 2004; Grolnick & Slowiaczek, 1994; Noack, 2004; Ratelle, Guay, Larose, & Senécal, 2004; Skinner, Zimmer-Gembeck, & Connell, 1998; for reviews, see Fredricks et al., 2004; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006), only recently has the role of peer affiliations in students' engagement been examined empirically.

Studies from multiple traditions show that various kinds of peer affiliations are associated with children's motivation, their behavior in school, and their eventual academic success. For example, friendships have been shown to be positively related to academic motivation and performance (e.g., Altermatt & Pomerantz, 2003; Berndt, Hawkins, & Jiao, 1999; Wentzel, McNamara-Barry, & Caldwell, 2004) and negatively related to behavior problems in school (Ennett & Bauman, 1994; Poulin, Dishion, & Haas, 1999). Sociometric categories and acceptance scores are also correlated with school motivation and performance (e.g., Bukowski & Cillessen, 1998; Chen, Chang, & He, 2003; Guay, Boivin, & Hodges, 1999), as are friendship groups, social crowds, and groups of child ren who "hang out" together (e.g., Brown, 1999; Farmer & Rodkin, 1996; Kiesner, Poulin, & Nicotra, 2003; Kurdek & Sinclair, 2000; Wentzel & Caldwell, 1997; for a review, see Rubin, Bukowski, & Parker, 2006).

However, serious questions remain about how correlations between children's academic performance

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Correspondence concerning this article should be addressed to Thomas Kindermann, Department of Psychology, P.O. Box 751, Portland State University, Portland, OR 97207-0751. Electronic mail may be sent to kindermannt@pdx.edu.

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and their relationships with peers should be interpreted. Although studies consistently show that child ren with high-quality peer relationships tend to do better in school, is this because peers support children's school performance, or is it because children who do better at school tend to affiliate with higher functioning peers? Or, are quality of peer relations and school performance not causally related at all, because both are caused by a third variable, such as high-quality parenting or teaching? The key issue is how to design studies so that processes of peer influence can be weighed against peer selection and the role of external factors, thus minimizing the potential that alternative explanations are responsible for findings that seem to suggest peer influences.

Goals of the Study

The goal of the current study was to examine how research on naturally existing peer groups can add to the larger literature on peer influences on children's academic development. Although a child's world of peers is complex, including friendships of various levels of closeness as well as sociometric status, popularity, and peer rejection, this study focused on natural groups. These are the peers with whom individual children interact most frequently and spend the most time at school. Along with closeness of relationships, frequency of interaction is likely to distinguish the peers who will contribute most heavily to a given child's development. The method used to identify peer groups, socio-cognitive mapping (SCM; Cairns, Perrin, & Cairns, 1985), has the advantage that it allows for objective identification of the members of a child's group and for assessment of their characteristics independently from the information provided by the individual.

The study examined whether the engagement of a child's peer group members at the start of the school year could predict the development of that child's own engagement versus disaffection across the school year. Two previous small-scale studies (Kindermann, 1993; Kindermann, McCollam, & Gibson, 1996) have shown that children who are initially ''rich'' in terms of their own and their peer groups' motivational characteristics tend to become ''richer'' over time, whereas children who are initially ''poor'' show declines. Guided by an interactional perspective (Baltes, 1996; Bronfenbrenner & Morris, 1998), the studies were based on the assumption that peers exert their influence in social interactions. One likely mechanism of influence, which has been documented in *in vivo* observations in the classroom, is peer reinforcement. Changes in children's own engagement across time can be predicted from the levels of contingent support for on-task classroom behavior provided by their peer group members (Sage & Kindermann, 1999).

The current study builds on previous research in three ways. First, the study included an entire grade cohort of children in a small town. A limitation of previous studies has been a focus on selected classrooms, which places artificial boundaries on the range of members of students' peer groups. By preadolescence and adolescence, peer groups are typically not confined to specific classrooms. Hence, by including all the students in sixth grade in a school system, the study incorporates a more ecologically valid and appropriate definition of the natural boundaries of students' peer groups. Second, the study directly addressed design problems that are created for socialization researchers by the fact that children select the members of their groups. Self-selection of group members leads to problems not found in studies of contexts that are assigned to children (i.e., children cannot select parents or teachers). Self-selection means that children can belong to more than one group, can leave their group, and, most important, they can select their groups in a way that creates initial similarities among group members, an issue referred to as ''assortativeness'' (Kindermann, 2003). Third, peer influences were examined in relation to competing influences from teachers and parents. The study used a longitudinal design and a series of controls that allow analyses to separate processes of peer influences from processes of peer selection as well as from simultaneous processes of influence from parents and teachers.

Peer Relations and Classroom Engagement

The focus of the current study was whether changes in children's own engagement across time could be predicted from the characteristics of their earlier peer group affiliates. The target outcome was engagement versus disaffection in the classroom (Connell, 1990; Wellborn, 1991). At the core of this construct are markers of engaged behaviors, including effort exertion, trying hard, and persistence, as well as indicators of mental effort, such as attention and concentration. This aspect of engagement has also been referred to as academic behavior, on-task behavior, or class participation (Fredricks et al., 2004). The conceptualization also includes engaged emotions, such as enthusiasm, interest, and enjoyment. The opposite of engagement is disaffection, which includes the core behaviors of disengagement, namely, passivity, lack of initiation, lack of effort, and giving up. In addition, it includes mental withdrawal and

ritualistic participation, such as lack of attention, pretending to pay attention, and going through the motions. Disaffected emotions include those that reflect enervated, alienated, or pressured participation (e.g., sadness, boredom, anger, anxiety).

Engagement was the key construct in this study because it is a central construct in most current theories of motivation (Skinner, Kindermann, Connell, & Wellborn, 2007) and because, as an observable manifestation of motivation, it is highly salient to teachers and peers (Skinner & Belmont, 1993). Research has shown that children's active, enthusiastic, and effortful engagement in learning activities predicts their achievement in and completion of school (e.g., Connell, Halpern-Felsher, Clifford, Crichlow, & Usinger, 1995; Connell, Spencer, & Aber, 1994; Skinner, Wellborn, & Connell, 1990; Skinner et al., 1998; for a review, see Fredricks et al., 2004).

Challenges in the Study of Naturally Occurring Peer Group Influences

The study of children's peer groups presents thorny methodological problems, chief among them, how members should be identified. Networks consist of children who tend to hang out together and share time and activities on a regular basis (Cairns et al., 1985). Such groups are typically self-organized, highly fluid, and formed for a variety of reasons. They are often poorly defined, and obtaining accurate information is difficult. In particular, doubts have been raised about the accuracy of children's self-reports of affiliations because they tend to exaggerate their associations with popular peers (Cairns & Cairns, 1994; Leung, 1996).

SCM employs children as expert observers of social interactions because they have access to everyday exchanges in a way that cannot easily be matched by other observers. Multiple children in a classroom are asked to report about classmates whom they know to hang around frequently with one another, and composite maps are formed of the groups on which reporters agree. Similar to Moreno's (1934) sociograms, these maps depict the connections of children who share affiliations with one another (see Figure 1 for an example). One strength of the approach is that the identification of groups is based on multiple observers whose level of agreement can be determined; consensus maps have been shown to be consistent with independent observations (Gest, Farmer, Cairns, & Xie, 2003). A second advantage is that more of a child's affiliates are included than when dyadic friendships are considered. A third advantage is that, compared with most assessments of peer relationships, the accuracy of SCM is not as dependent on participation rates. Thus, when assessing reciprocal friends, each child who does not participate will also be missing as a (potential) friend of the remaining children. For SCM, not every student in a classroom needs to participate. If consensus is high and the sample of reporters is fairly representative for a setting, reports from slightly more than half of its members are sufficient to yield reliable maps (Cairns & Cairns, 1994).

Individuals and their groups. Because natural groups are (largely) self-selected, a child can be a member of many subgroups at the same time. In Figure 1, student KER (lower right) has 8 members in her peer network, and COD has 14; many members are shared but many others are not. It becomes difficult to define groups objectively in a way that children are assigned to only one group. An alternative is to define a group with respect to individuals, so that socialization processes are assumed to take place reciprocally between each individual and all of the others who are his or her affiliates. This has one specific advantage: Instead of assuming that socialization contexts are the same for each member of a group, each member is seen as having his or her own unique network (all children with whom he or she is affiliated). Thus, if a girl is in a group with two boys, she interacts with people of the opposite sex, whereas each boy has a mixed-sex group. This strategy makes it possible to examine interindividual differences in socialization contexts, even among members of the same group.

Assessing group characteristics. A second challenge to the study of peer group influences is capturing a group's influential features. Children's self-reports about their peers tend to be closely matched to their reports about their own characteristics, but using such correlations to infer peer influence is "unsatisfactory" (Jaccard, Blanton, & Dodge, 2005, p. 136) because a child's own characteristics likely shape his or her perception of affiliates. If instead groups are defined independently, their psychological characteristics can be assessed independently as well. Peer characteristics can be described by the peers themselves or by other reporters (such as teachers), and these can be aggregated to form a group profile. To form composites, researchers have used scores averaged across the members of a child's group (Kindermann, 1996; Kurdek & Sinclair, 2000; Ryan, 2001). When groups are fairly homogeneous, it is reasonable to assume that the average across a child's affiliates captures the central properties of his or her group.

Capturing peer influences. A third challenge is how peer influences should be conceptualized and empirically evaluated. Such influences are usually conceived of as socialization processes, and correlations between a child and his or her peer group

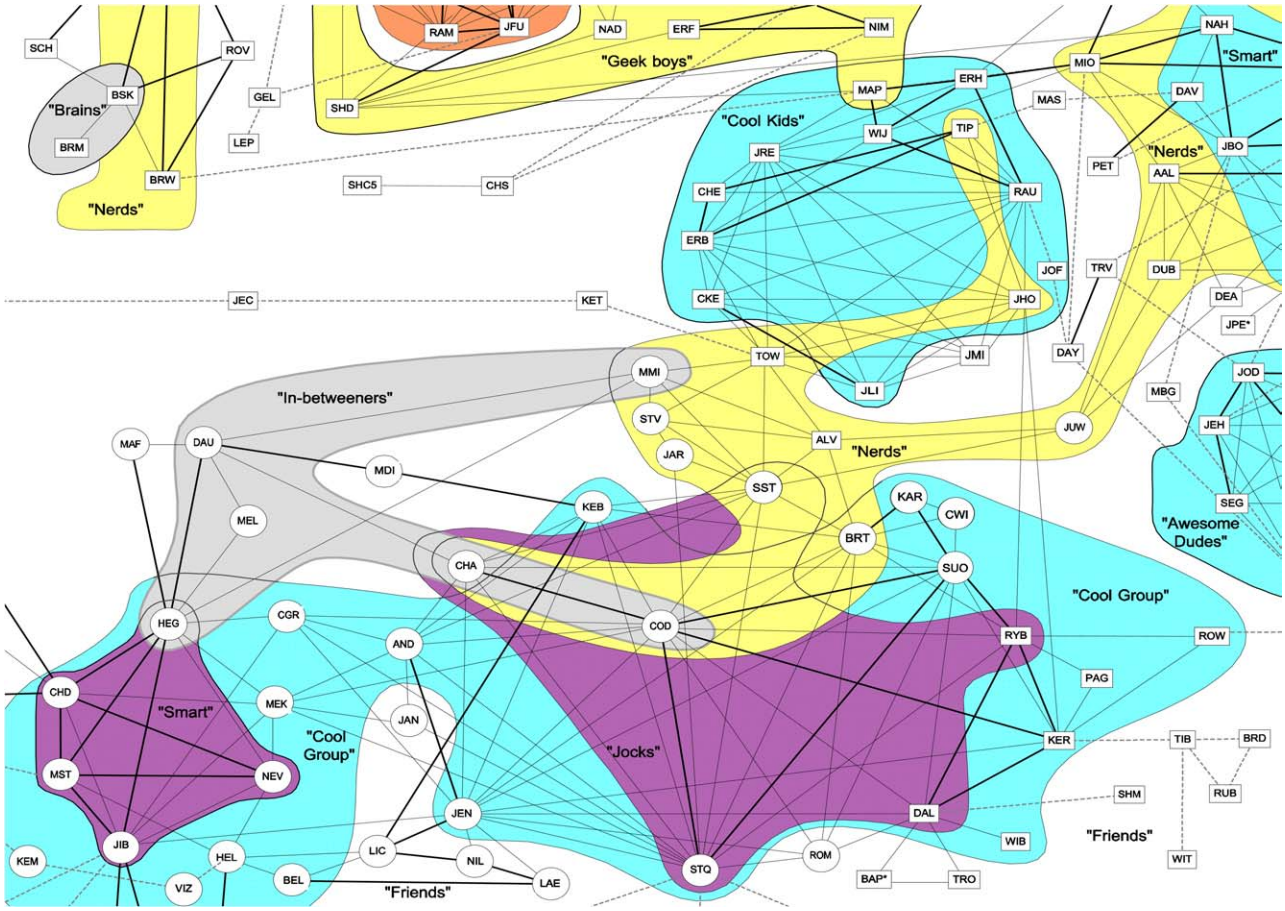

Figure 1. Subset of the composite socio-cognitive map of sixth graders' social networks in a small town (the entire map can be viewed at www.psy.pdx.edu/~thomas/Research). Circles denote girls and squares denote boys; letters inside the shapes represent individuals' names. The terms in quotation marks denote the names that students gave to the groups.

members are sometimes considered evidence of their presence. Traditionally, peer selection is seen as a threat to the validity of peer socialization studies (e.g., Kandel, 1978). Peer groups are characterized by assortativeness (Kindermann, 2003); they are not formed at random and children tend to be similar to the peers with whom they chose to affiliate. Hence, correlations are as likely to reflect processes of selection as they are to reflect processes of socialization.

Controls for selection. Because predictions are correlational, alternative explanations need to be eliminated; it is possible that processes other than peer influences could produce patterns of change in children that mimic those of socialization influences. There are several possible alternative explanations. First, in groups in which members are similar to one another, the members may follow similar developmental pathways because of their similarity. One empirical solution to this problem is to test for socialization effects by examining whether the characteristics of a target child's peer group at one point in time predict changes in that child's characteristics across time over and above his or her initial similarity with the group.

Second, although longitudinal designs yield improvements over concurrent correlations, results can still be affected by peer selection; selection preferences can exist for a variety of other characteristics that are associated with differential developmental change (e.g., achievement, IQ, gender; Hamm, 2000). For example, girls tend to form groups with other girls during much of their school years and to be more motivated and to achieve higher grades (e.g., Eccles, Wigfield, & Schiefele, 1998). Over time, correlation patterns that look like positive influences from high-functioning groups may partly be explained by the fact that their affiliates were also girls. Similarly, children may have preferences for specific kinds of groups (e.g., in terms of size, homogeneity, or stability). Whenever positive changes in children are related to the high functioning of their peer groups, this may be an outcome of interactions and group influence, but it

can also be an outcome of processes by which well-adjusted students become members of larger, more homogeneous, or more stable groups that consist of similarly well-adjusted members.

Third, assortativeness can also lead children to join a group whose members are similar with regard to influences they experience from outside of their group. Teacher influences are likely the most powerful determinants of children's classroom behavior, and they seem to work in a way that students who do well at one point in time tend to improve (or remain stable) across time (Skinner & Belmont, 1993). When teachers are effective in promoting ''good'' students' development, and such students form groups with similar other students, their own change over time can be an outcome of teachers' involvement over and above group influences. The same can be true with regard to parent influences. Parental support and involvement have also been implicated as a factor in determining children's motivation and success in school, and members of a peer group can experience similar levels of stimulation and parent involvement at home (e.g., Fletcher, Darling, Steinberg, & Dornbusch, 1995). Thus, children's home environments may be responsible for their change across time, and peer influences may not add much to this explanation. When group influences are examined, it is important to make sure that predictions of children's change remain robust when potential alternative influences from other social partners are controlled.

In sum, the current study, examining an entire cohort of students in a small town, focused on whether the engagement profile of a child's peer group, assessed independently and reliably at the beginning of the school year, would make a unique contribution to changes in that child's engagement across the school year over and above the effects of selection preferences and the effects of involvement from parents and teachers. The general expectation was that children who were motivationally rich at the beginning of the school year would selectively associate with peers who were also relatively high in motivation (and that their parents and teachers would also be more supportive), whereas children who were motivationally poor in the fall of sixth grade would associate with peers who were less engaged (and have parents and teachers who were less involved in the children's school work). At the same time, when controlling for the effects of parents and teachers, peer selection, and children's level of academic functioning, it was expected that the engagement profiles of children's peer groups would predict changes in children's own engagement and disaffection over the 1st year of middle school, such that initially rich children, through their association with engaged peers, would become even richer, whereas motivationally poor children would become even more disaffected. By including controls for selection preferences and for simultaneous influences from other social partners, the study used a design that shows promise for capturing the complexity of peer groups while overcoming some of the problems that are associated with the study of their influences.

Method

As part of a larger longitudinal project (Skinner et al., 1998), the study focused on an entire cohort of sixth graders in a rural/suburban town in a northeastern state, during the 1st year when children started in middle school. The town had about 15,000 inhabitants; 90% were of European American descent, and 87% of the adults had a high school or higher degree. The school was the only public school in town for this age group; the distance to the next town was about 16 miles. A small number of students who attended private school or commuted to school outside of town were not included in the study.

Setting and Sample

Out of the total of 366 sixth graders in the town (48% girls), 340 participated (93%) who consented and had parental permission to participate. Information on ethnic background was not obtained. Students were grouped into homeroom classrooms; the school's intent was to have one teacher assigned to each class who was primarily responsible for the students and saw them every day. All 13 teachers participated and all stated that they were very familiar with their students.

Design and Measures

Student questionnaires were administered at two time points during regular classroom hours. The first measurement point was within the first 3 months of the school year; the second was within 3 months of its end. Teachers completed questionnaires on students' school engagement within a 1-month window around both assessments.

Engagement versus disaffection. Academic engagement was assessed using a 14-item scale that tapped teachers' perceptions of each student (Wellborn, 1991). The measure consists of two components: behavioral and emotional engagement (e.g., ''This student works as hard as he/she can''; ''In my class, this student appears happy''). Previous studies have

shown that the components are moderately intercorrelated (r = .31, n = 144) and that they form an internally consistent indicator of engagement (α = .95, n = 185; Wellborn, 1991). Over an 8-month period, engagement ratings were highly stable (r = .73, p < .001, n = 144) and moderately correlated with grades and achievement scores (ranging from .40 in mathematics achievement to .58 in reading; Skinner & Belmont, 1993; Skinner et al., 1990).

At the beginning of sixth grade, teachers provided information on 318 students (93% of students who had permission to participate; 87% of the population). Seven of the 340 participants were missed because they changed homerooms, 8 had just recently enrolled and teachers did not know them well, and 7 had not yet arrived at school. At the end of the school year, reports on 322 students were obtained; 18 of the fall participants had left, but the 22 students who had been missed in the fall were included. Three hundred students had teacher-reports at both time points.

Academic achievement. Students' mathematics grades were obtained at the end of fifth grade and at the end of sixth grade. Letter grades were converted to numbers and both grades were averaged. Mathematics grades were chosen as indicators of achievement because they were assumed to be close approximations of measures of ability and, compared with other grades, less directly affected by students' levels of engagement in the classroom.

Teacher involvement. At the beginning of the school year, students also reported on the extent to which they experienced differential levels of teacher involvement. The measure developed by Skinner and Belmont (1993), consists of eight items tapping perceptions of the teacher availability, caring, warmth, and affection (e.g., "My teacher knows me well"; "My teacher doesn't seem to enjoy having me in class"), and has sufficient measurement characteristics (internal consistencies were between .79 and .85 in Grades 3 through 7; stability was .55 over a school year). In a previous study, the ratings were moderately correlated with teacher ratings of students' engagement (correlations were between .24 and .33 in Grades 3 through 7) as well as achievement scores (correlations between .21 to .33, all ps < .01, n = 401; Skinner et al., 1998).

Parent involvement. At the beginning of sixth grade, students also reported on their perceptions of their parents' involvement. The measure consists of 16 items (an 8-item subscale of warmth, e.g., "My parents understand me very well"; and an 8-item subscale of rejection, e.g., "Sometimes I wonder whether my parents like me"). In a previous study, the subscales were shown to have high internal consistencies (α = .88 and .83) and to be highly negatively intercorrelated (r = .67, p < .001, n = 1,247), and parent involvement was moderately correlated with students' self-reports of their academic competence (warmth: r = .28; rejection: r = −.30, all ps < .01; Skinner, Johnson, & Snyder, 2005).

Peer groups. Students' networks were assessed via SCM (Cairns et al., 1985). In questionnaires, children were asked to list groups of students in their grade whom they knew to frequently "hang out" with each other. Students were asked to list as many groups and members as they knew (in school and outside), to include dyads, to not forget to include themselves, and to include the same children as members of different groups if appropriate. The forms provided spaces for up to 20 groups and 20 members (no student exhausted the space). A typical report would, for example, denote Children A, B, and C to form one group, and D and E to form another. For purely descriptive purposes, children were asked to give each group a name that characterized "what the group was about." Discussions of the method are available elsewhere (cf. Cairns, Gariépy, & Kindermann, 1990; Kindermann, 1996). The method relies on free recall and focuses on public knowledge of affiliations. Networks are assumed to exist among students on whom observers agree they are frequently affiliating.

At the beginning of sixth grade, 280 students (76% of the population; 56% were girls) provided information about peer networks in their grade; 60 children (18% of participants; almost evenly distributed across homerooms and gender) did not provide such information (5 children had only illegible entries, 15 indicated they did not know anything about groups, and 33 left this part of the questionnaire unanswered; 7 had not yet arrived for the fall term). At the end of sixth grade, network information was assessed to examine stability; 219 students (60% of the cohort) provided peer group information.

Network identification. At the beginning of the year, the 280 informants issued 3,047 group member nominations for a total of 694 groups, each with between 2 and 15 members. On average, a child nominated 2.7 groups with about 5 members. At the end of the school year, the 219 informants issued 3,590 nominations for 664 groups (averaging 3 groups with 5.4 members).

To identify group affiliations, the nominations were arranged in a co-occurrence matrix denoting the frequencies with which each child was nominated to belong to the same group as any other child, across the entire grade. A portion of the matrix is presented in Table 1. Binomial z tests examined whether children were more likely to be nominated as being in

Table 1
Co-Occurrence Matrix Among (Selected) Girls in a Cohort of Sixth Graders

	KER	RYB	DAL	COD	SUO	ROM	STQ	CHR	KAA	KAW	ELT	JEP	LIP	Total nominations
KER	—	**28**	**23**	**12**	**10**	3	3	0	0	0	0	0	0	36
RYB	**28**	—	**20**	**11**	**12**	3	**4**	0	0	0	0	0	0	32
DAL	**23**	**20**	—	**10**	**9**	**4**	2	0	0	0	0	0	0	28
COD	**12**	**11**	**10**	—	**19**	**8**	**13**	0	0	0	0	0	0	29
SUO	**10**	**12**	**9**	**19**	—	**9**	**10**	0	0	0	0	0	0	29
ROM	3	3	**4**	**8**	**9**	—	**4**	0	0	0	0	0	0	11
STQ	3	**4**	2	**13**	**10**	**4**	—	0	0	0	0	0	0	17
CHR	0	0	0	0	0	0	0	—	**10**	**10**	**9**	**10**	0	14
KAA	0	0	0	0	0	0	0	**10**	—	**13**	**13**	**12**	0	16
KAW	0	0	0	0	0	0	0	**10**	**13**	—	**13**	**10**	0	17
ELT	0	0	0	0	0	0	0	**9**	**13**	**13**	—	**10**	0	18
JEP	0	0	0	0	0	0	0	**10**	**12**	**10**	**10**	—	0	13
LIP	0	0	0	0	0	0	0	0	0	0	0	0	—	24
No. of informants														260
Total nominations														3,047
No. of groups generated														694

Note. Total nominations are necessarily smaller than the sums of conominations; boldfaced cells denote significant conominations ($p < .01$). The abbreviations in the column and row headings denote names students gave to sixth-grade girls' groups.

a group with any other candidate than could be expected by chance. For example, in Table 1, across all 36 reports in which student KER was nominated to have a group, student RYB was noted 28 times as a member of the same group (78%). Overall, RYB was nominated to be a member of 32 of the 694 groups that were generated (5%). Thus, the conditional probability of finding student RYB as a member of KER's network, given that KER had a group (28/36 = .78), was compared with the unconditional probability with which RYB was found in any group (32/694 = .05). The significant z score of 21.47 indicates that RYB was a member of KER's group. Because of the many cases with low expected cell frequencies, Fisher's exact test was used in addition (Sterling's approximation; von Eye, 1990), and only connections that were significant ($p < .01$) using both strategies were accepted. Significant connections that were based on single conominations were not accepted; in almost all cases, these were children's self-nominations.

The resulting composite social map consisted of all significant network connections. A subset of the map is presented as Figure 1 (individual placements are arbitrary). As a criterion for accurateness, kappa indices (Gest et al., 2003) indicated that individuals' reports were highly consistent with the composite map (average kappa was .88). Only errors of commission were considered; errors of omission were excluded because it is unrealistic to expect that all informants would know the same amount about all networks (e.g., girls may know less about boys' groups). It should be noted that the approach is individual oriented: The method identifies children's connections with one another, not distinct groups. This has two advantages: First, multiple group memberships are retained so that a child can have connections that are not shared with the other members of his or her group. Second, a child's group context is captured as specific for that child so that interindividual differences in context influences can be examined.

Network characteristics. The number of members in each student's group was used to indicate network size. The number of students whom a student kept as group members across time was taken as an indicator of network stability. Across each child's group members, the percentage of students was computed who were students of the same gender. As markers of the engagement characteristics of children's groups, composite group profiles were formed; scores were calculated by averaging the teacher-rated engagement scores across the members of each child's group. For example, the average engagement score of students RYB, DAL, COD, SUO, PAG, ROW, JEN, and JHO in Figure 1 was taken as indicating the engagement level of KER's peer network. Finally, as a measure of person-to-group similarity, the (absolute) difference was taken between each individual child and the composite score of his or her group. Group names were not analyzed systematically, but name characteristics on which there was high consensus were

examined for the extent to which these referred to larger crowds.

Friendships. At the beginning of sixth grade, children also nominated their three best friends in class, in school, and outside of school. The goal was to capture peer relationships of students who would not be members of peer networks, either because they would not be known well enough in the grade or because they only would have relationships that were not publicly known. Reciprocal friendships were identified using school and class rosters of students in the town; 294 students listed at least one friend (94% of participants).

Results

A first set of analyses gives descriptive information on individuals and their change. A second set examines the characteristics of social networks. A third set focuses on selection processes as well as on potential simultaneous influences from outside children's peer groups. Controls are included for individual and network characteristics that indicate children's preferences for specific kinds of peer partners (sex, academic competence), for specific kinds of groups (gender composition, size, homogeneity, stability), and for the levels of their teachers' and parents' involvement. The final set of analyses examines whether children's change in engagement can be predicted from the characteristics of their peer groups over and above the contributions of the selection controls, as well as when potential competing influences from teachers and parents are controlled.

Individual Engagement, and Teacher and Parent Involvement

On average, students were highly engaged (*M*s = 3.09 to 3.25 on the 4-point scale) and remained highly stable ($r = .75$, $p < .001$, $n = 300$). Students also perceived teachers and parents to be fairly involved (*M*s = 2.83 and 3.21 on the 4-point scale). There were no differences between the students who participated in the study and students who did not, but an analysis of variance confirmed that girls were more engaged than boys (3.20 vs. 3.01), $F(1, 298) = 12.32$, $p < .01$. In the following analyses, missing values were estimated using a full information maximum likelihood procedure (FIML; Amos 5; Arbuckle, 2003). As Table 2 shows, student engagement was moderately correlated with student reports of teachers' and parents' involvement, and involvement from adults was highly intercorrelated.

Social Networks

At the beginning of the school year, 293 students (80% of the cohort) were members of social networks. A typical student had 4.9 other children in his or her group (ranging from 0 to 17 members; 73% had networks larger than dyads). Students with large networks were typically simultaneous members of several crowds. Figure 1 gives an illustration using the names students gave to girls' groups (with nomination frequencies larger than 2; the entire map can be viewed at www.psy.pdx.edu/~thomas/Research). Students RYB, KER, and COD were members of a "cool" crowd. The male student RYB was also

Table 2
Correlations Between Individual Variables in Fall and Spring of Sixth Grade

	1 Fall, Teacher-Reported Student Engagement	2 Spring, Teacher-Reported Student Engagement	3 Student Mathematics Achievement	4 Fall, Student-Reported Teacher Involvement	5 Fall, Student-Reported Parent Involvement
1 Fall, Teacher-reported Student Engagement		.76***	.62***	.32***	.28***
2 Spring, Teacher-reported Student Engagement			.48***	.36***	.31***
3 Student Mathematics Achievement				.05	.22**
4 Fall, Student-reported Teacher Involvement					.53***
5 Fall, Student-reported Parent Involvement					

Notes. $N = 366$.
** $p < .01$, *** $p < .01$.

a member of COD's mostly female group of "jocks," and COD was also a member of groups of "nerds" and "in-betweeners." Large crowds of cool students or nerds bridged between otherwise separate groups. For example, among the six crowds of nerds or "geeks" in the cohort, two provided the connection between the otherwise segregated male and female crowds of "popular" students. Note that group names are depicted solely for descriptive purposes; in the following analyses, groups were subjectively defined, so that RYB's peer group was the set of all children with whom he shared a connection.

Social inclusion. A total of 56 boys and 17 girls (20% of the cohort) had no network at the beginning of sixth grade (about half of those remained without a network over time). Among those were the 18 students without permission to participate. The 55 students without a network who had teacher reports were less engaged than the 263 who had networks and teacher scores, $F(1, 316) = 9.4$, $p < .01$. However, they were not necessarily isolated. They had about 1.3 reciprocal friends (range = 0–6), nominated 4.3 friends (counting participants only; range = 0–11), and received 3.1 nominations (range = 0–10). Apparently, these friendships were not publicly known; 10% were cross-gender friendships, 20% were denoted as friendships outside of class, and 15% were friendships outside of school, even though the friends also attended the school.

The converse also held true: Children without friends were not necessarily without networks. Twenty participating children had not listed a friend, but these had an average of 2.1 network members (range = 0–8) and received 2.7 friendship nominations (range = 0–7). Similarly, the 14 children who received no friendship nomination had an average of 2.9 group members (range = 0–13) and nominated about 3.5 friends (range = 0–9). In the cohort, only 27 children (7%) did not have a reciprocal friendship or social network, and only 5 boys and 1 girl without a network (2%) did not nominate a single friend or received one nomination (5 of these left the study). Thus, only 2% to 7% can be considered to be isolated from the social fabric at school.

Network composition. A set of broad descriptors was used to describe the extent to which children had specific preferences for group members. On average, 98% of a child's group members were also sixth graders (others were from between first and seventh grades). In addition, 94% of a child's group members were of the same gender as that child; 80% of networks were gender homogenous and 2% contained exclusively members of a different gender. Only about 60% of a child's group members were students who were assigned to the same homeroom.

Membership stability. Stability of networks was fair; most students changed networks extensively. On average, a child maintained ties with 3 (61%) members (range = 0–11). About 25% of the children lost network connections to all of their earlier affiliates (conversely, 50% of the students with no network in the fall formed new affiliations in the spring). About 50% of the students lost connections to at least half of their members. Nevertheless, 19% remained with entirely stable networks.

Engagement and Network Composition

Several properties of children's peer groups were related to students' own engagement. Network size and stability were related to engagement, indicating that highly engaged children had selected larger networks ($r = .22$, $p < .01$) and groups that contained a higher number of stable members ($r = .18$, $p < .01$). Because girls belonged to higher engaged groups, $F(1, 261) = 9.53$, $p < .01$ (using pairwise deletion of missing data), analyses verified that these relations remained significant when children's sex was controlled.

Similarity in engagement was considered to be a key selection criterion. However, it was not expected that children would necessarily seek out candidates according to classroom engagement; rather, it was expected the selection processes would target similarities in a wider range of characteristics, only some of which would be compatible with a focus on academic work. Thus, homogeneity within networks was expected as a by-product of selection processes that followed various interindividually different criteria. At the beginning of the school year, students were found to be similar to their group members. Engaged students were members of groups that were similarly engaged ($r = .49$, $p < .001$) and not much different from the students themselves (using absolute person-to-group differences; $r = -.20$, $p < .01$). Most children (70%) had engagement scores that differed less than 1 *SD* (.59) from the profile score of their network. Larger groups were as homogeneous as small groups.

Group homogeneity persisted over time. Although children exchanged about 40% of their initial group members, children who were highly engaged in the fall remained to be with highly engaged groups in the spring ($r = .40$, $p < .001$), and there was moderate stability in the groups' engagement profiles ($r = .42$, $p < .001$). Consistent with earlier studies on selected classrooms (Kindermann, 1993; Kindermann et al., 1996), member turnover occurred in a way that preserved the groups' engagement composition. Thus, one can expect that influences from peer groups on

children's own engagement would also remain fairly consistent across time.

Peer Networks and Children's Engagement Across Time

Similarity between individuals and the members of their group can be an outcome of three processes: peer selection (e.g., according to similarity), social influence from members of a group, and similarity of influences from people outside the peer context. Structural equation modeling (SEM; Amos 5; Arbuckle, 2003) was used to examine the extent to which children's subsequent (spring) engagement could be predicted from the previous (fall) engagement levels of their peer groups when indicators of assortativeness were controlled. It was expected that the indicators of assortativeness (i.e., peer selection and influences from teachers and parents) would explain a substantial portion of the variance (e.g., Epstein, 1983; Kandel, 1978) but that group profiles would also predict children's resulting engagement.

Figure 2 shows the results. The first set of controls addressed structural aspects of groups that can result from selection processes. Controls were included for students' sex (because of gender differences in engagement and because member selection was gender specific), the size of their peer groups (larger groups consisted of more motivated members), network stability (to balance differential amount of exposure because stable networks were typically more engaged), and children's academic achievement (mathematics grades because students with higher academic ability had more engaged networks). Only achievement and sex were unique predictors.

A second set of controls addressed similarities between children and their group members. Homogeneity in the groups' gender composition was included because of children's preferences for same-sex affiliates. Similarity in engagement between child ren and their groups (absolute difference) was of interest because children who were more similar to their group tended to be more engaged. Neither variable contributed significantly.

A third set of controls addressed the extent to which subsequent engagement scores can be outcomes of the influences of involvement from teachers and parents. Separate regressions showed that teacher and parent involvement were both predictors of children's engagement in the spring ($\beta = .37$, $t = 5.95$, $p < .001$, $n = 222$; and $\beta = .30$, $t = 4.66$, $p < .001$, $n = 230$; using pairwise deletion of missing values). When both teacher and parent involvement were used together, teacher involvement continued to be a significant predictor ($\beta = .30$, $t = 3.99$, $p < .001$, $n = 212$) but at the expense of parent involvement. Thus, both involvement scores were summed as an indicator of adult involvement, which made a strong contribution to the spring engagement.

The resulting model (see Figure 2) showed a good fit with the data ($\chi^2 = 19.005$, $p = .214$; 15 *df*, minimum discrepancy/DF [CMIN/DF] = CMIN/DF = 1.267, comparative fit index [CFI] = .996, root mean square error of approximation [RMSEA] = .027; 90% confidence interval [CI] = .000 to .059). Children's group profiles remained significant predictors of their engagement over and above the effects of the controls. The entire set of variables explained 47% of the variance in engagement. Nested comparisons showed that all network variables explained 24% of the variance and that the assortativeness controls accounted for half of this percentage. On the one hand, this is consistent with traditional assertions that at least half of the similarity between children and their groups would be the outcome of member selection processes (e.g., Hamm, 2000; Kandel, 1978). On the other hand, the simple time-lagged analysis focused on engagement at the end of the year, not on individual change. It shows that children's previous network profiles were related to their own engagement at the end of the school year over and above the contributions of the assortativeness variables. Some of this similarity likely denotes socialization influences, but some also reflect continuity of children's prior engagement. If groups are hypothesized to exert influences, analyses need to examine whether group profiles predict how children change.

Peer Group Influences on Engagement

Hypotheses about peer group socialization effects focused on intraindividual change as an outcome of the influences that group members exert on a child. Analyses examined whether children's peer group affiliations at the beginning of sixth grade predicted their engagement at the end of the school year over and above their own initial engagement. A first analysis used a simultaneous regression to show that changes in children's engagement could be predicted by the engagement composition of their initial peer groups, when only children were included who had nonmissing peer group profiles. The effect was significant ($\beta = .10$, $t = 2.33$, $p < .05$, $n = 263$) and confirmed Kindermann's (1993) findings. However, the partial correlation was small and matched by small average change. Members of networks that showed higher than average engagement at the beginning of the year (who tended to be more engaged themselves) remained stable across time

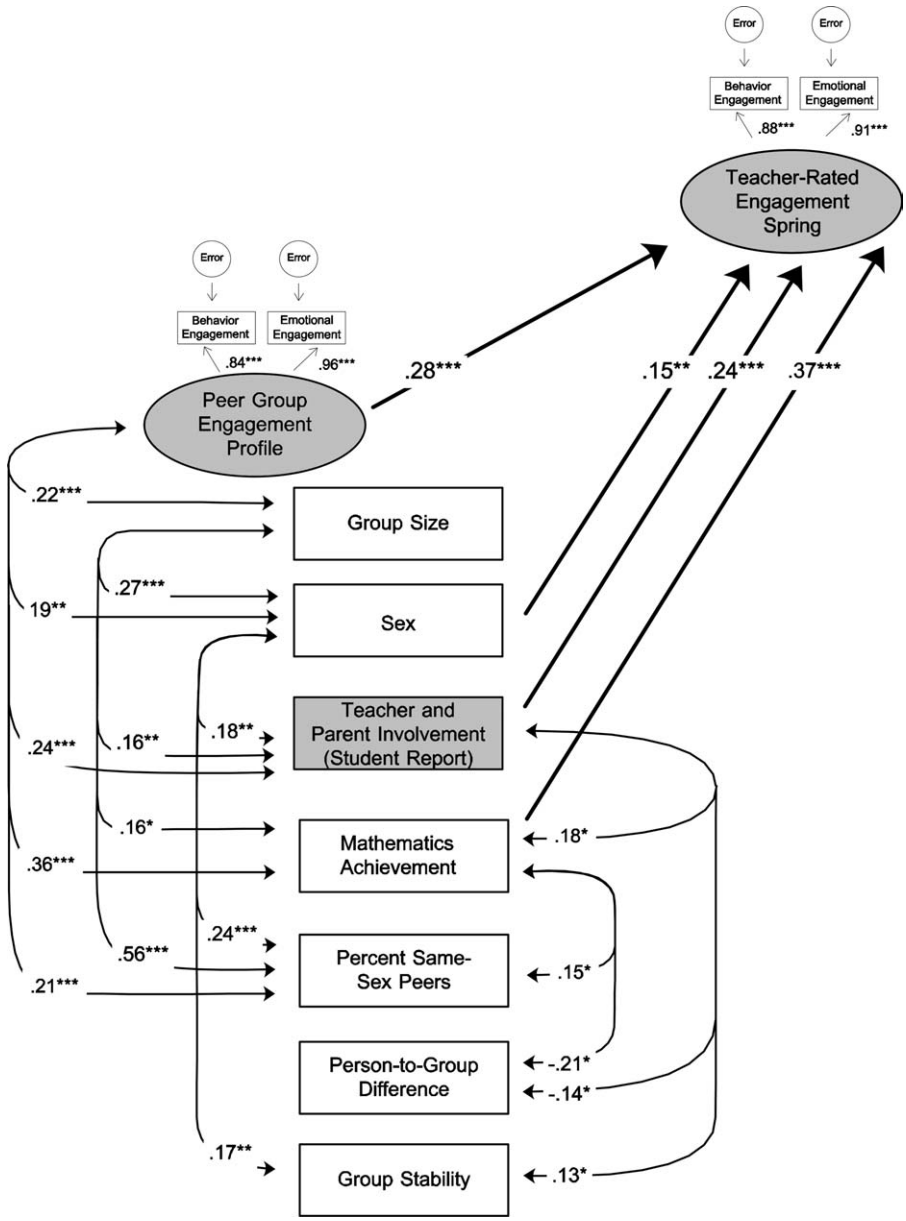

Figure 2. Structural equation model predicting students' engagement at the end of sixth grade.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

(3.30 vs. 3.29), whereas children who were with less engaged groups decreased (by 1.5% on the 4-point scale, from 2.96 to 2.90). Even children with peer groups in the lowest quartile of all groups in the grade did not show more than a 2% decrease. Nevertheless, there were subsets of children for whom peer influences appeared to be more powerful: Peer groups explained 3% of the variance in changes in engagement when only students below the median were considered, and 13% when only the 41 students who changed more than 1 *SD* on the engagement scale were considered.

The study's main analysis included attention to group-member-selection processes as well as to alternative influences. When children select their own peer group members, it is possible that the kinds of criteria they use to select their peers are better indicators of their own developmental pathways than the actual engagement characteristics of their group members. The selection controls that are included (sex, gender homogeneity, achievement levels, network size, and person-to-group similarity) may appear limited in terms of the extent to which they cover the entire range of possible criteria (i.e., the

group names in Figure 1 suggest a multitude of criteria). However, in a longitudinal design, children serve as their own controls and it can be assumed that the controls for person-to-group similarity in engagement (in relative as well as absolute terms) reflect controls for the extent to which various selection preferences have produced similarities in levels of engagement. Finally, because it is also possible that influences from parents and teachers are better predictors of children's change than influences from peer group members, levels of adult involvement were included as additional controls. SEM (Amos 5; Arbuckle, 2003) was used to determine whether children's peer network characteristics were able to predict their own changes in engagement over and above the control variables and the alternative influences. Missing values were estimated using FIML.

Figure 3 shows the results. The data fit the model well (χ^2 = 22.660, p = .481; 23 *df*, CMIN/DF = .985, CFI = 1.00, RMSEA = .000, 90% CI = .000 to .042). Peer group engagement profiles remained predictors of children's change across time over and above the contributions of the controls (β = .128, $p < .05$). The model showed that children's sex was also a significant predictor of engagement change (β = .094, $p < .05$; denoting that girls showed more positive change when their groups' engagement levels were held constant). Network size was a negative predictor when the groups' engagement level was controlled (β = −.141, $p < .01$), although group size had been positively related to engagement at each time point; if a child's group was larger at the average level of engagement, this was associated with negative change. Finally, adult involvement was also a significant predictor over and above group profiles (β = .090, $p < .05$). Academic achievement and the other control variables were correlated with individual and group engagement but were not related to change in engagement over time.

In sum, although peer group influences were small, they existed over and above the contributions of the selection variables and the (similarly small) influences from adults. Three features of the model should be noted. First, SEM methods allow researchers to take correlations between measurement errors into consideration. In the model, individuals' measurement errors were assumed to be correlated across time, and peer group influences were examined over and above the correlated errors. One may argue that this is unrealistic. High stability of children's engagement in terms of teacher perceptions may be due to "real" stability, but it also may be due to stability of measurement errors; both are part of the real world. However, the control did not lower stability to an unrealistic level. When peer group influences on engagement are concerned, it seems preferable to focus on how peers can affect unique teacher ratings independently of effects on measurement errors.

Second, initial measurement errors of the peer group engagement profiles were also assumed to be correlated with initial measurement errors of individual engagement. This is justified because peer group profiles were averaged across the individual scores of the members of a child's peer group. The errors should be correlated; the analysis examined person-to-group similarity independently of similarity in measurement errors. Finally, for reasons of caution, one further peer context variable was included in a follow-up analysis: the engagement profiles of children who were reciprocal friends of a child but not members of his or her peer group network. The goal was to make sure that their inclusion would not alter the findings. These profiles did not contribute to children's change in engagement, and their inclusion had no effect on the fit of the model (χ^2 = 23.947, p = .579, 26 *df*, CMIN/DF = .921, CFI = 1.0, RMSEA = .000; χ^2 difference = 1.347, 1 *df*).

Discussion

The main goal of this study was to examine the effects of sixth graders' naturally existing peer groups on changes in their classroom engagement across the first year of middle school. Based on SCM, 80% of the students were identified as members of social networks; 73% had networks larger than dyads. Networks were found to be homogeneous in their members' levels of engagement. Although member turnover was high across the school year (40%), members were exchanged in such a way that the groups' motivational homogeneity remained fairly intact. Most importantly, peer group profiles of engagement predicted changes in students' own engagement from the fall to the spring of sixth grade. Students who initially shared networks with highly engaged peers remained engaged or even increased, whereas students with less engaged groups showed declines. Across the school year, the magnitude of peer influence amounted to about 2% on the 4-point engagement scale.

Several design features supported the contention that these effects can be interpreted as socialization influences. The study included the entire population of sixth-grade students in a small town, used independent reporters of peer group membership (consensus maps), and classroom engagement (teacher report), relied on indicators of school engagement that are part of everyday social interactions in the classroom, examined students' intraindividual change as the target outcome,

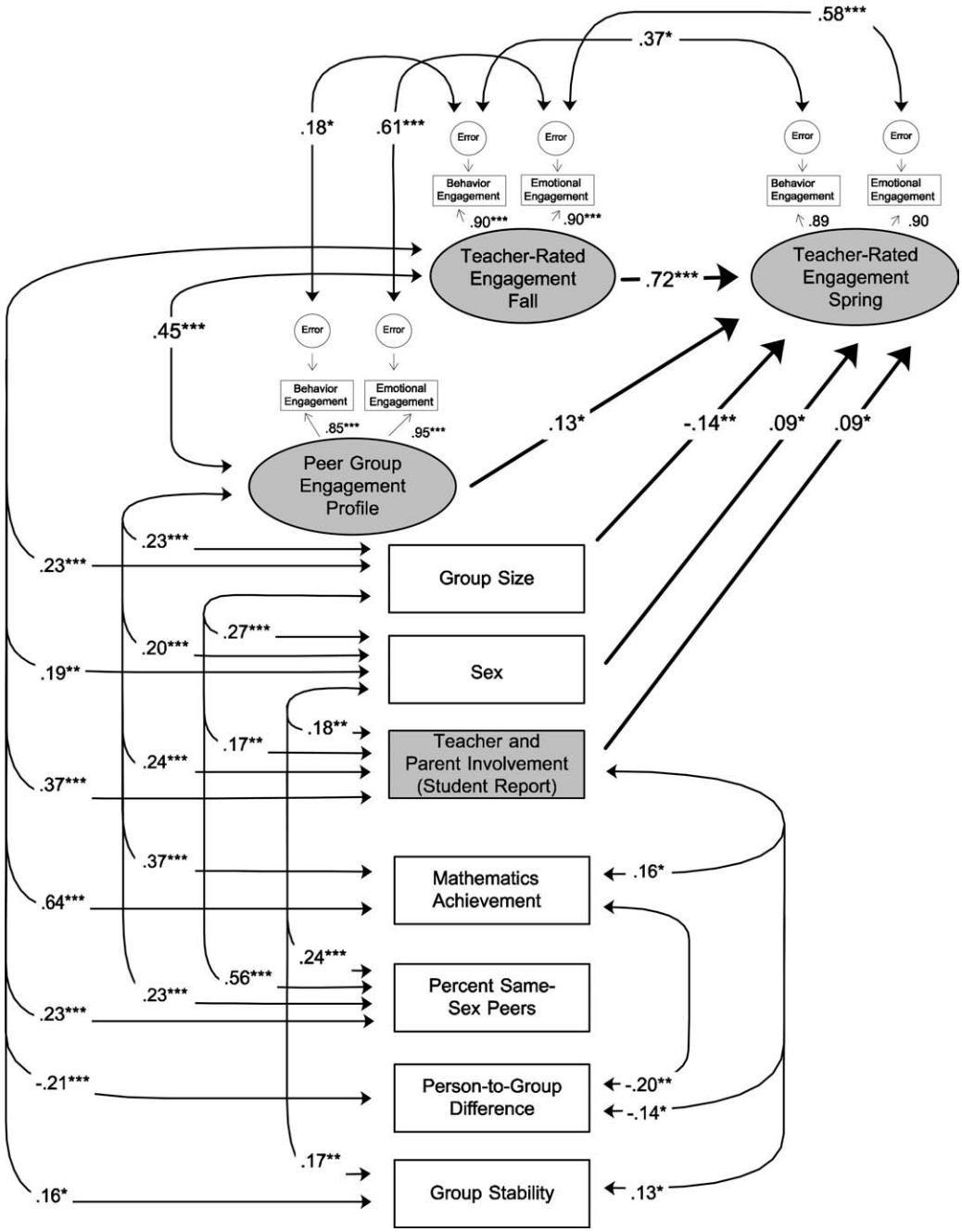

Figure 3. Structural equation model of peer group influences on students' engagement during sixth grade.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

disentangled peer group selection from peer group influences, and controlled for simultaneous socialization influences from teachers and parents. The current findings of peer group influences in a whole town may appear to be less powerful than those found in prior studies that confined the range of students' network members to classmates (Kindermann, 1993; Kindermann et al., 1996), but they remained significant when considered over and above the simultaneous contributions of peer selection processes and the significant contributions from teachers and parents.

Mechanisms of Influence

The design of this study allowed for clear identification of one source of peer influences. However, the nature of the processes that were responsible for change in children's engagement was not explicitly examined. The literature on socialization proposes

several possible (general) processes, such as modeling, reinforcement, and pressure to conform (e.g., Altermatt & Pomerantz, 2003; Harris, 1995; Kindermann, 2003). Beyond these, a variety of other mechanisms have been proposed. Theories of motivation focus on the engagement of peers as an energizing resource; their enthusiastic participation makes schoolwork more fun and enjoyable. Studies in which individual relatedness to friends, peers, and classmates has been found to predict changes in individual engagement over the school year (e.g., Furrer & Skinner, 2003) are consistent with such explanations. Engaged peers may also be sources of help, support, and instrumental aid in tracking and completing seatwork, class projects, and homework assignments.

By the same token, there are additional mechanisms through which peer group disaffection could exert a downward pressure on children's own engagement in school. Disaffected peers may discourage children from becoming involved in current (or trying out new) learning activities, leading children to withdraw their own effort or exertion. If peers value and prioritize nonacademic activities, this may distract children from active participation in school. Peer groups who believe that enthusiasm about learning is not "cool" may undercut children's willingness to demonstrate their interest and commitment to classroom activities (e.g., Graham, Taylor, & Hudley, 1998). All of these are "amplifying" mechanisms in which the rich get richer and the poor get poorer, effects that are consistent with the findings of the current study.

A key direction for future studies on peer influences will be to observe how social influences work in natural environments. Such studies are rare and time consuming, but they have documented a variety of interactions (e.g., discussions, evaluative discourse, prosocial interchanges, and social learning contingencies) that can be mechanisms of influence (e.g., Altermatt, Pomeranz, Ruble, Frey, & Greulich, 2002; Berndt, Laychak, & Park, 1990; Dishion, Andrews, & Crosby, 1995; Hawley, Little, & Pasupathi, 2002; Sage & Kindermann, 1999; Wentzel et al., 2004). The study of peer influences would be strengthened by direct examination of such mechanisms.

Processes of Selection

Although the goal of the present study was to disentangle selection from socialization effects to obtain an estimate of the magnitude of peer influences, findings also revealed strong effects of group member selection. Children sorted themselves into peer groups that were relatively homogeneous in engagement, and although they reshuffled themselves across the school year, the resulting groups again showed similar profiles of engagement (a phenomenon described as assortativeness). If peer groups exert an impact on the trajectories of children's own engagement, it is important to understand how children move into (and out of) peer groups.

It is possible, although not necessary, that children prefer to affiliate with others who show the same degree of interest and enthusiasm for school, that is, the same level of engagement. However, selection using any criteria that are associated with engagement produces similar assortativeness effects. The control variables used in this study suggest multiple avenues of peer selection. One would be achievement: Children may select their peers based on their level of "smarts," preferring to affiliate with children at about the same level of academic performance. Another would be gender: Consistent with most studies on school motivation and peer groups (cf. Eccles et al., 1998), there were gender differences in engagement, corresponding peer group profiles, and changes in motivation. Girls' engagement remained relatively stable whereas boys' decreased, and differences in trajectories coexisted with similarities in processes of how boys and girls selected group members and how they were influenced by their groups.

Many alternative pathways are possible. Children may be excluded from peer groups based on their lack of interest in school or their poor grades (as suggested by the literature on peer rejection; e.g., Bierman, 2004; Buhs, Ladd, & Herald, 2006). Children may also select peers based on their preferred activities (as suggested by the literature on social crowds and friendship groups; e.g., Brown, 1999; Urberg, Degirmencioglu, & Pilgrim, 1997); children who are more into sports or social activities may not be as academically engaged as those focused on good grades. Looking beyond the immediate group itself, children may also prefer others whose parents have similar values and expectations because it allows them to feel more comfortable and to create peer groups whose priorities are consistent with those from home; parents may also try to influence peer associates directly. Finally, children may prefer to spend time with peers who like the teacher as much (or as little) as they do. A key avenue for future research is the study of the processes by which selection (and reselection) occur.

It is important to note that even though several common selection characteristics were related to children's own engagement, indications of group influence effects persisted even when these characteristics were controlled. Consistent with earlier studies (e.g., Kindermann et al., 1996; Sage & Kindermann, 1999), influence processes from peer groups are

present across children with a variety of different selection preferences, and the influences appear to differ only in terms of the levels of engagement at which they operate.

Interplay of Selection and Socialization

The most informative studies of peer influences consider how processes of selection and socialization work together over time. A simple example can be drawn from the current study: If children select others who are similar to themselves to begin with, peer interaction processes do not have as great an opportunity to socialize children toward further similarity (e.g., Altermatt & Pomerantz, 2003). However, it is also possible that if selection occurs primarily on the basis of similarity, socialization effects may lead to maintenance or even to increasing diversity over time. For example, children may select peers who like them just the way they are and may stay engaged with peers only as long as they remain supportive. From this perspective, the role of peer groups might be primarily to support or amplify pre-existing characteristics. Or peer groups may create diversity: Once similar children join together, peers may socialize children to different roles within the group or children may work toward expressing their individuality. Such processes would lead not to increasing homogeneity but to patterns of change in which groups and the individual children within them would become more different from each other over time.

The openness of natural groups, to which children can aspire and from which they can freely exit, may also shape socialization influences in complex ways. For example, mechanisms of influence that rely on negative interactions, such as criticism or coercion, may not be found as frequently in peer groups. If aversive interactions are common, a child would be likely to leave or the group itself might break up. Moreover, such openness may paradoxically allow socialization influences to come before selection occurs, as children try to take on characteristics and behaviors that facilitate group entry. In designing studies, it will be important to recognize that the interplay between selection and socialization is an ongoing process that iterates over time.

Limitations of the Study

The goal of the study was to examine influences from reliably identified peer groups on school motivation in an entire social system. Of course, the focus on a rural town invites new questions about sampling, for example, whether the findings would generalize to larger towns or different school systems. However, two previous studies with children in suburban elementary schools (Kindermann, 1993; Sage & Kindermann, 1999; average engagement levels were 3.0 and 3.2, respectively) and one study with adolescents in an inner-city school (Kindermann et al., 1996; average engagement level was 2.60) have found comparable effects of peer selection and socialization processes. Thus, it seems likely that the findings can be generalized.

A second limitation is that 20% of the children in this study did not have a social network. However, researchers using SCM should not necessarily conclude that all students without social networks are isolated at school; many (76%) of these children had friends. SCM tends to overestimate social isolation for students whose ties are not publicly known or whose friendships are private. Conversely, friendship assessments can underestimate the extent to which children without friends are nevertheless embedded in well-known peer groups of frequently interacting children. Most of the participants without a reciprocal friend (57%) and most of the children who did not nominate a friend (66%) were identified as members of social networks.

Finally, the magnitude of peer effects was modest, particularly when assortativeness was controlled. Several factors place constraints on the magnitude of peer effects, explaining why their influences should not necessarily be larger. First, findings from earlier studies (Kindermann, 1993; Kindermann et al., 1996) suggest that effects can be larger when only classrooms of volunteering teachers, and not an entire social system, are included. The current study included all classrooms in a town as well as cross-classroom networks, and their inclusion should give a more appropriate estimate of the magnitude of peer effects. Second, children with an "average" level of motivation tend to select "average" peers, and only children whose own levels of engagement deviate markedly from those of their peers should be influenced more. Third, although peer influences contribute about 2% to the variance in changes in children's engagement, teachers and parents contribute only about 4% more. It may be wise not to overestimate the extent to which any single kind of context agent can affect changes in children's engagement. Unless subgroups of students can be identified who are particularly susceptible to peer influences, the strongest predictors of children's engagement will always be their past behavior, which includes the cumulative effects of a history of selection and socialization by peers and adults. Finally, there seems to be a pattern of continuous decline in children's motivation across the years they spend in school (see Fredricks et al., 2004). The current study traced the path of only one school year, and it is possible that the peer influences that

appear small in any given year can accumulate substantially across a child's entire school career.

Future Research on Social Influences on Classroom Engagement

The current study focused on peer groups and their influence on changes in children's classroom engagement. This focus converges with almost all developmental theories in postulating that social partners who interact most frequently with a child should be most influential, and it follows the perspective that social interactions are the engine of development (Bronfenbrenner & Morris, 1998). To better understand how these proximal processes operate, future research should focus on processes of selection and reselection, studying how children come to be members of multiple groups, as well as on mechanisms of influence, investigating the pathways through which these peers can shape children's development (Kindermann, 2003). The findings of the study also suggest that a child's peer world is more complex than can be captured by any single approach and that future studies will benefit from combining different methods of assessing children's peer contexts. Different relationships may be differentially influential. As friendship researchers assert (e.g., Gest, Graham-Berman, & Hartup, 2001; Laursen, 2005), peer influences may depend not only on frequency of interaction but also on levels of interpersonal closeness among affiliates. Closeness may boost the influence of peer groups (e.g., Ladd, Birch, & Buhs, 1999), and influences may be strongest from peers who are close to children and who interact with them frequently. Moreover, researchers need to be open to the possibility that closeness and frequency of interaction are not the only features of peer relationships that matter. For example, victimization researchers (Hodges & Card, 2003; Juvonen, Nishina, & Graham, 2000; Snyder et al., 2003) have pointed out that peers whom a child is actively trying to avoid can nevertheless have a profound influence on his or her development in school. A child's social world involves more than relationships with friends and frequent interaction partners. If studies attempt to examine overall patterns of peer influences, additional peer partners would need to be considered.

Finally, future studies may be less concerned with the unique effects from peer groups and more concerned with questions about whether (and how) influences from peers work synergistically or antagonistically with actual influences that emerge from parents or teachers (e.g., Fletcher et al., 1995; Wentzel, 1998). Recently, studies have begun to explore specific combinations of effects from multiple partners (e.g., Chen, Chang, He, & Liu, 2005; Goldstein, Davis-Kean, & Eccles, 2005; Ladd et al., 1999; Mounts & Steinberg, 1995; Pettit, Bates, Dodge, & Meece, 1999; Wentzel, 1998). For future studies incorporating the effects of children's affiliations with peers on their development in school, both alone and in combination with other social partners, the current study supports assumptions about the unique importance of peers. At the same time, it highlights strategies that show much promise for tackling the complex conceptual and empirical issues of how to detect peer group influence effects in naturalistic studies.

References

Altermatt, E. R., & Pomerantz, E. M. (2003). The development of competence-related and motivational beliefs: An investigation of similarity and influence among friends. *Journal of Educational Psychology, 95*, 111–123.

Altermatt, E. R., Pomerantz, E. M., Ruble, D. N., Frey, K. S., & Greulich, F. K. (2002). Predicting changes in children's self-perceptions of academic competence: A naturalistic examination of evaluative discourse among classmates. *Developmental Psychology, 38*, 903–917.

Arbuckle, J. L. (2003). *Amos 5*. Chicago: SmallWaters.

Baltes, M. M. (1996). *The many faces of dependency*. New York: Cambridge University Press.

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., Laychak, A. E., & Park, K. (1990). Friends' influence on adolescents' academic achievement motivation: An experimental study. *Journal of Educational Psychology, 82*, 664–670.

Bierman, K. L. (2004). *Peer rejection: Developmental processes and intervention strategies*. New York: Guilford.

Bronfenbrenner, U., & Morris, P. A. (1998). The ecology of developmental processes. In W. Damon (Series Ed.) & R.M. Lerner (Vol. Ed.), *Handbook of child psychology: Vol. 1. Theoretical models of human development* (5th ed., pp. 993–1028). New York: Wiley.

Brown, B. B. (1999). Measuring the peer environment of American adolescents. In S. L. Friedman & T. D. Wachs (Eds.), *Measuring the environment across the life span: Emerging methods and concepts* (pp. 59–90). Washington, DC: American Psychological Association.

Buhs, E. S., Ladd, G. W., & Herald, S. L. (2006). Peer exclusion and victimization: Processes that mediate the relation between peer group rejection and children's classroom engagement and achievement? *Journal of Educational Psychology, 98*, 1–13.

Bukowski, W. M., & Cillessen, A. H. (Eds.). (1998). Sociometry then and now: Building on six decades of measuring children's experiences with the peer group. *New Directions for Child Development, no. 80*.

Cairns, R. B., & Cairns, B. D. (1994). *Lifelines and risks: Pathways of youth in our time*. New York: Cambridge University Press.

Cairns, R. B., Gariépy, J.-L., & Kindermann, T. A. (1990). *Identifying social clusters in natural settings*. Unpublished manuscript, University of North Carolina at Chapel Hill.

Cairns, R. B., Perrin, J. E., & Cairns, B. D. (1985). Social structure and social cognition in early adolescence: Affiliative patterns. *Journal of Early Adolescence*, *5*, 339–355.

Chen, X., Chang, L., & He, Y. (2003). The peer group as a context: Mediating and moderating effects on relations between academic achievement and social functioning in Chinese children. *Child Development*, *74*, 710–727.

Chen, X., Chang, L., He, Y., & Liu, H. (2005). The peer group as a context: Moderating effects on relations between maternal parenting and social and school adjustment in Chinese children. *Child Development*, *76*, 417–434.

Connell, J. P. (1990). Context, self, and action: A motivational analysis of self-system processes across the life-span. In D. Cicchetti (Ed.), *The self in transition: Infancy to childhood* (pp. 61–97). Chicago: University of Chicago Press.

Connell, J. P., Halpern-Felsher, B. L., Clifford, E., Crichlow, W., & Usinger, P. (1995). Hanging in there: Behavioral, psychological, and contextual factors affecting whether African American adolescents stay in school. *Journal of Adolescent Research*, *10*, 41–63.

Connell, J. P., Spencer, M. B., & Aber, J. L. (1994). Educational risk and resilience in African-American youth: Context, self, action, and outcomes in school. *Child Development*, *65*, 493–506.

Dishion, T. J., Andrews, D. W., & Crosby, L. (1995). Antisocial boys and their friends in early adolescence. *Child Development*, *66*, 139–151.

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.

Englund, M. M., Luckner, A. E., Whaley, G. J. L., & Egeland, B. (2004). Children's achievement in early elementary school: Longitudinal effects of parental involvement, expectations, and quality of assistance. *Journal of Educational Psychology, 96*, 723–730.

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. Karweit (Eds.), *Friends in school: Patterns of selection and influence in secondary schools* (pp. 177–200). New York: Academic Press.

Farmer, T. W., & Rodkin, P. C. (1996). Antisocial and prosocial correlates of classroom social positions: The social network perspective. *Social Development*, *5*, 174–188.

Finn, J. D. (1989). Withdrawing from school. *Review of Educational Research*, *59*, 117–142.

Fletcher, A. C., Darling, N. E., Steinberg, L., & Dornbusch, S. M. (1995). The company they keep: Relation of adolescents' adjustment and behavior to their friends' perceptions of authoritative parenting in the social network. *Developmental Psychology, 31*, 300–310.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74*, 59–109.

Furrer, C., & Skinner, E. A. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology, 95*, 148–162.

Gest, S. D., Farmer, T. W., Cairns, B. D., & Xie, H.-L. (2003). Identifying children's peer social networks in school classrooms: Links between peer reports and observed interactions. *Social Development*, *12*, 513–529.

Gest, S. D., Graham-Berman, S., & Hartup, W. W. (2001). Peer experience: Common and unique features of the number of friendships, social network centrality, and sociometric status. *Social Development*, *10*, 23–40.

Goldstein, S. E., Davis-Kean, P. E., & Eccles, J. S. (2005). Parents, peers, and problem behavior: A longitudinal investigation of the impact of relationship perceptions and characteristics on the development of adolescent problem behavior. *Developmental Psychology, 41*, 401–413.

Graham, S., Taylor, A. Z., & Hudley, C. (1998). Exploring achievement values among ethnic minority early adolescents. *Journal of Educational Psychology, 90*, 606–620.

Grolnick, W. S., & Slowiaczek, J. L. (1994). Parental involvement in children's schooling: A multidimensional conceptualization and motivational model. *Child Development*, *65*, 237–252.

Guay, F., Boivin, M., & Hodges, E. V. E. (1999). Predicting change in academic achievement: A model of peer experiences and self-system processes. *Journal of Educational Psychology, 91*, 105–115.

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.

Harris, J. R. (1995). Where is the child's environment? A group socialization theory of development. *Psychological Review, 102*, 458–489.

Hawley, P. H., Little, T. D., & Pasupathi, M. (2002). Winning friends and influencing peers: Strategies of peer influence in late childhood. *International Journal of Behavioral Development*, *26*, 466–474.

Hodges, E. V. E., & Card, N. A. (Eds.). (2003). *Enemies and the darker side of peer relations*. San Francisco: Jossey-Bass.

Jaccard, J., Blanton, H., & Dodge, T. (2005). Peer influences on risk behavior: An analysis of the effects of a close friend. *Developmental Psychology, 41*, 135–147.

Jimerson, S. R., Campos, E., & Greif, J. L. (2003). Towards an understanding of definitions and measures of school engagement and related terms. *The California School Psychologist*, *8*, 7–28.

Juvonen, J., Nishina, A., & Graham, S. (2000). Peer harassment, psychological adjustment, and school functioning in early adolescence. *Journal of Educational Psychology, 92*, 349–359.

Kandel, D. B. (1978). Homophily, selection, and socialization in adolescent friendships. *American Journal of Sociology, 84*, 427–436.

Kiesner, J., Poulin, F., & Nicotra, E. (2003). Peer relations across contexts: Individual-network homophily and

network inclusion in and after school. *Child Development*, *74*, 1328–1343.

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. (1996). Strategies for the study of individual development within naturally existing peer groups. *Social Development*, *5*, 158–173.

Kindermann, T. A. (2003). Development of children's social relationships. In J. Valsiner & K. Connolly (Eds.), *Handbook of developmental psychology* (pp. 407–430). Thousand Oaks, CA: Sage.

Kindermann, T. A., McCollam, T. L., & Gibson, E. (1996). Peer group influences on children's developing school motivation. In K. Wentzel & J. Juvonen (Eds.), *Social motivation*: *Understanding children's school adjustment* (pp. 279–312). Newbury Park, CA: Sage.

Kurdek, L. A., & Sinclair, R. J. (2000). Psychological, family, and peer predictors of academic outcomes in first through fifth grade children. *Journal of Educational Psychology, 92*, 449–457.

Ladd, G. W., Birch, S. H., & Buhs, E. S. (1999). Children's social and scholastic lives in Kindergarten: Related spheres or influence? *Child Development*, *70*, 1373–1400.

Laursen, B. (2005). Dyadic and group perspectives on close relationships. *International Journal of Behavioral Development*, *29*, 97–100.

Leung, M.-C. (1996). Social networks and self enhancement in Chinese children: A comparison of self reports and peer reports of group memberships. *Social Development*, *5*, 146–157.

Moreno, J. L. (1934). *Who shall survive? A new approach to the problem of human interrelations*. Washington, DC: Nervous and Mental Disease Publishing.

Mounts, N. S., & Steinberg, L. (1995). An ecological analysis of peer influence on adolescent grade point average and drug use. *Developmental Psychology, 31*, 915–922.

Noack, P. (2004). The family context of preadolescents' orientations towards education: Effects of maternal orientations and behavior. *Journal of Educational Psychology, 96*, 714–722.

Pettit, G. S., Bates, J. E., Dodge, K. A., & Meece, D. W. (1999). The impact of after-school peer contact on early adolescent externalizing problems is moderated by parental monitoring, perceived neighborhood safety, and prior adjustment. *Child Development*, *70*, 768–778.

Poulin, F., Dishion, T. J., & Haas, E. (1999). The peer influence paradox: Friendship quality and deviancy training within male adolescent friendship. *Merrill-Palmer Quarterly, 45*, 42–61.

Ratelle, C. F., Guay, F., Larose, S., & Senėcal, C. (2004). Family correlates of trajectories of academic motivation during a school transition: A semiparametric group-based approach. *Journal of Educational Psychology, 96*, 743–754.

Rubin, K. H., Bukowski, W., & Parker, J. G. (2006). Peer interactions, relationships, and groups. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (6th ed., pp. 571–645). New York: Wiley.

Ryan, A. M. (2001). The peer group as a context for the development of young adolescents' 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.

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.

Skinner, E. A., Johnson, S., & Snyder, T. (2005). Six dimensions of parenting: A motivational model. *Parenting: Science and Practice*, *5*, 175–236.

Skinner, E. A., Kindermann, T. A., Connell, J. P., & Wellborn, J. G. (in press). Engagement as an organizational construct in the dynamics of motivational development. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook of motivation in school*. Mahwah, NJ: Erlbaum.

Skinner, E. A., Wellborn, J. G., & Connell, J. P. (1990). What it takes to do well in school and whether I've got it: A process model of perceived control and children's engagement in the classroom. *Journal of Educational Psychology, 82*, 22–32.

Skinner, E. A., Zimmer-Gembeck, M. J., & Connell, J. P. (1998). Individual differences and the development of perceived control. *Monographs of the Society for Research in Child Development, 6(Serial No. 245)*.

Snyder, J., Brooker, M., Patrick, M. R., Snyder, A., Schrepferman, L., & Stoolmiller, M. (2003). Observed peer victimization during early elementary school: Continuity, growth, and relation to risk for child antisocial and depressive behavior. *Child Development*, *74*, 1881–1898.

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.

von Eye, A. (1990). *Introduction to configural frequency analysis: The search for types and antitypes in cross-classifications*. New York: Cambridge University Press.

Wellborn, J. G. (1991). *Engaged vs. disaffected action: Conceptualization and measurement of motivation in the academic domain*. Unpublished doctoral dissertation, University of Rochester.

Wentzel, K. R. (1998). Social relationships and motivation in middle school: The role of parents, teachers, and peers. *Journal of Educational Psychology, 2*, 202–209.

Wentzel, K. R., & Caldwell, K. (1997). Friendships, peer acceptance, and group membership: Relations to academic achievement in middle school. *Child Development*, *68*, 1198–1209.

Wentzel, K. R., McNamara-Barry, C., & Caldwell, K. A. (2004). Friendships in middle school: Influences on motivation and school adjustment. *Journal of Educational Psychology, 96*, 195–203.

Wigfield, A., Eccles, J. S., Schiefele, U., Roeser, R., & Davis-Kean, P. (2006). Development of achievement motivation. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional and personality development* (6th ed., pp. 933–1002). New York: Wiley.