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Natural Peer Groups as Contexts for Individual Development: The Case of Children's Motivation in School

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This study examined the role of natural peer-group selection and socialization processes in children's school motivation. At the beginning of the school year, self- and teacher reports of classroom engagement were obtained for 109 students in 2 4th- and 2 5th-grade classrooms. On the basis of interviews with 57 students, composite maps of the social networks in these classrooms were constructed, which were found to be reliable across reporters and composed of children with similar motivational orientations. Longitudinal analyses of a 4th-grade classroom across the school year indicated continuity in the motivational composition of peer groups, despite considerable changes in individual memberships. Evidence was found for motivationally based group selection across time and for group socialization of individuals' engagement.

Children's motivation in school has been a central concern for psychologists and educators because of its short-term and long-term consequences. Children who are engaged in the challenges of ongoing learning activities can be expected to increase their competencies across time and to feel pride and satisfaction in their accomplishments. Research shows that children who are engaged in school do in fact earn higher grades, score higher on standardized tests of achievement, and show better personal adjustment to school (Skinner, Wellborn, & Connell, 1990).

However, a largely unexplored influence on children's motivation is their peer-group affiliations in school. Traditionally, teachers and parents have been studied as the major socialization agents of children's academic motivation (Blumenfeld, 1992). However, teachers and parents themselves insist that peer groups play an important role in children's motivation, personal adjustment, and socialization and that they directly impinge on their academic learning and success.

Currently, research on peer influences follows two general avenues: the study of friendship dyads (e.g., Berndt, 1989; Furman, 1989; Gottman, 1983) and the study of sociometric peer status in the classroom as a whole (e.g., Asher & Dodge, 1986; Ladd, 1983). Studies on friendships, following the example of research on parent–child socialization, examined dyadic peer and friendship interactions for their effects on individuals' development (Berndt, Laychak, & Park, 1990; Tesser, Campbell, & Smith, 1984; see also Hartup, 1983). From this perspective, a target child's development is influenced by the personal characteristics of those children with whom he or she shares reciprocal stable dyadic relationships. In sociometric research, in contrast, methodologically sophisticated strategies for assessing overall popularity have been considered to be state-of-the-art methods (Asher & Dodge, 1986; Coie & Dodge, 1983; see also Cairns, 1983). This tradition holds that one's standing within the classroom as a whole is a determinant of one's future development. Although these sociometric methods are useful assessments of overall popularity, they provide little information on natural networks of individuals and thus are not designed to identify the specifics of socialization contexts for target children.[1]

The present study is an attempt to complement these two traditions. A new method was used to identify those individuals who make up a target child's natural peer network in order to determine potential influences of close social partners on that individual's motivational development. Consistent with sociometric traditions, it is assumed that students develop within a peer context that has a certain structure, that this structure is perceived similarly by many students in a classroom, and that this structure has important implications for individuals' development. Following friendship research, it is assumed that it is essential to identify important others and the characteristics they possess, in order to examine their influence on the individual. In the present study, *composite social–cognitive maps* are formed of natural group structures within the classroom on the

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[1] Although in current psychological research the use of sociometric analyses appears to be restricted to examining individuals' positions within a setting, in sociology sociograms are often used for examining networks of relationships (e.g., Wellman & Berkowitz, 1988).

basis of multiple children's reports of which children "hang out together in a group" (Cairns, Gariepy, & Kindermann, 1990; Cairns, Perrin, & Cairns, 1985).

Peer Contexts and Motivation

Why should a student's peers influence his or her motivation in school? Children's networks of peers consist largely of their friends; hence, children personally identify with them and share some degree of relational bond (Berndt, 1989; Lynch & Wellborn, 1988). Children choose to associate, spend time, and participate in activities with their peer groups (Cairns, Neckerman, & Cairns, 1989; Larson & Richards, 1991). Frequent contact and common activities, combined with interpersonal connectedness, may make children's peer groups a strong socializing power in the classroom. Consistent with these expectations are findings that individuals who stay close friends across time tend to become more similar to one another (Kandel, 1978a, 1978b) and experimental findings that interactions among close friends can change students' school motivation (Berndt et al., 1990).

However, natural peer contexts differ from those studied traditionally in socialization research (e.g., parents and teachers) in that these are not biologically or institutionally assigned; individuals themselves have some say about who will be included in their context. Hence, it becomes important to ask about which others become selected as peer affiliates by a given student. The purpose of the current research is to examine the extent to which natural and changing peer affiliations can be studied as contexts for the development of children's motivation in school.

In this study, student motivation is conceptualized as *engagement versus disaffection* (Connell, 1990; Connell & Wellborn, 1991). The concept refers to the intensity and quality of children's involvement in initiating and carrying out learning activities and encompasses the typical behavioral constructs from theories of achievement motivation (Wellborn, 1991). Engagement includes sustained involvement in learning activities; children who are engaged select tasks at the border of their competencies, initiate action when given the opportunity, and exert effort and concentration in the implementation of learning tasks. The opposite of engagement is disaffection. Disaffected children are passive, do not try hard, and give up easily in the face of challenges.[2]

It should be noted that although school motivation was the focus of this study, it is only one possible candidate for a construct around which peer groups can be organized. In fact, more obvious and publicly observable student characteristics (e.g., intelligence, extracurricular activities, school achievement, socioeconomic status) might be expected to be even more critical for group formation. Although it is not assumed that students' motivation is the primary catalyst for group affiliations, and, although it is acknowledged that affiliations are formed for many reasons, it was the goal of this study to examine whether school motivation can be considered to be one of the features around which peer groups are organized.

Research Questions

The study is meant as an initial correlational investigation of the role of peer contexts in children's motivation to learn. Hence, although one aim is to introduce a method to identify the people who make up a child's natural peer group, the main focus is on examining the processes of how children's peer contexts can influence their engagement and disaffection in school. The study consists of two parts: a set of questions on concurrent relations between peer groups and children's motivation and a set of questions addressing longitudinal changes in these relations.

Concurrent analyses examine whether the composition of a given child's peer group can be based on motivation; group homogeneity would be regarded as initial evidence for peer-selection processes according to motivational criteria. Longitudinal analyses examine two further questions. The first is about peer selection and resulting change in the motivational composition of a child's peer group across time: Are new peer-group members also selected according to motivational criteria? The second question is about evidence for socialization processes: Are changes in children's motivation related to their earlier peer affiliations?

The most basic question centered on the motivational composition of peer groups: Can peer groups be understood as being organized around children's behavioral engagement in school? The issue was whether, for any target child, that child's motivational orientation would be more similar to his or her own peer group than to non-peer-group classmates. If groups appear motivationally homogeneous at one point in time, we have support for the notion that they are initially formed around motivational criteria. Corresponding questions about the role of peer-selection and socialization processes across time were examined longitudinally.

The selection hypothesis suggests that, despite changes in the particular individuals who make up a network at different points in time, the motivational composition of the networks will nevertheless stay stable. It should be noted that change in peer groups comprises two simultaneous processes: namely, change in who is a member of a peer group (member turnover) and change within the individuals themselves (member development). Hence, group stability needs to be examined separately with regard to membership and intraindividual changes. In addition, changes in the composition of a student's peer group were expected to be predictable from individuals' initial level of motivation: Highly motivated students were expected to belong to networks that changed in a positive direction over the school year, and students with low motivation were expected to belong to networks that changed negatively.

Testing hypotheses about socialization processes within peer groups involved examining changes in how children themselves felt. Evidence for socialization processes would be found if the initial level of motivation of a child's peer group could predict that child's own change in motivation over time.

Method

Sample

Within the first month of a school year, 109 children from four classrooms (two each in Grades 4 and 5) in a rural/suburban school

[2] Although the concept includes the two components of behavioral and emotional engagement (Wellborn, 1991), in the current study, only the behavioral component was examined.

district in upstate New York filled out self-reports about their classroom engagement; their teachers completed parallel teacher reports. Students were lower-middle to middle class and were almost equally divided by grade, classroom, and sex. Of these students, 57 for whom separate parental permission was obtained were interviewed individually about their classroom's peer networks. At a second measurement point within the last month of school, 104 students participated again in an administration of the questionnaire, and 22 students in one of the fourth-grade classrooms (selected based on convenience) were interviewed again.[3]

Measures

Engagement versus disaffection. Student engagement was assessed using teacher perceptions of how students appeared in class and self-reports of student motivation. Teacher reports were considered to be indicators of students' observable behavior in the classroom; self-reports were considered to be indicators of students' internal states. For teachers, a 10-item scale was used that tapped their perceptions of each student's behavioral involvement during learning activities (Skinner et al., 1990; Wellborn, 1991). Examples are "This student just tries to look busy" or "works as hard as he/she can." The scale forms a highly internally consistent indicator of student engagement ($\alpha = .95$, $n = 185$; Wellborn, 1991), and over an 8-month period, the ratings were shown to be highly stable ($r = .73$, $p < .001$, $n = 144$; (Skinner & Belmont, in press; Skinner et al., 1990).

Students' self-reported engagement was assessed using a parallel 10-item scale. Examples are "I try as hard as I can in school" or "When I'm in class, I just act like I'm working." The scale shows high internal consistency ($\alpha = .87$) and stability ($r = .72$, $p < .001$, $n = 144$; Skinner & Belmont, in press) across a school year.

In previous studies, teacher reports and self-reports for behavior engagement were found to be moderately intercorrelated ($r = .31$, $p < .01$, $n = 144$). Also significant correlations were reported with students' grades and achievement scores in mathematics, language, and science (ranging from .26 to .67; Skinner et al., 1990; Wellborn, 1991).

Peer groups. For assessments of peer-group networks, individual children were asked to report, of their classmates, "who hangs around together" with whom. A typical report would, for example, state that the children KIM, MIA, and LYN form one group and IAN, CAL, and NAT form another; if reporters wanted to do so, classmates could be reported as belonging to more than one group at the same time. From these interviews, the social network structures of the entire classrooms were reconstructed. One of the advantages of the method used is that not every student in the classroom needs to be interviewed to achieve a reliable map of its network structures. (For further discussion of the nomination procedure, see Cairns et al., 1985.) It should be noted that the procedure uses students' free recall and so does not rely on assumptions of uniform informedness among the students in a class.

Using multiple reporters from each classroom, composite social maps were formed for a summary account of the total group structure in each classroom. Because the method is new, the procedure by which peer-group scores for individuals were derived are explained in more detail.

First, to determine group structures, matrices were constructed of the frequencies with which any two individuals were nominated to be together in the same group, separately for each classroom. These matrices were the basis for further analyses (see Table 1 for an example of one of the fourth-grade classrooms for girls). Three points should be noted. First, conominations across genders were rare and are not depicted. Second, a student could be nominated to belong to more than one group; hence conominations were often larger than the total number of informants in the class. For example, students FAY and BEV were conominated 21 times (by 14 reporters); of these, 9 reporters conominated them only once in a group of girls, 1 reporter nominated them for an additional group that included other girls, two reporters nominated them once for groups that included boys, and both BEV and FAY themselves also included several boys in additional groups. Third, for illustration, quite complex networks are depicted in Table 1; often, clear network structures emerged already from co-occurrence matrices.

Conomination matrices can be analyzed in a variety of ways to construct representations of network structures (Cairns et al., 1990). Examples include weighted chi-square analyses; correlational analyses of relationship similarities, which can be tested using structural linear equation models (Jöreskog & Sörbom, 1985); hierarchical cluster analyses in conjunction with multidimensional scaling; principal coordinate analysis; and correspondence analysis (Legendre & Legendre, 1983).

For purposes of this study, individuals' networks were determined using a very simple and straightforward method, namely, binomial z tests on conditional probabilities of conominations. For every student, the question was asked, "Given that this student has a group, how likely are any other students to be found in this group?" This conditional probability was compared with the probabilities that these students were named in any group at all. The advantage of this procedure is that for every child in a classroom, on a given significance level, those children who make up this child's peer-group members are identified.[4]

For example, in one classroom (see Table 1), of all individual students nominated for groups, ANN was named 31 times and BEV was named 33 times. Given that ANN was named as a member of a group, BEV was named 29 times (of 31) as a member of the very same group. This leads to a conditional probability of .94 for BEV to be named in the same group as ANN. Because 159 groups were generated in total by the 22 respondents, the expected (unconditional) probability for BEV to be found in any group is .21 (33/159). The test yields a z score of 11.14 for BEV to be named in ANN's group, which is highly significant ($p < .01$). The same procedure was applied to all students' conominations in the class.

The resulting interconnections among individuals can be represented in the form of network structures (Figure 1). Conominations significant at $p < .01$ are depicted; geometric distances are arbitrary. Note that, across classrooms, there was high variability of network sizes (ranging from many dyads up to one group of 7 boys in a fifth-grade classroom; average size was 2.3); although in this specific classroom no girl was found without a group, this was the case for a total of 13 children.

In a second step, for each child, a peer-group motivation score was calculated by averaging the engagement scores of the other members of a given child's peer groups, with the target child's own score deleted. The resulting peer-group motivation scores ranged from 1.6 to 4.0 for teacher reports and from 1.33 to 4.0 for self-reports (with 1 indicating total alienation and 4 highest engagement).

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[3] Note that analyses of variance (ANOVAs) showed that the 57 students who participated in the individual interviews did not differ on any of the motivational variables from the 52 students who did not. Missing values of 5 students who did not attend the second questionnaire administration were estimated as classroom- and gender-specific averages.

[4] In those cases in which group membership probabilities were too small for the z test, an approximation to the exact binomial test was used (using Stirling's formula; see von Eye, 1990). The major advantage of using a significance criterion (in difference to frequencies of conominations) for determining whose peer scores to include in a child's group average is an adjustment for nomination base rates (in analogy to Bakeman and Gottman's 1986 sequential analysis, less often but consistently co-occuring candidates have chances for group inclusion that are equal to those for very popular students).

Table 1
Example of a Co-Occurrence Matrix for Girls in a Fourth-Grade Classroom

Student	Student													Total nominations[a]
	ANN	BEV	CAM	DEE	EVE	FAY	GIN	HEA	INA	JAN	KIM	LYN	MIA	
ANN	—	29	12	11	4	19	11	4	4	3	1	1	1	31
BEV	29	—	11	10	4	21	11	4	5	3	1	1	1	33
CAM	12	11	—	19	11	8	13	8	5	4	2	2	4	25
DEE	11	10	19	—	9	6	8	5	5	4	2	0	2	23
EVE	4	4	11	9	—	3	9	4	2	3	5	5	3	17
FAY	19	21	8	6	3	—	14	5	6	4	2	4	3	28
GIN	11	11	13	8	9	14	—	12	7	11	6	6	7	34
HEA	4	4	8	5	4	5	12	—	5	8	3	3	5	16
INA	4	5	5	5	2	6	7	5	—	2	2	1	1	14
JAN	3	3	4	4	3	4	11	8	2	—	1	3	4	14
KIM	1	1	2	2	5	2	6	3	2	1	—	7	5	13
LYN	1	1	2	0	5	4	6	3	1	3	7	—	15	19
MIA	1	1	4	2	3	3	7	5	1	4	5	15	—	19

Note. Matrix represents the number of times each child in the classroom was reported to be in the same group as any other child. In the total classroom, groups generated = 159, group nominations = 565.
[a] Totals of single nominations are necessarily smaller than the sums of multiple conominations.

Consistency of Individuals' Network Nominations

Interreporter consistency was evaluated by comparing individual reporters' group nominations with the extracted composite map, focusing on errors of commission only. Individuals' nominations were found to be quite consistent with the composite networks ($\kappa = .70$); using ANOVAs, no indications were found for reliability differences across grades, gender of respondents, or points of measurement.

Results

Initial Peer-Group Composition

Initial data analyses focused on the homogeneity of peer groups with regard to motivational characteristics of their members at the beginning of the school year. Note that, for these analyses, 13 students were left out who were found not to belong to a group.

Two approaches were used to examine group homogeneity. First, individuals were assigned to groups, using a 50% decision rule applied to the significant connections. As can be seen in Figure 1, students could be members of several groups at the same time. In all 4 classrooms (with 35 groups identified), 8 students were found to be members of 2 groups and 1 student a member of 3 groups. It should be noted that group assignments could also have been based on conomination frequencies (e.g., Gest, Graham-Bermann, & Hartup, 1991). However, the significance-based approach appears more consistent with the correlational analyses to follow: On average, assigned groups consisted also of about two companions for a given child.

A multivariate analysis of variance (MANOVA) procedure with groups as the independent variable and reporter (i.e., teacher and self) as the dependent variables was used in an unbalanced design to test the hypothesis that peer groups were similar in their motivational orientations. Using the scores of members of multiple groups repeatedly reduced the variance between groups. Nevertheless, it was found that the variance in individuals' engagement within peer groups was still smaller than the variance between groups, $F(68, 152) = 1.86$, $p < .001$. Separate univariate tests yielded significant differences for both teacher-rated engagement, $F(34, 77) = 1.74$, $p < .05$, and self-reported engagement, $F(34, 77) = 2.28$, $p < .01$.

Second, correlational analyses were used to examine the correspondence between individual children's scores and their peer-group scores on the motivation variables. It should be reiterated that, for each child, his or her peer-group score was the average of the scores of those classmates who were in that child's peer group. The correlations can be interpreted analogous to item–total correlations, in which a child's peer group is the scale and the child an item. The correlations were significant for teacher-rated engagement ($r = .55$, $n = 96$, $p < .001$). Correlations between individuals' self-reported engagement and their groups' scores, although lower, were also significant ($r = .28$, $n = 96$, $p < .01$).

Peer-Group Stability Across the School Year

Longitudinal analyses examined how children and their peer groups changed. Analyses on group changes are based on the data from one fourth-grade classroom, for which group information was available at the end of the school year. In a MANOVA, no significant differences emerged between this and the other classrooms in any of the individual or group variables. It should be noted that, although 3 students in this class belonged to no group initially, all were integrated in groups by the end of the year.

First, stability in peer-group memberships was examined. Overall, stability in group memberships was low, with about 50% turnover across the 8 months ($\kappa = .44$). Second, it was examined whether, despite turnover, children's peer groups remained stable in terms of their motivational composition. For this analysis, individuals' own motivation was treated as stable across time. Children's group scores at the beginning of the year were compared with their group scores at the end, when both averages were based on individual motivation scores from the beginning of the year. Significant continuity was found in how children's networks appeared motivationally (teacher report, $r =$

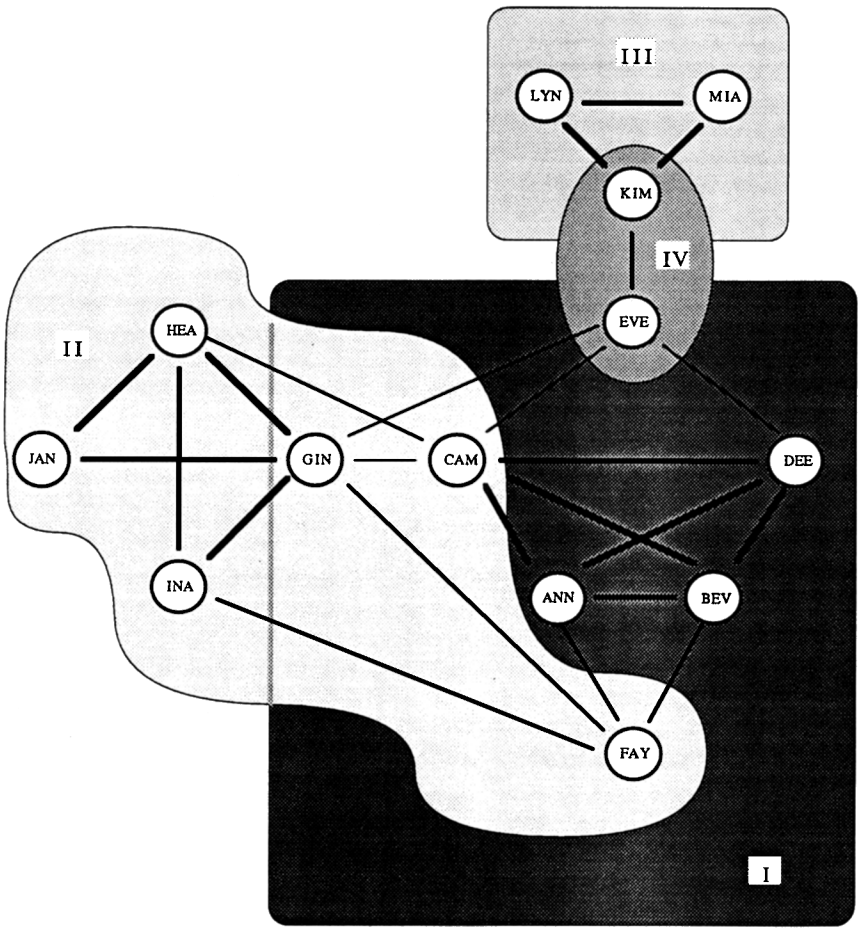

Figure 1. Composite social network: Classroom 4A for girls (dyadic interconnections with $p < .01$). (Note that, although specific assignments of individuals to groups are not necessary for most methods presented here, they are for examining group differences. A 50% group inclusion rule was used for groups with more than two members: Group 1 was first considered to be formed by students ANN to DEE, then to also include EVE and FAY, who each had connections with 50% of these four, and then to include GIN, who had again connections with 50% of the six others. Group 2 was formed by GIN to JAN and included CAM and FAY; Group 3 consisted of KIM to MIA, and Group 4 of EVE and KIM.)

.80, $p < .001$, $n = 25$; self-report, $r = .47$, $p < .05$, $n = 25$). ANOVAs showed no mean level changes in children's group scores across time. They did, however, show an increase in the average group size (from 2.2 to 2.64), $F(1, 27) = 45.40$, $p < .0001$. In sum, despite turnover, children's changing peer groups were found to reorganize in a way that their motivational profiles remained intact.

Longitudinal Peer Selection and Socialization

The results indicating motivational homogeneity at the beginning of the year and continuity of changing peer networks across the year can be regarded as initial evidence for peer selection and socialization processes. In addition, group changes across the year were examined. If children's peer-group scores at the end of the year were still related to how motivated the children themselves were at the beginning, this would be evidence for continued selection processes across time. With regard to teacher perceptions, when membership changes only were concerned (and intraindividual change was again eliminated), children's group scores at the end of the year were found to be correlated with their individual scores at the beginning ($r = .68$, $p < .001$, $n = 25$). This was not the case for student's self-report engagement scores ($r = .20$, *ns*, $n = 25$).

For further examination of selection processes, the hypothesis was tested that individuals had an effect on their groups' motivational profiles; analyses examined the extent to which students' motivation at the beginning of the year predicted *changes* in the motivational composition of their peer networks. Multiple regression analyses were used to determine whether children's group scores in the Spring could be predicted from their own individual motivation in the Fall over and above the contribution of their initial group scores.

For use in these analyses, an index of the magnitude of group membership changes, referred to as the selection index, was calculated as the proportion of the resulting networks in the Spring that was due to inclusion of new members since the Fall. It was assumed that selection processes would have a larger

impact in groups in which more membership turnover had occurred. Thus, these analyses examined how individuals' motivation scores, weighted by the amount of newly gained peer-group members, predicted changes in the groups' composition across time.

With regard to teacher-rated engagement, changes in the motivational composition of children's groups were significantly related to children's own initial motivation (weighted with the selection index; standardized regression coefficient: $\beta = .37$, $t = 2.42$, $p < .05$, $n = 25$). Hence, children's engagement (teacher rated) at the beginning of the school year predicted changes in how motivated their peer groups were across time, especially for those children whose groups had high member turnover. (Average initial engagement was 2.9 for children whose groups changed positively compared with 2.7 for children whose peer groups did not change or changed negatively.) However, self-reported engagement, also weighted with the selection index, did not predict changes in the motivational composition of children's networks.[5]

To explain this latter finding further, individuals' self-perceptions were examined using the whole sample. For this, membership turnover, instead of intraindividual change, was controlled. Children's motivation at the beginning of the school year was found to be related to their peer-group scores at the end, when only outcomes of intraindividual change in network members were considered ($r = .29$, $p < .01$, $n = 96$). Thus, it was concluded that member turnover had resulted in a loss in motivational homogeneity with regard to self-perceptions.

In sum, three kinds of evidence were found for the hypothesis that selection processes were related to motivational criteria: (a) Initial peer-group homogeneity suggested that selection processes according to motivational criteria existed at the beginning of the year; (b) with regard to teacher ratings, despite considerable membership turnover across the school year, peer groups' motivational profiles were maintained when intraindividual change was controlled; and (c) motivational group changes over time that were based on membership changes were related to teacher ratings of students' initial engagement.

Finally, the hypothesis of socialization effects of social networks was examined. The target of these analyses was change in each student's engagement over the school year (self-reports only were used to guard against "halo effects" of outsiders). Because group changes were not of interest, the whole sample was again available to test this hypothesis. A multiple regression analysis examined the extent to which a student's peer-group membership in the Fall predicted his or her own motivation at the end of the school year over and above his or her initial engagement in the Fall. As expected, the motivational profiles of students' peer networks at the beginning of the year predicted changes in their own motivation from Fall to Spring ($\beta = .15$, $t = 2.06$, $p < .05$, $n = 96$). This can be taken as evidence that, although motivational criteria may have become less important organizers for children's peer groups across time, peer groups at the beginning of the year (which were motivationally organized at that time) nevertheless have an influence on how individual children's motivation changed across the school year.

Discussion

This study provides initial evidence for the power that natural peer groups may possess to promote or undermine children's motivation in school. The first objective was to examine whether there was evidence that children selected other peers according to their engagement in the classroom. This was the case at the beginning of the school year: Children tended to affiliate with classmates who shared a similar motivational orientation. These results are consistent with earlier studies on homogeneity among affiliated peers with regard to school performance (Tesser et al., 1984), motivation (Berndt et al., 1990), and other personal characteristics (Cairns et al., 1989; Kandel, 1978a, 1978b).

At the end of the school year, peer groups had reorganized in a way that their motivational composition was preserved, despite considerable turnover of individual group members. Although self-reported motivation was not any more an important criterion for peer-group selection, teacher-reported engagement continued to be: The groups still appeared homogeneous, and children's own initial motivation predicted how member turnover would change the profiles of their peer networks across time.

The second objective of the study concerned socialization processes within these self-selected networks. Consistent with this hypothesis, self-reports of the extent to which the members of a target child's peer group were engaged at the beginning of the school year were predictive of that child's own change in motivation across the year.

One remaining question concerns the decreases in group homogeneity from Fall to Spring in self-reports, which were found despite the stability observed within groups and individuals. Peer-group homogeneity is usually viewed as the outcome of complementary processes of peer selection and peer socialization (e.g., Cohen, 1977; Kandel, 1978a). If new members are selected according to motivational similarity with target students, group homogeneity should increase or remain stable across time.

Of course, one explanation is the low power of the analyses, given the small sample whose group affiliations were studied longitudinally. However, several alternative explanations also seem plausible. It could be that motivational criteria play a role for peer selection only at the beginning of the year, when children do not know each other very well. Hence, timing of measurements would be crucial for detecting selection processes. This would also imply that other variables became more powerful organizers of peer affiliations across time.

A second explanation suggests that teacher perceptions of child behavior are biased by children's group memberships. What was presented as selection processes would then be more an effect of teacher expectations than of students' actual motivation. However, membership turnover was large (more than 50% of the initial group memberships were exchanged). To maintain biases, teacher perceptions would have had to shift accordingly; however, in other studies, teacher engagement ratings were shown to be very stable (Skinner et al., 1990). Alternatively, it could be argued that group-selection processes could be expected to proceed more according to criteria that can be openly perceived by others and not so much according to private perceptions (or internal states). Teacher-rated engagement

[5] Alternative indexes for proportions of children lost or retained in a students' network across time did not yield significant predictions.

might be a good estimate for what is publicly observable in the classroom. In fact, a report by Jussim (1989) pointed to the possibility that some of the findings on teacher biases in the literature might denote accurateness of teachers' perceptions instead of teacher "halo effects." In vivo observations by independent observers will be necessary to decide between these alternatives.

A third set of alternative explanations is methodological. A significance criterion was used to determine those children who make up a target child's network; group scores were computed as unweighted means of all others who met this criterion. This is conservative because not every member may be equally important in a network. Alternative methods could use weights for members' centrality that are based, for example, on frequencies of conominations, on individuals' number of interconnections within groups, or, perhaps most promising, on informants' own ratings of their group members' centrality.

Most important, the study of changing individuals within changing peer groups poses conceptual–methodological challenges. In naturally existing contexts, many developments occur at the same time; target individuals' development occurs together with membership change in their peer networks (turnover by means of inclusion or exclusion) and with change within those members. It should be noted here that, in the majority of traditional studies in which group homogeneity was found to increase longitudinally, stable groups were examined and not groups with considerable membership turnover. Processes of peer selection may, although maintaining group integrity, lead to losses in correlations between individuals and their groups, because individuals' networks become increasingly integrated over the school year.

In any case, the results of the study highlight two main processes of peer dynamics in school. Within the macrocontext of the classroom and at least at the beginning of the school year, children actively select contexts for themselves that are largely unique to the individual. These peer contexts change in a way that preserves their motivational composition, despite member turnover, and the direction of their change is partly predictable from the child's initial motivation. In turn, initial peer contexts are related to individuals' further development across a school year in a way that changes within individuals can be described as outcomes of group socialization processes. Methods for identifying the specific contexts that are influential for students' development in school are essential for describing these processes.

Overall, the results presented need to be regarded with some caution: There may be differences with regard to students' gender, but, because of the relatively small sample sizes, it was decided to exclude examination of sex effects. There may also be influences of the sample selected; for example, selection and socialization processes according to motivation may be dependent on the variance that exists within a setting.

Specifying Children's Developmental Contexts

More generally, children's development in school is widely understood as being influenced by the social contexts in which their learning occurs. The methods presented here may be useful if one wants to move beyond examining influences of contexts that are institutionally assigned to individuals (like the teacher) or the influence of the classroom as a whole (as in sociometric studies). If the goal is to examine those specific peer contexts that may influence an individual's development and to describe how those contexts change themselves across time, the methods presented appear useful. Developmentalists are no longer content with the so-called social address model of social contexts (Bronfenbrenner, 1989). Increasingly, they want to understand an individual's context on a detailed level and want to see what this context actually does to or for the individual (Kindermann & Skinner, 1992).

The identification of peer networks within the classroom and the quantification of their characteristics can also be regarded as complementary to the study of dyadic friendships in attempts to partition the school ecology into subunits that are developmentally relevant for individual subjects. It seems reasonable to assume that students' networks consist primarily of their close friends and include some more peripheral members in addition. This leads to questions about whether consideration of larger networks adds unique predictive power in studying the pathways of individuals' development.

Using the method described, it becomes possible to identify an individual child's context without relying solely on self-reports. Rather, the method relies on public information, without the necessity of obtaining descriptions from each and every child on everyone else in the classroom (Cairns et al., 1985). The extent of reliability with which these networks are identified can be determined empirically.

Similarly, the method's orientation toward individuals' connectedness with specific contexts helps provide information beyond public consensus on who may be seen as popular, rejected, or neglected. Thus, the method can be expected to also be a helpful supplement to existing sociometric methods. Some children who are highly popular overall may at the same time be unpopular with specific networks, whereas controversial, and also some overall neglected or rejected children may nevertheless have networks of their own. Finally, the methods described allow the examination of selection and socialization processes across time and, by using group aggregation scores as markers of the psychological profile of a child's peer network, allow longitudinal analyses even in cases in which the specific members in a child's network would be completely exchanged.

As the title of this article suggests, school motivation should be considered as an example only. The methods described open up the study of changing individuals within changing contexts and make possible the empirical investigation of how developing individuals exert influences on the composition and change in their self-selected contexts. The effects found do not necessarily imply that peer processes actually target motivation specifically. Other variables that are more proximally related to peer affiliations may be more powerful criteria around which groups are organized and may be more powerful determinants of the consequences that peer affiliations have for individuals. For example, peer effects may also be explained by group agenda and activities that are just incompatible with engagement in the classroom.

Thus, it was not the intent of this study to show that engagement was causal for peer affiliations. In fact, the literature points to many different variables as likely candidates (see also Cairns et al., 1989), and engagement could be just a marker for something else that governs selection processes (e.g., socioeco-

nomic status, intelligence, academic performance). Hence, the analyses on selection and socialization processes can provide descriptive information only: Peer groups may have their impact on motivation specifically, or the effects may be by-products of selection and socialization processes aimed at characteristics that are related to engagement. The intent was to show that children's emerging peer networks can be understood as being organized around motivational variables.

However, it is possible that children do select peers who are similar to themselves with regard to behavioral engagement and that children's peer groups are influential in promoting or dampening the amount of engagement these children show themselves in the classroom. The data presented here are by no means conclusive, but they are consistent with such a scenario. More research is needed to discover whether parents and teachers are correct in their assertion that, when it comes to motivation in school, peer groups are strong influences. Perhaps the methods presented here can offer suggestions for future studies of these processes in children's natural environments.

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