
Strategies for the Study of Individual Development within Naturally-Existing Peer Groups*

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Abstract

The investigation of peer influences on children's development in natural settings rests squarely on appropriate methods to identify those individuals who are influential for a given child. Traditional methods of sociometric ratings or assessments of friendship choices are not intended to identify reciprocal influences in children's peer groups of social interrelationships. In the study of networks within sociology, researchers have focused on the structural properties of children's networks, instead of the psychologically meaningful characteristics of the children who comprise a target child's network. To complement these strategies, a method is presented that can reliably identify those individuals who constitute children's natural peer groups in a setting. This information is used to form composite maps that represent the psychological peer context of a given child. Strategies are outlined for analyzing processes of group selection and socialization among developing individuals and their changing peer contexts.

Keywords: Peer groups; social network structures; group stability; relationship continuity

Developmentalists commonly agree that social contexts are a major determinant in shaping individuals' development. The socialization agents studied most intensively have been primary caregivers, and until recently almost exclusively mothers. However, at the same time that the influence of other family members, such as fathers and siblings, has been studied, research has also begun to consider social-

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ization agents outside the family. Central among these have been children's relationships with their age-mates (Harris, 1995; Hartup, 1983).

Two approaches have traditionally been used to investigate peer relationships: the examination of sociometric status (Asher & Coie, 1990; Coie, Dodge & Coppotelli, 1982; Newcomb, Bukowski, & Pattee, 1993) and the study of children's friendships (c.f., Berndt, 1989; Hallinan & Williams, 1990; Kandel, 1978; Ladd, 1990; Newcomb & Bagwell, 1995). In recent years, an additional avenue for investigating children's relationship with their age-mates has emerged, namely, the study of naturally-existing peer groups (c.f., Cairns, Perrin, & Cairns, 1985). In these studies, children's peer groups are typically identified by asking multiple child reporters from the same setting to describe 'who hangs out together with whom in a group'. These reports are combined to form reliable 'composite social maps' of children's peer affiliations. Then, for any given child, his or her peer group(s) and their members can be identified (c.f., Cairns, Gariépy, & Kindermann, 1989).

The goal of this paper is to outline this relatively new area and to describe strategies for using these methods to study the mutual influence of individuals and their peer groups. In doing so, I first briefly present the method used for identifying peer networks. Second, I suggest that these new methods provide a unique perspective on children's relationships with their peers, and specifically, I argue that naturally existing peer networks capture social influences that are different from those examined by researchers studying sociometric status, friendships or friendship groups, and even from those which sociologists typically refer to as network structures. Third, two important issues are discussed that are encountered when this method is used to examine the reciprocal effects of peer groups and individual development: (1) how to transform information about peer group membership into information about peer group psychological processes; and (2) how to deal with the fact that natural peer groups change in many different ways over time. In describing strategies for studying individual development within peer groups, I concentrate on conceptual issues. However, the goal is also to provide examples from two studies (Kindermann, 1993; McCollam, Kindermann & Metzler, 1995) in enough detail so that readers will be able to adapt these methods to their own research questions.

How Can We Identify Children's Naturally-existing Peer Groups?

For any given child, *naturally-existing peer groups* are the multiple and potentially overlapping networks of age-mates with whom the child spends time and shares activities. These groups, usually larger than dyads, are 'natural' in the sense of being mutually selected by children and not assigned by institutions (as are classmates) or biology (as are siblings). These groups may be formed around common activities or organized around affective bonds. These groups are likely to change over time, retaining some members, losing and adding others.

Peer groups can be identified based on the reports of multiple participants in a setting. In general, children are asked to name those children who are known to associate with each other on a regular basis. A typical strategy is to simply ask children, 'Who hangs out together?'. A child's membership in these naturally-existing peer groups is assumed to be observable with regard to physical proximity and time spent together. Hence, it is expected that children can report those

children with whom they and other children spent time (as can anyone in the setting). Reports are expected to be relatively accurate because group membership is defined using observable behavioral criteria (physically spending time together).

Two specific advantages of this method should be highlighted. One advantage of observable criteria (compared to personal criteria, such as liking) is that public consensus about peer group memberships is expected. If multiple reporters of associative preferences are employed, the amount of cross-reporter consistency in a setting can be determined empirically. A second advantage is that not each and every child in a setting is needed as a reporter to obtain reliable information; about 50% of the members of a classroom seem to be sufficient (Cairns, et al., 1985).

Typically, these reports are aggregated into a 'co-occurrence matrix', a matrix depicting how often each child in the setting is nominated to be together in a group with any other child. This co-occurrence matrix is then used in further steps to identify the members of each child's peer group. Cairns and colleagues (1989) discuss several methods to statistically determine the connections between individuals and their peers, including multidimensional scaling, correspondence analysis, and multiple comparisons of group membership probabilities with overall nomination frequencies. These methods have been shown to produce reliable maps of peer group networks in school settings (c.f., Cairns, et al., 1985; see also Cairns, Leung, Buchanan & Cairns, 1995).

Because of our focus on individuals within peer groups, we prefer methods that determine whether a given child is connected to specific other candidates. Binomial *z*-tests can be used to determine whether, when considering a specific child, any other child in the setting is more likely to be nominated as belonging to the same group than could be expected by chance. The basic goal is to identify who, among a group of candidates, actually has ties to a given individual and who does not. Further discussion of this strategy can be found in Kindermann (in press).

Are Peer Groups Different from Social Categories, Friendship Groups, or Sociological Networks?

Given that much research in recent years has focused on children's peer relationships, it is essential in presenting any purportedly new method to compare and contrast its target to those of existing methods. Hence, I will briefly discuss the differing content of groups based on social status, other social categories, and friendships, with those based on peer group affiliations. (Differences and similarities between friendship and sociometric research will not be discussed, but see Bukowski & Hoza, 1989; Parker & Asher, 1993). I will also briefly contrast composite social maps of peer groups with sociological network analyses

A critical difference between peer relations based on popularity, friendship, and peer group membership lies in the *criteria* that define group membership. In the case of sociometric status, children are placed in different categories (e.g., popular or rejected) based on how much they are liked and disliked by their peers; children are grouped together because they are similar in terms of peer acceptance. In the case of other social categories (e.g., 'brains' or 'nerds'; see Brown, Mounts, Lamborn, & Steinberg, 1993), children are grouped together in different categories because of the way they are perceived by their classmates. In the case of friend-

ship, children belong in friendship dyads because of their durable, mutually dyadic, and affectionate bonds; in friendship groups (e.g., Urberg, Degirmencioglu, Tolson, & Halliday-Scher, 1995), children are grouped together because they share common friends. In contrast, in the case of natural peer groups, children belong together in the same group because they are known to spend time together and share activities in a given setting. These groups are characterized by 'associative preferences', which are expressed behaviorally through selective attention and proximity seeking.

Because different criteria are used for membership inclusion, there is no necessary overlap among these different groups. It is an empirical question, for example, whether popular children (or 'nerds') tend to spend time together (i.e., belong to the same peer groups). The most common assumption about overlap among these groups is that children's peer groups are composed of their friends. However, this is also not necessarily the case. It is possible that friendships *develop* from the members of a child's peer group (c.f., Cairns, et al., 1995). In this case, in a given child's peer group and at a particular time, only some of the members would be considered his or her friends. Furthermore, if a child has multiple peer groups, it is possible that only one of these groups contains mutual friends. The child may spend time with and be influenced by peers who merely tolerate his or her presence in the group.

In fact, two studies have reported about the overlap between children's friends and their peer group members. Cairns and colleagues (1995) reported that at two time points during the second half of the school year, 57% and 82% of children's (self-nominated) friends were also members of their peer group networks in a sample of 4th and 7th graders. In an ongoing study, we examined the same question about a month after the beginning of the school year (McCollam, et al., 1995). Using the methods described above, we identified peer groups for an entire cohort of 6th graders about a month after the beginning of the school year in a rural/suburban school district ($N = 280$ reporters out of a total of about 350 students; overall consistency of the composite map was $\kappa = .80$). Children were also asked to list their three best friends in class, in school, and outside school (a somewhat broader range of nominations than is typically used).

In this study, only about 42% of the (participating) children whom a student nominated as his or her friends were also found to be members of his or her peer group(s); in fact, a substantial number of cross-gender, cross-grade, and out-of-school friendships (even with people from the same classroom) were not contained in peer groups. Conversely, about 41% of the children who were in a child's peer group(s) were also nominated by that child as his or her friends. When only *reciprocal* friendship nominations were considered (in which the child was also nominated as a friend by the child he or she nominated), a higher proportion of these friends (about 63%) was found within a child's peer group(s), but, of course, a child's peer network contained fewer reciprocal friends (26%). The only cases in which more than half (69%) of the members of a child's peer group(s) were also nominated as his or her 'friends' were networks that were labeled as groups of 'friends' by reporters.

It appears that some of the ambiguity about the overlap among sociometric, friendship, and naturally existing peer groups may be caused by the different methods used to assess group membership. If a child is asked to name the children

she likes, she may name specific others based on their popularity (a sociometric criterion), based on her affection for them or based on reciprocity expectations (friendship criteria), based on their social category (e.g., being 'brain' or 'nerds'; criteria of social comparison), or based on their behavioral association with the target child (a peer group criterion). Although there are, of course, some drawbacks to methods of assessing peer groups, at least it is clear how children are grouped together, namely, based on multiple reports of behavioral association, and the reliability of these groupings can be assessed.

Network structures

Although consideration of children's peer groups is a relatively new topic of investigation in developmental psychology, a long standing interest in naturally existing social structures can be found in the fields of sociology (and anthropology). Proponents of these approaches argue that the target of analysis, instead of the individual, should be *network structures* of peers or friends (c.f., Wellman & Berkowitz, 1988; Wasserman & Galaskiewicz, 1994). Typically, individuals' self-reports of their friends or peers have been used to determine characteristics of their personal networks, such as size (number of individuals in a given network) and coherence (number of interconnections within a network). Researchers then attempt to identify the antecedents and consequences of these structural characteristics. For sociologists, for example, a key question is the effect of network properties on the integration of large-scale social systems.

The current paper is based on the premise that developmentalists are also interested in peer networks, but less so in their overall structural characteristics, and more so in the psychological characteristics of those children who comprise an individual child's peer context. Relative to sociologists, the task for psychologists may be somewhat easier. Instead of dealing with the thorny methodological problems associated with describing overall group structures (Wellman & Berkowitz, 1988), psychologists require seemingly 'simpler' methods to reliably identify, for a given child, those others with whom he or she naturally associates in a setting. This set of goals has its own problems, and those will be discussed next.

How Can We Capture the Changing Nature and Influence of Children's Peer Contexts?

One reason for the growing interest in natural peer groups is the strong assumption (and accumulating supporting evidence) that a child's peers exert a socializing influence on his or her individual development; and peer relationships are assumed to be reciprocally influenced by the individual as well. In fact, the study of peer groups and individual development can be seen as a prototypical case of reciprocal influences between a developing person and a changing context (Kindermann & Skinner, 1992; Kindermann & Valsiner, 1995).

Psychological profiles of peer groups

Methods for identifying children's naturally existing peer groups can provide interesting information about the identity of children's peer group members. However, if this information is compared to the study of parent-child interactions, the peer

group methods are analogous to only having succeeded in identifying a child's 'mother'. We believe that the *psychological characteristics* of a child's peer group members constitute an important social context for his or her development. Thus, it is necessary to identify the aspects of the peer group(s) that are hypothesized to influence (or be influenced by) the developing child. These factors can include peer behaviors, competencies, values, or beliefs. In general, groups can be described as a joint function of the characteristics of their members and it is these characteristics, expressed in interactions, which are likely to influence the individual development of members.

One limitation of earlier studies of peer influences has been a reliance on children's *perceptions* of the characteristics of their peers. An advantage of the current method is that any technique can be used to assess peer attributes, including observations, peer self-reports, file data (e.g., grades), or, of course, reports of a child's perceptions of his or her peers. By assessing peer characteristics using multiple techniques, it becomes an empirical question whether peers' actual characteristics or children's perceptions are more influential for their development.

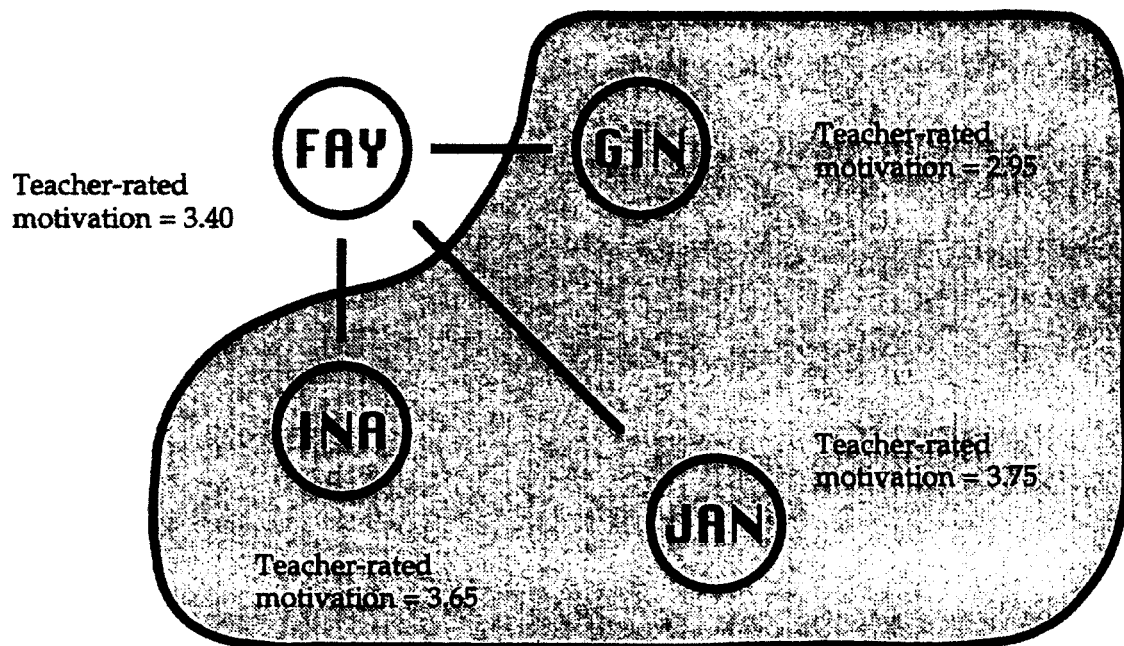
Based on assessments of individual children, an index of the peer context can be constructed for each child, reflecting a 'composite psychological profile' of that child's peer group(s). Depending on the exact question under study, there are many different ways to form peer group composites. The simplest strategy is to use the average score of the child's group members. Alternatively, if one argues that the effects of peers are additive and cumulative, then peer group scores can be totaled rather than averaged. Or, if one is interested in the effects of diversity among group members, then the standard deviation or variance of peer group members' scores could be used. In combination with each of these methods, one can incorporate theoretically or empirically based assumptions that some members (e.g., friends) may have more of an impact on the child's development. To reflect this, weights can be attached to peer group scores before they are aggregated.

Figure 1 shows how we used a peer group average strategy in a study on two 4th and two 5th grade classrooms ($N = 109$; Kindermann, 1993). The study was conducted in a rural/suburban school district. Students came mainly from families of middle and lower socioeconomic status, and were evenly divided according to gender. After about one month from the beginning of the school year, 57 students from these classrooms were individually interviewed about peer group affiliations in their classrooms. About a month before the end of the school year, 22 students from one 4th grade classroom were interviewed again. Students also filled out questionnaires about their own engagement versus disaffection in school at both time points (Wellborn, 1991; the measure is a ten-item scale with ratings from 1 (not at all true) to 4 (very true), $\alpha = .95$; an example is: 'When I'm in class, I just act like I'm working'). In addition, teachers also provided reports of students' engagement in the classroom during the first half of the school year (using a parallel ten-item scale; $\alpha = .87$; e.g., 'In my class, this student tries as hard as he/she can.') In previous studies, both scales have been found to be moderately intercorrelated, to be correlated with grades and achievement scores, and to be highly stable across a school year (Skinner & Belmont, 1993; Skinner, Wellborn, & Connell, 1990; note that the entire engagement scale consists of subscales for behavioral as well as emotional engagement; only the behavior scale was used in this study).

Because the study aimed to examine reciprocal influences between the motivational characteristics of individual children and those of their peer groups,

Target Child

Target Child's Peer Group



$$\text{Teacher-rated motivation of Fay's peer context} = \frac{(\text{GIN motivation} + \text{INA motivation} + \text{JAN motivation})}{3} = 3.45$$

Figure 1. Peer group averaging strategy for forming group profile scores (adapted from Kindermann, 1993).

motivation of target students was assessed independently from that of their peers. The peers' motivation was not assessed using target children's perceptions; instead it was assessed using peers' own reports and their teachers' reports of each student's engagement in the classroom. To calculate peer context scores, the simplest procedure was used (see Figure 1). The two peer context scores for each child were: (1) the average of the teacher-reports of their peers' engagement, and (2) the average of their peers' own self-reports. For example, Fay's peer group scores were the averages of Gin, Ina, and Jan's teacher-reported and self-reported engagement scores.

A major advantage of an aggregate index of peer group context is that it allows unique yet comparable scores to be formed for every child, despite concurrent differences in peer group size and overlapping memberships, and even despite changes in peer group members and their characteristics over time. In the face of changes in membership and in individuals, the group score continues to reflect the aggregate psychological characteristics of a child's peer context. This allows such scores to be useful in examining processes of mutual influence between developing individuals and their changing peer groups. Following a brief discussion of the changing nature of children's peer groups, a series of strategies designed to examine such processes will be described.

The 'development' of children's naturally-existing peer groups over time

A striking characteristic of children's peer affiliations is the extent to which they change over time. Unlike parent or sibling relationships, which only rarely change (e.g., through death or divorce), it is typical for children's peer associates to change radically over time. For a given child, some members will remain with the

group, some will leave, and new members will be added. The magnitude of these turnover rates will depend on the length of observations, as well as on the overall stability of classroom units. For example, across a period of three weeks, Cairns and colleagues (1995) found that 90% of the groups in their study kept half or more of their members intact. Across a school year, the example study (Kindermann, 1993) showed an average of about 50% turnover in the members of a child's peer group. Across a one year period, and across the transition from one grade to the next, Neckerman (1996) found that only about 30% of the groups in her study had managed to keep at least half of their members intact. In addition, this study also showed that group stability was much higher in classrooms, in which many students remained with the same classmates from one grade to the next.

However, even within a peer group whose membership remains intact, the psychological characteristics of the group may change over time because the individuals who comprise a target child's peer group are themselves developing. In addition, the relationships within a peer group may change, as children's closeness to the other members changes, and the intensity and reciprocity of affective bonds between pairs of group members may shift as children form or dissolve friendships. At the same time, a child's relationship to an entire group may change, as he or she becomes more of a 'core' or more of a 'fringe' member (c.f., Cairns et al., 1995). And finally, the organizing features of a given peer group (what holds the group together) can change over time; thus, the initial reason for which a group is formed (e.g., sports interests) can change (to hanging out at the mall). The changing nature of peer group membership and the dynamics within peer groups pose special challenges for the study of individual and peer group development. It should be noted that these same 'developments' may affect friendship and sociometric groups as well; hence, some of the strategies that are discussed in the following may also be applicable to these areas of study.

How Can Peer Group Information Be Used to Study Individual Development?

Many empirical questions are included in the dual issues of how individuals influence their peer groups and how peer groups contribute to individual development. One important route through which a child can influence his or her peer group are processes of selection and elimination. *Selection* refers to the expression of children's associative preferences through both the bids they make to join certain peer groups, and their attempts, once they belong to a group, to maintain existing or to recruit additional members. Processes of *elimination* are those in which a child attempts to exclude new or existing members, or actually leaves the peer group himself or herself. The impact children can have on the nature of this social context should be highlighted; with almost all other important socializing contexts (e.g., parents, siblings, teachers), the child exerts no selection or elimination influences whatsoever.

The processes by which peer groups influence individual children can generally be referred to as *socialization*. Whereas selection and elimination affect the composition of the group (i.e., which specific children are members of a group), mutual socialization influences what individuals and groups actually *do* to and which each other: their activities, interactions, agenda, rules, proscriptions, and so forth. In general, socialization is likely to be toward group homogeneity; however, with

regard to individual group members, socialization may also occur towards specific functions or roles within a group (Cairns, et al., 1989; Youniss, 1986).

Children are probably very different in the extent to which they can influence peers and in the degree to which they can be influenced by peer groups. The influences of the child on the group and the groups' influences on the individual depend on factors both within the peer group, such as the length of time a child associates with a specific group, the stability of the other members, the affective bonds the child shares with other members, and the child's core vs. fringe status, as well as on factors within the individual, such as a child's self-confidence, social skills, autonomy, independence, and on the strength of alternative socializing influences, such as parents, teachers, and other peers. For discussion purposes, individuals' effects on groups will be distinguished from the effects of groups on the individual. Although both are aspects of reciprocal socialization, the former will be referred to as participation and the latter as socialization.

Strategies to examine peer group homogeneity

In general, if any of the processes of differential selection, elimination, or socialization are at work in peer group formation, one would expect to find relations between a target individual and his or her average peer group score. The result would be significant correlations between individuals' scores and those of their group members. Also, greater similarity would be expected *within* peer groups than between groups.

Two strategies to assess peer group homogeneity can be illustrated from the example study (Kindermann, 1993), using the characteristic of children's behavioral engagement. First, correlations between individuals' own engagement in school and the (average) profile scores of their peer group(s) indicated that highly motivated individuals tended to have peer groups that were also high on motivation, and vice versa (teacher-report: $r = .55$, $n = 96$, $p < .001$; self-report: $r = .28$, $n = 96$, $p < .01$). A second strategy to test group homogeneity was to use analyses of variance which compared within-group with between-group variation. Significant group differences were found, indicating higher similarity *within* peer groups of children than between groups (teacher-report: $F(34,77) = 1.74$, $p < .05$; self-report: $F(34,77) = 2.28$, $p < .01$). Note that if multiple group memberships are frequent, MANOVA-strategies can alternatively be used to examine whether individuals' peer group scores are similar to their own scores, but different from similarly aggregated non-peer group scores.

Strategies to examine consistency of peer group profiles over time

Models of more specific mechanisms can be examined using longitudinal data. Across time, mechanisms of selection and elimination should lead to specific patterns of group stability and change, both in memberships and in how groups are organized with regard to psychological variables. Turnover of peer group members is an indicator of the amount of selection and elimination operating over time. If these processes are occurring based on systematic criteria, then, for example, it could be expected that new members are added and old members are eliminated in ways that preserve the homogeneity of the groups' composition.

It should be emphasized again that changes in a child's peer group scores over

time can be the result of two different processes: (1) the stable peers in a child's group are changing in their individual characteristics (due perhaps to the influence from the target individual, but also to other factors, such as maturation or setting-external influences), *and/or* (2) the actual members of a child's peer group are changing over time (due to selection of new members or elimination of existing members). These two processes of change need to be distinguished.

One strategy for testing the hypothesis that stability in children's peer group scores persists over time, despite changes in the actual members of these groups, is to correlate children's peer group scores at one time with their peer group scores at a later time (calculated using the changed peer group, but ignoring intraindividual change). In the example study (Kindermann, 1993), this strategy revealed high consistency in the motivational orientation of children's peer groups. High correlations were found from Fall to Spring in children's peer group engagement scores, despite considerable turnover in members (see Figure 2).

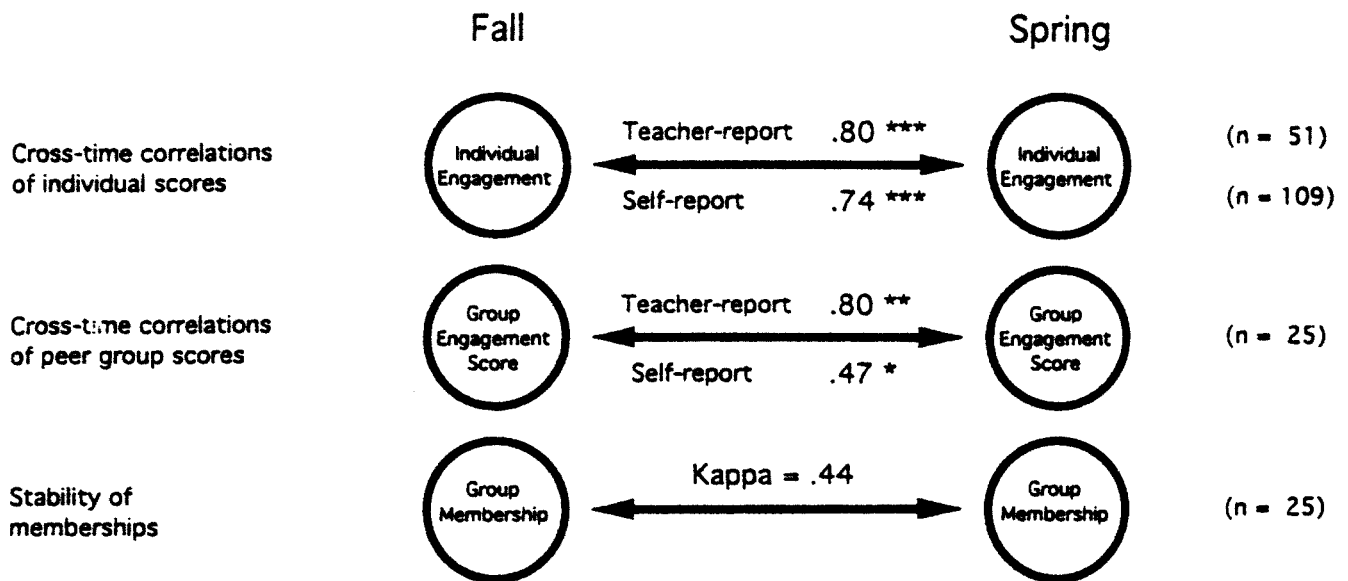
Strategies to examine mechanisms of influence from individuals to peer groups

With regard to changes in peer group characteristics, processes of differential selection, elimination, and participation are expected to produce changes in group scores that can be predicted from individual children's initial characteristics. In the empirical example, the potential operation of these processes led to the expectation that a child's motivation at the beginning of the school year would predict changes in how motivated the students were that made up his or her peer networks across the year: Initially highly motivated students should be associated with groups that became more motivated across the year (and vice versa).

In general, two different strategies utilizing cross-time multiple regression can be used to examine group changes. The first strategy is to focus on subgroups of individuals. *Participation effects* (individual children influence how their peers change intraindividually) can be tested by examining whether individuals' scores at Time 1 contribute to changes in peer group scores of those children *who are stable members from Time 1 to 2* (member turnover is controlled). *Selection and elimination effects* (changes due to changes in peer group membership) are tested by examining whether individual scores at Time 1 contribute to changes in peer group scores of children *who are not stable members from Time 1 to 2* (holding constant individuals' values so that intraindividual change is controlled).

Thus, when participation effects are examined, analyses can focus only on those individuals who have stable peer groups. Regressions determine whether individuals' scores at Time 1 are related to changes in their group scores when these are entirely due to intraindividual change. Conversely, selection analyses can focus only on those individuals who gained new peer group members; regressions examine whether individuals' scores at Time 1 are related to changes in their peer group scores when changes can only be due to selection of new members. Elimination analyses go the opposite route: Only those individuals who lost peers across time are considered; it is expected that individuals' scores at Time 1 are related to change in their group scores when these changes are due to losses of members. Although it seems relatively straightforward, one problem with this strategy is that large samples will be needed. The power of analyses will depend on the number of children who have stable members or in- versus out-movers.

Correlations Examining Individual and Peer Group Stability



Multiple Regressions Examining Individual and Peer Group Change

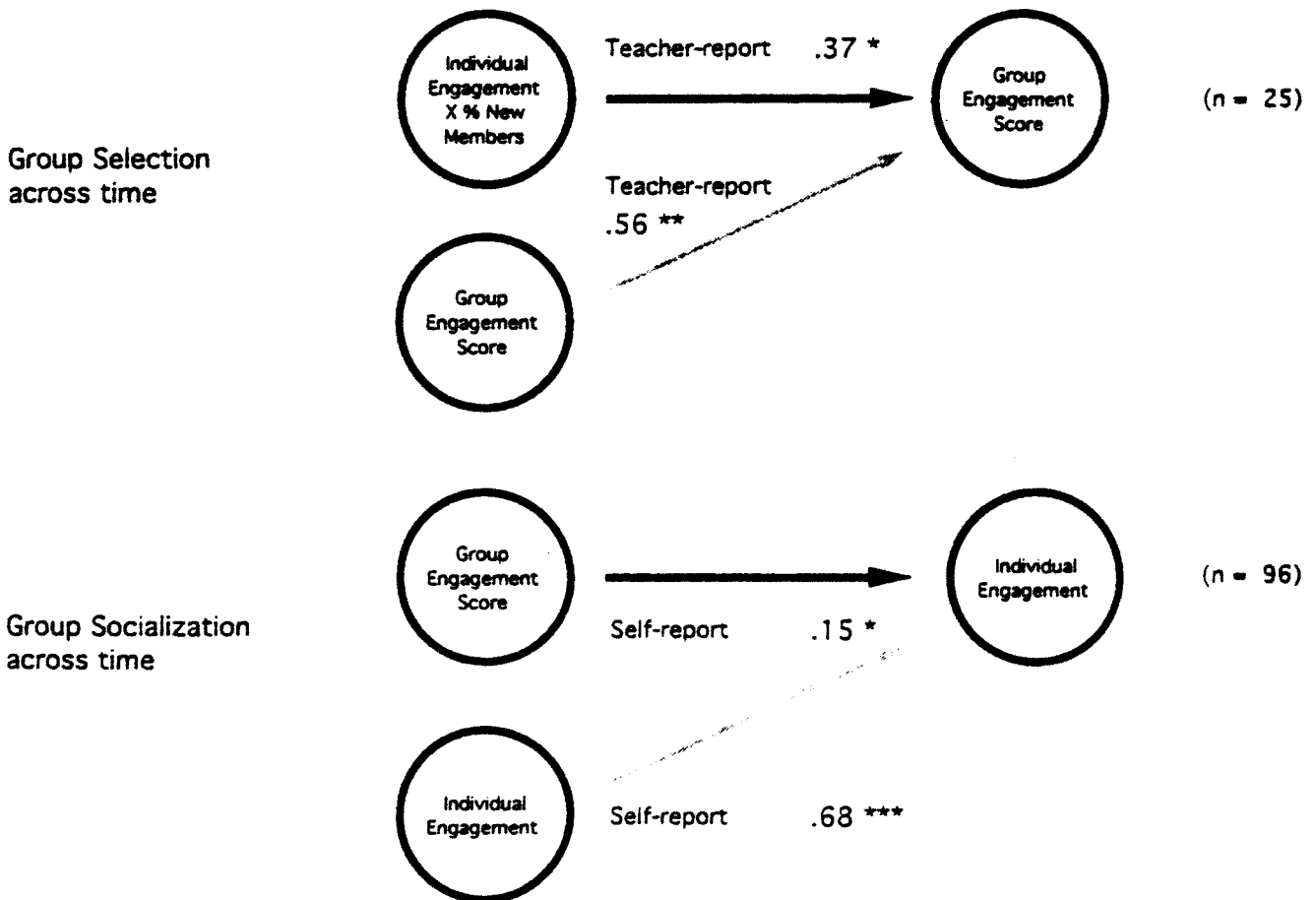


Figure 2. Strategies for examining peer group stability and processes of peer group selection and socialization across time (adapted from Kindermann, 1993). Stability coefficients for individuals' teacher-engagement ratings are based on a separate sample of fourth and fifth graders. Group scores in Spring are from one longitudinal classroom. For analyses of group selection processes, in order to hold constant changes within individuals, group scores (Time 2) are based on peer affiliations in Spring, using teacher- or self-report scores on engagement from the Fall (Time 1).

More suitable for smaller samples are strategies in which multiple regressions examine whether the impact of individuals on groups is stronger for children who belong to differentially stable groups. Using the same basic multiple regression strategy (prediction from initial individual scores to changes in group scores), par-

participation, selection and elimination processes can be examined by weighting the independent variable (individual scores). Participation effects are examined by weighting the individual scores (Time 1) by the number of people *kept* as stable peer group members across time (in effect holding peer group membership constant). Selection effects are examined by weighting the individual scores by the number of group members *added* from Time 1 to Time 2 (holding constant individuals' values and thus controlling for intraindividual changes). Elimination effects are examined by weighting the individual scores by the number of group members *dropped* (again holding intraindividual change constant). In the empirical example, students' initial motivation predicted changes in their groups' motivational composition, when weighted with the number of students newly gained across time (see Figure 2). Initially highly motivated students ended up with more motivated groups, especially when these groups attracted many new members. There was no indication of systematic elimination effects.

Strategies to examine mechanisms of influence from peer groups to individuals

Hypotheses about socialization processes focus on whether individuals' own development is influenced by the characteristics of their peer group members. If socialization occurs, individuals' gains or losses across time would be predictable from the initial composition of their peer groups. For testing socialization hypotheses, one strategy is to use multiple regressions which examine whether peer context scores at one time predict change in individuals from that time to a later time. This strategy was used in the example study (Kindermann, 1993). Multiple regressions tested whether individuals' motivation at the end of the school year could be predicted by the composition of their peer group(s) from the Fall before, over and above their own motivation at the beginning of the year. Consistent with socialization effects, change in individuals' own motivation was found to be related to the motivational composition of their initial peer networks (see Figure 2).

Often, socialization effects will not be expected to be of equal strength for all groups. Effects may be stronger among those children who stay together for a longer time (e.g., who remain stable group members across the school year). Just as with testing the effects of individuals on groups, two strategies can be used: (1) contrasting the effects of groups on individuals between subsamples of individuals who are stable vs. unstable members of groups; and (2) regression models which include as weights (for initial group-scores) indices of relative membership stability. For example, increases in individual children's motivation over the school year as a result of socialization effects would be expected for those children who belonged to peer groups that were high in motivation initially, and whose members were stable over the school year. In the empirical example, this hypothesis was not supported for the smaller subsample whose groups were followed up longitudinally.

Strategies for examining differential effects

Differential effects of individuals on groups and of groups on individuals can be included; this also pertains to effects of multiple group memberships. The conceptual question is whether certain children exert particularly powerful influences on peer groups and whether certain peer groups (or subgroups) are particularly

powerful in their socialization effects on individuals. In general, large samples will be needed to test any expectations regarding specific subgroups; hence, with smaller samples, weighting procedures may be the best approximation.

Strategies to examine *differential effects of individuals on their peer groups* have as their goal to identify the specific individual characteristics which enhance the prediction of changes in peer group scores over time. Hypotheses can be tested, for example, that those children who have the most impact on changes in their peer groups across time (with regard to both memberships or psychological characteristics) are children who have high sociometric status, who are reciprocally nominated as friends, who are identified as core (compared to fringe) members, who are most socially skilled, or who hold multiple simultaneous group memberships. Effects can be detected by examining the interaction of the potential factor with the individual independent variable in predicting to group change over time.

Strategies to examine *differential effects of peer groups on individuals* have as their goal to identify characteristics of groups that should make them particularly powerful socializers of their members. For example, positive changes might be expected for children whose peer groups are more popular overall; greater change might be expected for children who belong to groups who share more reciprocal friendships, show higher relatedness among each other, or are more integrated. These effects can be detected by examining the interaction of the potential factor with the group independent variable in predicting to individual change over time.

Sub-group analyses can also be used to identify the characteristics of children who are particularly open to influence from their peer groups. Analyses can contrast the effects of peers on children who are high vs. low on the potential characteristic (e.g., who have low vs. high self-esteem, are fringe vs. core members, or who want to be accepted by their groups vs. who feel secure with their groups). The study of openness to peer group influence would be especially useful in organizing interventions, both those designed to aid children in resisting peer pressure and those designed to utilize peers as socialization agents (e.g., peer counseling). In the empirical sample, when only subjects reported to be 'followers' were considered, their motivational change was found to be predicted by their initial group scores ($\beta = .45$, $n = 17$, $p < .05$), but this was not the case for 'leaders' ($n = 18$).

Finally, differential analyses can also be used in order to examine effects that are based on commonly used sociological variables, such as group size or group integrity/inclusiveness. For example, it may be expected that those groups will exert more influence over the development of their members which are small and well-integrated (i.e., which show more exclusive memberships and more ties among members). For developmental psychologists, in general, group size may often not be a critical variable, and it will usually suffice to show that group size does *not* affect a specific finding. For example, in the empirical illustration, selection and socialization effects were not affected when group sizes were controlled.

Conclusion

The methods described in this paper for identifying children's personal ties within natural peer groups make possible the study of a powerful socializing influence in children's lives. The goal of this paper was to specify empirical routes for examining the impact of the psychological characteristics of groups on individuals as well as individuals' influences on their groups, as both change across time. It does not

claim to be a comprehensive map of every avenue by which peer relations influence individual development. Additional influences which do not involve a child's peer groups or peer associates (such as the impact of having a group of bullies in the neighborhood) remain to be explored. As the paper's title suggests, this framework is limited in scope to the study of individual development *within* children's natural peer groups.

This paper began with a note of caution that the social world of childhood may be more complex than often seems to be assumed. At least, there are indications that children's peer groups, children's groups of friends, or categories of children with different social status may consist of partly the same, but partly different children. On the one hand, one could assume that if this is the case at some time in children's development, these different contextual agents can have different developmental impact. On the other hand, it is also possible that peer and friendship contexts have synergistic effects. For example, with regard to children's school motivation, the example study described in this paper suggested that children's peer groups have an influence on their school motivation. In essence, the (motivationally) 'rich' became 'richer' across time (and vice versa), due to peer selection and socialization processes across a school year. In a recent study, we found the same two basic processes operating in a sample of 8th through 11th grade adolescents (Kindermann, McCollam, & Gibson, in press). Nevertheless, there are also reports by friendship researchers (Berndt & Keefe, 1995; Berndt, Laychak, & Park, 1990) suggesting that children's friends are similarly influential for their school adjustment.

Indeed, this paper may be regarded as an encouragement to combine different approaches to studying peer relations. As a complement to research on sociometric status and friendship, the framework presented may provide new insights into children's social functioning. In combination with work on sociometric status, for example, the study of peer groups can examine whether peer popularity is a gateway of access to group membership and whether the effects of rejection can be buffered by belonging to a group. In combination with the study of friendship, consideration of peer groups may reveal that peer groups whose members share close affective bonds are especially powerful socializing forces, and that children with no friends may find entry into peer groups a first step in learning how to establish close relationships. If so, the analysis of peer groups may also aid in tracing the pathways by which children change in sociometric status or friendships over time.

On a larger scale, the consideration of peers converges with recent proposals to take seriously the notion that individuals develop within changing environments (e.g., Kindermann & Valsiner, 1995), with current theorizing on the importance of peers for development (Harris, 1995), as well as with reports of other socialization agents, such as parents and teachers, who emphasize the limits of their own efforts in guiding children and adolescents in the face of often opposing influences from age-mates. Developmental psychology also sensitizes researchers to the potential for peers to influence individual development in both deviant or destructive directions as well as toward autonomous and adaptive functioning. Whichever the presumed valence and whatever the target outcome, it is clear that multiple, overlapping and changing peer groups in schools, in neighborhoods, and on the street exert powerful effects on children. The study of the reciprocal influences between individuals and peer groups may add to our understanding of this force in individual development.

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