

Peer Relations Across Contexts: Individual-Network Homophily and Network Inclusion In and After School

Jeff Kiesner, François Poulin, and Eraldo Nicotra

Peer relations across 2 contexts (in school and after school) were examined for 577 participants, approximately 12 years old, from 3 middle schools in Milan, Italy. The primary research questions were: Do peer networks from different contexts uniquely contribute to explaining variance in individual behavior? Do measures of peer preference and peer network inclusion across contexts uniquely contribute to explaining individual depressive symptoms? Structural equation models showed that both the in-school and the after-school peer networks uniquely contributed to explaining variance in 2 types of individual problem behavior (in-school problem behavior, after-school delinquency), and that similarity with the 2 peer networks varied according to behaviors specific to each context and across gender. Finally, both in-school and after-school peer network inclusion contributed to explaining variance in depressive symptoms, after controlling for classroom peer preference.

Past research on peer relations typically has been conducted at what Bronfenbrenner (1979, 1989) labeled the microsystems level. Microsystems are the immediate settings in which individuals live, for example, their peer group and their family. Although a great deal of research has examined peer and family microsystems, almost no research has attempted to examine the multiple contexts of these microsystems. As Bronfenbrenner (1979) pointed out more than 20 years ago, what we know about socialization agents is “confined to the interchange between persons taken two at a time” (p. 845). More recently, research has shown that mesosystem models that link peer contexts with family contexts are important for understanding social development (Dishion, Duncan, Eddy, Fagot, & Feltrow, 1994; Farrell & White, 1998; Scaramella, Conger, Spoth, & Simons, 2002). However, the conceptualization of the peer context has remained unidimensional, considering only single-peer contexts, typically in the school, and frequently examining only dyadic relationships.

These limitations in the peer-relations literature are general and thus it would be possible to study the multiple contexts of the peer microsystem as they relate to a variety of social adjustment variables, including prosocial behavior, family relations, depressive symptoms, and antisocial behavior. In the present study we focused on antisocial behavior and depressive symptoms. We chose these variables because a great deal of the existing literature has linked peer relations (i.e., affiliation, acceptance and rejection) with both of these variables, but it has not examined them across contexts.

The fundamental issue addressed in the present research was whether multiple peer contexts provide unique experiences for the individual. If they do, these different peer contexts may play unique roles in individual development. Moreover, different peer contexts may play differentially important roles on development depending on the outcome measure. For example, having delinquent friends outside of the school may provide a higher risk situation than delinquent friends within the school. Indeed, friendship selection itself may differ across contexts because of differences in selection opportunity and social pressures. Similarly, low peer acceptance in one context (i.e., the school) may create a greater risk for social developmental problems, such as depression, than low peer acceptance in some other context (i.e., the neighborhood). Moreover, low peer acceptance across contexts may create either additive or interactive effects with regard to outcomes such as depression. Thus, what is frequently referred to as

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“peer relations,” and typically studied in the school context, may represent a complex network of unique (although probably correlated) peer-relations contexts. These different contexts may then play unique roles in individual development.

The present study represents a first step toward understanding the potentially unique effects of multiple peer contexts. Two primary research goals were addressed. First, we examined the unique contributions of multiple peer contexts with regard to problem behavior. To do so, we tested whether the behavioral characteristics of an in-school peer network and those of an after-school peer network both uniquely contribute to explaining individual problem behavior, and whether these relations differ across different types of problem behavior. Second, we examined whether three separate measures of individual peer relations, across contexts, provide unique contributions in explaining depressive symptoms. In doing so we tested for main effects as well as interaction effects.

Peer Relations and Antisocial Behavior

An important dimension of child and adolescent peer relations is the behavioral similarity between individuals and their peer affiliations (Kandel, 1978; Poulin et al., 1997; Urberg, Degirmencioglu, & Tolson, 1998). Previous research has provided a great deal of evidence showing that antisocial youth typically have antisocial friends and that having antisocial friends predicts an escalation in antisocial behavior (Dishion, Spracklen, Andrews, & Patterson, 1996; Kiesner, Cadinu, Poulin, & Bucci, 2002; Vitaro, Brendgen, & Tremblay, 2000). However, as noted earlier, research in this area typically has focused on only one friendship (or group) at a time—frequently in the school context.

The importance of studying after-school peer contexts with regard to problem behavior is suggested by the research of Dishion, Andrews, and Crosby (1995) showing that adolescent antisocial boys and their close friends typically live in the same neighborhood and meet in unsupervised and unstructured activities. Other research has shown that during adolescence, individuals begin to spend more time with peers in unsupervised nonschool contexts (Csikszentmihalyi, Larson, & Prescott, 1977). Therefore, extending peer relations research to include and explicitly model nonschool contexts may be especially important for the adolescent age group and when considering problem behavior.

It should be noted that some past research has examined after-school peer contacts in relation to

problem behavior (e.g., see Dishion et al., 1995; Pettit, Bates, Dodge, & Meece, 1999) and demographic variables (Patterson, Vaden, Griesler, & Kupersmidt, 1991). However, this research has not examined these after-school contacts comparatively with in-school peer contacts. Therefore, no conclusions could be drawn with regard to the similarities or differences of these separate peer contexts.

The first questions addressed in this study were whether both the in-school and after-school peer networks demonstrate a unique similarity with the individual's behavior, and whether the pattern of individual network similarity differs across different types of behavior (in-school problem behavior and after-school delinquency). Three hypotheses can be generated regarding individual network similarity across different behaviors and across different peer contexts. First, it could be hypothesized that the school setting imposes limits on who can be friends (i.e., selection may be limited to classroom peers), whereas other settings, such as the neighborhood, have fewer limits. Thus, it might be suggested that outside of the school, individuals could be more selective when choosing their friends, predicting a higher level of homogeneity among neighborhood friends. On the other hand, the highly structured setting of the school may give social pressure for homogeneity among friends. For example, if an antisocial student wishes to be friends with a prosocial student, the teacher and peers may provide feedback to one or both individuals that such a relationship would not be well accepted (i.e., teasing from peers). This would predict a higher level of homogeneity among school friends. A third possibility is that individuals select friends who are behaviorally similar to themselves in that particular context. In this case, the level of similarity would depend on the setting and the type of behavior. Thus, individuals may be more similar to school friends when considering school behavior and more similar to after-school friends when considering after-school behavior.

We hypothesized that both networks would be similar to the individual, but that they would demonstrate different patterns with respect to explaining unique variance in individual behavior. More specifically, we predicted that, for in-school problem behavior (i.e., disturbing classmates, being argumentative) the in-school network would show a stronger unique relation with the individuals' behavior, whereas for after-school delinquency (i.e., stealing from a store, doing graffiti on or vandalizing public transportation) the after-school network would show a stronger unique relation. The structural equation

model used to test these hypotheses is presented in Figure 1 and fully explained in the Results.

An important aspect of our hypothesis is that both peer networks are expected to explain unique variance in individual behavior. To the extent that the two groups do explain unique variance, these groups may be offering the individual unique behavioral opportunities. That is, although the groups may be behaviorally similar to each other, they also may be different enough to provide unique experiences and opportunities. Indeed, these groups may be selected not only for what they have in common (delinquency) but also for their unique behavioral characteristics (specific behaviors or activities unique to the group or group members).

Peer Relations and Depressive Symptoms

A second important dimension of peer relations concerns the effects that an individual's peer status within a specific context has on his or her social adjustment (Ollendick, Weist, Borden, & Greene, 1992; Parker & Asher, 1987). Research has shown that peer rejection and depressive symptoms are both concurrently related (Boivin, Poulin, & Vitaro, 1994; Cole & Capentieri, 1990; Patterson & Stoolmiller, 1991) and that peer rejection longitudinally predicts increases in depressive symptoms (Kiesner, 2002; Panak & Garber, 1992). Research on the link between peer relations and depressive symptoms (and social adjustment in general) have been almost exclusively limited to the school context; thus, conclusions are limited to the effects only within that setting.

In the previous section we argued that different peer contexts may offer different behavioral contexts for the individual; thus, these contexts should be considered as distinct. In the present section we argue that peer acceptance and inclusion also may differ across contexts. If this is true, these different experiences of peer acceptance and inclusion may have different effects on the individual. We start with a review of the limited research on this topic.

To our knowledge, only one study has attempted to examine the relation between social adjustment and peer relations across contexts. In that study East and Rook (1992) examined whether individuals with low peer acceptance in school compensate by developing stronger after-school relationships with siblings and peers, and whether these relationships served as a protective factor regarding psychosocial distress. Results showed that isolated individuals reported receiving more social support, as compared with aggressive or average individuals, from their

favorite sibling but not their after-school friend. Moreover, there appeared to be a positive effect of sibling support for individuals who were isolated at school. Nonschool friends did not appear to provide benefits for the isolated participants in the same way that siblings did.

Two other studies have provided descriptive data regarding peer networks outside of the school. Ladd (1983) presented data showing that popular, average, and rejected third and fourth graders did not significantly differ from each other on their number of nonschool friends. Research by Ray, Cohen, and Secrist (1995) showed that, whereas rejected individuals reported fewer perceived friends in the classroom (as compared with popular and average children), this pattern was not found for nonschool perceived friends. Thus, these studies suggest that there may be no link between peer acceptance at school and peer acceptance outside of school. However, these earlier studies were limited by the use of only self-report measures and thus could not examine peer acceptance outside of the school according to the peers.

Durrant and Henggeler (1986), however, have compared peer rating across school and nonschool contexts. They found moderate correlations between classroom peer ratings (fourth and fifth grades) and peer ratings in nonschool activities (i.e., church groups, scouts; correlations ranging from $r = .19$ to $r = .58$). These findings suggest that although peer relations appear similar across settings, the relation is far from perfect. Therefore, an individual who is rejected by classroom peers may be recognized by nonclassroom peers as a friend or group member. These differing levels of peer acceptance and inclusion across different contexts may provide unique information (i.e., independent main effects) for explaining individual levels of depressive symptoms. Moreover, different measures of peer acceptance and inclusion across different settings may interact with each other to create either higher risk or lower risk situations with regard to depressive symptoms. For example, high peer acceptance and inclusion outside of the school may buffer the negative effects of low peer acceptance and inclusion within the school.

Because the present study was conducted in a relatively well-defined and isolated neighborhood, and because we asked participants to identify both an in-school and an after-school peer network, we were able to construct a peer network inclusion score based on the number of nominations received, by other participants, as a network member for both the in-school and after-school networks. Thus, in

addition to a traditional measure of classroom peer preference (Coie, Dodge, & Coppotelli, 1982), we also have two measures of peer network inclusion based on the number of nominations received as a network member by the other participants, for both the in-school network and the after-school network. Although the peer network inclusion measures are not measures of popularity or rejection (see the Method section), they are measures of the inclusion in the other peers' networks, across contexts, as reported by those peers. We proposed that, similar to measures of popularity and rejection in the classroom, inclusion or noninclusion in other peers' networks could have similar effects on individuals' adjustment. Thus, it could be expected that low levels of network inclusion would be associated with higher levels of depressive symptoms and high levels of network inclusion would be associated with lower levels of depressive symptoms.

We hypothesized that the three measures of preference and inclusion would uniquely contribute to explaining variance in depressive symptoms. In addition, for reasons discussed earlier, we tested for interactions among the three measures of preference and inclusion.

Additional Research Questions

In addition to the preceding research questions, two other questions were addressed. The first question was whether in-school and after-school peer networks are composed of the same individuals (i.e., what is the level of overlap between different networks?). Information regarding the level of overlap between the two networks is relevant for understanding the importance of studying peer networks across settings. For example, if overlap is found to be high, the after-school network would essentially be a replica of the in-school network and there would be no need to study the after-school network. This would be especially important if there is a relation between level of overlap and the individual's adjustment and behavioral characteristics. Therefore, we also tested whether there is a relation between behavioral characteristics of the individual and the level of overlap between the in-school and after-school peer networks (second additional question). If antisocial youth are found to have less overlap across networks than non-anti-social youth, it would appear especially important to study after-school peer networks for antisocial youth.

Finally, although we had no a priori hypotheses regarding gender, we tested for gender differences in the primary analyses.

Method

Participants

Because the goal of the present study was to examine peer relations both in-school and after-school, it was important to have access to a high proportion of both the individuals' in-school and after-school peer network members. Thus, it was necessary to have a sample from a well-defined geographic area in which most after-school friends would live in the same area and attend a participating school. To meet these goals we conducted this study in a neighborhood of Milan, Italy. The specific neighborhood, although part of a major metropolitan city, is isolated from the rest of the downtown area with regard to public transportation and physical distance for walking. Thus, it was likely that most after-school network members would come from the same neighborhood. Three middle schools serve this neighborhood.

All three middle schools serving the neighborhood agreed to participate. Students are assigned to a school based on proximity, and residence within a specific catchment area, so that the students in these schools were residents of the same catchment area and living in relatively close proximity to each other. All students (sixth through eighth grades) from all three middle schools were asked to participate.

A total of 798 students were enrolled in these schools, of which 30 did not regularly attend school. Therefore, the total possible sample was 768. Parent permission to participate was obtained for 593, of whom 577 (75% of the total possible sample) actually participated. Of these 577 participants (288 girls, 289 boys), 215 were sixth graders, 171 were seventh graders, and 191 were eighth graders. The mean age was approximately 12 years. Of the 577 participants, 540 (93%) identified themselves as being ethnically Italian (457 reported being only Italian, and 83 reported being Italian and some other ethnicity such as Albanian, French, Jewish). Thirty-seven participants reported belonging only to a non-Italian ethnic group (i.e., Albanian, French, German). A series of independent sample *t* tests showed that the 37 non-Italians and the 540 Italians did not differ on any of the behavioral or peer relations variables (all t s < 1.75).

Based on the inclusion of three middle schools, serving 768 students, the neighborhood used in the present study is larger than what typically is considered a neighborhood in the United States. Indeed, it is unlikely that the participants in this study knew most of the other participants, or

same-aged peers living in this neighborhood. However, because this neighborhood is isolated from the rest of the city and because we included all of the public schools in this neighborhood, we maximized the possibility of identifying both in-school and after-school network members.

The decision to conduct this study in a relatively low socioeconomic status (SES) area of a major metropolitan city increased the chances of finding higher levels of problem behavior. Although the SES of individual participants was not directly measured, the most recent census data available (census year 1991; Istituto Nazionale di Statistica, 1996) indicated that the selected zone had a higher rate of unemployment and fewer working professionals and managerial level workers than the city average.

Procedure

Questionnaire booklets were administered to the students in the classroom during normal school hours during February. One research assistant was present during all administrations, which lasted approximately 1 hr and 15 min. Administration of these questionnaires was highly structured, with all students completing the same section of the questionnaire booklet at the same time, then waiting for instructions for the following section. In addition, teachers were asked to complete a teacher report of child problem behavior. All measures were administered within each classroom on the same day.

Measures

Nominations of in-school and after-school peer networks. During the assessment of in-school and after-school peer networks, participants were asked to think about the groups of peers with whom they spend time. Therefore, in the present description of the measure we refer to groups rather than peer networks. This procedure involved three steps. First, students were given a definition of a group that included two key characteristics: (a) there must be at least three children in the group (including the target child), and (b) these children must spend time together. Thus, a dyad would not qualify as a group and a set of independent friends who do not spend time together would not qualify as a group. In the second step, participants were asked to list the names of their peers who were in their group. This procedure was repeated for an in-school group and an after-school group. Participants were allowed to nominate only one group for each context. For the in-school group, participants were able to list any

students from the school, whether or not those students were participating in the study. For the after-school group, participants were allowed to nominate anybody, whether or not those individuals attended the same school and whether or not those individuals were participating in the study. All participants were asked to nominate the in-school group first and the after-school group second. Seventeen participants (2.9%) reported having no in-school group, and 21 participants (3.6%) reported having no after-school group. Four of these participants had neither an in-school nor an after-school group.

In the present study peer networks were defined as the participant's individually nominated in-school and after-school networks with no requirements of reciprocated nominations. The use of individually nominated networks, without requiring reciprocity of nominations, has been used in previous research (Kiesner et al., 2002). This research has shown that self-nominated networks are behaviorally similar to the individual, and that the behavioral characteristics of the network predict individual change, even after controlling for prior individual behavior. Although research has shown that reciprocated friendships are characterized by more positive engagement and higher scores on relationship properties such as similarity, mutual liking, and loyalty (Newcomb & Bagwell, 1995), important limitations exist with requiring reciprocated nominations. As Newcomb and Bagwell (1995) have pointed out, requiring reciprocated nominations is likely to result in a limited subset of participants. In fact, previous research requiring reciprocated nominations has found that between 22% (Parker & Asher, 1993) and 32% (Berndt, Hawkins, & Jiao, 1999; Vitaro et al., 2000) of participating children have no reciprocated friendships, and that individuals without reciprocated friendships show more adjustment problems than those with reciprocated friends. Finally, as previously argued, isolated individuals (with no reciprocated friendships) may be able to nominate a group of peers with whom they identify or spend time, and those peers may be important for individuals' development (Kiesner et al., 2002). For these reasons we have taken an inclusive approach to defining peer networks.

After-school delinquency. The youth-report questionnaire (a modified version of the Child Telephone Interview; Dishion et al., 1984) was used as a measure of the participants' behavior. Within this questionnaire there are 29 questions regarding both problem behavior and positive behavior. Because we wanted to examine problem behavior that would

occur within the school (measured by teacher and peer reports, see the following sections) separately from problem behavior that would occur outside of the school, we used the self-report items to create a problem behavior scale based on activities that would occur outside of the school, probably with peers, and that would not involve nonpeer relationships (i.e., arguing with parents). Thus, we chose three activities that would meet these criteria: stole something from a store, did graffiti on public transportation or property, and vandalized public transportation or property. Participants were asked to indicate how often they were involved in these behaviors thinking about the last week, using a 4-point scale: (0) never, (1) rarely, (2) sometimes, and (3) frequently. The standardized Cronbach's alpha for these three items was .73. These three items were standardized and the mean was calculated to form a measure of after-school delinquency.

Peer reports of problem behavior. Unlimited and cross-gender peer nominations on three behavioral questions were used as a measure of problem behavior. These questions were: "Who are the kids that tease (in a mean way) other kids?" "Who are the kids that hit other kids?" and "Who are the kids that get in trouble?" The number of nominations received by the classmates on each of these questions were computed and standardized within each classroom to control for differences in class size. Cronbach's alpha for these items was .91. These standardized scores were then linearly combined.

Teacher report of problem behavior. An adapted version of a teacher report questionnaire (Kiesner, 1997) was used to measure problem behavior in the classroom during the past week. Nine items from the questionnaire were used to calculate the problem behavior score. These questions included, for example, "Was argumentative?" "Disturbed classmates?" and "Threatens and picks on other kids?" All questions required a response using a 6-point Likert scale, ranging from 1 (*No, not at all*) to 6 (*Yes, frequently*). A separate form was used for each student. Cronbach's alpha for the nine items was .94. Individual scores are the sum of the nine items, which were then standardized across the entire sample.

Combined teacher and peer report of in-school problem behavior. A combined teacher and peer report of individual problem behavior was created by calculating the mean of the standardized peer and teacher reports of individual problem behavior. The correlation between these two measures was $r = .68$ ($p < .0001$). This variable is named in-school problem behavior.

Peer network behavior scores. To calculate a behavior score for each peer network on each of the variables of interest (after-school delinquency, in-school problem behavior) we calculated the average score of all the network members (excluding the target member). This was done separately for the in-school network and after-school network on each of the variables. For individuals who had no peer network (either in or after school), or for whom no network members were participants (thus, for whom we had no behavioral data), we assigned missing data for the corresponding network score. Note that network members who were not study participants (i.e., attended one of the schools but did not participate, lived outside of the neighborhood, or attended some other school) could not be included in the calculation of network behavior scores. Percentages of network members who were study participants are presented in the Results section.

Depressive symptoms. The Child Depression Inventory (CDI; Camuffo, Cerutti, Lucarelli & Mayer, 1988; Kovacs, 1980) was used to measure symptoms of depression. For ethical reasons one item asking about suicide ideation was dropped from the questionnaire. Responses for the CDI are coded on a scale of 0 to 2. Thus, for the 26 items used in the present study there was a possible range from 0 to 52, with higher scores indicating higher levels of depression. Cronbach's alpha for the 26 items was .83. The average score was $M = 11.3$ ($SD = 6.5$). The nonstandardized responses to the 26 items were summed to form one score of depressive symptoms.

Classroom peer preference. Peer nominations were conducted within each classroom, providing each participant with a list of his or her classroom peers. The classroom peers, rather than the schoolwide peers, were used as a reference group because in Italian schools students remain with the same group of classmates for the entire day and year, as well as across the 3 years of middle school. Unlimited and cross-gender peer nominations from classmates on the liked-most (LM) and liked-least (LL) questions were used to assess each adolescent's level of social preference. The number of LM and LL nominations received were computed for each participant and were standardized within each classroom and across gender. A classroom peer preference score (LM - LL) was then calculated for each participant and used as an indicator of classroom peer status. The correlation between LM and LL was $r = -.78$ ($p < .0001$). Although this correlation is strong, it is consistent with a previous study using a different sample from a different Italian city ($r = -.79$, $p < .0001$; Kiesner et al., 2002).

Nominations received as an in-school network member and as an after-school network member. Our goal was to develop a measure that would give us a sense of a child's peer inclusion across two contexts: the school setting and the after-school setting. To do that, we computed two separate scores. First, we computed the number of times each child was nominated by his or her peers as an in-school network member (in-school peer network inclusion). Second, we computed the number of times each child was nominated by his or her peers as an after-school network member (after-school peer network inclusion). The mean number of nominations received as an in-school network member was $M = 4.0$ ($SD = 2.9$), and as an after-school network member was $M = 2.4$ ($SD = 2.3$). Because the reference group for the in-school peer network inclusion measure was the same-school peers, this score was standardized within each school. The correlation between the standardized in-school peer network inclusion score and the after-school peer network inclusion score was $r = .62$ ($p < .0001$).

It is important to draw a clear distinction between the different measures of peer preference and network inclusion used in the present study. The first is that the traditional peer preference measure is composed of both negative (i.e., rejection) and positive (i.e., acceptance) nominations, whereas the network inclusion scores represent only positive nominations as being a network member. The second distinction regards the reference group in which preference and network inclusion are considered. In the present study peer preference uses the classroom peers as the reference group. The measures of network inclusion, on the other hand, use either the entire school, or the entire neighborhood. This is because for in-school network inclusion the participants could receive nominations from all of the students in the same school, and for after-school network inclusion they could receive nominations from any participant from any of the schools representing the entire neighborhood.

Results

The results section is divided into three parts. In the first part we present descriptive statistics and correlations. Note that in this first part we address the additional research questions regarding overlap across network members and its relation to individual problem behavior. In the second part we present structural equation models examining the unique contributions of the in-school and after-school peer networks to individual in-school problem behavior

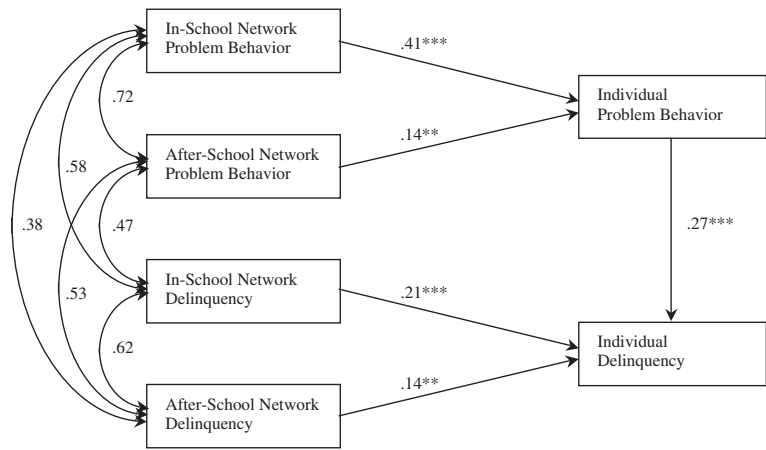
and delinquency. Finally, in the third section we present data regarding the unique contributions of peer preference, and in-school and after-school network inclusion in explaining depressive symptoms.

Descriptive Statistics and Correlations

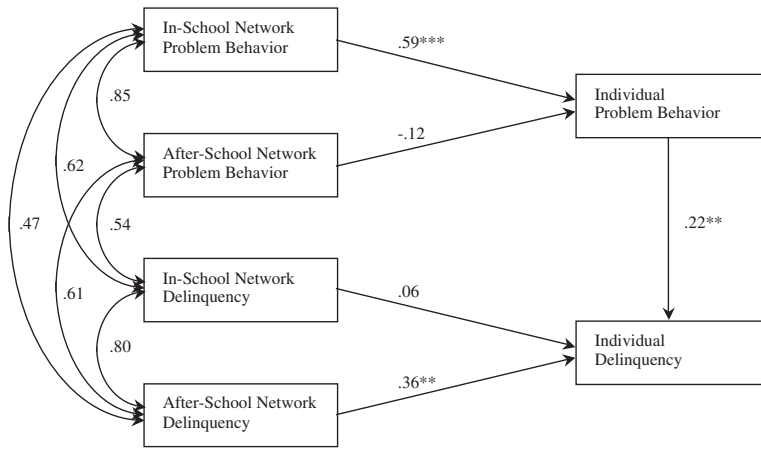
Because participants were able to name the same group member for both groups, we examined the level of overlapping members across the two groups. To examine this we calculated the proportion of overlapping members that was equal to the number of overlapping members divided by the total number of unique members. For example, if an individual nominated three members in each group, and one of those individuals was named for both groups, the proportion score would be $1/5$ (for which the denominator is equal to two nonoverlapping members from each group and one member who was redundant across both groups). The mean proportion of overlapping members was $M = .33$ ($SD = .30$). Thus, on average, only about one third of the network members were in both the in-school and after-school networks. Of the 543 participants who had both an in-school and an after-school network, 125 (23%) had no overlapping members and 37 (6.8%) had complete overlap. These data suggest that in-school and after-school networks represent separate contexts, made up of mostly different individuals, and thus merit further study.

Because the after-school network could be composed of individuals from the same school or from any other school, participants had been asked to indicate whether each after-school network member attended the same or a different school. Of the 554 participants who reported having an after-school network, 68 (12.3%) reported that none of those network members attended their own school and 166 (28%) reported that all of their after-school network members attended their own school. The mean proportion of after-school network members attending the same school as the target individual was $M = .61$ ($SD = .35$).

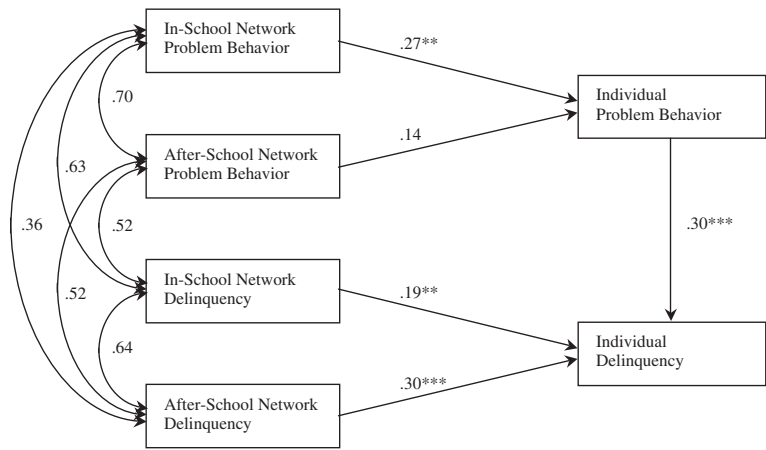
To create a behavioral score for each network it was necessary to identify all of the network members who also were participating in this study (and therefore for whom we had behavioral data). The mean proportion of peer network members who were participating, and thus for whom we had data, was $M = .75$ ($SD = .24$, $n = 560$) for the in-school peer network, and $M = .50$ ($SD = .32$, $n = 556$) for the after-school peer network. Thus, we were able to



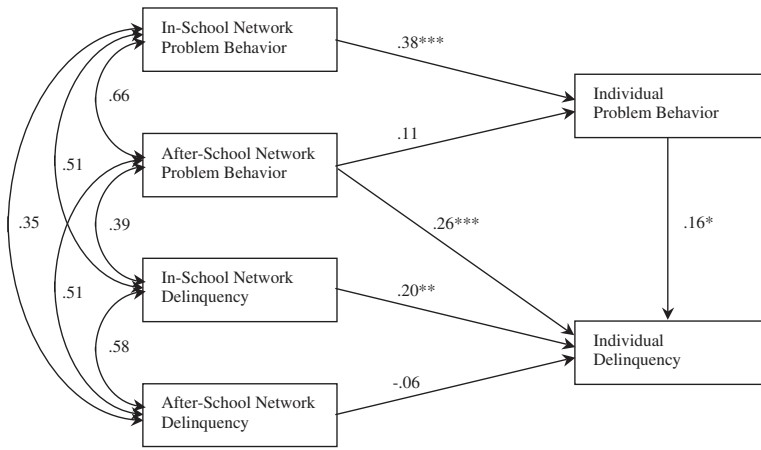
(a) Full sample ($n = 458$)



(b) Reduced sample ($n = 131$)



(c) Full Sample Girls ($n = 227$)



(d) Full Sample Boys ($n = 231$)

Figure 1. Structural equation models testing for unique contributions of in-school and after-school peer networks in explaining variance in individual in-school problem behavior and after-school delinquency. The bivariate correlations presented at the left side of each figure were all significant at $p < .001$ for all analyses. * $p < .05$. ** $p < .01$. *** $p < .001$.

identify fewer after-school network members than in-school network members.

The correlations between the individuals' behavior scores, variables regarding group composition (group size, overlap, proportion attending the individual's school), and individual peer preference and network inclusion are presented in Table 1. We discuss only the correlations relevant to the goals of the present study or the validity of the measures.

It can be seen that the two measures of problem behavior (in-school problem behavior and after-school delinquency) are positively correlated with each other. Thus, individuals who are rated by teachers and peers as showing high levels of problem behavior in the school also tend to engage in higher levels of stealing and vandalism outside of the school.

The correlations between the two measures of individual problem behavior and the proportion of overlapping members and the proportion of network members attending the same school were all equal to zero. These correlations address the additional research question regarding the relation between individual problem behavior and overlap between the two networks. These results show that the individual's behavioral tendencies are unrelated to these structural characteristics of the networks.

All three measures regarding peer preference and network inclusion were positively correlated with each other, providing support for the validity of the network inclusion measures. The strength of these correlations (from $r = .33$ to $r = .62$) indicates that although classroom peer preference is related to network inclusion both within the entire school and outside of the school, these relations are far from perfect. Thus, the measures of network inclusion may provide important information beyond what is provided by the classroom peer preference measure.

In-school problem behavior was negatively correlated with peer preference. This is consistent with the idea that the behaviors contributing to this scale are aversive and lead to peer rejection. However, in-school problem behavior was not related to either in-school or after-school network inclusion, suggesting that the aversive behavior that leads to peer failure in the classroom may not be related to a lack of peer affiliations outside of the classroom. On the other hand, after-school delinquency demonstrated a weak positive association with network inclusion, both in school and after school. Thus, individuals who steal and vandalize after school appear to have relatively larger peer networks—as determined by their peers—than their nondelinquent peers. Although these associations were weak, this finding suggests that stealing and graffiti may be inherently social activities that may facilitate the development of social networks in some contexts.

Consistent with prior research showing that individuals rejected at school do not report fewer friends outside of school (Ladd, 1983; Ray et al., 1995), the present study also showed a weak relation between classroom peer preference and the size of the self-nominated after-school peer network ($r = .09, p < .05$).

Both network inclusion scores were positively related to the size of participants' own self-nominated peer networks. This provides further support for the validity of these measures. It is important to note that the group size variables are based on self-report whereas the network inclusion scores are based on peer reports. Therefore, these correlations are not inflated by using a single informant across measures.

Although not presented in Table 1, we also tested for gender differences on all variables presented in Table 1. Gender differences were found only for

Table 1
Zero-Order Correlations Among Central Variables

Measure	1	2	3	4	5	6	7	8
1. School problem behavior								
2. Delinquency	.35***							
3. Group size in school	.15***	.15***						
4. Group size after school	.14**	.16***	.47***					
5. Proportion of overlapping members	-.03	.01	-.11*	-.10*				
6. Proportion from own school	.02	-.03	.02	-.12**	.67***			
7. Classroom peer preference	-.26***	.07	.12**	.09*	.07 [†]	.03		
8. In-school peer network inclusion	.02	.09*	.31***	.24***	.08*	.10*	.48***	
9. After-school peer network inclusion	.06	.12**	.20***	.19***	.23***	.24***	.33***	.62***

Note. Missing values excluded pairwise. Sample sizes range from 541 to 577.
[†] $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

in-school problem behavior ($t = 9.5, p < .001$) and after-school delinquency ($t = 3.5, p < .01$), with boys scoring higher on both measures.

Structural Equation Models Examining Individual-Network Behavioral Similarity

To test for the unique contributions of the two networks in predicting individual in-school problem behavior and after-school delinquency we used structural equation modeling (LISREL 8; Jöreskog & Sörbom, 1996). The main goal of these analyses was to compare the unique contributions of the in-school and after-school networks in explaining variance in two types of problem behavior. To do so we used the four group behavior scores as predictors, and the two individual behavior scores as dependent variables. We allowed all four of the network behavior scores to covary among themselves. We also specified a path that goes from individual in-school problem behavior to individual delinquency. We then used the in-school problem behavior scores from both the in-school and after-school networks to predict individual in-school problem behavior, and we used the delinquency scores from both the in-school and after-school networks to predict individual delinquency. The conceptual model for this analysis can be seen in Figure 1a.

By structuring the analysis this way we are testing whether both the in-school network and the after-school network uniquely contribute to each type of behavior. However, we limit these contributions to within-behavior type. That is to say, we used only the in-school problem behavior scores to predict the individual's in-school problem behavior, and only the delinquency scores to predict the individual's delinquency.

For the following analyses only those participants who had complete data were included. That is, participants who had either no in-school or after-school network were not included, and participants for whom we could not identify at least one network member, for both networks, were not included. In all, 119 participants did not have complete data. Thus, for the following analyses a sample of 458 participants (227 girls, 231 boys) was used. Using independent-samples t tests, we found that the participants included in these analyses were significantly more delinquent than the participants not included ($t = 2.5, p < .05$), but that there was no difference on the measure of in-school problem behavior ($t < 1$). Therefore, the generalizability of these results may be limited.

Results from the first model are presented in Figure 1a. All fit indexes show that this model fit the data well ($\chi^2 = 7.93, df = 4, p = .09$; RMSEA $< .05$; GFI = .99; AGFI = .97). All path coefficients were significant. These results suggest that both the in-school group and the after-school group are important for understanding both types of individual behavior. However, it can also be seen that the path coefficients for the in-school group are consistently stronger than the paths for the after-school group.

Because the distributions of both individual behavior scores were positively skewed ($\gamma = 1.6$ for in-school problem behavior, $\gamma = 2.2$ for delinquency), we retested the model excluding participants who scored at or below the 20th percentile on the in-school problem behavior score. The new distributions were improved ($\gamma = 1.4$ for in-school problem behavior, $\gamma = 1.8$ for delinquency). Based on this reduced sample ($n = 368$), the model again demonstrated a good fit with the data ($\chi^2 = 7.15, df = 4, p = .13$; RMSEA $< .05$; GFI = .99; AGFI = .97), and the path coefficients were almost unchanged and all were again significant.

Because we had behavioral data on a smaller proportion of the after-school network members ($M = .60, n = 458$) as compared with the in-school network members ($M = .78, n = 458$), the estimates of the after-school network behavior scores were likely to be less reliable than the estimates of the in-school network behavior scores. This difference could explain why the path coefficients were stronger for the in-school group than for the after-school group. Therefore, we reanalyzed the data, requiring that at least 75% of an individual's network members, of both networks, be study participants (thus, for whom we would have behavioral data). Based on this selection criteria a reduced sample of 131 participants (76 girls, 55 boys) was identified. A series of t tests showed that the selected and nonselected participants were not different on the measures of in-school problem behavior or after-school delinquency.

Again, all fit indexes indicate that the model fit the data well ($\chi^2 = 4.65, df = 4, p = .33$; RMSEA $< .04$; GFI = .99; AGFI = .94). As can be seen in Figure 1b, a different pattern of results was found with regard to the magnitude of the different path coefficients. Whereas with the full sample the in-school network showed stronger effects across both behavior types, in the present model only the in-school network demonstrated a unique relation with individual in-school problem behavior, and only the after-school network demonstrated a unique relation with individual delinquency.

To test whether the same model fit for both boys and girls, we conducted a multiple-group analysis, fitting the original model (Figure 1a) to both the girls' and boys' data simultaneously. In doing so the structural paths, but not the correlations, were constrained to be equal across groups. This constrained model did not fit the data ($\chi^2 = 29.27$, $df = 13$, $p < .01$; RMSEA = .07; GFI = .97). Therefore, we tested the original model separately for boys and girls, using the Modification Indices provided by the LISREL program to make adjustments to the models. For girls the original model fit well ($\chi^2 = 6.09$, $df = 4$, $p = .19$; RMSEA < .05; GFI = .99; AGFI = .95), and no modifications were indicated. The path coefficients are presented in Figure 1c and are similar to those found when using the reduced sample: Only the in-school network demonstrated a unique relation with individual in-school problem behavior, and the after-school network demonstrated a slightly stronger relation, as compared with the in-school network, with individual delinquency.

The original model did not fit the boys' data ($\chi^2 = 11.99$, $df = 4$, $p < .05$; RMSEA = .09; GFI = .98; AGFI = .91). The Modification Indices indicated that only one path be freed up, going from the after-school network's in-school problem behavior to individual delinquency. After allowing this path, the model fit the data well ($\chi^2 = 0.23$, $df = 3$, $p = .97$; RMSEA < .00; GFI = 1.00; AGFI = 1.00). The path coefficients are presented in Figure 1d. As shown in the figure, the in-school network demonstrated unique relations with individual in-school problem behavior and individual delinquency, on the respective measures. The only significant relation found for the after-school network was the path going from that network's in-school problem behavior to individual delinquency.

Because there were no gender differences on any of the measures regarding network structure (group size, overlapping members, proportion from own school) it is unlikely that the gender differences found in the structural models can be attributed to potential differences on these variables. However, there were gender differences with regard to the proportion of network members who were study participants, and thus for whom we had behavioral data. Girls had a higher proportion of network members who were study participants for both the in-school network ($M = .81$, $SD = .21$ for girls, $M = .75$, $SD = .22$ for boys; $t = 3.02$, $p < .01$) and the after-school network ($M = .62$, $SD = .26$ for girls, $M = .57$, $SD = .26$ for boys; $t = 2.32$, $p < .05$). However, even though the gender differences were significant, they were not large, and it seems

unlikely that they would result in such large differences in the structural equation model. Nonetheless, the boys' data may be biased because we had access to a lower proportion of both in-school and after-school network members when creating the behavioral scores for each network.

Peer Preference and In- and After-School Network Inclusion as Predictors of Depressive Symptoms

It additionally was hypothesized that network inclusion across settings would contribute to depressive symptoms beyond what is explained by peer preference in the classroom. To test this hypothesis we conducted a multiple regression using gender, peer preference in the classroom, in- and after-school network inclusion, and the 3 two-way interactions between peer preference and in-school and after-school network inclusion. We also tested for all two-way and three-way interactions involving gender, but none reached significance and their inclusion did not change the pattern of findings or significance tests of the other effects. Therefore, these interaction terms were not included in the following analysis. To facilitate interpretation, all predictors involved in the interaction terms were standardized to have a mean of 0 and a standard deviation of 1 before creating the interaction terms (Aiken & West, 1991). All predictors were entered simultaneously. All study participants were included in this analysis ($N = 577$).

Results are presented in Table 2. The overall model explained approximately 7% of the variance, $F(7, 570) = 6.04$, $p < .0001$. It can be seen from these results that both peer preference in the classroom and in-school network inclusion uniquely contributed to predicting depressive symptoms, after

Table 2
Results of the Regression Model Predicting Depressive Symptoms

Predictor	β
Gender	.07
Classroom peer preference	-.13**
In-school peer network inclusion	-.16*
After-school peer network inclusion	.06
Classroom peer preference by in-school peer network inclusion	.01
Classroom peer preference by after-school peer network inclusion	-.02
In-school peer network inclusion by after-school peer network inclusion	.21***

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

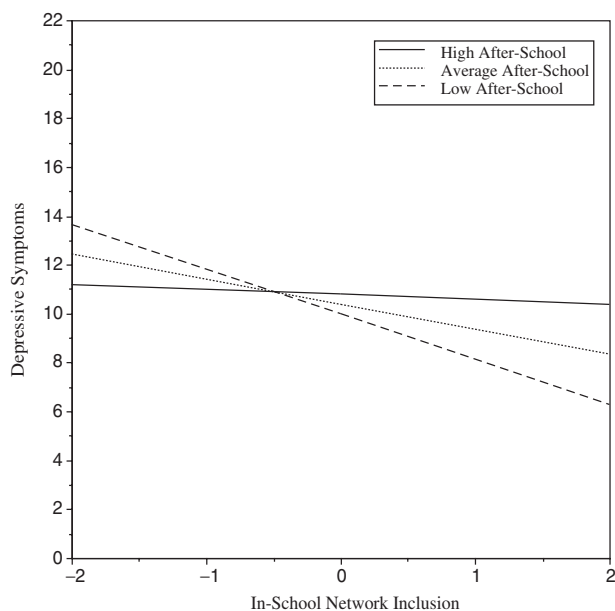


Figure 2. Simple regression slopes of depressive symptoms regressed on in-school peer network inclusion at three levels of after-school peer network inclusion.

controlling for the other. On the other hand, the main effect for after-school network inclusion did not contribute to the model. However, the interaction between in-school and after-school network inclusion did significantly contribute to the model.

To help interpret the interaction between in-school and after-school network inclusion, the simple slopes for depression regressed on in-school network inclusion at three levels of after-school network inclusion (high = +1SD, average = at the mean, low = -1SD) are presented in Figure 2. It can be seen in this figure that when the individual experiences low after-school network inclusion there is a positive relation between in-school network inclusion and depressive symptoms. On the other hand, when the individual experiences high after-school network inclusion there is no relation between depressive symptoms and in-school network inclusion. Thus, network inclusion outside of the school may protect individuals from the negative emotional effects of low network inclusion in the school.

Discussion

This study was conducted to examine two contexts of adolescents' peer microsystems. By assessing peer networks both in school and after school, we were able to evaluate individual network similarity regarding both an in-school peer network and an

after-school peer network. Moreover, because multiple measures of behavior were obtained we were able to evaluate individual network similarity also across two types of problem behavior: in-school problem behavior and after-school delinquency. Finally, we tested whether peer network inclusion both in school and after school uniquely explains variance in individual depressive symptoms, after controlling for peer preference in the classroom.

Regarding the first question, when including all participants with complete data ($n = 458$), the proposed structural equation model fit the data well. The path coefficients indicated that both peer networks significantly contributed to explaining individual behavior, even after controlling for the other. This was found for both behaviors and after controlling for the effect of individual in-school problem behavior on individual after-school delinquency.

An important aspect of these findings is that although the two peer networks are behaviorally similar, both networks demonstrate a unique similarity with the individual. That is, each network has some behavioral characteristics in common with the individual that are not also in common with the other network. This has two important implications. The first implication is that each of the peer networks provides the individual with unique behavioral opportunities. As a result, the individual may be exposed to different behaviors in different peer contexts and therefore may experience different learning or reinforcement experiences across these two contexts.

The second implication is that different networks, or network members, may be selected for the unique behavioral opportunities that they provide the individual. This suggests that individuals select peer networks and network members based not only on what those individuals have in common but also on what each one can uniquely offer. For example, the two networks examined in the present study could be selected, in part, for a general antisocial (or non-anti-social) tendency, such as a core set of behavioral tendencies. However, the different networks could further be selected because of specific behaviors unique to that network and thus not in common with the other network.

Because, on average, we were able to identify a lower proportion of after-school network members than in-school network members, we reanalyzed the data using a selected subsample, including only participants for whom we could identify at least 75% of the network members for both networks ($n = 131$). The pattern of results was different. Whereas both

peer networks continued to be important for explaining variance, these contributions were specific to the behavior type relevant to that context. That is, the in-school network explained unique variance only for in-school problem behavior, and the after-school network explained unique variance only for after-school delinquency. This pattern of findings is in line with the hypothesis presented in the Introduction, stating that individuals select affiliations with peers who are behaviorally similar to themselves in that specific context. However, because this subsample represents just more than 20% of the overall sample, conclusions must be taken with caution.

The results described above are qualified by important differences found between girls and boys. For the girls, the original model fit the data well and the path coefficients were similar to those found for the reduced sample. This suggests that, similar to the reduced sample, girls tend to select peer affiliations based on context-specific behaviors. This analysis was based on all girls with complete data ($n = 227$), and therefore the conclusions can be taken with a good degree of confidence.

Boys demonstrated a different pattern of results. Across both behavior types, the in-school network appeared to be the most consistent predictor of individual behavior. This suggests that boys may be more selective with regard to in-school peer networks than after-school networks. However, the additional path added to the boys' model, going from the after-school network's in-school problem behavior to the individual's delinquency, demonstrates that the after-school network also shows a unique behavioral similarity with the individual, but across behaviors. One possible explanation is that boys may be selecting their after-school networks based on in-school behaviors. For example, boys' after-school networks may actually be formed within the school context, even though they gather together during after-school hours. This would occur, for example, if a group of boys who are in separate classes within the school context meet and create networks while at school (i.e., while arriving at or leaving school) but actually spend time together during after-school hours. Thus, in-school behaviors may be more important than after-school delinquency for selecting the after-school group. If this explanation were true, we would expect to find that boys meet their after-school group members in the school context and that girls meet their after-school group members outside of school. In the present study we did not have these data and therefore could not evaluate this hypothesis.

Although the present data provide information on individual network similarity across two contexts, no conclusions can be drawn regarding peer influence. Future research should examine how peer networks from different contexts may differentially affect or have interactive effects on the individual's behavioral development. Research on extracurricular activities may be informative for this. For example, Mahoney (2000; Mahoney & Cairns, 1997) has shown that participation in school-based extracurricular activities was related to lower rates of school dropout and criminal arrests for high-risk youth. Most relevant for the present study is that this reduced level of dropout and arrests depended on whether the individual's social network also engaged in extracurricular activities (Mahoney, 2000). Other research, focusing on nonschool extracurricular activities, has found that involvement in extracurricular activities that are low in structure is related to higher levels of antisocial behavior and affiliation with deviant peers (Mahoney & Stattin, 2000). Although these studies did not examine peer relations comparatively across contexts, they do suggest that nonclassroom settings are important contexts that require further study.

There are at least two hypotheses for differential peer influence when considering an after-school peer network and an in-school peer network. The first hypothesis is that the after-school network would have the most influence on after-school delinquency and that the in-school network would have the most influence on in-school behaviors. However, we could also consider these two networks as three subsets: (a) nonoverlapping after-school members, (b) nonoverlapping in-school members, and (c) overlapping members. It is possible that the nonoverlapping members would have the most influence if, for example, they were selected because of specific desired behaviors. On the other hand, it is also possible that the overlapping members could have the most influence because the individual has the most contact with those members, and possibly the strongest relationships. Untangling these multiple sources of influence remains a challenge for future research.

It should be noted that the actual behaviors that contributed to the in-school problem behavior measure and the delinquency measure were very different. Whereas in-school problem behavior was defined as disruptive and aggressive behavior, delinquency was defined as stealing and vandalizing. The reason for measuring such different behaviors across settings was to tap problem behaviors that would be typical and possibly specific

to that context. This approach was used in order to study peer affiliations in different contexts with regard to behaviors most relevant to that context.

The second general research question regarded the assessment of peer network inclusion outside of the classroom and its relation to individual levels of depressive symptoms. The correlations between classroom peer preference and in-school and after-school network inclusion (ranging from $r = .33$ to $r = .62$) suggest that individuals with low peer acceptance in the classroom typically also experience low peer inclusion outside of the classroom. However, the magnitudes of these correlations suggest that important differences also exist across settings. Thus, considering multiple contexts of the peer microsystem may provide new information for understanding individual development.

Regarding depressive symptoms and peer preference and peer network inclusion, we found that both classroom peer preference and in-school network inclusion uniquely contributed to explaining depressive symptoms. This is important because it provides further evidence that expanding peer relations research to include multiple contexts of the peer microsystem provides important new information for understanding individual adjustment. In fact, the magnitude of these two effects was approximately the same, suggesting that both effects are about equally as important.

Moreover, we found that although after-school network inclusion had no direct relation with depressive symptoms, it did interact with in-school network inclusion. The pattern of results suggests that receiving nominations as an after-school network member may be a protective factor against the negative effects of low network inclusion in the school. The role of after-school network inclusion has important implications for social-adjustment problems, such as depressive symptoms, as well as intervention and prevention programs to reduce such problems. First, it is clear that we must extend the definition of the peer relations construct to include both schoolwide and after-school contexts. Doing so will add to our understanding of the developmental implications of peer acceptance and inclusion. Second, these findings suggest that intervention and prevention programs may be more effective if they attempt to facilitate peer inclusion across multiple contexts. However, we are aware of no such studies that have evaluated such a strategy.

Although after-school network inclusion interacted with in-school network inclusion, the overall pattern of results suggests that in-school peer preference and network inclusion are more impor-

tant than after-school network inclusion in terms of main effects. One explanation for this difference is that peer relations at school place the individual's social success or failure in public view and provide clear social comparisons within the classroom and school. Outside of school, on the other hand, there is less opportunity for social comparison, and thus, although an individual may not have an after-school network, they may not be continually and publicly reminded of their social failure.

Another interesting finding from the present analyses was the positive relation between after-school delinquency and both network inclusion scores, whereas in-school problem behavior was negatively related to classroom peer preference. Thus, whereas in-school problem behavior appears to be aversive to classroom peers, stealing and vandalizing may be cause for being selected by others as a peer group member. This pattern of findings suggests that peer acceptance likely differs across contexts and that the behavioral correlates of acceptance and inclusion also differ across contexts.

A couple of limitations of this study should be noted. First, the present sample comes from an isolated and low SES neighborhood of a large metropolitan city. Although this setting was chosen for the advantages it offered the study (i.e., the possibility to identify both in-school and after-school peers while still using a sample from an urban setting), this sample may also limit the generalizability of these results. Second, asking individuals to nominate both peer networks, one right after the other, may have created biases in the data. For example, participants may have been more likely to nominate the same individuals in both groups (overestimating membership overlap). Third, having individuals report on their after-school group while they were in school may have resulted in an overestimate of classmates and schoolmates in their after-school network. Nevertheless, the overall levels of network overlap and proportion of after-school group members attending the individuals' school were not high. Finally, results showed that the participants who were not included in the first set of structural equation models were significantly less delinquent than those who were included. This suggests that the generalizability of these results may be limited and that replication will be important.

Finally, in the present study, peer affiliations were defined only at the group level. However, for some individuals the most important peer relationships may be at the dyadic level. Future research should examine groups as well as dyadic friendships. For example, Urberg, Degirmencioglu, and Pilgrim (1997)

showed that whereas groups provided more exposure to substance use, similarity on substance use was stronger with friends than with group members. Moreover, both friend substance use and group substance use demonstrated unique effects on individual escalation in substance use. More work is needed to understand the multiple contexts and multiple levels of peer relationships.

In conclusion, the present study is one of the few studies that have attempted to examine the multiple contexts of adolescents' peer microsystem. Two important findings emerged. First, the present study provided evidence that peer networks across different settings show unique contributions in explaining individual behavior. Second, the present study provided evidence that high peer network inclusion outside of the school may be a protective factor against the negative effects of low peer network inclusion within the school. To better understand the role of peer relations in the development of social adjustment, we should begin to consider the complexity of multiple contexts and behavior types embedded within the peer microsystem.

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