Peer Experience: Common and Unique Features of Number of Friendships, Social Network Centrality, and Sociometric Status

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Abstract

Three conceptually distinct dimensions of classroom social position (number of mutual friendships, social network centrality, and sociometric status) were examined in relation to each other and to peer-nominated behavioral reputation among 205 7- and 8-year old children. There were moderate correlations in children's standing across the three dimensions, but categorical analyses underscored the limits to these associations (e.g., 39% of Rejected children had at least one mutual friendship; 31% of Popular children did not). Each dimension was associated with a distinct profile of peer-nominated social behavior and, in multiple regression analyses, accounted for unique variance in peer-nominated behaviors. Number of friendships was uniquely associated with prosocial skills; network centrality was uniquely associated with both prosocial and antisocial behavioral styles; and being disliked was uniquely associated with the full range of social behaviors. Results provide empirical validation for the conceptual distinctions among number of reciprocated friendships, social network centrality and being liked or disliked.

Keywords: Peer relations; Friendship; Social Networks; Sociometrics

Having friends, occupying a central position in the network of informal peer groups, and being liked or disliked are three conceptually distinct aspects of children's social position in the classroom. The correlates and developmental significance of being liked or disliked have been the focus of many studies (Hartup, 1983; Parker & Asher, 1987; Rubin, Bukowski, & Parker, 1998); and the forms and functions of children's friendships are now central topics in peer relations research (Bukowski, Newcomb, & Hartup, 1996; Hartup, 1996; Newcomb & Bagwell, 1995). Relatively less attention has been afforded to social network centrality, which has been defined as the number of times children are named by classmates as members of informal peer groups

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(Cairns, Cairns, Neckerman, Gest, & Gariepy, 1988; Farmer & Rodkin, 1996). Each of these dimensions, however, may be developmentally important in its own right. For example, mutuality between friends may contribute to prosocial skills and the development of the self-system (Bagwell, Newcomb, & Bukowski, 1998; Hartup, 1996); occupying a central role in the classroom social network could provide a platform for either prosocial or antisocial leadership (Cairns & Cairns, 1994; Farmer & Rodkin, 1996; Rodkin, Famer, Pearl, & Van Acker, 2000; Salmivalli, Huttenen, & Lagerspetz, 1997); and being extremely disliked may forecast long-term problems in social adaptation (Bagwell et al., 1998; Parker & Asher, 1987). The goal of the present study was to test whether each of these conceptually distinct dimensions of children's social position in the classroom would show empirically distinctive and unique relations to children's behavioral reputation.

Interrelations Among Number of Friendships, Network Centrality, and Sociometric Status

The present focus on unique features of children's number of friends, network centrality and sociometric status should not obscure recognition of processes that may link these dimensions. Friendships, for example, provide unique opportunities for learning basic social skills and the workings of close relationships (Berndt, 1982; Hartup, 1996; Sullivan, 1953), and these skills may contribute to a child's position within the larger peer groups that comprise the classroom social network. The ways in which a child establishes and changes affiliations in these fluid groups (Cairns, Leung, Buchanan, & Cairns, 1995) could influence the child's overall acceptance among classmates. Levels of social acceptance, in turn, may affect opportunities for friendship formation (Bukowski, Pizzamiglio, Newcomb, & Hoza, 1996).

Several studies suggest there are limited associations among the three dimensions of social position. For example, liked children are more successful at entering existing play groups, have more extensive social networks, and make more stable friendship choices than disliked children (Dodge, Schlundt, Schocken, & Delugach, 1983; Ladd, 1983; Newcomb & Bukowski, 1983). However, many disliked children resemble non-disliked children in terms of friendship formation and social network centrality (Cairns, et al., 1988; Cillessen, Van IJzendoorn, Van Lieshout, & Hartup, 1992; French, 1988; George & Hartmann, 1996). Among older preadolescent children, for example, class bullies participate in widely recognized cliques despite being generally disliked by their classmates (Salmivalli, Lagerspetz, Bjorkqvist, Osterman, & Kaukiainen, 1996).

Overall, interrelations among children's number of friends, social network centrality, and sociometric status have been examined in a fragmented fashion, so the first goal of this study was to describe the interrelations existing among these three aspects of classroom social position. We hypothesized that children's number of friends and social network centrality would be moderately correlated since both dimensions assess success in forming social relationships. We expected more modest correlations between children's number of friends and network centrality, on the one hand, and their being liked or disliked, on the other. This expectation was based on past conceptual discussions (Bukowski, Pizzamiglio et al., 1996; Cairns, 1983; Hartup, 1996) and empirical findings (Cairns et al., 1988; Cillessen et al., 1992) that underscore the distinction between measures of affiliative success (e.g., number of friendships, network centrality) and measures of group attitudes toward children (e.g., sociometric status).

Relations to Social Behavior

The behavioral correlates of friendships, network centrality and sociometric status suggest the three aspects of social position have both common and unique features. Children with friends are more socially outgoing and display more prosocial behaviors (e.g., cooperation, altruism) than children without friends (Hartup, 1993). Network centrality is correlated with athletic skill and prosocial peer leadership (Farmer & Rodkin 1996). Being liked is generally correlated with sociability and prosocial peer leadership (see Asher & Coie, 1990; Hartup, 1983; Parker & Asher, 1987). Against this broad backdrop of the normative correlates of social position, recent studies have demonstrated that the acceptability of problem behavior varies systematically across classrooms, so that in some classrooms network centrality (Xie, Cairns, & Cairns, 1999) and being liked (Stormshak, Bierman, Bruschi, Dodge, & Coie, 1999) are associated with aggression rather than with prosocial behavior.

Despite the fact that having friends and being liked have similar correlates, researchers have begun to clarify their distinctive contributions to children's social behavior and adjustment. For example, Ladd (1990) found that friendship participation in kindergarten predicted school adjustment at the end of the school year even after controlling for earlier levels of being disliked. Similarly, Parker & Asher (1993) found that friendship participation and being disliked made incremental contributions to the prediction of loneliness among 5th graders. In multiple regression analyses including both friendship participation and being disliked, Bagwell et al. (1998) found that, among fifth graders, friendship participation was uniquely associated concurrently with reputation as a well-liked leader, whereas being disliked was uniquely associated with reputation as aggressive and immature. More impressively, distinctive predictive patterns consistent with developmental theory persisted into early adulthood. Childhood friendship participation was uniquely associated with higher general self-worth and less depressive symptomatology in young adulthood; whereas being disliked was uniquely and negatively associated with broad indices of adult adjustment (i.e., work and school performance; activity involvement). These findings support theoretical statements emphasizing the role of friendships in the development of the self-system (Sullivan, 1953). They are also consistent with long-standing views that peer rejection is a useful predictor of future maladjustment (Kohlberg, et al., 1972; Parker & Asher, 1987).

There is little theory that describes the developmental significance of social network centrality, but several considerations seem relevant. Network centrality is indexed by the number of times a child is named by classmates as a member of an informal peer group using a 'free recall' nomination format (i.e., a class roster is not provided). It seems likely that children who are named frequently are involved in a group that is socially salient for many classmates, whereas children who are named infrequently are involved in a group that is not salient for many classmates or are not involved in a group at all. Since children are not asked to 'filter' their nominations in any evaluative way, the salience of a child's peer group could derive from 'positive' qualities (e.g., prosocial leadership), 'negative' qualities (e.g., aggressive or bullying behavior), or some combination of the two. This view is consistent with the finding that children in the same peer group are similar in both 'positive' qualities such as popularity, academic skills and conventional values (Cairns & Cairns, 1994; Kindermann, 1993; Leung, 1996), and 'negative' qualities such as aggression and bullying (Cairns et al., 1988; Leung, 1996; Salmivalli et al., 1997). It is also consistent with ethnographic

studies suggesting that children in high-status peer groups alternately make prosocial gestures (to gain followers) and hostile gestures (to preserve group boundaries) toward classmates (Adler & Adler, 1995). To the extent that network centrality brings with it a greater control over scarce resources in the classroom (e.g., attention, materials), it can also be seen as a manifestation of social dominance (Hawley, 1999). Network centrality, then, represents a distinct aspect of a child's social position (i.e., participation in an informal social group that is salient to the group as a whole) that could reflect and predict either prosocial or antisocial behavioral styles.

Evidence on the diverging associations of network centrality and sociometric status with aggression supports this view. Being disliked is strongly associated with aggression, whereas network centrality is generally uncorrelated with aggression (Cairns et al., 1988), except for a weak negative association among girls (Farmer & Rodkin, 1996) and a *positive* association among boys with average academic skills (Farmer & Rodkin, 1996). These findings are analogous to the diverging associations of aggression with sociometric popularity and peer-perceived popularity among middle-school students (Parkhurst & Hopmeyer, 1998). Whereas sociometric popularity (i.e., receiving many liked most nominations) is associated with *below-average* aggression, peer-perceived popularity (i.e., being rated as popular by classmates) is associated with *above-average* aggression. Indeed, an examination of the network centrality of boys with varying behavioral profiles suggested that very high network centrality was a characteristic of both 'Model' boys (cooperative, studious, leaders) and 'Tough' boys (antisocial, athletic, cool) (Rodkin, Farmer, Pearl, & Van Acker, 2000). In sum, both conceptual and empirical considerations suggest that network centrality may reflect a sort of social dominance that may derive from either prosocial or antisocial behaviors.

No one has examined whether network centrality accounts for unique variance in social behavior beyond that accounted for by the child's number of friends and liked or disliked status. In the present study we assess social behavior with the Revised Class Play peer nomination inventory (RCP; Masten, Morison, & Pellegrini, 1985) since it contains a range of behaviors highlighting the conceptual distinctions among measures of classroom social position (e.g., leadership and prosocial skills; aggression and aversive interpersonal styles; affective sensitivity). If network centrality accounts for such unique variance in the social behaviors measured by the RCP, it would buttress the argument that the conceptual distinctions discussed above must be maintained in describing children's social position in the classroom. The second goal of this study, then, was to examine the relations between the three dimensions of children's classroom social position and behavioral reputation. We hypothesized that: a child's number of friendships would be associated with positive reputation as a peer leader; being disliked would be strongly associated with reputation for aggression; being liked would be moderately related to positive peer leadership; and social network centrality would be moderately related to both positive peer leadership and aggression. More generally, we expected that number of friends, social network centrality, and being liked or disliked would each account for unique variance in at least one aspect of peer-nominated social behavior. We also expected that each social behavior would be predicted by at least one index of success in forming social relationships (number of friends or network centrality) and one index of group attitudes toward the individual (being liked or disliked). In doing so, we expected to underscore that children's social position in the classroom 'peer environment' and its developmental implications must be conceptualized as multidimensional rather than unidimensional.

Method

Participants

Participants were 239 students from twelve second- and third-grade classrooms in two schools in a midwestern suburban-metropolitan school district. There were 116 boys (37 2nd graders, 79 3rd graders) and 123 girls (43 2nd graders, 80 3rd graders). The ethnic composition of the sample was 92% White, with approximately equal numbers of African-American, Asian-American, and Hispanic children composing the remaining 8%. The school district serves mostly middle- and lower-middle class families. Permission slips were sent home with all children in the 12 participating classrooms. Informed parental consent was obtained for the 239 participants, with an overall participation rate of 79%. Thirty-four children were excluded from all analyses due to missing values on the mutual friendship measure (see below); so the final N for all analyses was 205.

Procedures

The study was conducted between January and March in the first school, and during March and April in the second school. As part of a larger investigation, participants participated in a 30-minute classroom assessment during which they made sociometric nominations, identified a best friend in the class, and completed an abbreviated version of the Revised Class Play. Approximately 2 weeks after the classroom assessment (median interval = 12 days), participants were interviewed individually to obtain nominations of friends and to describe the social networks in their classrooms.

Number of Reciprocated Friendships. During the classroom assessment, participants were asked if they had a best friend from their respective classes, and, if so, to identify that person. Later, during the individual interviews, participants were asked, 'Some people have a number of close friends, others have one best friend, and others don't have a best friend. What about you?' Participants were free to name as many friends as they wished. Nominations from the classroom and individual assessments were combined to form a single list of self-reported friends. (This was done to reduce the amount of missing data resulting from children failing to name a friend in one or the other assessment.) Next, the number of reciprocated friendships was determined for each participant. This number was then standardized within classroom and sex. Missing values were assigned to children whose self-reported list of friends consisted entirely of classmates who were not participating in the study (N = 34) since, by definition, their nominations could not be reciprocated. This reduced the N for all analyses from 239 to 205.

Social Network Centrality. During the individual interview, participants were asked two free-recall questions regarding the social networks in their classrooms. Participants were asked, 'Are there some kids here at school who hang around together a lot?' and were prompted to name groups of boys and groups of girls in their own classes. Reports from all participants in a classroom (boys and girls) were combined. *Social network centrality* was calculated as the total number of times each participant was named to a social group, standardized within classroom and sex. Participants were also asked, 'Are there some kids who don't have a group?' *Social network isolation* was calculated as the total number of times each participant was named as not having

a group, also standardized within classroom and sex. For one analysis, social network centrality scores were trichotomized for descriptive purposes, so that each participant's centrality could be described as Low ($z < -.75$, $N = 88$), Medium ($|z| < .75$, $N = 88$), or High ($z > .75$, $N = 70$).

Sociometric Status. During the classroom assessment, participants were provided a roster with the names of the same-sex members of their classes and were asked to identify 3 people they 'liked most' and 3 people they 'liked least.' Participants' total nominations for 'liked most' and 'liked least' were standardized within classroom and sex. Sociometric categories of Popular, Rejected, Neglected and Controversial were also determined using the procedures described by Coie, Dodge, & Copotelli (1982). Average status was a residual category consisting of all children who did not meet criteria for one of the other four categories.

Social Behavior. Participants nominated one boy and one girl for each role in an 18-item version of the Revised Class Play (RCP; Masten et al., 1985). In order to reduce administration time, only four items from the Sociability-Leadership scale were administered (the four highest-loading items in the factor analyses reported by Masten et al., 1985). All items from the Aggression-Disruptiveness and Sensitivity-Isolation scales were administered. Votes for each role were standardized within classroom and sex. Each of the three broad-band scales of the RCP has well-replicated psychometric properties (e.g., Chen, Rubin, & Sun, 1992) and unique predictive validity (Morison & Masten, 1991). For the present study, however, individual items were analyzed separately as dependent variables in the regression analyses. This strategy preserves important conceptual distinctions that would be obscured by using composite scores (e.g., among Sociability-Leadership items, we expected network centrality to have a strong link to being a 'class leader,' but not to having a 'good sense of humor'). Item-level analyses also allow greater comparability to other studies of peer-nominated social behavior that use a different combination of items than exists in the RCP. Six-month stability coefficients for individual RCP items were obtained for the 48 3rd grade students who had participated in the original RCP study (Masten, personal communication; Masten et al., 1985). Two of the 18 items had insufficient stability to serve as reliable dependent variables: Would Rather Play Alone Than with Others ($r = .33$) and Very Shy ($r = .39$). Four of the remaining 16 items are best seen as measures of peer-perceived social position rather than peer-perceived social behavior (i.e., everyone likes to be with, 6-month stability $r = .84$; has many friends, .72; often left out, .78; trouble making friends, .83). Analyses involving these items are presented separately and are not a focus of discussion. The remaining 12 items are more clearly interpreted as measures of social behavior (i.e., class leader, 6-month stability $r = .66$; good sense of humor, .59; loses temper easily, .76; bossy, .76; picks on others, .71; teases others, .68; gets into fights, .62; interrupts others, .53; shows off, .53; feelings hurt easily, .75; sad, .72; can't get others to listen, .58).

Results

Relations Among Number of Friends, Network Centrality, and Sociometric Status

Pearson Correlations. Pearson correlations among the five measures of social position ranged from quite weak ($r = -.17$) to relatively strong ($r = -.59$). The strongest correlation was the negative association between being liked and being disliked ($r = -.59$, $p < .001$). There were also moderately strong correlations among number of friends,

Table 1. Pearson Correlations Among Number of Friends, Network Centrality, and Sociometric Status

	Number of Friends	Network Centrality	Network Isolation	Liked Most
Network Centrality	.49***	—		
Network Isolation	−.17*	−.27***	—	
Liked Most	.46***	.49***	−.32***	—
Liked Least	−.20**	−.17**	.32***	−.59***

Note: N = 205.
*$p < .05$.
**$p < .01$.
***$p < .001$.

network centrality and being liked (r's range from .46 to .49, $p < .001$). However, number of friends and network centrality had only weak and negative associations with being disliked ($r = -.20$ and $r = -.17$, respectively, both $p < .01$). Nominations for network isolation were only modestly associated with liked least nominations ($r = .32$, $p < .001$); and only weakly and negatively related to number of friends, network centrality, and liked most nominations (r's ranged from −.17 to −.32, all $p < .05$ or $p < .001$). These moderate associations were generally consistent with expectations.

Categorical comparisons. Interrelations among these dimensions also may be considered using categorical versions of the continuous measures. Sociometric categories of Popular, Controversial, Average, Neglected, and Rejected were determined based on liked most and liked least scores; network centrality scores were trichotomized (i.e., $z < -.75$, $|z| < .75$, $z > .75$); and children's friendship participation was defined as having one or more reciprocated friendships. We examine the network centrality and friendship participation of children in the different sociometric categories (Table 2); then we examine the association between network centrality and friendship participation.

There was a significant association between sociometric status and network centrality, $\chi^2(8) = 49.51$, $p < .001$. Analysis of standardized residuals for each cell suggests the following divergences from chance expectancy: Popular children and Controversial children were more likely to have high network centrality; Rejected children were more likely to have low network centrality; and Neglected children were less likely to have high network centrality and more likely to have low network centrality. There was a very similar association between sociometric status and friendship participation, $\chi^2(4) = 17.25$, $p < .01$. The ordering of friendship participation rates paralleled the findings for network centrality, with friendships being progressively less common among Popular (69%), Controversial (64%), Average (55%), Rejected (39%) and Neglected (21%) children. However, the only specific cell with a significant deviation from chance expectancy was the small number of Neglected children with one or more friendships. Finally, network centrality was strongly associated with friendship participation, $\chi^2(2) = 36.13$, $p < .001$. Friendship participation was more common than expected by chance among high-centrality children (80%); and less common than expected by chance among low-centrality children (30%).

Table 2. Network Centrality and Friendship Participation as a Function of Sociometric Status

Sociometric Status	Network Centrality			Reciprocated Friendships
	Low	Medium	High	1 or More
Popular (N = 42)	.14 (6)	.29 (12)	.57*^{G} (24)	.69 (29)
Controversial (N = 11)	.09 (1)	.18 (2)	.73*^{G} (8)	.64 (7)
Average (N = 95)	.19 (18)	.48 (46)	.33 (31)	.55 (52)
Neglected (N = 24)	.63*^{G} (15)	.33 (8)	.04*^{L} (1)	.12*^{L} (5)
Rejected (N = 33)	.52*^{G} (17)	.30 (10)	.18 (6)	.39 (13)

Note: N = 205. Reading across rows, entries indicate the proportion (and frequency) of individuals with a given sociometric status with Low ($z < -.75$), Medium ($|z| < .75$) or High ($z > .75$) network centrality; and the proportion with at least one reciprocated friendship.
Denotes cells for which observed frequency is either significantly greater than (^{G}) or significantly less than (*^{L}) chance expectancy, based on analysis of standardized residual for each cell.

These categorical comparisons clarify the limits of the associations among friendship participation, network centrality and sociometric status. For example, the substantial variation in network centrality and friendship participation within each sociometric group (e.g., 18% of Rejected children had high network centrality and 39% had friends) supports the notion that network centrality and friendship participation are distinct from sociometric status. Similarly, the substantial proportion of low-centrality children with friendships (30%) underscores that participation in dyadic relationships is not synonymous with centrality in the classroom social network.

Relations with Peer-Perceived Social Position and Behavior

Pearson correlations. Each of the 5 measures of classroom social position was positively associated with each of the 4 RCP items describing peer-perceived social position (see Table 3). More distinctive patterns emerged in relation to the 12 RCP items describing social behavior. Number of friendships was modestly correlated with leadership and good humor, uncorrelated with Aggression-Disruptiveness, and weakly and negatively correlated with sadness-sensitivity (i.e., 'feelings hurt easily,' 'usually sad'). Network centrality was correlated moderately with leadership; modestly with good humor and several indicators of Aggression-Disruptiveness; and modestly and negatively with sadness-sensitivity. Network Isolation was correlated moderately with sensitivity; weakly with sadness and several indicators of Aggression-Disruptiveness items; and weakly and negatively with leadership and good humor. Liked most was correlated moderately with leadership and good humor, modestly and negatively with sadness-sensitivity, and weakly and negatively with indicators of Aggression-Disruptiveness. Liked least was correlated moderately with most indicators of Aggression-Disruptiveness, modestly with sadness-sensitivity, and modestly and negatively with leadership and good humor. It is noteworthy that network isolation showed a com-

Table 3. Pearson Correlations Among Peer Relations Measures and Peer-Nominated Social Behavior

RCP Items	Number of Friends	Network Centrality	Network Isolation	Liked Most	Liked Least
Peer-Perceived Social Position					
Everyone Likes . . .	.32***	.50***	−.21**	.54***	−.35***
Has Many Friends	.41***	.56***	−.19**	.55***	−.34***
Trouble Making Friends	−.21**	−.14*	.37***	−.46***	.54***
Often Left Out	−.22**	−.33***	.46***	−.41***	.42***
Sociability-Leadership					
A Class Leader	.34***	.39***	−.16*	.43***	−.35***
Good Sense of Humor	.28***	.25***	−.17**	.38***	−.30***
Aggression-Disruptiveness					
Loses Temper Easily	−.10	.10	.25***	−.19**	.41***
Too Bossy	−.10	.16*	.19**	−.20**	.44***
Picks on Other	−.02	.19**	.13*	−.25***	.43***
Teases Others	−.11	.23***	.11	−.17**	.40***
Gets into Fights	−.09	.12	.23***	−.22**	.48***
Interrupts Others	−.07	.09	.17**	−.22**	.42***
Shows Off A Lot	.01	.25***	.11	−.14*	.28***
Sensitivity-Isolation					
Feelings Hurt Easily	−.21**	−.32***	.39***	−.31***	.32***
Usually Sad	−.16*	−.35***	.28***	−.33***	.28***
Can't Get Others to Listen	−.10	−.10	.41***	−.29***	.39***

Note: N = 205.
*$p < .05$; **$p < .01$; ***$p < .001$.

parable but somewhat weaker profile of correlates than liked least. Moreover, network centrality and liked most had similar positive links to leadership-humor and negative links to sadness-sensitivity, but network centrality was positively associated with Aggression-Disruptiveness whereas liked most was negatively associated with those items.

Multiple regression analyses. The unique variance of each measure of social position in relation to each RCP item was examined through multiple regression analyses. First, for each RCP item, the increment in R^2 associated with adding a particular peer relations measure to a regression equation that already includes the other four peer relations measures was determined. This provided a direct measure of the unique variance associated with each peer relations measure with respect to each RCP item. Second, 2-way interactions between each social position measure and sex (male/female) and grade (2 vs. 3) were considered. This was accomplished by testing the significance of each interaction term separately, after the block of social position measures had been entered. These results are summarized in Table 4. Since there were 32 possible interaction effects for each social position measure (2 interaction terms across each of the 16 RCP items), only interaction terms that are replicated across multiple items on the same RCP scale are interpreted as reliable.

Table 4. Multiple Regression of Revised Class Play (RCP) Items on Peer Relations Measures: Unique Variance (Partial R^2) Associated with Each Peer Relations Measure

RCP Items	Number of Friends	Network Centrality	Network Isolation	Liked Most	Liked Least	Multiple R^2
Peer-Perceived Social Position						
Everyone Likes	—	.09***	—	.04**	.02* (–)	.32***
Has Many Friends	—	.13***	—	.04**	.02* (–)	.40***
Trouble Making Friends	—	—[F]	.09***[3]	.03* (–)	.12***	.41***
Often Left Out	—	—	.12***[3]	—	.06***	.35***
Sociability-Leadership						
A Class Leader	.02*	.06***	—	—	.06*** (–)	.26***
Good Sense of Humor	.03*[F]	—	—	—	.02* (–)	.15***
Aggression-Disruptiveness						
Loses Temper Easily	—	.07***	.06***	—	.10***	.27***
Too Bossy	.02* (–)	.09***	.02*	—	.11***	.26***
Picks on Others	—[3]	.10***	—	—	.10***	.27***
Teases Others	.04** (–)	.13***	—	—	.12***	.28***
Gets into Fights	—	.08***[3]	.03*	—	.17***	.32***
Interrupts Others	—	.03**	—	—	.10***	.19***
Shows Off A Lot	—	.10***	—	—	.03*	.17***
Sensitivity-Isolation						
Feelings Hurt Easily	—	.03* (–)	.10***[3]	—	.03*	.28***
Usually Sad	—[2]	.05*** (–)	.04**[3]	—	.03*	.24***
Can't Get Others to Listen	—	—	.10***[3]	—	.04**	.24**

Note: N = 205. Column entries under each measure indicate the increment in R^2 associated with adding that peer relations measure to a regression equation that already includes the other four peer relations measures. Betas were positive unless noted by a negative sign in parentheses. A superscript indicates a significant two-way interaction effect such that prediction was stronger for the grade (2 or 3) or sex (M or F) indicated.
*$p < .05$; **$p < .01$; ***$p < .001$.

The five social position measures collectively accounted for substantial variance in the 4 RCP items measuring peer-perceived social position (R^2 ranged from .32 to .41, median $R^2 = .38$). Network centrality, liked most and (negatively) liked least were uniquely associated with the two items measuring peer-perceived popularity (everyone likes to be with; has many friends). Not surprisingly, being disliked, network isolation and (negatively) being liked were uniquely associated with peer-perceived difficulty in making friends and being left out.

More interestingly, each measure of social position except 'liked most' nominations demonstrated reliable unique variance with respect to several of the 12 RCP items describing social behavior. (All ΔR^2 reported below were statistically significant at $p < .05$; more precise p-values for each ΔR^2 are noted in Table 4). Number of friends

was uniquely associated with being a class leader ($\Delta R^2 = .02$) and having a good sense of humor ($\Delta R^2 = .03$), and was negatively associated with teasing ($\Delta R^2 = .04$) and bossiness ($\Delta R^2 = .02$). There were three interaction effects involving number of friends: the negative association with picking on others and being sad occurred only among 3rd graders, and the positive association with having a good sense of humor was stronger for girls. These interaction effects were not replicated with other items on the same scales and so were not explored further.

Network centrality was associated with reputation as a leader ($\Delta R^2 = .06$); and was negatively associated with sadness ($\Delta R^2 = .05$) and feelings getting hurt easily ($\Delta R^2 = .03$). Interestingly, network centrality was also uniquely and *positively* associated with every item on the Aggression-Disruptiveness scale ($.03 < \Delta R^2 < .13$), with its strongest connections to peer nominations for teasing, showing off, picking on, and bossing classmates ($\Delta R^2 = .13, .10, .10, .09$, respectively). Network centrality was uniquely associated with fighting among 3rd graders only, and with having trouble making friends among girls only, but these interaction effects did not replicate across items. Network isolation scores uniquely predicted all three items on the Sensitivity-Isolation scale, but for each item there was an interaction effect such that network isolation was a unique predictor of social behavior for 3rd graders but not for 2nd graders. Network isolation was also positively associated (with no interaction effect) with three Aggression-Disruptiveness items: losing one's temper easily ($\Delta R^2 = .06$), fighting ($\Delta R^2 = .03$), and bossing ($\Delta R^2 = .02$).

Remarkably, liked most scores were not uniquely related to any social behaviors, whereas liked least scores were uniquely associated with all 12 RCP social behavior items. The most robust associations were with the Aggression-Disruptiveness items, with the strongest association with getting into fights ($\Delta R^2 = .17$; for all items on scale, median $\Delta R^2 = .10$). Liked Least scores also were associated with sadness, feelings getting hurt easily, and not getting others to listen ($.03 < \Delta R^2 < .04$); and were associated negatively with being a class leader ($\Delta R^2 = .06$) and having a good sense of humor ($\Delta R^2 = .02$).

Discussion

Categories of Peer Experience

Results provided strong empirical support for making conceptual distinctions among friendship, social network, and sociometric measures in middle childhood. There were moderate concordances among these three aspects of children's social position in the classroom, but success in one dimension was not synonymous with success in the others. Moreover, each dimension was associated with a distinctive profile of social behavior and had unique variance with respect to social behavior in a manner consistent with previous findings and theory. These findings contribute to an emerging, more differentiated view of children's peer relations that recognizes the distinctive developmental significance of several aspects of children's social position in the classroom environment.

There were moderate concordances among the three dimensions of peer relations, such that number of friendships and network centrality shared approximately one-fourth of their variance with each other and with being liked, but less than 4% of their variance with being disliked. This pattern is consistent with the view that friendship is more strongly linked to acceptance than to rejection (Bukowski, Pizzamiglio et al.,

1996) and suggests the same may be true for network centrality. Friendships, network centrality, and social acceptance could be mutually supportive in several ways that could not be distinguished in the present cross-sectional study. For example, being generally well-liked may facilitate both the formation of mutual-liking relationships (i.e., friendships; Bukowski, Pizzamiglio et al., 1996) and recognition as a social group participant. The reverse process (i.e., friendships and network centrality facilitating popularity) is also possible, but was less consistent with the longitudinal pattern of associations observed by Bukowski, Pizzamiglio et al. (1996). Finally, the moderately strong correlation between number of friendships and network centrality is consistent with the findings that mutual friendships are frequently but not always embedded within larger, informal peer groups (Cairns et al., 1995; Gest & Fletcher, 1996; Kindermann, 1996; Leung, 1996).

Categorical analyses highlighted the limits of these associations. At each level of success in one dimension, the full range of variation was observed in the other dimensions. For example, 31% of all Popular children did not have a mutual friendship and 14% had low network centrality; conversely, 39% of all Rejected children had a mutual friendship and 18% had high network centrality. These findings add to a growing body of research documenting the varied friendship experiences of Rejected children (George & Hartman, 1996). They are also consistent with emphases on the importance of distinguishing measures of group attitudes (e.g., acceptance/rejection) from measures of peer relationships (friendships, informal groups) (Bukowski, Pizzamiglio et al., 1996; Cairns, 1983; Hartup, 1996).

The more differentiated view of children's peer relations that emerges from these findings also raises interesting questions about how to explain the strikingly mixed success of some children. For example, what characterizes well-liked children with low network centrality and no friends; or disliked children with mutual friendships and high network centrality? A first step toward answers to these questions was taken by examining the separate and combined association of the social position measures to children's behavioral reputation.

Behavioral Correlates

The behavioral correlates of friendship, social network, and sociometric measures in the present study were consistent with numerous previous studies. Friendships, network centrality and being liked were all positively associated with Sociability-Leadership characteristics; and negatively associated with signs of affective sensitivity. However, being liked was weakly and *negatively* associated with Aggression-Disruptiveness, whereas network centrality was weakly but *positively* associated with several items on that scale. The latter finding is consistent with several studies that generally have not found negative associations between network centrality and aggression (Cairns et al., 1988; Farmer & Hollowell, 1994; Farmer & Rodkin, 1996; Sun, 1995).

The somewhat paradoxical correlation of network centrality with both prosocial and antisocial behavioral styles is understandable when one considers that social network nominations are neutral in valence (i.e., 'Who hangs around together a lot?'). Farmer & Rodkin (1996) suggest that high network centrality can be achieved through any behaviors that have consequences that are salient to many members of the class, whether those behaviors are prosocial (i.e., leading, joking) or antisocial (i.e., teasing, picking on) in nature. The fact that network centrality correlates more strongly with

prosocial than with antisocial behavior, however, suggests it may be safest to conclude that network centrality may be facilitated by prosocial characteristics but not precluded by antisocial ones.

The behavioral correlates of network isolation and being liked least cut across virtually all social behaviors and differed only in strength of association. Both measures were moderately associated with affective sensitivity. Being disliked was more strongly associated with Aggression-Disruptiveness and had a more substantial (though still weak) negative association with Sociability-Leadership items. The fact that nominations for network isolation (i.e., 'Are there some kids who don't have a group?') and being disliked were only weakly correlated ($r = .32$) suggests they may tap distinct peer experiences despite their similar behavioral correlates.

The multiple regression analyses provided compelling evidence of the unique behavioral correlates of number of friendships, network centrality, and sociometric status. Each measure exhibited unique variance with respect to multiple peer-nominated behaviors, and the patterning of these unique associations was both distinct and theoretically meaningful. Although the regression equations obtained with these cross-sectional data cannot be interpreted as supporting particular causal models, they do indicate that, despite their intercorrelations, the peer relations measures each contained reliable and unique variance in relation to salient aspects of peer reputation.

Consistent with both prior research (Hartup, 1996) and theory (Sullivan, 1953), number of friendships was uniquely and positively associated with prosocial skills (leadership) and positive affect (good humor), and was uniquely and negatively associated with socially aversive styles (teasing, bossing). These findings are consistent with other research documenting the distinct contributions of having friends to social adjustment and wellbeing (Bagwell et al., 1998; Ladd, 1990), but they extend previous research by controlling for peer acceptance, network centrality, and network isolation. The fact that number of friendships helps account for individual differences in theoretically meaningful social behaviors after controlling for so many correlated aspects of peer experiences provides strong validation of the importance of friendships for individual differences in prosocial skills.

The prosocial and antisocial correlates of network centrality became even more striking in the multiple regression context. The correlation of network centrality with being a leader ($r = .39$) remained significant in the context of the other predictors ($\Delta R^2 = .06$), whereas no unique relation to having a good sense of humor remained. The weak associations with antisocial characteristics ($.01 < r < .23$) became notably stronger ($.03 < \Delta R^2 < .13$) after taking into account the other social position measures. These findings support the view that network centrality can reflect either prosocial or antisocial behavioral leadership styles (Cairns et al., 1988; Farmer & Rodkin, 1996; Rodkin et al., 2000) and may be a manifestation of social dominance (Hawley, 1999).

Nominations for network isolation were uniquely associated with sadness and having one's feelings hurt only among 3rd graders. This finding is consistent with other research suggesting that, as children's interactions extend beyond the dyads of early childhood to the larger groups of middle childhood, low social participation becomes increasingly salient (Rubin et al., 1998). This is reflected in the increasing reliability of children's nominations for shyness and withdrawal (Younger et al., 1993), the increasing temporal stability of such nominations (Coie & Dodge, 1983), and the increasing association between such nominations and peer rejection (Coie & Pennington, 1976). Younger et al. (1993) found that the most substantial shift in

children's perceptions of low social participation occurred sometime between 1st and 4th grades; the present shift from 2nd to 3rd grade in the meaning of network isolation is consistent with that timetable.

Among 3rd graders, then, the conceptual distinction between network isolation and being disliked was validated by the unique contributions of these measures to the prediction of both Sensitivity-Isolation items and several indicators of Aggression-Disruptiveness. The fact that peer perceptions of sadness and sensitivity were uniquely related to indicators of both network centrality (reversed) and network isolation suggests that children's position in the network of informal peer groups is an emotionally meaningful one, at least from the group's perspective. A question for future research is whether such network measures predict children's self-reported wellbeing independently of friendship and sociometric status (e.g., Parker & Asher, 1993).

Network isolation was also uniquely and positively related to three indicators of Aggression Disruptiveness (i.e., loses temper easily, gets into fights, too bossy). The fact that each of these items was also positively related to network centrality suggests that extreme status (high or low) in the network of informal peer groups is associated with aggression. This paradoxical finding provides support for two diverging views of the social affiliation patterns of aggressive children: (a) that aggressive children are socially isolated and (b) that aggressive children participate in widely-recognized peer groups. The coexistence of both trends in the same data set suggests there are subgroups of aggressive children with divergent social network characteristics. This possibility was confirmed by Rodkin et al. (2000). They found that 'Tough' boys, whose antisocial behavior took place in the context of a reputation as 'cool' and 'athletic,' had very high network centrality; whereas 'Troubled' boys, who were equally antisocial but less 'cool' and 'athletic,' were much more likely to be socially isolated.

Although network centrality and network isolation each were associated with Aggression-Disruptiveness, they had distinctive patterns of association across the seven items comprising that scale. Network isolation was most strongly related to loses temper easily and gets into fights while network centrality was most strongly associated with teasing, showing off, bossing, and picking on others. One possibility is that the physically aggressive and angry forms of aggression may be more strongly associated with network isolation, whereas other aversive interpersonal styles may occur in the context of bids for social dominance among active participants in classroom social networks. In other words, while all forms of aggression may be associated with being disliked, different forms of aggression may have different implications for success in the network of classroom social groups.

Some of the processes that underlie the complex links between social behavior and social position in the classroom could be clarified through careful analyses of patterns of peer affiliations. In addition to using children's descriptions of the classroom peer groups to derive an index of social network centrality (as was done in the present analyses), analyses could focus on how actual patterns of classroom affiliations differ for children with varying social positions. For example, Cairns et al. (1988) found that aggressive children were generally disliked but tended to be in cliques with other aggressive children. Similarly, Salmivalli et al. (1997) found that classroom bullies were generally disliked but were solidly embedded in cliques with peers who either explicitly or implicitly condoned bullying. Attention to such friendship- or clique-level support processes may resolve some of the apparent paradoxes when social position is examined only at the individual level.

The patterns described above highlight the utility of considering the individual peer reputation items as separate dependent variables rather than as components of multi-item scales. In general, items within the same RCP scale had very similar correlates and provided multiple replications of the patterns described above. However, inconsistencies within scales were often consistent with theoretical expectations. For example, within the Sociability-Leadership scale, being liked was uniquely correlated with only the two items that directly tapped peer-perceived popularity (everyone likes to be with, has many friends) whereas friendship was uniquely correlated with only the two items that address prosocial skills (class leader, good sense of humor). Conversely, being perceived as popular (i.e., everyone likes) was associated with both actual popularity (liked most scores) and network centrality, supporting the view that perceived popularity captures aspects of both acceptance and social dominance (Parkhurst & Hopmeyer, 1998). Other patterns were not expected but were coherent. For example, within the Sensitivity-Isolation scale, network centrality was uniquely associated with only the two items measuring affective sensitivity and sadness. Although these item-level patterns await replication in other studies, they suggest there is merit in considering relatively narrow-band aspects of peer reputation in studies of correlated dimensions of peer experience.

The fact that children's number of friendships accounted for relatively little unique variance in social behavior may be due to several factors. First, most behaviors measured by the Revised Class Play are relevant to the group context (e.g., class leader), whereas the derivatives of friendship may extend primarily to functioning in dyadic relationships (e.g., intimacy, self-enhancement). Bukowski, Hoza & Boivin (1994), for example, found that friendship status predicted self-worth one year later, but did not predict self-perceived social competence. Second, other aspects of children's friendship experience, such as friendship quality (Parker & Asher, 1993), may have a more robust association with children's social behavior than the number of friendships per se (Bukowski & Hoza, 1989; Hartup, 1996). Time limitations prevented the use of friendship quality measures in the present study. Third, the mutual friendship measure may have been less reliable than the peer network and sociometric measures because both parties in the relationship had to participate in the study in order to identify the friendship; network and sociometric measures did not have this constraint. Additional studies of the significance of different aspects of friendship experience are needed.

The present sample size provided limited power to detect grade and sex differences in effects. Although there was one well-replicated interaction by grade (such that network isolation was a stronger predictor among 3rd graders), there may be other sex differences or 3-way interactions involving grade and sex that could not be detected. Moreover, this study did not address process-oriented or causal questions concerning the association between the peer relations measures and peer reputation for social behavior. Our treatment of peer reputation as a dependent variable in the multiple regression analyses was a heuristic strategy for identifying which measures of social position contained reliable and unique variance with respect to those behaviors. We recognize that social behavior may be as likely to cause differences in peer relations as to result from them.

Future studies could productively test the robustness of the present findings by employing additional measurement strategies. For example, ratings (rather than nominations) of acceptance/rejection may provide a more sensitive measure for children in the average range of popularity (Rubin, Bukowski, & Parker, 1998). More

generally, methods that extend beyond peer reports (e.g., teacher ratings, behavioral observations) are necessary to establish the generality of the present findings. Finally, it is important to examine how the behavioral correlates of multiple indices of social position may vary across different classroom contexts (Stormshak et al., 1999; Xie et al., 1999),

Our results contain implications for studies of both individual difference prediction and studies of developmental processes. With regard to individual difference prediction, the findings make clear that different dimensions of children's classroom social position are differentially and uniquely associated with social behavior. At the very least, number of friendships, friendship quality, social network centrality/isolation, and social acceptance/rejection need separate consideration. A focus on individual difference prediction, however, should not deflect attention from developmental processes. These results demonstrate diversity in patterns of peer relations at only one time, but little is known about the nature and causes of changes in these patterns across time. Longitudinal studies in which multiple dimensions of classroom social position are assessed across time are needed to examine this issue.

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