

Involvement or Isolation? The Social Networks of Children with Autism in Regular Classrooms

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Abstract Including children with autism in regular classrooms has become prevalent; yet some evidence suggests such placements could increase the risk of isolation and rejection. In this study, we used social network methods to explore the involvement of children with autism in typical classrooms. Participants were 398 children (196 boys) in regular 2nd through 5th grade classes, including 17 children (14 boys) with high functioning autism or Asperger's syndrome. Children reported on friendship qualities, peer acceptance, loneliness, and classroom social networks. Despite involvement in networks, children with autism experienced lower centrality, acceptance, companionship, and reciprocity; yet they did not report greater loneliness. Future research is needed to help children with autism move from the periphery to more effective engagement with peers.

Keywords Autism · Social networks · Peer acceptance · Friendship · Loneliness

Impairments in social interaction, such as difficulties in forming peer relationships and particularly friendships, constitute an important area of deficit in autism (American Psychiatric Association, 1994). In-

creasingly, educators are placing children with disabilities in regular classrooms, intending to enhance social as well as academic development. However, little is known about how children with disabilities, and with high functioning autism in particular, form peer relationships and friendships in these environments. Some evidence suggests that in certain situations, inclusive placements may lead to increased rejection of children with disabilities (MacMillan, Gresham, & Forness, 1996; Ochs, Kremer-Sadlik, Solomon, & Gainer Sirota, 2001; Sale & Carey, 1995). Other researchers, however, stress the benefits to children both with and without disabilities (Gallagher et al., 2000; Villa & Thousand, 1995). To understand how a child with autism functions in a social environment, it is crucial to establish an effective method for describing the set of social opportunities and restrictions offered by that environment. What is the nature of the social structure into which the child is being included? What peer relationships are available, and how will participation influence the child's status in the classroom? This study utilizes the social network clustering method developed by Cairns and Cairns (1994) to address these questions. Combining the viewpoints of multiple participants, this method enables us to explore how children with autism perceive their own social connections within the classroom social structure, and how other children perceive them.

Friendship is one aspect, a building block, of the social structure; however, children with and without autism may differ in what they mean when they think of a "friend." Researchers define friendship as an intimate relationship providing "companionship, mutual support, and affection" (Freeman & Kasari, 1998, p. 341), but a child with autism might define a

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friend as someone who responds when you say “hello.” Friendship requires an ability to understand what another person is thinking and feeling; but children with autism may assume that others have access to the same perceptions they do (Hobson, 1990). In comparison to family relationships, friendships provide supports in, and links to, the larger social world. Moreover, friendship is mutually voluntary. To build and maintain a friendship requires high-level interpersonal skills, such as the ability to offer fun companionship, to be reliable, to help when needed, and to express and exchange feelings (Asher, Parker, & Walker, 1998), but these are skills that children with autism find especially challenging (Kasari & Sigman, 1996; Kasari, Chamberlain, & Bauminger, 2001). Friendships for children with autism can provide an invaluable context for honing interpersonal skills and developing a sense of self in relation to others. Nevertheless, for children with autism, forays into the social world can bring major challenges, which if not properly addressed can lead to social rejection and victimization.

Social participation potentially carries both risks and benefits for children with autism in inclusive settings. Mixed-ability friendships are thought to raise behavioral expectations for the child with a disability by providing age-appropriate role models and skilled interactional partners. Mixed settings, for example, can enhance the generalization of newly learned social skills (Garfinkle & Schwartz, 2002; Laushey & Heflin, 2000; Strain, 1983). However, demoralization and loneliness may result when children with disabilities compare themselves to others. Whether using “assertive friendly” strategies to try to force themselves into playground games (Siperstein & Leffert, 1997), or trying to “prove” their social competence in an inclusive setting (Bullock, 1988), children with disabilities are at risk of being rejected even as they try their best to fit in. Bauminger and Kasari (2000) found that high functioning children with autism reported greater loneliness than typical peers, though their reports of loneliness were less connected to the quality of their friendships. What emerges for children with autism is a picture of a confusing social world, in which conventional social signals may be misunderstood, resulting in increased risk of peer rejection and loneliness.

In contrast to friendships, which are dyadic, reciprocal relationships with a strong emotional component, social networks consist of the patterns of interactions between individuals over a period of time. These informal social groupings are the “clusters” from which friendships may form. The set of web-like connections forming a social network may be

represented by a “sociogram”, consisting of lines connecting nodes on a chart, or by a matrix indicating the presence or absence of a link between each pair of individuals. Cairns and Cairns (1994) used network methods to track friendship groups in their 14-year study of risk factors in childhood and adolescence. By asking each student to report on the whole classroom, and not just the groups to which the individual student belonged, the Cairns’ obtained data that were more reliable and complete than self-reports alone. They found considerable variation in the makeup of peer clusters from year to year, although children consistently tended to form connections with others who shared similar characteristics. Using the Cairns’ methods, Farmer and Farmer (1996) examined the integration of children with learning disabilities and emotional-behavioral disorders in regular classrooms. They also found that children with similar characteristics, and similar diagnoses, tended to form into clusters. This tendency to form relationships with others who are similar to oneself, known as “homophily”, is one of the most consistent findings of social network studies to date.

In this study, we sought to examine how children with autism face a variety of challenges as they attempt to negotiate the social environments of regular 2nd to 5th grade classrooms. To what degree are these “included” children actually included in their peers’ social networks? How do children with autism compare with their peers on measures of social network involvement; friendship qualities, reciprocity, peer acceptance, and loneliness? How is their social network involvement related to these other measures of friendship and peer relationships? A related question is to what degree these children’s self-perceptions correspond to others’ perceptions of them. Are there age or gender differences in how typical children integrate children with autism into their networks? At issue, ultimately, is how general education teachers and their students can help children with autism participate in the social networks of the classroom and, in the process, develop a sense of self in relation to others.

Methods

Participants

Participants were 398 children (196 boys) in regular 2nd through 5th grade classes, including 17 “target” children (14 boys) with confirmed clinical diagnoses of high-functioning autism or Asperger’s syndrome. These target children with autistic spectrum disorders

(the “ASD” group) were enrolled in general education as their primary setting for the majority of the school day, receiving designated services such as speech and language or occupational therapy on a “pull-out” basis or integrated into their classroom activities. Participants belonged to four 2nd grade classrooms, seven 3rd grade classrooms, two mixed 2nd–3rd grade classrooms, one 4th grade classroom, and two mixed 4th–5th grade classrooms. One 2nd-grade classroom included two children with ASD, one boy and one girl. The target children had confirmed diagnoses of autism or Asperger’s syndrome by independent psychologists not associated with the school districts (for example, Regional Center or university clinic evaluations), and their IQs were in the normal range (mean IQs: Verbal = 107.3, Performance = 105.2, Full Scale = 107.3. Full Scale range: 89–129). Diagnoses and IQs were obtained via documents received from parents. At the time of data collection, each of the classrooms had been intact at least 4 months, enough time for the formation of social networks.

Classmates: All Peers Group

Social network data, based on aggregate peer reports, were obtained on all 381 non-ASD peers (182 boys) from the classrooms of the 17 children with ASD. Self-report data and network nominations were gathered from 249 of these children (109 boys), who had parental permission. Students without parental permission did not provide self-report or network data; however, they frequently were recipients of social network nominations from participating children.

Classmates: Matched Peers Subgroup

In order to compare children with ASD to their peers without autism on social network and sociometric data, a subgroup of peers was established with the same N as the ASD group ($N = 17$). For each child with ASD, one peer was randomly selected from among the child’s classmates of the same gender. Once chosen, this “matched peers” subgroup of 17 children (14 boys) remained consistent throughout all subsequent analyses.

Procedures

Identifying Participants

Participants were identified at seven schools in two local school districts. Prior to identification of individual children, permission to conduct the study was

obtained through district research offices and school principals. An administrator at each school identified one or more children with autism, enrolled in regular classes, to invite to participate in the study. Invitation letters were sent to the families of these children. In order to protect families’ confidentiality, identities of prospective subjects were not revealed to investigators until the families contacted them directly, by means of a return letter. Upon completion of consent forms, parents of the children with ASD provided demographic information via a brief questionnaire. Teacher permission was also sought for each classroom. Separate consent forms were sent to the parents of all classroom peers, describing the research as a study of “friendships in school.” To protect participants’ confidentiality, there was no mention of children with disabilities in the description of the study.

Once selected, classrooms had high participation; in all but one, over 50% of the class participated. Cairns and Cairns (1994) describe data indicating that social network results are robust, even with participation rates as low as 50%. Because errors of omission are more common than errors of commission, clusters tend to be defined more conservatively when responses are low. In one of our classrooms, eight of 20 students filled out self-report information and made nominations; however, the teacher indicated the clusters that emerged from the aggregate analysis were consistent with her experiences in the classroom.

Collecting Children’s Nominations and Self-report Data

During spring quarter, when classrooms had been intact for 4 months or more, children’s nominations and self-report data were obtained. With such intact classrooms, previous researchers have found evidence of relative stability in friendships over the course of the school year, following their initial formation early in the fall (Berndt & Hoyle, 1985). Participating children completed surveys during a 45–60 min session in each class, during which one researcher read aloud to the students a written questionnaire containing the social network, acceptance, loneliness, and friendship quality measures listed below, while another researcher circulated around the classroom, providing assistance to any children who needed it. Assistance consisted mainly of keeping children on track and sometimes re-reading the questions aloud. Children without parental permission did assigned schoolwork in nearby classrooms.

Measures

Friendship Nominations

Children completed a nine-page questionnaire, including social network questions and the Loneliness and Friendship Qualities Scales (Asher, Hymel, & Renshaw, 1984; Bukowski, Hoza, & Boivin, 1994), prepared in a large, child-friendly font. The survey yielded three types of friendship nominations: “Buddies”, “Top 3”, and “Best Friend.” First, participants were asked to list all the classmates with whom they “like to hang out”: the “buddies” list. In social network terminology, the number of nominations made by a subject is the “outdegree” score, and the number of nominations a subject receives is the “indegree” score (Wasserman & Faust, 1994, p. 126). Next, participants were asked to circle the names of their three closest friends in the class (“Top 3”), and finally, to put a star by the name of their one “Best Friend” in the classroom. These responses were used to obtain reciprocity and peer acceptance scores, as described below.

Reciprocity of Friendships

Two types of reciprocity were defined for this study: “Top 3” and “Best Friend” Reciprocal scores (T3R and BFR). “Top 3 Reciprocal” (T3R) refers to the percentage of individuals nominated to a subject’s Top 3 list, who nominated the subject reciprocally to their own Top 3 lists. If a nominated individual did not participate, and hence could not make reciprocal nominations, that individual is removed from the T3R calculations. The possible values of T3R range from 0 (no reciprocal nominations) to 1.0 (all nominations were reciprocated). T3R is calculated by the formula:

$$T3R = \frac{(\# \text{ of reciprocated Top 3 nominations received})}{(\# \text{ of reciprocated Top 3 nominations possible})}$$

In other words, T3R = the number of Top 3 nominations received from the subject’s own Top 3 nominees, divided by the maximum number of possible nominations that could have been received from the subject’s Top 3 nominees. The denominator includes only those nominated individuals who participated themselves; thus, a subject’s T3R score is not penalized if the individuals nominated did not themselves participate.

For example, consider a subject who nominates three friends, but only two of them participate themselves, and of these only one nominates the subject as a Top 3 friend. Then $T3R = 1/2 = .50$. As another example, consider a subject who nominates three

friends. All three nominees participate themselves, but only two nominate the subject as a Top 3 Friend. $T3R = 2/3 = .67$.

The Best Friend Reciprocal (BFR) score simply represents whether or not the person whom the subject nominated as “Best Friend” also nominated the subject as “Best Friend” reciprocally. If so, the score is 1; if not, the score is 0. If, however, the subject made no “Best Friend” nomination, or if the person whom the subject nominated as “Best Friend” did not participate, then the score was treated as missing data.

Peer Acceptance

In the literature, sociometric peer acceptance scores have used ratings of how much students like to spend time with each other student in their classroom. Traditionally, children may sort photos of their classmates into piles to indicate liking, disliking, and neutrality. Ethical concerns have been raised, however, as to whether such ratings may reinforce negative judgments toward peers. Fortunately, it is possible to derive a peer acceptance measure directly from the friendship nominations data gathered. Essentially, children have sorted their classmates into two piles: those with whom they like to “hang out”, and those with whom they do not (only focusing on the positive nomination). Summing the number of “buddy” nominations received, also known as the “indegrees”, yields a measure of how many students in the classroom freely choose to “hang out” with the subject. These scores are then converted to z-scores, with classroom mean = 0 and $SD = 1$, to permit direct comparison across classrooms of different sizes.

Social Networks

In addition to reporting on their own friendships, participants also gave social network information that represented their perceptions of the social environment of the classroom as a whole. Based on the Cairns’ (1994) method, participants were asked to list all the names of children in their class who hang out together; they were also reminded to include groups of the opposite sex, and to include themselves if they hang out with a group. Names could be listed twice if a child was seen as belonging to more than one group. This free-recall method was used rather than asking respondents to place each peer’s name in a group, because the relative strength of students’ tendency to recall classmates is an important indicator of the peers’ prominence in the social structure. These varying recall rates were used later to calculate children’s “Social Network Centrality” scores, as described below.

Determining Social Network Clusters

In order to derive classroom clusters from peers' reports, and individuals' centrality in these clusters, we followed the Cairns' (1994) procedure. A detailed description of the scoring method can be obtained from the authors. Through a series of steps, each student receives a "profile" listing the number of times the student is named to a group with each other student. Each time two children are named to the same group, this is known as a "co-occurrence." These profiles are then correlated with each other, and whenever the correlation exceeds an established criterion (.40, as established by Cairns & Cairns), the children are considered to belong to the same "cluster." A line is drawn between the two points on the Social Network Map. The basic idea is that cluster members will tend to have similar patterns of co-occurrences with other cluster members. In this way, coherent sets of linkages are identified among individuals in the social field.

Determining Social Network Centrality (SNC)

Once the clusters have been identified, the next step is to determine the prominence, or "centrality", of each student within the social networks of the classroom. Using Cairns' methods (Cairns & Cairns, 1994; Farmer & Farmer, 1996), three scores are calculated in order to determine centrality: (1) the "individual centrality" of the child, (2) the "cluster centrality" of the cluster, and finally, (3) the "Social Network Centrality" (SNC) of the child. The first two types of centrality are used to determine the third. First, each student's "individual centrality" is determined by adding up the total number of times the student was identified as belonging to any cluster. Individuals receive "high", "medium", or "low" centrality based on comparison with the highest individual centrality score in the classroom: scores that are 70% or more of the highest score are considered "high"; those that are 30% or less are "low", and scores between 30 and 70% are "medium" individual centrality.

Next, the "cluster centrality" for each cluster is determined by calculating the average centrality of the two cluster members with the highest individual centrality. For instance, if a cluster includes members with individual centrality scores of 11, 7, 2, 14, and 4, then the "cluster centrality" will be the average of the highest two: in this case, 11 and 14, which equals 12.5. Clusters are designated as "high", "medium", or "low", based on comparison to the highest centrality cluster in the classroom: those with centrality scores that are 70% or more of the highest cluster are classified

as "high"; those with scores 30% or less are "low", and clusters in between have "medium" centrality (Farmer, Pearl, & Van Acker, 1996; Farmer & Rodkin, 1996).

Finally, children's individual and cluster centrality scores are combined to determine their "Social Network Centrality", or SNC, scores. Four levels of SNC are possible, based on Farmer's categorizations (Farmer & Rodkin, 1996): nuclear, secondary, peripheral, and isolated (see Table 1). Nuclear SNC refers to a combination of high individual and cluster centrality. Secondary SNC is attained if the individual and/or cluster centrality scores are medium, but neither type of centrality is low. Peripheral SNC results from low individual or cluster centrality, or both. Finally, children who belong to no cluster at all are considered Isolated. These four levels of involvement are coded from 3 (Nuclear) to 0 (Isolated), as an indication of how well children are integrated in the informal peer networks.

Loneliness

Participating children completed the Asher Loneliness Scale (Asher et al., 1984). This self-report measure consists of 24 statements such as "I feel left out of things at school", or "I get along with my classmates." Students marked a 1-to-5 scale indicating the frequency with which they felt that way, ranging from "never" to "always." Sixteen scale items are interspersed with 8 non-scale distracter items. Possible scores range from 16 to 80. The investigators verbally presented the items while the children read from the written questionnaire and filled in their answers.

Friendship Qualities

Keeping in mind their one "best" friend in the class, participants completed Bukowski's Friendship Qualities Scale, or FQS (1994), with the investigator reading each question aloud to the group. Reciprocal nomination is not required for completing the scale, which was completed by all but one of the 17 children with autism, and all of the matched peers. The 23 questions of this self-report measure, marked on a 1-to-5 scale of

Table 1 Determining social network centrality (SNC)

Cluster centrality	Individual centrality		
	High	Medium	Low
High	Nuclear = 3	Secondary = 2	Peripheral = 1
Medium	Secondary = 2	Secondary = 2	Peripheral = 1
Low	Peripheral = 1	Peripheral = 1	Peripheral = 1
No cluster	Isolated = 0		

agreement from “never” to “always”, fall into five subscales: closeness, companionship, conflict, helpfulness, and security. Sample items include “I think about my friend even if my friend is not around” (closeness); “If my friend or I do something that bothers the other one of us, we can make up easily” (security); or “My friend and I can argue a lot” (conflict). Subscale scores, ranging from 1 to 5, are obtained by dividing total scores by the number of items per subscale.

Qualitative Data

Qualitative data were obtained in several ways. When first recruited for the study, parents of the children with autism were asked to write paragraphs concerning their child’s inclusion experiences, and their child’s peer relationships. Upon arrival at each classroom, investigators informally observed the children, noting the activity and any unusual observations in fieldnotes. After data collection, teachers and parents of the target children received social network cluster results, and completed follow-up questionnaires, discussing how well the results matched their expectations, and characteristics of the children, teacher, or parents that could have contributed to the formation of the groups. Several parents asked to meet with researchers to discuss the results in greater detail; with permission, these conversations were tape recorded and transcribed. Two coders reviewed the qualitative data from multiple sources, and general themes were derived, including forms of support from parents, teachers, and peers.

Results

Preliminary Analyses: Effects of Grade Level and Gender

To determine whether results for any variables varied systematically according to children’s grade level or gender, correlations were calculated between these demographic variables and each of the dependent variables of interest: social network centrality (SNC), peer acceptance, reciprocity, friendship qualities, in-degrees, out-degrees, loneliness, and IQ. These correlations were run separately for the ASD and matched-peers groups (except IQ scores, which were known only for children with autism). Grade level was negatively associated with Top 3 reciprocal friends scores among children with autism ($r_{16} = -.53$, $P < .05$, effect size $r^2 = .28$) and the matched peers ($r_{16} = -.71$, $P < .01$, $r^2 = .50$), indicating that as children got older, the reciprocity of their Top 3 friendship nominations

tended to decline for both groups. Among the matched peers sample, higher grade levels were also associated with declining reciprocity in best friend nominations ($r_{12} = -.59$, $P < .05$, $r^2 = .35$). However, grade level was positively associated with companionship within the same matched peers group ($r_{17} = .57$, $P < .05$, $r^2 = .32$), suggesting an increased importance in “doing things together” among the older children without ASD. None of the other dependent variables correlated significantly with grade level for either group.

The only significant gender-related comparison involving the ASD and matched peers groups is that children with autism were more likely than their gender-matched peers to have network connections with girls ($\chi^2(1) = 4.64$, $P < .05$). Boys do tend to form groups with other boys, and girls with girls, but for children with autism this pattern is altered more frequently than for other children. The “Parent Paragraphs on Peer Relations” offer some suggestions as to why children with autism may find support among girls: parents describe peer relationships with boys as more “competitive” and describe incidents of taunting, such as when one group of boys gave a boy with autism a nickel to lick the toilets. Another parent wrote, “In each year of sports, there has always been at least one teammate who would tease [our son] and give him a hard time.” Girls, on the other hand, are described in these paragraphs with adjectives such as “helpful” and “socially mature”; some parents describe setting up playdates with girls for their boys with autism. Despite these differences, however, boys still tend to be drawn together by common, gender-related interests, such as video games and card-based battle games.

Social Involvement: Group Comparisons

Social Network Centrality (SNC)

Children with ASD scored significantly lower in Social Network Centrality (SNC) than the matched group of typical peers ($F_{1,32} = 6.45$, $P < .05$, effect size $\eta^2 = .17$), indicating that the children with ASD tended to be less centrally involved in the social structure of the classroom. These scores can range from 0 (isolated) to 3 (nuclear). Among the children with autism, 35% were classified as peripheral, 47% secondary, and 18% nuclear. Among the matched peers, however, only 6% were classified as peripheral; 47% received a rating of secondary, and 47% nuclear. There were no isolates in either group. The mean matched peers score, 2.41 ($SD = 0.62$), fell between nuclear and secondary, whereas the mean ASD score, 1.82 ($SD = 0.73$), fell between secondary and peripheral status. In short,

though a few children with autism reached nuclear status, they were more likely than their peers to fall into the peripheral group. However, it is notable that although some of the children with ASD were seen as having ties to only one or two other children, none of the children in either group emerged as isolated. Only six of the 381 children in the all-peers group (less than 2%) were classified as isolated; fewer than half the classes surveyed contained any isolates.

Friendship Quality Scores

Among the five friendship qualities of companionship, helpfulness, closeness, security, and conflict, the two groups showed significant differences only in companionship. Compared to their peers without autism, children with ASD reported doing fewer things with and spending less time with their best friends in the classroom. This difference is reflected in lower scores on the companionship scale: the matched peers group scored an average of 4.19 ($SD = .50$) on this 5-point scale, whereas children with autism averaged only 3.63 ($SD = .94$; $F_{1,30} = 4.53$, $P < .05$, $\eta^2 = .13$). As with all of the friendship measures, subjects reported on their closest friendship in the classroom, not necessarily on the best friendship in their lives. Hence, these scores must be thought of as within the “universe” of the classroom. The lack of significant differences in each of the other four friendship qualities is also of interest. Despite being less centrally involved than typical children, children with autism do not appear to perceive differences in the quality of their friendships, with the exception of reporting less mutual participation in joint activities.

Reciprocal Friendships

Children with autism experienced less reciprocity in their friendship nominations at all three levels we examined: all “buddies” named, “Top 3” friends, and best friends. Children with autism nominated significantly more peers as buddies they “like to hang out with” (outdegrees; mean = 5.44, $SD = 3.18$) than nominated them (indegrees; mean = 2.88, $SD = 2.55$; within-subjects $F_{1,32} = 6.31$, $P < .05$, $\eta^2 = .17$). For the matched peers, this comparison was not significant. Similarly, children with ASD received significantly fewer reciprocal Top 3 nominations than the matched peers group: the mean T3R score for children with ASD was .34 ($SD = .34$), indicating only about one-third of reciprocable “Top 3” nominations were reciprocated. For the matched peers group, the mean T3R score was .60 ($SD = .43$), a significant difference (one-tailed $t_{30} = 1.91$, $P < .05$, $\eta^2 = .11$). Children with

ASD experienced less reciprocity at the best friend level, as well: they received only 2 out of 15 possible reciprocal best friend nominations. In comparison, the matched group received 7 out of 12. Using Fisher’s exact test, this difference was significant at $P < .05$.

Peer Acceptance and Loneliness

Despite lower overall peer acceptance, children with ASD did not report any greater loneliness than the matched peers group. Expressed as z -scores, the mean peer acceptance score for the ASD group was below zero (mean = $-.78$, $SD = 1.10$), whereas for the matched typical group, the mean score was positive (mean = $.26$, $SD = .68$). As predicted, this difference was significant, with the ASD group receiving lower peer acceptance than the matched group ($F_{1,32} = 11.01$, $P < .01$, $\eta^2 = .26$). We had predicted that children with autism would express greater loneliness than their peers; however, loneliness scores for the ASD group (mean = 30.12, $SD = 10.8$) were not significantly lower than for the matched peers (mean = 27.92, $SD = 12.75$; $F_{1,32} = 0.28$, NS). For children with autism, peers’ perceptions as revealed in acceptance scores have little impact on their own perceptions of loneliness at school.

Relationship of Social Network Centrality to Other Variables

As a measure of children’s prominence in the social structure of the larger group, we would expect that Social Network Centrality (SNC) would have positive associations with other desirable social outcomes. To explore these associations, we correlated SNC with reciprocity, peer acceptance, and loneliness for the ASD and matched peers groups. SNC correlates significantly with Top 3 Reciprocity for both the ASD ($r_{16} = .59$, $P < .05$, $r^2 = .35$) and matched peers groups ($r_{16} = .61$, $P < .05$, $r^2 = .37$); however, SNC is not associated with Best Friend Reciprocity for either group. Compared to the multiple friendships represented by the Top 3 nominations, the “best friend” dyad may be less tied to prominence in the larger networks. Peer acceptance correlates significantly with SNC for both the children with autism ($r_{17} = .62$, $P < .01$, $r^2 = .38$) and the matched peers group ($r_{17} = .52$, $P < .05$, $r^2 = .27$). Among the children with autism, SNC is also positively associated with “buddy” nominations received ($r_{17} = .56$, $P < .05$, $r^2 = .31$), and closeness ($r_{16} = .61$, $P < .05$, $r^2 = .37$), but these associations are not significant for the matched peers. The

combination of individual and cluster centrality represented by SNC relates to positive social characteristics for both groups, but the associations may be particularly salient for children with autism, with ties to reciprocity, peer acceptance, nominations received, and closeness.

Group Perception Vs. Self-perception

For both children with autism and their typical peers, we expected that children who are perceived by the group as more involved in the classroom social structure will also tend to perceive themselves as more involved. In other words, we expected that children who received more “buddy” nominations (i.e., more “indegrees”) would also nominate more classmates (i.e., have a higher number of “outdegrees”). Correlating “indegrees” with “outdegrees” for each of the groups, the two variables were less closely related for the children with autism than for others. Indeed, for the ASD group, the non-significant trend was in a negative direction ($r_{16} = -.08$, NS), whereas a positive relationship approached significance for the matched group ($r_{17} = .41$, $P = .10$, $r^2 = .17$). We also expected that within each of the groups, children who see themselves as more involved (i.e., with more “outdegrees”) would be more likely to be a part of a group, have friendships of higher quality and greater reciprocity, be more accepted, and tend to experience less loneliness at school. To analyze, children’s “outdegree” scores were correlated with their network centrality (SNC); friendship qualities of closeness, companionship, and security; peer acceptance; and loneliness scores. However, these hypotheses were not supported, as these comparisons yielded no significance for the ASD or matched groups.

Qualitative Findings

Classroom observations, parent paragraphs and interviews, and teacher questionnaires provided contextual information concerning how the involvement of children with autism in friendships and social networks developed over time. Reviewing the results, parents and teachers agreed that the identified clusters accurately reflected the actual social situation. Asked whether the results matched what she would have expected, one teacher wrote, “Completely! It’s unbelievable! Every group was exactly as it played out in our class, including the solitary ones.” Another wrote, “The students who were rated as ‘N’ [Nuclear] were the most outgoing and ‘popular’ students.” None of the

parents or teachers who responded indicated that the results were inaccurate. In one classroom, a highly socially competent girl was assigned to no cluster; however, when the teacher reflected on the results, she said this girl divided her time among all the clusters to such an extent that she might not be seen as “belonging” to any one of them.

One theme that emerged is the importance of parent and teacher supports for enhancing children’s social integration. The story of an especially successful child with autism (“Child A”, see Fig. 1) illustrates a successful combination of these supports. This 2nd-grade girl had the highest social network centrality of all the children with ASD in the study, and the highest individual centrality of all the children in her class, with cluster ties to every girl student. She was artistically gifted, and had age-level verbal abilities, despite her tendency to speak in monologues about irrelevant topics. Yet, as her mother describes it, early in the year, her daughter was almost completely socially isolated. Whereas her daughter had told her that she had “lots of friends”, her mother observed that at lunchtime, the girl played completely by herself, in the proximity of other children who ignored her presence. The mother saw no spontaneous interactions between her daughter and other children. As a result of these observations, the mother decided to take action.

To facilitate her daughter’s inclusion in the classroom, the mother enlisted the assistance of teachers, therapists, and networking with other parents. Luckily, she was friendly with the mother of one of the most well-liked girls in the class. She met with the other mother, and discussed ways in which they might encourage the peer to reach out to the girl with autism. The mother also rehearsed social interactions with her daughter at home, and the school speech therapist wrote social scripts for her, such as “How can I join a

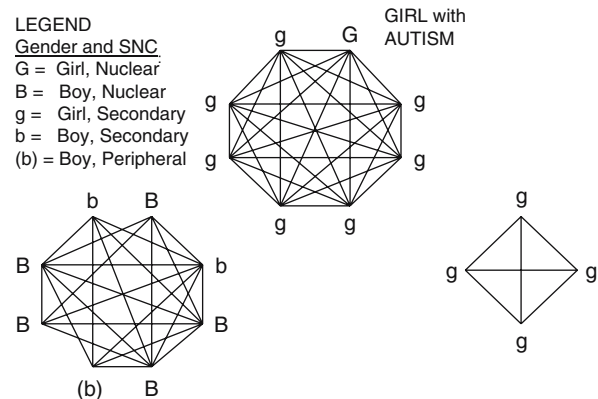


Fig. 1 Social network map of a girl with autism who has “nuclear” social network centrality (SNC)

group?” and “How can I greet a friend?” Because the girls in her class usually hugged each other in the mornings, the girl with autism was taught this skill as well, step by step, at home and in speech therapy. The teacher, too, made a point of asking the children as they went to recess, “Who’s going to be playing with (so and so) today?”, not singling out the girl with autism, but gently encouraging the children to be inclusive. After the girl with autism had been routinely invited into the games of the larger social group, her mother organized a slumber party, inviting the whole group of girls. After the party, the whole group considered this girl a close friend.

Still, even in the wake of this remarkable success, the girl’s mother continues to have concerns about the future. She wonders what will happen over the next few years, as the girls’ interests become more developed:

“I think that the way kids are friends will change, and I see already that little girls will chit-chat with each other and talk about, you know, movies or whatever. She doesn’t do that. And right now she can go up and say something really bizarre and the kids will just smile at her, because I think the kids aren’t quite that sophisticated yet. But it will be interesting to see, next year, when kids are a little more sophisticated, and she comes in and says something really bizarre. If she does that often enough, are they going to reject her?”
(Mother of girl with autism)

Peer support themes played an important role in the case of another child with autism, who was notably less successful in terms of his overall social integration in the classroom (“Child B”, see Fig. 2). With a very low individual centrality score, this 2nd-grade boy was very rarely mentioned as part of a group. Although

the social network map indicates that he is connected to a cluster of mostly girls, this map illustrates the impact of self-nominations on the social network measures when a child receives very few nominations overall. In this case, the child with autism reported himself as belonging to the group of girls; however, none of them nominated him as part of their group. As a result, his pattern of nominations correlated highly with the pattern of nominations belonging to the group; yet it was only his own self-perception that yielded this result. As illustrated by the dotted lines in Fig. 2, if his self-nominations are removed from the calculations, then his peripheral status is reduced to belonging only to a single dyad with another low-centrality boy. His parents’ observations corroborate the network data:

“He doesn’t have a best friend or even regular playmates. He has had play dates with various kids, but they are often unsuccessful, as his interests and skills related to social functioning are limited... [His classmates] are aware that he is different, and they want to help him succeed academically and behaviorally. They try to keep him from acting inappropriately. Kids who have not been in a classroom with him tend to not be as supportive and understanding.” (Mother of boy with autism)

During a class observation, we saw how this boy’s classmates worked to incorporate him into a structured game in the classroom during a rainy-day recess. The teacher had started a game of “Corners”, in which one child stands with eyes closed at the front of the room, while the others run to each of the four corners. When the child at the front calls out a number, all the children in that corner are “out.” The game proceeds until one child is left, who is the winner, and goes to the front of the room for the next round. Watching this activity, we were quickly able to identify the child with autism. His movements were awkward, and as he moved from corner to corner attempting to avoid being called out, his eyes had a somewhat startled look. The teacher used the investigators’ arrival as an opportunity to leave the classroom for several minutes, so the children were observed without direct teacher supervision for a short time.

Several times, the child with autism ended up in a corner that was called out, yet he continued to play. Discussion arose among the children as to whether to force him to quit playing that round. Some believed that he should follow the same rules as everyone else, while others felt that they could give him some leniency. Ultimately they allowed him to remain in the

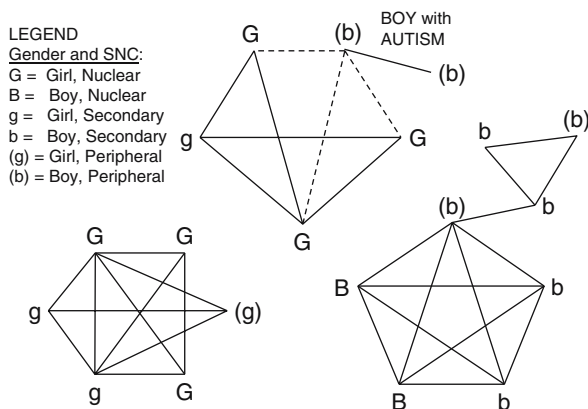


Fig. 2 The effects of the self-nominations of a boy with autism. If this child’s self-nominations are not included in the calculations, the connections represented by dotted lines are eliminated

round until it was down to only a few children, and he was clearly in the called-out corner. Finally they insisted that he had to sit down. The child with autism seemed confused; he didn't want to lose, but he seemed unsure how to respond. When at last his classmates all agreed he was out, he reluctantly co-operated and sat down as instructed. The supportiveness of the boy's peers was clear; they had to draw a fine line between accommodating his differences and setting limits. They had to decide as a group to what extent they would demand "typical" expectations for his behavior in the group, and he had to figure out how to cope with being confronted by all of his classmates. Both the child and his peers probably gained some social knowledge from these interactions. At the same time, the interactions clearly did not involve the easy reciprocity that characterizes traditional friendships. A trade-off exists between the social stressors placed on children, and their potential gains in understanding. Whether this trade-off is ultimately beneficial may depend largely on how the teacher perceives and helps the children manage the balance of positives and negatives.

Discussion

The involvement of children with autism in the social structures of regular classrooms reveals a mixed picture. On the one hand, the children with autism managed to avoid social isolation: some had only a few weak ties and no reciprocal friendships, while others were centrally involved and enjoyed considerable reciprocity. Patterns of social network involvement varied. Children with autism were more likely than their matched peers to have peer cluster connections with girls, suggesting that girls may be more likely than boys to take on a "care-taking" role among their classmates. In some classes, the child with autism was connected to the social structure by a single link with a popular child. In other classes, the child with autism formed a part of a small group, set apart from the most prominent groupings. In one class, the child with autism had become the center of social attention, with the highest individual centrality of all her classmates; yet even in this case, the child's teacher and parents worry about how she might fare socially in the future, when their current strategies for social inclusion could prove less effective. Overall, the average level of social network centrality (SNC) was lower for the children with autism than for their peers, they were less well accepted, and they had fewer reciprocal friendships among their "Top 3" and "Best Friend" nominations. Yet, the children with autism reported levels of closeness,

security, and conflict that were similar to their peers, and they reported no greater experiences of loneliness.

There seems to be a difference between how children with autism see themselves, and how others see them, socially in the classroom. In general, children with autism see themselves as more socially involved than their peers report. Despite their lower than average peer acceptance, however, the children with autism are not seen as isolated. Children with autism have some reciprocated friendships; but their friendship nominations are less likely to be reciprocated than typical peers', and they are less sought out for "hanging out" together. Many typical children appear to view their friendships with autistic children as qualitatively different from their other friendships. Yet these relationships may still meet certain developmental functions of friendship for the children with autism, such as providing a setting for trying out various senses of the self in interaction with others, for learning social skills, and for preparing for adult relationships.

Clearly, there is a wide range of levels of involvement, from being at the very center of things (e.g., Child A) to being nearly isolated (e.g., Child B). As evidenced in the game of "Corners" observed in classroom B, even when a child is not generally seen as a group member, classmates may make substantial efforts to facilitate the child's involvement. These efforts may backfire if the child with autism comes to be seen as a burden to peers. However, classmates may show levels of acceptance that same-age non-classmate peers may not. It also appears that active efforts of parents and teachers can make dramatic improvements in the social networking of high-functioning children with autism. Nevertheless, friendships between children with and without disabilities may not look the same as friendships between children of similar abilities. Fortunately, they may not need to. If a child with autism is genuinely satisfied with the social opportunities and experiences available in a regular classroom, then perhaps full emotional reciprocity in a traditional sense is not so necessary. Just as inclusion challenges regular teachers and typical children to modify their sense of what is possible educationally, so we are challenged to broaden our concept of friendship to accommodate a balancing of differences as well as celebrating similarities. The emotional benefits of the relationship may differ for the individuals, and yet still be of value to both.

Why do children with autism report low levels of loneliness, despite having lower peer acceptance, friendship reciprocity, and social network centrality? It seems unlikely that the low loneliness scores would result from intentional distortion of the self-report data, because due to "theory of mind" deficits, children

with autism rarely engage in counter-factual reasoning or deceit (Sodian & Frith, 1993). Could it be that children with autism receive sufficient emotional support from a limited number of less reciprocal friendships? Or do their social cognitive deficits leave them unable to recognize the relative weakness of their social relationships, resulting in a kind of “ignorant bliss?” Several parents reported that their children seemed “oblivious” to social involvement cues.

Loneliness may be thought of as resulting from a mismatch between the desire for, and the perception of, reciprocal friendship. Why do children with autism report low levels of loneliness? Perhaps, due to a lack of social awareness, they do not realize that they are not being selected as often. If so, then there would be a lack of mismatch between desire and perception, keeping loneliness low (i.e., “I want lots of friends, I perceive that I have lots of friends.”) Another possibility is that they do not care whether or not they are selected as often; in this case, a lack of mismatch between desire and perception would minimize loneliness (“I don’t want lots of friends; I don’t have lots of friends.”) A third possibility is that they don’t feel lonely because they do in fact belong to a group of some kind. As a result, they would experience less mismatch between their desire and perception (“I want some friends; I have some friends”). Future research might consider how the feelings of loneliness experienced by children with autism are affected by the interplay between the desire for, and perception of, reciprocity of friendships.

The notion that children with autism may experience a degree of happy obliviousness regarding their social status is supported by several features of this study. For example, within the ASD group, reported loneliness bears virtually no relation to the degree of social network involvement, whereas in the larger typical peer group, high social network involvement is highly correlated with decreased loneliness. The implication is that typical children realize whether they are left out of the social groupings, and report greater loneliness if they are, whereas the autistic children show less sensitivity to their own lack of involvement. Similarly, outdegrees (nominations made) seem to be less closely related to indegrees (nominations received) for the autistic group than for others. Indeed, for the children with autism, the trend is for more outdegrees to be associated with fewer indegrees. For the larger typical peer group, the relation between outdegrees and indegrees is highly significant. Typical children are likely to nominate approximately as many children as nominate them, whereas children with autism are likely to nominate a larger number of friends than is realistic.

Still, there are limitations to the degree to which children with autism are satisfied with their friendships. Given the limited range of interests that characterizes autism, it is not surprising that these children would report lower levels of companionship than their peers. The ability to come up with “things to do”, and to implement these ideas, may be a crucial target skill in improving the social development of children with autism in inclusive settings. Friendships take on greater depth when they cross the home–school boundary (Hirsch & Dubois, 1989). Children with autism may need special help to cross this boundary. From the qualitative data, it appears that the remarkable social success of Child A came about in part due to the highly active efforts of her mother and teacher in helping her develop “things to do” with her peers.

The study of social networks for children with disabilities could be broadened in a number of interesting directions, in duration as well as scope. Pursuing longitudinal or cross-sectional studies, over a year-long time frame or longer, would allow us to examine changes in social network involvement over time, with or without intentional interventions. Examining children of other ages, in other grades, with other disabilities, from varied cultures, or of differing socioeconomic status, would enable us to see how such demographic factors influence the development and meaning of peer networks. Although subjects for this study were sought in a large, urban school district, most of the subjects who ultimately were permitted to participate came from upper-middle-class schools with predominantly European American populations. Due to trends in parental advocacy, it is possible that a higher proportion of children with autism included in regular classes may come from affluent communities. Nevertheless, identifying subjects representing a wider range of SES and ethnicity would yield a more balanced look at inclusion practices.

No children with autism in this study emerged as socially isolated. However, it should be noted that only those children who had permission from their parents and teachers, and who were recommended for the study by school principals and inclusion facilitators, were enrolled in the study. It is possible that these individuals may have been highly motivated to demonstrate positive results. Indeed, the parents of some potential subjects chose not to allow participation in the study because they felt the subject of friendships was too painful for their children to address. This loss of subjects may have tilted results toward the positive, eliminating some children who experienced higher degrees of isolation than those reported. In future work, securing the participation of children in more

challenging situations, as well as successes, would provide a broader knowledge base from which to address the range of inclusion experiences.

Social network methods have much to offer for the study of the social implications of inclusive settings, both for children with disabilities and their typically developing peers. Yet further work is needed to effectively “flesh out” the social network “skeleton” for children with autism. What characteristics of teachers, children, parents, programs, and curricula will promote the social integration of children with autism and other disorders? The effectiveness of teaching or consultation strategies can be examined over time in multiple timepoint studies. Incorporating playground and classroom observations of peer interactions, using interval coding systems and discourse analysis, would add dimensions to a multimethod exploration of peer social networks. Social network analyses may suggest network-based strategies for improving the experiences of children who lack peer acceptance, reciprocity, and companionship. Different methods may be appropriate for children who are on the periphery versus those who are more centrally connected. Moreover, just as important as understanding how the child fits in the group, is understanding the opportunities afforded by the group to the child. Mapping the social “geography” can be a valuable tool for pinpointing how to invite less involved children into more regular and frequent social contact. Through identifying and lending support to ongoing patterns of social interaction, educators, parents, and clinicians can help create a context for children with autism to understand themselves in relation to others, and encourage them to become active participants in their social milieu.

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