

The Peer Social Networks of Young Children with Down Syndrome in Classroom Programmes

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Background The nature and characteristics of the peer social networks of young children with Down syndrome (DS) in classroom settings were examined within a developmental framework.

Method Comparisons were made with younger typically developing children matched on mental age and typically developing children matched on chronological age.

Results Similar patterns were found for all three groups for most peer social network measures. However, group differences were obtained for measures of teacher assistance and peer interactions in unstructured situations.

Conclusions Positive patterns appeared to be related to the social orientation of children with DS and the special efforts of teachers to support children's peer social networks. Findings also suggested that fundamental peer competence problems for children with DS remain and may best be addressed within the framework of contemporary models of peer-related social competence.

Keywords: classroom settings, Down syndrome, peer competence

Introduction

Community preschool, school and child care programmes provide ideal contexts for young children to establish relationships with their peers and to develop friendships. Yet a substantial proportion of young children with developmental (cognitive) delays experience unusual difficulties interacting with peers in these settings and forming social networks. Compared to appropriate groups of typically developing children, findings consistently indicate that the peer relationships of heterogeneous groups of young children with developmental delays are limited both in terms of the frequency of interactions and their quality. In particular, children with delays interact less often with peers, engage in lower levels of group play but higher levels of conflicts when they do interact, and form relatively few reciprocal friendships (e.g. Kopp *et al.* 1992; Diamond 2002; Guralnick *et al.* 2006b, 2007; Brown *et al.* 2008). Many of these behavioural patterns, evident in free-play or semi-structured contexts, appear to reflect fundamental peer-related social competence problems, problems even more serious than anticipated based on children's

developmental levels. Among specific peer competence concerns are problems regulating emotions, the ability to appropriately and accurately process complex social information, a failure to organize peer interactions within a larger social task framework, and a lack of knowledge about expected social rules and play themes (see Guralnick 1999). One consequence of these peer competence problems is limited peer social networks, including the size of those networks and the frequency of play with network peers in a variety of settings.

Despite these peer competence problems and the relationship difficulties that they create, much can be done to support the formation and maintenance of children's peer social networks. This is especially the case in classroom settings where extensive opportunities are available to form social networks with peers. Indeed, during social play activities, teachers often utilize strategies designed to foster social interactions or friendships among children in their classrooms, both specialized and inclusive (e.g. Buyse *et al.* 2003). These strategies tend not to be highly individualized interventions designed to promote peer competence (see Guralnick *et al.* 2006a) and are not employed as extensively as

appears warranted (Brown & Conroy 2002; Brown *et al.* 2008). Nevertheless, they are potentially capable of enhancing many aspects of children's peer social networks in the classroom (Brown *et al.* 2001).

Available evidence suggests that the peer social network concerns noted above affect a substantial proportion of young children with developmental delays. However, considerable variability exists among heterogeneous groups of children with delays as well as between definable subgroups of children. One important and useful way to define subgroups is to consider the aetiology of a child's delay, a perspective and approach that continues to generate important insights into children's developmental patterns and prospects for intervention (Hodapp *et al.* 2003). Of all the subgroups of children with delays, children with Down syndrome (DS) may be most responsive to teachers' efforts to support their peer social networks. This aetiologically homogeneous subgroup has a prevalence of approximately 1 in 700 births and remains the most common genetic cause of intellectual disability (Sherman *et al.* 2007). Although the developmental and behavioural patterns of these children are by no means homogenous, they nevertheless share important characteristics. Among these is an orientation to social stimuli and an interest in social interaction (see Kasari & Hodapp 1996; and Fidler & Nadel 2007). Indeed, parents of children with DS note their child's sociability as a relative strength (Loveland & Kelley 1991; Carr 1995; Hornby 1995). Similar views appear to be held by teachers (Gilmore *et al.* 2003). Alternatively, it is important to point out that these perceptions exist despite substantial concerns with respect to many aspects of home and neighbourhood peer social networks and the peer competence of children with DS (Byrne *et al.* 1988; Carr 1995; Freeman & Kasari 2002; Guralnick 2002; Howell *et al.* 2007; Guralnick *et al.* 2009). In fact, evidence is accumulating to suggest that significant social competence problems are associated with children with DS, affecting numerous relationships (Wishart 2007; Cebula & Wishart 2008; Iarocci *et al.* 2008).

In this investigation, these contrasting perspectives of the social development of children with DS were evaluated in the context of children's peer social networks in classroom settings. Peer social network measures focused on children's social contacts in the classroom including network size, frequency of interactions with identified social partners, amount of time these dyads engaged in play, and the quality of those interactions, including level of conflicts and involvement in play. A unique feature of this study was to place the classroom-

based peer social networks of children with DS in a developmental perspective. To accomplish this, peer social network measures were not only obtained from a group of children with DS, but also from a group of younger typically developing children matched on mental age (MA-match) and a group of typically developing children matched on chronological age (CA-match). Given the potential value of teacher support of children's peer social networks in the classroom and the perceived social orientation of children with DS, it was anticipated that the frequency and quality of the networks for these children would, at minimum, be similar to those of children in the MA-match group. Moreover, despite constraints imposed by children's level of cognitive development on peer interactions (Brownell 1986; Howes 1987), in further consideration of the strong social orientation of children with DS and the fact that they have more years of experience with peers than their MA-match (younger) peers, the peer social networks of children with DS may even come to approximate those of children in the CA-match group in the classroom context. However, in view of the apparent social competence problems of children with DS noted above, it is also possible that important aspects of the peer social networks of children with DS may turn out to be less well developed than even typically developing children similar in developmental level. If this is the case, it emphasizes the need and urgency for highly specialized peer competence interventions for this subgroup of children with delays.

Finally, the degree to which teachers recognized that dyads involving children with DS and their playmates required special approaches to foster their social interactions was examined. If so, teachers should report more extensive efforts to facilitate and directly assist children with DS to interact with peers in comparison to both matched groups of typically developing children. Although the specific strategies teachers employed were not determined, the information was obtained with respect to the extent to which they helped children to initiate play, to maintain that play, and to resolve conflicts; i.e. critical social tasks. Teachers were also asked about the extent to which they helped children regulate their emotions as well as understand social rules and other knowledge-based aspects of play. The latter constitute foundation processes for social tasks essential for supporting children's peer-related social competence (Guralnick 1999). Information about teacher involvement to support children's peer interactions for social tasks may provide a useful framework to guide subsequent intervention.

Method

Participants

Subsequent to Institutional Review Board approval, young children with DS were recruited through contact with local DS parent groups, public schools, state agencies and early intervention centres in a large metropolitan community. Participating groups distributed announcements describing an opportunity to participate in a research project intended to learn more about how having DS affects children's peer interactions and social involvement. Parents who were interested in participating in the study contacted project staff directly. To be included in the sample, a child with DS had to meet the following criteria: (i) be between the ages of 54 and 83 months, (ii) have a karyotype which confirmed that the child's diagnosis was due to trisomy 21, (iii) obtain a Full Scale IQ (FSIQ) score which equated to a MA of 2.5 years and above on the Stanford-Binet, Fifth Edition (Roid 2003) and (iv) have a primary female caregiver (minimum of a 6-month relationship, as mothers were our informants for some measures). Exclusion from the sample occurred if the child had a diagnosis of Pervasive Developmental Disorder, if English was not his/her primary language, or if he/she had unusual sensory or motor problems. Of the 30 children with DS who met all four criteria, 27 completed the entire study.

Two comparison groups of typically developing children ($N = 27$ in each group) were recruited by sending similar study announcements to parents of children enrolled in child care centres and public schools. Parents who were interested in participating were asked to contact study staff directly and underwent qualifying testing to create two groups of typically developing children who were matched on a case-by-case basis to the children with DS. One group was matched on the basis of CA to the children with DS and the other group was matched on the basis of MA. To be included as a CA-match for each child with DS, the typically developing child had to meet the following criteria: (i) the child's CA had to be similar (± 3 months at the time of testing) to that of the child with DS to be matched; (ii) be the same gender as the child with DS; (iii) obtain a FSIQ score between 90 and 130 on the Stanford-Binet Intelligence Scale – Fifth Edition (SB5; Roid 2003) and (iv) have a primary female caregiver (minimum of a 6-month relationship). These inclusion requirements were similar for the MA-match for each child with DS (e.g. same gender), except that the typically developing child's MA (based on the FSIQ from the SB5) had to be

within ± 3 months of the child with DS at the time of testing. Although family demographics were not used as matching variables, these variables were monitored for equivalence and adjustments made if necessary in the participant selection process. Based on mother reports, typically developing children were excluded if they had any known developmental difficulties, a behaviour problem defined as obtaining a total behaviour problem score in the borderline clinical range or higher ($T \geq 65$ on preschool version and $T \geq 60$ on the school-age version) on the Child Behavior Checklist (Achenbach & Rescorla 2000, 2001), a major uncorrected sensory or motor problem, or a primary language other than English.

A final criterion for inclusion in this study for all children was the cooperation of each child's primary teacher as identified by the mother. This occurred in all instances. As described below, teachers were informants for measures of children's behaviour problems, social skills, and peer relations, as well as all peer social network and teacher support measures.

For all 81 participants, mothers were asked about their child's ethnicity, grade in school (preschool, kindergarten, first grade), if in child care only and siblings. In addition to child demographic information, standard demographic information about the family (marital status, ethnicity, educational and occupational status, and income) was gathered via self-reports from mothers. The Hollingshead Four Factor Index of Social Status (Hollingshead 1975) was used to calculate a measure of family social status (range 8–66; see Table 1 for descriptive characteristics).

For the children with DS, information was also collected with respect to the type of classroom placement and types of special services received. As reported by mothers and confirmed by research staff, classroom placement consisted of one of the following four categories varying in terms of the degree of inclusion with typically developing children: (i) full inclusion – with typically developing children all day and most of the children in the class were developing typically; (ii) partial inclusion – with typically developing children most of the day but some of the school day is spent exclusively with children with special needs; (iii) partially specialized – with typically developing children only some of the day, usually for lunch or recess or other selected activities, but mostly with other special needs children and (iv) specialized – never with typically developing children. Special services consisted primarily of occupational, physical, speech and language, and behaviour therapy.

Table 1 Child and family characteristics for each of the three groups

Measures	Group					
	Down Syndrome		MA-Match		CA-Match	
	M or %	SD	M or %	SD	M or %	SD
Child demographics						
Age (years)	5.62	0.60	3.21	0.35	5.61	0.60
Gender (% male)	48.15		48.15		48.15	
Ethnicity (% Caucasian) ¹	81.48		81.48		85.19	
Family demographics						
Family social status ²	49.00	11.00	56.58	7.74	55.89	6.74
Mother's age (years)	39.12	5.88	36.98	3.88	39.17	5.32
Marital status (% partnered)	96.30		100.00		96.30	
Grade in School						
Preschool/Child Care (%)	51.85		100.00		44.44	
Kindergarten (%)	48.15		0.00		44.44	
First Grade (%)	0.00		0.00		11.11	
Child developmental characteristics						
Full Scale IQ ³	60.59	10.10	108.52	8.08	111.30	7.57
Mental Age ³	3.37	.50	3.48	.40	6.23	0.62
Total Language ⁴	55.67	8.18	122.93	10.79	120.04	9.74
Adaptive Behavior Composite ⁵	64.19	10.82	116.00	11.78	109.78	9.74
Behaviour problems						
Total Problems ⁶	57.07	6.85	47.89	10.32	48.35	9.91
Social Skills						
SSRS-T ⁷	77.00	11.56	96.78	13.53	103.27	14.78
Peer relations						
Aggressive with Peers ⁸	0.25	0.34	0.23	0.25	0.28	0.36
Prosocial with Peers ⁸	0.79	0.46	1.21	0.42	1.45	0.49
Asocial with Peers ⁸	0.80	0.48	0.47	0.38	0.24	0.33
Excluded by Peers ⁸	0.36	0.29	0.29	0.32	0.24	0.34
Hyperactive-Distractible ⁸	0.81	0.57	0.36	0.38	0.54	0.63
Anxious – Fearful ⁸	0.21	0.32	0.41	0.43	0.27	0.38

N = 27 per group except for teacher measures for CA-match group (*N* = 26).

¹Hispanic, 2.5%; Asian, 8.6%; Native American, 1.2%.

²Hollingshead Four-Factor Index of Social Status.

³Stanford-Binet Intelligence Scale – Fifth Edition.

⁴Preschool Language Scale – standard scores.

⁵Vineland Adaptive Behavior Scales, standard scores.

⁶Teacher Report Forms, T-scores.

⁷Social Skills Rating Scale – Teacher, standard scores.

⁸Child Behavior Scale – ratings.

Child developmental characteristics

Children in all three groups were evaluated by a psychologist with extensive prior experience working with young children with developmental delays and typically developing children. The *Stanford-Binet Intelligence Scales* – Fifth Edition (SB5; Roid 2003) was administered to assess children's intellectual development. The FSIQ was of primary

interest as was the MA score that was used to establish the match between younger typically developing children and children with DS. To evaluate children's language development, the *Preschool Language Scale* – Fourth Edition (PLS-4; Zimmerman *et al.* 2002) was administered. The Total Language (TL) scale was converted to standard scores for analysis. Finally, to obtain an estimate of children's adaptive functioning, the *Vineland Adaptive*

Behavior Scales (VABS; Sparrow *et al.* 1984) Survey Form was administered to each mother (or primary female caregiver) by trained interviewers. Only the total adaptive behaviour composite (standard score) was used to compare the three groups in this study.

Behaviour problems

Teachers, all of whom had a minimum of 2 months experience with the focal children, were asked to assess their behaviour problems using the preschool Caregiver (1½–5 years) and school-age (6–18 years) Teacher Report Forms (C-TRF; Achenbach & Rescorla 2000; TRF; Achenbach & Rescorla 2001). On each form, teachers rated the frequency of different behaviour problems using a 3-point scale [0 = not true (as far as you know); 1 = somewhat or sometimes true; 2 = very true or often true]. Higher scores indicate greater perceived behaviour problems. The TRF was used for children with DS with a MA below 6 years but who were 6 years or older chronologically. Only total problem scores (T scores) were used for analysis.

Social skills

Teachers completed the *Social Skills Rating System* (SSRS-Teacher; Gresham & Elliott 1990) to obtain their ratings of the focal children's general social functioning. The SSRS-Teacher version (Preschool Level and Elementary Level) contains 30 items that measure a variety of social skills. Teachers rated the occurrence of particular social skills using a 3-point scale for how often they see the skill demonstrated: (0 = never, 1 = sometimes, 2 = very often). Additionally, teachers were asked to rate how important each skill was for each child's success in their classroom using a 3-point scale (0 = not important, 1 = important, 2 = critical). The particular level completed (Preschool or Elementary) was based on the child's current programme placement. Teachers' responses were summed across all items to obtain a total raw score, which was converted to a single standardized score that was used for analysis.

Peer relations

To evaluate focal children's behaviours with peers at school or child care from an overall perspective, the identified teachers were asked to complete the *Child Behavior Scale* (CBS; Ladd & Profilet 1996). The CBS is a 65-item rating scale containing six subscales: (i) aggressive behaviour with peers, (ii) prosocial behaviour with peers, (iii) excluded by peers, (iv) asocial with peers, (v) hyperac-

tive-distractible and (vi) anxious-fearful behaviour. Teachers rated descriptions of children's behaviour (e.g. 'Prefers to play alone' or 'Ignored by peers') on a 3-point scale with respect to the extent that each description applied to the child being rated (0 = doesn't apply; 1 = applies sometimes; 2 = certainly applies). Ratings were simply summed and averaged for items in each scale for focal children in each of the three groups.

Peer social networks in school

To examine children's peer social networks in classroom settings, a Teacher Social Network Questionnaire (T-SNQ) was administered to each focal child's teacher. The T-SNQ is a revised and abbreviated form of a questionnaire for parents that has been used extensively with children with developmental delays (Guralnick 1997, 2002). Teachers were first asked to list no more than five children with whom each of the focal children played with regularly in their classroom. Criteria for regular play were as follows: (i) the focal child plays with the peer at least once per week on average, (ii) during free time, the focal child often selects the peer or the peer selects the focal child for contact and (iii) their play lasts for at least a few minutes at a time. The number of children so identified provided a measure of the size of the focal child's peer social network. In addition, for each dyad (focal child-identified playmate) teachers were asked to rate how often the children played together in a typical week (range: less than once a day to more than once a day) and the length of the average play time (range: <2 min to >10 min). Also, for each playmate identified, information was obtained with respect to whether he or she had any special needs (all categories: none, DS, other developmental delay, speech or language delay, other).

To assess the quality of play with children in their network, using 3- or 4-point rating scales, teachers were asked to rate the following for each dyad: (i) how well they get along (range: not very well to very well), (ii) typical level of excitement (range: calm to very excited), (iii) frequency of conflicts (range: rarely to frequently), (iv) level of disruption due to conflicts (range: no disruption to ends play) and (v) level of involvement with one another during play (range: don't stay close or interact much to a lot of interaction).

Teacher support

Finally, in addition to obtaining information regarding their educational attainments (highest academic degree), years of teaching, and number of children in their class,

teachers were asked about their role in supporting the focal child's play with each of the playmates identified. A general assessment was first obtained in response to a question regarding how much the teacher facilitated the child's play with that playmate (range: little or none to constantly). This was followed by six questions focusing on the extent of help needed by teachers (all categories: little or none, occasionally, frequently) to assist the focal children during play with each identified playmate in the areas central to children's peer-related social competence noted earlier: (i) managing emotions, (ii) managing conflicts, (iii) getting the play started, (iv) remaining involved in play, (v) understanding social rules and (vi) understanding how to engage in specific play activities.

To maximize the clarity of the questions and the accuracy of the responses, the questionnaire was reviewed with each teacher following its completion, and any corrections or additions were made at that time. The full range of categories for each of the items for each peer social network question in the T-SNQ can be found in footnotes in Table 2.

Procedure

As noted, a series of 27 triads were formed beginning with the identification of a child with DS. For mothers of children with DS who indicated interest, interviewers used a phone screen to describe the study and make a general determination of the likelihood that the child would qualify based on the exclusion and inclusion criteria noted earlier. In the phone screen, mothers were asked about their child's primary language, gender, and any special motor or sensory problems, and to confirm their child's karyotype. After completing the phone screen successfully, consent forms were sent and the mother and child were scheduled for testing at the university laboratory. The primary teacher for each child with DS was then contacted and appropriate consent forms completed. Once a child with DS met all criteria, with completed consent forms from all involved, typically developing children were recruited to achieve CA and MA matches and complete the triad. All children were required to be in different programmes. Procedures similar to those of the child with DS were then followed.

Data were analysed using SPSS version 15.0 and were entered and systematically reviewed for outliers, data entry errors and missing value patterns. Variables used in a GLM context (e.g. MANOVA, ANOVA) were examined to ensure the assumptions of normal distribution and homogeneity of group variances were satisfied. When appropriate, substantively related variable clusters were

identified (e.g. Quality of Play, Teacher Assistance). Group differences of clusters were initially verified using a MANOVA. When significant, the individual components of the cluster were examined and significant group differences identified.

Results

Child and family characteristics

Comparisons among the three groups for the child and family characteristics measures in Table 1 were first carried out. As indicated in Table 1, the groups were matched successfully in accordance with the experimental design. Specifically, pair-wise comparisons following significant ANOVAs for CA, $F(2, 78) = 185.9$, $P < 0.001$, partial $\eta^2 = 0.83$, and MA, $F(2, 78) = 269.5$, $P < 0.001$, partial $\eta^2 = 0.87$, indicated that children with DS were closely matched to the group of typically developing children on the basis of CA-match, $t(52) = 0.10$, $P = 0.96$, $d = 0.01$, and to the group of younger typically developing children (MA-match) on the basis of MA, $t(52) = 0.80$, $P = 0.41$, $d = 0.23$. These pair-wise measures of the absence of differences give us considerable confidence that our groups were well matched (Frick 1995; Mervis 2004). Moreover, the chronological and MAs of the two typically developing groups differed significantly from one another as expected [CA: $t(52) = 18.0$, $P < 0.001$, $d = 5.0$; MA: $t(52) = 19.4$, $P < 0.001$, $d = 5.38$]. The three groups did not differ on any of the family demographic or other child demographic measures presented in Table 1 ($P > 0.05$).

As indicated in the table, all the children in the MA-match group were enrolled in preschool/child care programmes whereas children in the DS and CA-match groups were enrolled equally between preschool/child care and kindergarten programmes [overall $\chi^2(4) = 26.1$, $P < 0.001$]. Also, it should be noted that the levels of inclusion for children with DS groups were as follows: full inclusion: 18.5%; partial inclusion: 33.3%; partial specialized: 25.9% and specialized: 22.2%.

Based on children's developmental status and CA, expected differences and similarities among the three groups were obtained for standardized measures of children's cognitive, language and adaptive behaviour (see child developmental characteristics in Table 1). Specifically, for FSIQ, following a significant ANOVA, $F(2, 78) = 292.9$, $P < 0.001$, partial $\eta^2 = 0.88$, follow-up tests revealed that the DS group's FSIQ score was significantly lower than either the MA-match, $t(52) = 19.2$, $P < 0.001$, $d = 5.34$, or CA-match, $t(52) = 20.9$, $P < 0.001$, $d = 5.79$,

Table 2 Peer social networks for each of the three groups in school setting

Measures	Group					
	Down syndrome		MA-match		CA-match	
	M or %	SD	M or %	SD	M or %	SD
Peer social contacts						
Network size	3.15	1.13	3.19	1.24	3.27	1.04
How often play together ¹	2.65	0.81	2.89	0.82	2.21	0.75
Average play time ²	2.36	0.94	2.10	0.84	1.58	0.48
Playmates special needs ³						
None	55.56		100.00		100.00	
Down syndrome	48.15		7.41		19.23	
Other developmental delay	18.52		0.00		0.00	
Speech or language delay	22.22		0.00		3.85	
Other	0.00		0.00		0.00	
Quality of play						
How well get along ⁴	1.50	0.43	1.66	0.35	1.51	0.35
Typical level of excitement ⁵	2.36	0.47	2.26	0.48	2.02	0.47
Frequency of conflicts ⁶	2.55	0.59	2.59	0.37	2.48	0.37
Disruption due to conflicts ⁷	2.73	0.49	2.61	0.57	2.58	0.54
Level of involvement in play ⁸	1.93	0.49	1.70	0.55	1.39	0.45
Teacher support						
How much facilitate play ⁹	2.07	0.60	2.56	0.42	2.68	0.36
Assistance ¹⁰						
Managing emotions	2.57	0.61	2.50	0.41	2.63	0.37
Managing conflicts	2.45	0.68	2.39	0.45	2.52	0.44
Getting play started	1.81	0.66	2.55	0.47	2.82	0.33
Remaining involved	1.72	0.64	2.66	0.41	2.82	0.32
Understanding social rules	1.83	0.60	2.35	0.55	2.60	0.47
Understanding how to play	1.80	0.65	2.61	0.46	2.86	0.28

¹1 = more than once a day, 2 = once a day, 3 = couple of times a week.

²1 = more than 10 min, 2 = 5–10 min, 3 = 2–4 min, 4 = less than 2 min.

³Per cent categorized at least once for identified playmates for each focal child (total can exceed 100%).

⁴1 = very well, 2 = okay, 3 = not very well.

⁵1 = very excited, 2 = active, 3 = calm.

⁶1 = frequently, 2 = occasionally, 3 = rarely.

⁷1 = ends play, 2 = major disruption, 3 = minor disruption, 4 = no disruption.

⁸1 = a lot of interaction, 2 = stay close but don't interact much, 3 = don't stay close or interact much.

⁹1 = constantly, 2 = occasionally, 3 = little or none.

¹⁰1 = frequently, 2 = occasionally, 3 = little or none.

groups. The two typically developing groups did not differ from one another ($P > 0.05$). For language, a significant ANOVA for groups for the Total Language Measure of the Preschool Language Scale was obtained, $F(2, 78) = 421.0$, $P < 0.001$, partial $\eta^2 = 0.92$. Again, as expected, children in the DS group had significantly lower language scores than children in either the MA-match, $t(52) = 25.8$, $P < 0.001$, $d = 7.16$, or CA-match, $t(52) = 26.3$, $P < 0.001$, $d = 7.29$, groups. The two typi-

cally developing groups did not differ significantly from one another ($P > 0.05$). A slightly different pattern was obtained for the composite score of the Vineland Adaptive Behavior Scales. Pair-wise comparisons following a significant ANOVA, $F(2, 78) = 184.8$, $P < 0.001$, partial $\eta^2 = 0.83$, indicated that, as expected, the DS group scored lower than either the MA-match, $t(52) = 16.8$, $P < 0.001$, $d = 4.7$, or CA-match, $t(52) = 16.3$, $P < 0.001$, $d = 4.5$, groups. However, the MA-match group also

obtained a significantly higher Vineland composite score than the CA-match group, $t(52) = 2.1$, $P < 0.05$, $d = 0.59$.

For children's behaviour problems, the Teacher Report Form yielded a Total Problems score. Follow-up comparisons following a significant ANOVA, $F(2, 77) = 8.6$, $P < 0.001$, partial $\eta^2 = 0.18$, indicated that the DS group had higher behaviour problem scores than either the MA-match, $t(52) = 3.9$, $P < 0.001$, $d = 1.07$, or CA-match, $t(51) = 3.7$, $P < 0.001$, $d = 1.05$, groups. The two typically developing groups did not differ significantly from one another ($P > 0.05$). Teacher ratings of children's overall social skills using the Social Skills Rating Scale produced the same pattern. Follow-up comparisons following a significant ANOVA, $F(2, 77) = 28.1$, $P < 0.001$, partial $\eta^2 = 0.42$, revealed that the DS group's social skills scores were lower than either the MA-match, $t(52) = 5.8$, $P < 0.001$, $d = 1.60$, or the CA-match, $t(51) = 7.2$, $P < 0.001$, $d = 2.02$, groups. Once again, the two typically developing groups did not differ significantly from one another ($P > 0.05$).

Finally, teachers provided global assessments of each child's peer relations using the Child Behavior Scale. A MANOVA for the six scales produced a significant effect, $F(12, 144) = 4.62$, $P < 0.001$, partial $\eta^2 = 0.28$. Each of the six measures was then examined separately with significant ANOVAs obtained for the following scales: prosocial with peers, $F(2, 77) = 13.9$, $P < 0.001$, partial $\eta^2 = 0.27$; asocial with peers, $F(2, 77) = 12.9$, $P < 0.001$, partial $\eta^2 = 0.25$; and the hyperactive-distractible scale, $F(2, 77) = 4.9$, $P < 0.01$, partial $\eta^2 = 0.11$. Follow-up comparisons revealed that the DS group was less prosocial than either the MA-match, $t(52) = 3.4$, $P < 0.01$, $d = 0.95$, or the CA-match, $t(51) = 5.0$, $P < 0.001$, $d = 1.40$, groups. The two typically developing groups did not differ significantly from one another ($P > 0.05$). For the asocial with peers measure, all three groups differed from one another: DS/MA-match, $t(52) = 2.8$, $P < 0.01$, $d = 0.78$; DS/CA-match, $t(51) = 4.9$, $P < 0.001$, $d = 1.36$; CA-match/MA-match, $t(51) = 2.3$, $P < 0.05$, $d = 0.65$. As seen in Table 1, the DS group was rated as most asocial, followed by the MA-match and then the CA-match groups. For the hyperactive-distractible measure, the DS group received the highest ratings, but differed significantly only from the MA-match group, $t(52) = 3.4$, $P < 0.01$, $d = 0.95$. Once again, the two typically developing groups did not differ significantly from one another ($P > 0.05$).

Peer social contacts

Separate ANOVAs were conducted for the three measures of children's peer social contacts (see Table 2). For

network size, no statistically significant differences were obtained ($P > 0.05$) with all groups averaging slightly over three regular playmates in the class. Groups did differ, however, with respect to how often identified playmates played together, $F(2, 77) = 5.0$, $P < 0.01$, partial $\eta^2 = 0.12$. Follow-up comparisons indicated that the CA-match group played together more frequently than either the MA-match, $t(51) = 3.2$, $P < 0.01$, $d = 0.89$, or the DS, $t(51) = 2.0$, $P < 0.05$, $d = 0.57$, groups. The latter two groups did not differ significantly from one another ($P > 0.05$). The final peer social contact measure, average play time, also produced a significant group effect, $F(2, 77) = 6.8$, $P < 0.01$, partial $\eta^2 = 0.15$. In this instance, although the DS group had the lowest average play time with playmates, significant differences were again found only for the DS/CA-match, $t(51) = 3.8$, $P < 0.001$, $d = 1.06$, and the MA-match/CA-match, $t(51) = 2.7$, $P < 0.01$, $d = 0.77$, comparisons.

Playmate special needs

The extent to which children's playmates had special needs was also examined. To account for differences in network size for each focal child, the measure in Table 2 represents the percentage of children in each group who identified playmates representing one of the five categories at least once. As indicated, only approximately half the children with DS had any identified playmate in the classroom who did not have special needs, with significant difference across groups, $\chi^2(2) = 70.85$, $P < 0.001$. These percentages for the children with DS are consistent with expected variations due to type of inclusive placement.

Quality of play

A MANOVA conducted for the five measures of play quality produced a significant effect, $F(10, 146) = 2.70$, $P < 0.01$, partial $\eta^2 = 0.12$. Follow-up ANOVAs were significant for only the 'typical level of excitement', $F(2, 77) = 3.8$, $P < 0.05$, partial $\eta^2 = 0.09$, and 'level of involvement in play', $F(2, 77) = 7.6$, $P < 0.001$, partial $\eta^2 = 0.17$, measures. Pair-wise comparisons indicated that, for the excitement measure, children in the CA-match group exhibited significantly more excitement during play than both the DS group, $t(51) = 2.7$, $P < 0.01$, $d = 0.76$, but not the MA-match group ($P > 0.05$). The DS and MA-match groups did not differ significantly from one another ($P > 0.05$). Similarly, follow-up comparisons for the level of involvement measure revealed that the CA-match group was more

involved in play than either the MA-match, $t(51) = 2.2$, $P < 0.05$, $d = 0.62$, or the DS, $t(51) = 4.1$, $P < 0.001$, $d = 1.15$, groups. The MA-match and DS groups did not differ significantly from one another, however ($P > 0.05$).

Teacher support

Teachers rated the extent to which they needed to support the play of the focal child when interacting with each of the playmates identified. For the overall measure, how much teachers facilitated play, an ANOVA produced a significant group effect, $F(2, 77) = 12.6$, $P < 0.001$, partial $\eta^2 = 0.25$. Follow-up comparisons revealed that much more facilitation was required for the children in the DS group than either the MA-match group, $t(52) = 3.5$, $P < 0.001$, $d = 0.98$, or the CA-match group, $t(51) = 4.5$, $P < 0.001$, $d = 1.25$. The two typically developing groups did not differ significantly from each other ($P > 0.05$). None of the within group correlations for the DS group between the overall teacher support measure and the three peer social contact measures were significant ($P > 0.05$).

To examine the extent to which specific types of assistance were provided by teachers to focal children in each of the dyads, a MANOVA was first carried out for the six measures of teacher assistance (see Table 2). This produced a significant effect, $F(12, 144) = 8.46$, $P < 0.001$, partial $\eta^2 = 0.41$. A series of ANOVAs were then carried out for each measure separately with significant group effects obtained for help 'getting play started', $F(2, 77) = 28.5$, $P < 0.001$, partial $\eta^2 = 0.43$, 'remaining involved', $F(2, 77) = 41.4$, $P < 0.001$, partial $\eta^2 = 0.52$, 'understanding social rules', $F(2, 77) = 14.1$, $P < 0.001$, partial $\eta^2 = 0.27$, and 'understanding how to play', $F(2, 77) = 34.4$, $P < 0.001$, partial $\eta^2 = 0.47$. As was the case for the overall measure of facilitation, follow-up comparisons indicated that the DS group required more assistance than either of the two typically developing groups in every instance. Findings were as follows: 'getting play started'; DS/MA-match, $t(52) = 4.7$, $P < 0.001$, $d = 1.31$, DS/CA-match, $t(51) = 7.0$, $P < 0.001$, $d = 1.97$; 'remaining involved'; DS/MA-match, $t(52) = 6.5$, $P < 0.001$, $d = 1.79$, DS/CA-match, $t(51) = 7.9$, $P < 0.001$, $d = 2.21$; 'understanding social rules'; DS/MA-match, $t(52) = 3.3$, $P < 0.01$, $d = 0.92$, DS/CA-match, $t(51) = 5.2$, $P < 0.001$, $d = 1.46$; and 'understanding how to play'; DS/MA-match, $t(52) = 5.3$, $P < 0.001$, $d = 1.47$, DS/CA-match, $t(51) = 7.7$, $P < 0.001$, $d = 2.15$. The two typically developing groups also differed significantly from each other for the 'getting play started', $t(51) = 2.4$, $P < 0.05$, $d = 0.69$,

and 'understanding how to play', $t(51) = 2.4$, $P < 0.05$, $d = 0.67$, measures. These differences were consistent with developmental expectations, with the CA-match group requiring the least assistance.

Teacher experience and education

Overall, teachers had approximately 15 years of experience, which was similar across groups ($P > 0.05$). Whether differences in teachers' educational levels existed across groups was then examined. To do so, level of teacher education was placed into the following four categories: (i) training/some college; (ii) Associate degree; (iii) Bachelor's degree or (iv) Master's degree. A teacher education scale was created by assigning ratings from 1 to 4 (lowest to highest education category), and averaging across groups. An ANOVA produced a significant group effect, $F(2, 77) = 16.6$, $P < 0.001$, partial $\eta^2 = 0.30$. Follow-up comparisons indicated that teachers in the DS group had the highest educational level ($\bar{x} = 3.63$, $SD = 0.49$), followed by the CA-match group ($\bar{x} = 3.00$, $SD = 0.85$), and then the MA-match group ($\bar{x} = 2.41$, $SD = 0.93$). All three groups differed significantly from one another: DS/MA-match, $t(52) = 6.0$, $P < 0.001$, $d = 1.67$; DS/CA-match, $t(51) = 3.3$, $P < 0.001$, $d = 0.93$; and MA-match/CA-match, $t(51) = 2.4$, $P < 0.05$, $d = 0.68$. Whether teacher educational level was related to our outcome measures for the DS group was then evaluated. Teachers were divided into two groups by level of education (Bachelor's degree, $N = 10$ and Master's degree, $N = 17$). ANOVAs were then carried out for measures of network size and the overall teacher facilitation measure. In addition, a MANOVA was conducted for the five qualities of play measures. None of these comparisons were significant ($P > 0.05$). Finally, teachers with Bachelor's degrees only across groups (N s: DS = 10, MA-match = 13, CA-match = 17) were compared on the same measures of network size, quality of play, and teacher facilitation. Once again, none of the comparisons were statistically significant ($P > 0.05$).

Class size

Class size also differed significantly across groups, $F(2, 74) = 11.1$, $P < 0.001$, partial $\eta^2 = 0.23$. Means (and standard deviations) are as follows: DS; $\bar{x} = 13.7$ (4.83); MA-match; 16.8 (4.85); CA-match; 20.0 (5.02). Pair-wise comparisons revealed that all three groups differed from one another: DS/MA-match, $t(49) = 2.3$, $P < 0.05$, $d = 0.65$; DS/CA-match, $t(51) = 4.7$, $P < 0.001$, $d = 1.31$; and MA-match/CA-match, $t(48) = 2.5$, $P < 0.05$, $d = 0.67$.

However, Pearson correlations for the network size, quality of play, and teacher facilitation measures were not statistically significant for any of the groups ($P > 0.05$).

Role of inclusion

Finally, whether participation with typically developing children in the class (inclusion) was related to any of the key measures in the study for the DS children was examined. For this analysis, extent of inclusion was assessed by first assigning children to two types of distinct programmes: (i) inclusive (combination of full and partial inclusion programmes) and (ii) non-inclusive (combination of specialized and partial specialized programmes). A series of MANOVAS were then carried out for the following measures: (i) child and family demographics (see Table 1 for specific measures), (ii) child developmental characteristics (except peer relations measures, see Table 1), (iii) peer relations measures, (iv) peer social contacts measures (see Table 2), (v) quality of play measures (see Table 2) and (vi) all teacher assistance measures (see Table 2). None of the MANOVAS were statistically significant ($P > 0.05$).

Discussion

Classroom settings constitute perhaps the most important environment within which young children establish their peer social networks. In this study various dimensions of those networks focusing on children with DS were examined. This subgroup of children with general developmental (cognitive) delays has a well-established behavioural phenotype, including a strong orientation towards the social aspects of their environment. It is this characteristic which may encourage these children to be interested in interacting with their peers as well as to be highly responsive to supportive efforts by teachers to foster those relationships. There are, however, forces that may tend to limit the peer social networks of children with DS. These include expected constraints on social development in all its forms exerted by children's levels of cognitive development as well as the peer competence problems that children with DS likely share with the larger group of children with developmental delays.

To evaluate these competing influences, the peer social networks of children with DS were examined within a developmental perspective by including two carefully matched groups of typically developing children; a group matched on MA and a group matched

on CA. Our analyses revealed that, in fact, the peer social networks of children with DS in the classroom were highly similar in most respects to typically developing children matched on MA. In particular, network size was similar as was the frequency and amount of time children played together. The quality of play also exhibited many similarities to these younger typically developing children as reflected in measures of how well the dyads got along with one another in the classroom, their typical levels of excitement, frequency of conflicts, the extent to which conflicts led to a disruption of play, and level of involvement in play. Also to be noted was the finding that, for many but certainly not all of our peer social network measures, children with DS were similar to their typically developing CA mates. These results were unrelated to teacher experience, level of teacher education, class size, or the availability of typically developing children in inclusive programmes.

Nevertheless, concerns about the overall peer competence of children with DS in the classroom environment were apparent in the ratings provided by teachers on the Child Behavior Scale. Children with DS were judged to be less prosocial and more asocial overall than typically developing children matched on MA. They were also judged to be more hyperactive and distractible and, based on a different measure (TRF) were also rated to have a higher level of behaviour problems. These concerns suggest that the general ability of children with DS to engage in sustained play with their peers may be significantly compromised, especially in settings that lack structure. It is important to point out that sustained play is a hallmark of socially competent interactions, requiring the integration of processes related to social-information, emotion regulation, and shared understanding, among others (Guralnick 1999; Yeates *et al.* 2007).

Despite overall difficulties in peer competence suggested by these measures, the classroom environment as organized and supported by teachers for children with DS may be responsible for the positive peer social contact and quality of play findings obtained in this study (i.e. peer social networks) for this group of children when engaging in dyadic play with regular playmates. That is, teachers clearly recognized that, overall, and even in comparison to MA-matched typically developing peers, children with DS exhibited unusual peer interaction difficulties. As a likely consequence of these circumstances, as our findings revealed, teachers were more proactive in their supportive efforts. Of note, the types of more supportive assistance

teachers provided were in areas fundamental to children's peer competence. These areas included assisting children to initiate and maintain play as well as to understand the basic rules and structure of social play. The specific strategies teachers used to accomplish this, their level of individualization, their feasibility, or effectiveness were not assessed. However, although teacher involvement in promoting interactions of children with developmental delays remains a concern (see Brown & Conroy 2002), our results suggest a more optimistic picture with respect to peer social networks in the classroom, at least when children with DS are involved. Apparently, direct support in ways that scaffold children's peer competence limitations are able to promote children's peer social networks. Whether these patterns are also evident for other subgroups of children with delays who may not be as interested in social interactions remains an important research issue. Moreover, studies of older children in which academic programmes are more central are warranted, and may present a different set of issues for teachers seeking to foster children's peer social networks. Finally, our findings highlight the need for more direct observational studies to both confirm reports by teachers as well as to identify the strategies actually employed.

In conclusion, the positive pattern of peer social network measures obtained in this study of children with DS and the supportive efforts by teachers should be considered with an awareness that fundamental problems in peer competence likely exist for this group of children. These problems are reflected in related findings of limited community peer social networks, reports of increased levels of loneliness, and overall difficulties in social competence for children with DS (Howell *et al.* 2007; Wishart 2007; Iarocci *et al.* 2008; Guralnick *et al.* 2009). As is the case for children with developmental delays in general, this problem must be addressed by sophisticated, highly individualized interventions. Contemporary models of peer competence and translational efforts to construct and implement intervention programmes are emerging (Guralnick *et al.* 2006a). Pedagogical techniques unique to the aetiologic-specific characteristics of children with DS that can supplement these contemporary intervention approaches are only at the early stages of development but can provide guidance (Wishart 2005). Future work along these lines, building upon the responsiveness of children with DS to the supportive efforts of teachers noted in this study, may yield the level of individualization necessary to address the complexities of children's peer-related social competence.

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