Peer-Related Social Competence of Young Children With Down Syndrome

Michael J. Guralnick, Robert T. Connor, and L. Clark Johnson
Center on Human Development and Disability, University of Washington

Abstract

The peer-related social competence of children with Down syndrome was examined in an observational study. Dyadic interactions with peers of children with Down syndrome were compared with the dyadic interactions of matched groups of typically developing children and with playmates differing in both familiarity and social skills. Results suggested that both risk and protective factors influenced the peer interactions of children with Down syndrome. Recommendations are made for applying contemporary models of peer-related social competence to etiologic subgroups to better understand the mechanisms involved and to provide direction for the design of intervention programs.

DOI: 10.1352/1944-7558-116.1.48

Down syndrome is the most common genetic disorder associated with intellectual disability. Despite the availability of sophisticated prenatal screening and diagnosis (Malone et al., 2005), the incidence of Down syndrome remains at approximately 1 in 800 live births (Patterson & Costa, 2005; Sherman, Allen, Bean, & Freeman, 2007). Knowledge of the genetic and neurobiological mechanisms underlying this disorder has expanded dramatically in recent years (Patterson, 2007), and research continues to refine what is now a well-established behavioral phenotype (Chapman & Hesketh, 2000). Extensive behavioral work in particular has identified important cognitive (Silverman, 2007) and language (Abbeduto, Warren, & Connors, 2007; Roberts, Price, & Malkin, 2007) profiles, and there is increasing interest with respect to the social development of children with Down syndrome.

Available evidence suggests that, compared with many aspects of cognition and language, the social development of children with Down syndrome appears to be a relative strength. In general, these children exhibit a strong orientation to social aspects of their environment and appear motivated to engage in social interactions (see Fidler & Nadel, 2007; Kasari & Hodapp, 1996, for reviews). Certain developmental characteristics of children with Down syndrome, such as well-developed representational skills, are also compatible with involvement in social forms of play (Sigman & Ruskin, 1999). The perceptions of parents and teachers of children with Down syndrome are consistent with this sociable profile and with social development as a relative strength (Fidler, Hepburn, & Rogers, 2006; Gilmore, Campbell, & Cuskally, 2003; Hornby, 1995; Loveland & Kelley, 1991). Moreover, parents of children with Down syndrome actively support their child's participation in settings containing typically developing peers during the early childhood and school years (Freeman, Alkin, & Kasari, 1999; Guralnick, 2002). Because Down syndrome is so well known and increasingly accepted (Lenhard et al., 2007), lower levels of perceived stigma also may encourage parents to actively foster their child's participation in community-based normative social activities (see Seltzer & Ryff, 1994). Together, these child characteristics, along with parental and societal

factors, may combine to support the development of social relationships and to foster all aspects of the social competence of children with Down syndrome. This includes children's peer-related social competence, the focus of this study.

However, recent research relevant to the social competence of children with Down syndrome has suggested vulnerabilities in those processes closely associated with children's peer-related social competence (see Crick & Dodge, 1994; Guralnick, 1999; Yeates et al., 2007). Specifically, in studies using various comparison groups, including typically developing children matched on chronological age, mental age, or language level, children with Down syndrome display substantial difficulties with respect to various aspects of social understanding and associated sociocognitive skills (Cebula & Wishart, 2008; Wishart, 2007; Wishart, Cebula, Willis, & Pitcairn, 2007). Related research also has revealed difficulties with respect to emotion-regulation abilities when faced with a frustrating situation (Jahromi, Gulsrud, & Kasari, 2008) and problems persisting when challenged with a difficult task (Wishart, 1996). In fact, aspects of sociability, such as high levels of approaching others, may be due to poor response inhibition in children with Down syndrome (Porter, Coltheart, & Langdon, 2007). Other developmental characteristics common to children with Down syndrome, such as unusual difficulties in expressive language (Chapman, 2003), also may place these children at risk for significant peer competence problems.

The risk and protective factors outlined above likely interact over time to establish a child's level of competence with peers. A crucial time period during which peer relationships are expected to flourish is when children participate in preschool or kindergarten programs (Howes, 1990; Rubin, Coplan, Chen, Buskirk, & Wojslawowicz, 2005; Yugar & Shapiro, 2001). Yet, we have virtually no information as to the levels of peer competence achieved by children with Down syndrome or their specific characteristics. The rare observational studies of the social interactions of children with Down syndrome with their peers during early childhood that have been carried out have included only comparison groups composed of children with other disabilities (Sigman & Ruskin, 1999). However, as discussed below, important insights into the peer competence of children with Down syndrome or other delays can be achieved when observations are placed within a developmental framework that includes comparison groups of typically developing children.

In this study, we recruited participants from three groups: (a) children with Down syndrome, (b) typically developing children matched on mental age (MA match) and other characteristics to the children with Down syndrome, and (c) typically developing children matched on chronological age (CA match) and other characteristics to the children with Down syndrome. In the main portion of the study, we paired focal children from each of the three groups with typically developing playmates matched on CA and gender. These dyads were then observed in a series of laboratory observations designed to evaluate children's entry into play and their ability to maintain that play, key elements of socially competent functioning with peers (Guralnick, 1999; Putallaz & Wasserman, 1990). For each focal child, information was obtained for a range of peer interaction measures. Among the specific measures evaluated as highly relevant to children with Down syndrome were children's interest level in their playmates (reflecting social orientation), cognitive level of play (reflecting representational play), peer conversation (representing expressive language), and the ability to sustain interactive play (representing social–cognitive information processing and task persistence). These comparisons among the three groups of focal children are represented in the first row of Table 1 (Cells A, B, and C; two 50-min observational sessions each).

Competing hypotheses can be generated regarding the patterns of peer competence likely to be exhibited by children with Down syndrome compared with the two matched groups of typically developing children. Consistent with cognitive-level constraints that exist for many aspects of children's peer interactions (Brownell, 1986; Howes, 1987), one possibility is that the peer interactions of children with Down syndrome will be highly similar to the MA-match group. It is also the case that protective factors noted earlier may combine with the approximately 2 years of additional experience with peers for children with Down syndrome compared with the younger, typically developing group (MA match) to bring some aspects of their interactions with peers beyond that level in the direction of their CA mates.

Alternatively, the many risk factors, in particular those involving social cognition and emotion-regulation concerns, may exert their influence, resulting in unusually low levels of peer competence. Indeed, children with Down syndrome may share many of the peer-related social competence problems exhibited by heterogeneous groups of children with developmental delays (Diamond, 2002; Guralnick & Groom, 1987b; Guralnick, Hammond, Connor, & Neville, 2006; Guralnick, Neville, Hammond, & Connor, 2007; Iarocci, Yager, Rombough, & McLaughlin, 2008). If this is the case, despite existing protective factors, the peer competence of children with Down syndrome might be less well developed than even those of children in the MA-match group.

We also examined this possible existence of unusual peer competence problems from a different perspective. In this case, we made comparisons of dyadic play between two groups in which both members of the dyad were identical in MA but with one group containing a child with Down syndrome. To accomplish this, an additional group of typically developing playmates was recruited for the children with Down syndrome, matched now in terms of MA (rather than CA). This pairing with focal group children with Down syndrome can be found in Cell G of Table 1 (two 50-min observational sessions). The peer interactions of the children with Down syndrome in this pairing were then compared with those of the focal children in the MA-match group (Cell B of Table 1). If risk factors associated with children with Down syndrome exert a strong influence on these two MA-equivalent groups, adverse effects on the peer interactions of children with Down syndrome, particularly on sustained forms of interactive play, should be evident.

Of note, evidence based on indirect measures of children's peer competence in longitudinal and group comparison studies that addressed the peer social network and friendship patterns of children with Down syndrome in home and community settings has, in fact, suggested the possible influence of risk factors. In general, studies have indicated that young children with Down syndrome have comparatively small peer social networks as well as less well-developed links with peers across settings, exhibit a general absence of reciprocal friendships, and report high levels of loneliness (Byrne, Cunningham, & Sloper, 1988; Carr, 1995; Freeman & Kasari, 2002; Guralnick, 2002; Guralnick, Connor, & Johnson, 2009; Howell, Hauser-Cram, & Kersh, 2007; Sloper, Turner, Knussen, & Cunningham, 1990).

A hallmark of socially competent functioning with peers is the ability to adjust to and integrate with a playmate's pattern of social interaction, thereby engaging in more sustained and productive forms of peer play over time (i.e., group play). This pattern is evident in circumstances in which playmates gradually become more familiar with one another (Doyle, Connolly, & Rivest, 1980; Shea, 1981). In this study, we examined this important aspect of peer competence in two ways. First, short-term changes in the social interaction patterns of the focal children in each of the three main groups (i.e., Down syndrome, MA match, CA match) were observed over time as they interacted with initially unfamiliar CA-matched playmates. We compared the first and second observational sessions (see first row in Table 1). Second, and at the other end of the familiarity

Table 1. Experimental Design Indicating All Pairings of Focal Children With Playmates

	Focal group		
Playmate pairing	Down syndrome	MA match	CA match
CA (unfamiliar)	●● (A)	●● (B)	●● (C)
Friend	● (D)	● (E)	● (F)
MA (unfamiliar)	●● (G)	—	—

Note. All chronological age (CA) and mental age (MA) playmates were typically developing children. Each bullet represents one 50-min observational session. Children in the MA-playmate comparison group were paired only with the focal children with Down syndrome (two sessions).

continuum, we also observed each focal child interacting with mother-identified friends (see second row of Table 1; only one 50-min observational session). Ideally, friendships are characterized by patterns of reciprocal and mutual social exchanges, with play among friends generating more sophisticated and extended social interactions than play among nonfriends (Hartup, Laursen, Stewart, & Eastonson, 1988; Hartup & Stevens, 1997; Hinde, Titmus, Easton, & Tamplin, 1985; Newcomb & Bagwell, 1995, 1996; Rubin et al., 2005; Vaughn, Colvin, Azira, Caya, & Krzysik, 2001). However, research with heterogeneous groups of children with developmental delays has indicated no advantage in play with friends for these children, clearly suggesting the influence of unusual peer competence problems (Guralnick, Gottman, & Hammond, 1996; Guralnick & Groom, 1988).

In contrast, comparisons involving children with Down syndrome have indicated that higher levels of play occur between friends than nonfriends (Freeman & Kasari, 2002). Protective factors, including child characteristics with respect to his/her social orientation as well as positive parental and societal influences, may serve children with Down syndrome well when engaging friends in play. If this hypothesis is correct, this would be a substantial benefit to children with Down syndrome and would minimize the impact of risk factors. Accordingly, as an additional manifestation of children's peer competence, both shorter term adjustments in play with initially unfamiliar peers (across two observational sessions) and longer term adjustments, represented by interactions with identified friends compared with unfamiliar playmates, were examined for all three focal groups of children.

Last, it is not only the familiarity of playmates that can affect the quality of the dyadic play of the focal child but also his/her playmates' skill level (Guralnick & Groom, 1987a). For heterogeneous groups of children with delays, a complex pattern exists with respect to the quality of peer interactions, as influenced by combinations of the focal child's and the playmate's developmental levels (Skinner, Buysse, & Bailey, 2004). Nevertheless, children with Down syndrome may benefit substantially from the scaffolding of play provided by more skillful playmates. As noted, in the main portion of this study, children with Down syndrome were paired with similar CA playmates who were typically developing children. One consequence of this might be better quality play than under conditions that did not have the advantage of having such a skillful playmate. To evaluate this possibility, we observed the peer interactions of children with Down syndrome when interacting with typically developing, CA-matched playmates and when interacting with younger, typically developing playmates (comparison of Cells A and G in Table 1). This younger group of typically developing playmates, although similar in MA to the children with Down syndrome, may well find it more difficult to engage these children in dyadic play given their less sophisticated social play skills. As such, to the extent that children with Down syndrome depend on the more skillful organization and orchestration of play by playmates of the same CA, dyadic play with younger, typically developing playmates should yield lower levels of peer interactions. Alternatively, even with less skilled playmates, a receptive and interested partner, especially one with good representational play skills such as a child with Down syndrome, may generate levels of dyadic play similar to those in which the playmate is older and more skillful.

In summary, we observed in detail the peer interactions of young children with Down syndrome within a developmental framework. Comparisons with MA- and CA-matched, typically developing children were examined for a range of peer interaction measures to determine how risk and protective factors affecting the peer competence of children with Down syndrome manifest themselves in various interpersonal contexts. We also examined the role of playmate characteristics with respect to familiarity and level of social skills. These analyses are intended to identify the patterns of strength and vulnerability associated with the peer interactions of children with Down syndrome and, thereby, to contribute to the understanding of this important aspect of their social development.

Method

Participants

Young children with Down syndrome were recruited through contact with local Down syndrome parent groups, public schools, state agencies, and early-intervention centers in a large metropolitan community. To be included in the sample, a child with Down syndrome had to meet

the following criteria: (a) be between the ages of 54 and 83 months, (b) have a karyotype that confirmed that the child's diagnosis was due to trisomy 21, (c) obtain a Full Scale IQ (FSIQ) score that equated to a MA of at least 2.5 years on the Stanford-Binet Test, Fifth Edition (SB5; Roid, 2003), and (d) have a primary female caregiver (minimum of a 6-month relationship, as mothers were our primary informants). Exclusion from the sample occurred if the child had a diagnosis of pervasive developmental disorder, if English was not their primary language, or if they had unusual sensory or motor problems. Of the 30 children with Down syndrome 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 centers 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 in the Down syndrome group. One group was matched on the basis of CA (CA match) to the children with Down syndrome and the other group was matched on the basis of MA (MA match). To be included as a CA match for each child with Down syndrome, the typically developing child had to meet the following criteria: (a) CA had to be similar (+/−3 months at the time of testing) to that of the child with Down syndrome, (b) be the same gender as the child with Down syndrome, (c) obtain a FSIQ score between 90 and 130 on the SB5, and (d) have a primary female caregiver (minimum of a 6-month relationship). These inclusion requirements were similar for the MA-match group for each child with Down syndrome (e.g., same gender), except that the typically developing child's MA (based on the SB5) had to be within +/−3 months of the child with Down syndrome 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. Typically developing children were excluded if they had any known developmental difficulties; a *behavior problem*, defined as obtaining a total behavior 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 (CBCL; Achenbach & Rescorla, 2000, 2001); a significant uncorrected sensory or motor problem; or a primary language other than English. These three groups of children constituted the focal groups shown in Table 1.

For all 81 participants, mothers were asked about their child's ethnicity, grade in school (preschool–child care, kindergarten, first grade), 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 by 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 2 for descriptive characteristics).

A second group of typically developing children was recruited by study announcements sent home through day care centers and the public schools to serve as unfamiliar playmates in observations of the focal children's play (Down syndrome, MA match, CA match). This group consisted of typically developing playmates selected to be of similar CAs (+/−3 months at time of observation; CA playmates) and gender to the focal children from each of the three main groups (see Row 1 in Table 1). In addition, a group of unfamiliar typically developing playmates matched in MA to the children in the Down syndrome group was recruited (MA playmates; Cell G in Table 1). This was the additional comparison established for the existing group of children with Down syndrome. To be included, unfamiliar playmates for all pairings with focal children in the four groups of dyads (Cells A, B, C, and G) had to obtain a standard score between 90 and 130 on the Abbreviated Battery IQ (ABIQ) of the SB5 and not have had any previous contact with the focal child with whom they would be paired. The ABIQ was used as an estimate of general intellectual ability due to its direct connection with the SB5 (see Child Development Measures section below), with corrected correlations of .81 with the SB5 FSIQ. Typically developing playmates for the four dyadic groups were excluded if they had any known developmental difficulties; a behavior problem score in the borderline clinical range or above ($T \geq 65$ on preschool version and $T \geq 60$ on school-age version) on the CBCL (Achenbach & Rescorla,

Table 2. Child and Family Characteristics for Children in Each of the Three Focal Groups

	Focal group					
	Down syndrome		MA match		CA match	
Measure	*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)[a]	81.48		81.48		85.19	
Family demographics						
Family social status[b]	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		.00		44.44	
First grade (%)	.00		.00		11.11	
Child developmental characteristics						
Full scale IQ[c]	60.59^{x}	10.10	108.52^{y}	8.08	111.30^{y}	7.57
Mental age[c]	3.37^{x}	0.50	3.48^{x}	0.40	6.23^{y}	0.62
Total language[d]	55.67^{x}	8.18	122.93^{y}	10.79	120.04^{y}	9.74
Adaptive behavior composite[e]	64.19^{x}	10.82	116.00^{y}	11.78	109.78^{z}	9.74
Total behavior problems[f]	57.07^{x}	6.85	47.89^{y}	10.32	48.35^{y}	9.91

Note. MA = mental age; CA = chronological age. For each measure, groups with the same superscript did not differ significantly from one another, whereas significant differences existed when superscripts differed.
[a]Latino, 2.5%; Asian 8.6%; and Native American 1.2%. [b]Hollingshead (1975) Four-Factor Index of Social Status; [c]Stanford-Binet Intelligence Scale–Fifth Edition (Roid, 2003). [d]Preschool Language Scale–Fourth Edition, standard scores (Zimmerman, Steiner, & Pond, 2002). [e]Vineland Adaptive Behavior Scales, standard scores (Sparrow, Balla, & Cicchetti, 1984). [f]Child Behavior Checklist, T scores (Achenbach & Rescorla, 2000, 2001).

2000, 2001); a significant, uncorrected sensory or motor problem; or a primary language other than English.

Last, friends of the focal children were identified (see Row 2 of Table 1). Mothers were asked to choose as a friend "a child with whom the focal child got along with the best or played with most frequently (minimum of once per month on average)." Friends could be either male or female but must have been at least 2.5-years old and not more than 10-years old at the time of observation. Relatives not living in the home were allowed, and the developmental status of the friend was not a concern. Information was collected from mothers with respect to each friend's CA, gender, ethnicity, and whether the child had a disability or developmental delay. Information was also obtained to calculate a measure of family socioeconomic status (SES). All but 4 mothers of children with Down syndrome were able to identify one friend, and identified children participated in the laboratory session.

Child Developmental Measures

Children in all three focal groups were evaluated by a psychologist with extensive prior experience working with young children with developmental delays and typically developing children. The SB5 (Roid, 2003) was administered to assess children's intellectual development. The FSIQ was of primary interest, as was the MA score, to establish the match between younger, typically developing focal children and the children with Down syndrome. To evaluate children's language development, the Preschool Language Scale–Fourth Edition (PLS-4; Zimmer-

man, Steiner, & Pond, 2002) was administered. Scores on the Total Language Scale were converted to standard scores for analysis. To obtain an estimate of children's adaptive functioning, the Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla, & Cicchetti, 1984) Survey Form was administered to each mother (or primary female caregiver) by trained interviewers. The standard score for the adaptive behavior composite was used to compare the three groups in this study. Last, each mother's assessment of her child's behavior problems was obtained using the preschool and school-age forms of the CBCL (Achenbach & Rescorla, 2000, 2001). Ratings were based on mothers' observations over the past 2 months on the preschool form (1.5–5 years) and the past 6 months on the school-age form (6–18 years). Mothers of children with Down syndrome with a MA below 6 years were asked to complete the CA-appropriate form of the CBCL. On each form, mothers rated the frequency of different behavior problems using a 3-point scale: 0 = *not true (as far as you know);* 1 = *somewhat or sometimes true;* and 2 = *very true or often true*. The total problem scores (T scores) were used for analysis.

Experimental Design and Procedure

Each of the three groups of focal children paired with CA-playmates (Down syndrome, MA match, CA match) as well as the added group that paired the children with Down syndrome with MA playmates underwent the same procedures with respect to testing and observations of dyadic play (see Table 1). Observational measures were obtained in a laboratory setting and were completed within a 16-week period for each focal child after meeting all inclusion criteria. Testing and laboratory observations were administered to the child with Down syndrome first, followed by the 2 matched focal children (MA and CA matches) as they were identified. For observational measures, focal children in each of the three groups with CA playmates were videotaped in a laboratory playroom for five play segments (50 min per session) on two consecutive sessions (Time 1 and Time 2; see below) while playing with unfamiliar, typically developing peers matched on CA and gender (CA playmate). The MA-playmate pairings for children with Down syndrome (Cell G in Table 1) were also videotaped on two consecutive laboratory sessions. Identified friends were similarly videotaped in dyadic play with the focal children for the five play segments but only on one occasion (see Cells D–F in Table 1). The order of observations for the CA-playmate pairings, the MA-playmate pairings for the Down syndrome children, and the friend pairings was randomly determined (except for the two required, consecutive observational periods scheduled on separate days).

Laboratory Observations for Unfamiliar Peers and Friends

Laboratory observations were carried out within a 12′ × 21′ carpeted area of a laboratory playroom designed to be similar to a typical preschool classroom. To record play interactions, the room was equipped with video cameras operated by remote control, a radio telemetry microphone for the focal child (both had vests capable of housing the microphone), and an overhead microphone. A remote-control panel with mixers balanced the auditory signals. Play was recorded on two Panasonic DMR-E50 DVD recorders, and a time code was superimposed on the recording with a Horita RM 50 II time code generator. Dyadic play was constrained to a 7′ × 8′ space at one end of the room. This play space was created by using two walls in the room and bookshelves to create a third wall. A piece of carpet covered the play area and helped the children define the end of the play space where there was no wall.

All laboratory observations of focal children in each of the groups with unfamiliar peers and friends followed the same experimental protocol. Specifically, the focal child and each playmate were scheduled to arrive at the same time. They entered the playroom where they were supervised by an adult who directed them in a 10-min warm-up session in which the children engaged in a structured play activity (e.g., puzzles, drawing, playdough, painting). Next, the children were videotaped engaging in a series of five consecutive play segments, each lasting 10 min. Two of the segments focused on the social task of entering into play (1 and 3) and two focused on the social task of maintaining play (2 and 4). The final segment was free play. During all five segments, the children were supervised by an adult (seated outside the play area) who was experienced with young children.

The play materials for each segment were selected to promote interactive play, to be within

the developmental abilities of a diverse group of children, and to be interesting. Five different sets of toys were used in the observations for each of the five segments respectively: (a) a castle set (including a plastic castle with human and animal figures); (b) a set of cars with a house, parking structure, and roadway rug; (c) a highly popular train set; (d) a kitchen set; and (e) free-play toys (two babies, two stuffed dinosaurs, fire engine set, assorted cars, planes, space flight set, medical kit, and horses). During each segment, only the materials for that activity were available to the children and the children were restricted to the play space. As noted, each dyad was videotaped for 10 min for each of the five segments.

After the initial warm-up period, the focal child stayed in the outside room and was asked to wait while the castle was set up for Segment 1 (entry). While this was occurring, the playmate (CA playmate, MA playmate, or friend) was allowed to begin play with the toy in the designated play space and was given the following instructions: "[Focal child] will join you in a moment." The adult helped the playmate to become involved with the toy and then directed the focal child to join the playmate after he or she had been involved with the toy for approximately 1 min. The focal child was given the following instructions to join the play of the playmate: "Now go play together with [playmate]. Okay, now tell me what are you going to do." Especially for the child with Down syndrome, a simple verbalization (e.g., "play") was all the response that was required. For all segments, at the 5-min mark, the adult attempted to promote *interactive play* if none was taking place at that time (defined as the absence of verbal or nonverbal social exchanges by both children to one another in the context of play materials in the previous 30 s; at least one of the exchanges must be positive or neutral in form).

The adult then removed the first toy set after 10 min and brought out the car set for the first maintaining-play segment (Segment 2). She helped the children get started playing together by showing them how the set could be used and she suggested an initial activity: If the children did not engage in play with the initial suggestion, the adult would attempt to help them engage in interactive play by making two additional suggestions. She would then back off as the timing for this segment began and re-engage only if no interactive play was occurring at the 5-min mark. The same general procedures were repeated using the train set for entry (Segment 3, same as Segment 1, with the focal child waiting in outer room area) and the kitchen set for maintenance (Segment 4, same as Segment 2). The fifth and final play activity was a free-play segment. During this segment, the dyad was instructed to play however they liked for 10 min with a collection of various types of toys (see above).

Child–Peer Play Coding Scheme

A time code superimposed on each videotape in conjunction with a remotely controlled tape-stop device allowed coders to view tapes at 10-s intervals. Only the play of the focal child was coded. Coders recorded the quality of social participation and levels of cognitive play during each 10-s interval using the revised version of the Play Observation Scale (POS; Rubin, 2000). This scale consists of 10 mutually exclusive and exhaustive categories. The first 3 were derived from Parten's (1932) social participation categories consisting of the following play classifications: (a) solitary (playing alone), (b) parallel (playing next to another child), and (c) group (playing with another child; a combination of Parten's associative and cooperative play categories). Nested within these 3 social participation categories are 5 measures of cognitive play based primarily on the work of Smilansky (1968): (a) functional (simple repetitive play), (b) exploratory (examining physical properties of objects), (c) constructive (learns to use materials, creates something), (d) dramatic (role taking and pretend play), and (e) games with rules (child behaves in accordance with prearranged rules). If any 10-s interval is coded as solitary, parallel, or group play, 1 of the 5 cognitive play categories is also scored (an "occupied" category was also available if the category of cognitive play could not be determined). The 7 remaining main categories consisted of the following: (a) unoccupied behavior (child not playing), (b) onlooker behavior (child watches other children but does not enter into play), (c) peer conversation (talking, questioning, and suggesting to other children but not playing), (d) transitional (moving from one activity to another), (e) adult directed (any activity with an adult), and (f) uncodeable. In addition, aggression (nonplayful hitting, grabbing, etc.) and rough-and-tumble play (playful physical contact, mock fighting) were double coded. This scale has been

applied effectively to children with disabilities similar to those in this study for playgroups (e.g., Guralnick, Hammond, Connor, & Neville, 2006) and in situations involving dyads (Guralnick & Groom, 1987a; Guralnick, Neville, Hammond, & Connor, 2007). Evidence with respect to convergent and discriminant validity has suggested that the scale of social participation, especially the group-play measure, constitutes a useful index of a more general construct of peer competence (Provost & LaFreniere, 1991).

Before coding, coders were trained for a period of 10–12 weeks on the POS (Rubin, 2000), with two coders being trained at the University of Maryland. For prestudy reliability for the full variable matrix, including cognitive play categories nested within the social participation categories, all raters reached the minimum criterion, obtaining an overall Cohen's k of .75. After training was completed, interrater reliability on 20% of randomly selected dyadic sessions was calculated between pairs of coders and produced an overall k value of .79. Intercoder differences were resolved through review and discussion.

Results

Child and Family Characteristics

Comparisons among the three focal groups were first carried out for all of the child and family characteristic measures found in Table 2. As indicated in the table, the three groups were matched successfully in accordance with the experimental design. Specifically, after finding significant analyses of variance (ANOVAs) for CA, $F(2, 78) = 185.9$, $p < .001$, partial $\eta^2 = .83$, and MA, $F(2, 78) = 269.5$, $p < .001$, partial $\eta^2 = .87$, we conducted pair-wise comparisons that indicated that the children with Down syndrome were closely matched to the group of typically developing children (CA match) on the basis of CA, $t(52) = 0.10$, $p = .96$, $d = 0.01$, and to the group of younger typically developing children (MA match) on the basis of MA, $t(52) = 0.80$, $p = .41$, $d = 0.23$. Because of these pair-wise measures showing the absence of differences, we were confident that our groups were well matched (Frick, 1995; Mervis, 2004). Moreover, as expected, the MAs and CAs of the two typically developing groups differed significantly from one another: CA, $t(52) = 18.0$, $p < .001$, $d = 5.00$, and MA, $t(52) = 19.4$, $p < .001$, $d = 5.38$. Of importance, the three groups did not differ significantly on any of the family demographic or other child demographic measures noted in Table 2 ($p > .05$). With respect to school placement, all the children in the MA-match group were enrolled in preschool programs, whereas children in the Down syndrome and CA-match groups were enrolled equally between preschool and kindergarten programs, overall $\chi^2(4, N = 81) = 26.1$, $p < .001$.

Based on children's developmental status and CA, expected differences and similarities among the three groups were obtained for the cognitive, language, adaptive behavior, and behavior-problem measures (see Child Developmental Characteristics in Table 2). Matching superscripts in Table 2 indicate that no statistically significant difference ($p > .05$) between the groups was found, whereas significance was detected ($p < .05$ at minimum) for groups with different superscripts (details of the ANOVAs and follow-up pair-wise comparisons can be obtained by contacting the first author [M.J.G.]).

Overall Peer Interaction Comparisons

For the initial analyses, POS (Rubin, 2000) measures were summed across all five segments (50 min/focal child) and transformed to percentages of intervals coded for each measure (see Table 3). A Group (Down syndrome, MA match, CA match) × Playmate (CA-playmate Time 1, CA-playmate Time 2, friend) mixed-measures multivariate ANOVA (MANOVA) was then carried out. The two time periods refer to the two consecutive 50-min sessions. A significant effect was obtained only for the group variable, $F(16, 134) = 7.8$, $p < .001$, partial $\eta^2 = .48$. A series of ANOVAs for the group variable was then conducted for all POS measures in the table, with significant effects obtained for all measures except parallel play and unoccupied. Findings were as follows: Solitary play, $F(2, 78) = 17.8$, $p < .001$, partial $\eta^2 = .31$; group play, $F(2, 78) = 30.9$, $p < .001$, partial $\eta^2 = .44$; transition, $F(2, 78) = 16.7$, $p < .001$, partial $\eta^2 = .30$; onlooker, $F(2, 78) = 15.2$, $p < .001$, partial $\eta^2 = .28$; peer conversation, $F(2, 78) = 29.8$, $p < .001$, partial $\eta^2 = .43$; and adult directed, $F(2, 78) = 13.2$, $p < .001$, partial $\eta^2 = .25$. Follow-up comparisons indicated that in all except two instances, noted below, these effects could be accounted for by differences between the CA-match group compared with the

Table 3. Play Observation Scale Measures for Each of the Three Focal Groups for Dyads Containing Chronological Age–Matched Playmates

	Focal group					
	Down syndrome		MA match		CA match	
Measure	*M* (%)	*SD*	*M* (%)	*SD*	*M* (%)	*SD*
Solitary play	32.36	14.86	25.35	13.06	11.77	10.31
Parallel play	29.88	8.40	33.91	9.56	34.42	7.46
Group play	10.12	9.05	14.03	13.37	35.15	14.65
Transition	11.22	4.12	9.59	4.04	5.59	2.71
Unoccupied	0.41	0.65	0.80	2.66	0.08	0.19
Onlooker	9.80	6.22	7.36	3.29	3.37	2.59
Peer conversation	1.14	1.32	3.55	1.83	7.76	5.04
Adult directed	1.31	1.25	2.08	1.41	0.52	0.41
Constructiveness composite	3.49	0.26	3.53	0.27	3.79	0.10

Note. Data are percentages of intervals for each peer interaction measure. $n = 27$ per group, except that 4 children in the Down syndrome group could not identify a friend to bring to the laboratory.

other two groups. Specific comparisons are as follows: solitary play, Down syndrome/CA match, $t(52) = 5.9$, $p < .001$, $d = 1.64$, and MA match/CA match, $t(52) = 4.2$, $p < .001$, $d = 1.18$; group play, Down syndrome/CA match, $t(52) = 7.6$, $p < .001$, $d = 2.09$, and MA match/CA match, $t(52) = 5.5$, $p < .001$, $d = 1.53$; transition, Down syndrome/CA match, $t(52) = 5.9$, $p < .001$, $d = 1.65$, and MA match/CA match, $t(52) = 4.3$, $p < .001$, $d = 1.18$; and onlooker, Down syndrome/CA match, $t(52) = 5.0$, $p < .001$, $d = 1.37$, and MA match/CA match, $t(52) = 4.9$, $p < .001$, $d = 1.37$. As expected, the CA-match group engaged playmates at a more advanced level than either of the other two groups–playing alone, being in transition, and observing their playmates less often but participating in group play to a much greater extent.

However, not only did the CA-match group converse more than both the Down syndrome group, $t(52) = 6.6$, $p < .001$, $d = 1.83$, and the MA-match group, $t(52) = 4.1$, $p < .001$, $d = 1.13$, but the Down syndrome group also engaged in significantly less peer conversation than did the MA-match group $t(52) = 5.5$, $p < .001$, $d = 1.54$. Differences among all three groups were also found for the adult-directed measure: CA match/MA match, $t(52) = 5.5$, $p < .001$, $d = 1.53$; CA match/Down syndrome, $t(52) = 3.1$, $p < .01$, $d = 0.87$; and the Down syndrome/MA match, $t(52) = 2.1$, $p < .05$, $d = 0.59$. In this case, it was the chronologically youngest children (MA-match group) that required the most direction from adults. Uncodeable and double-coded measures occurred at very low rates.

Last, a constructiveness of play composite score was created by assigning scale values to each of the five levels of play ranging from functional play (*Level 1*) to games with rules (*Level 5*). The Group × Playmate ANOVA also produced a significant effect only for group, $F(2, 74) = 13.4$, $p < .001$, partial $\eta^2 = .27$. Pair-wise comparisons indicated that the Down syndrome and CA-match groups differed significantly from one another, $t(48) = 5.4$, $p < .001$, $d = 1.57$, as did the MA-match and the CA-match groups, $t(52) = 4.6$, $p < .001$, $d = 1.27$. Again, the constructive play of the CA-match group was at a higher level than either of the other two groups. No differences were obtained for the MA-match and Down syndrome groups comparison ($p > .05$).

Effects of Friendships

To examine the possible influence of the friendships of a child's playmates more closely, we focused on comparisons between children in their first laboratory visit (Time 1) with an unfamiliar peer (CA playmate) and their first (and only) laboratory visit with a friend. Separate Group (Down syndrome, MA match, CA match) × Friendship (CA playmate Time 1, friend) ANOVAs were carried out for each of the four key measures described earlier that were most likely to be affected by the special characteristics of

children with Down syndrome: group play, peer conversation, onlooker behavior, and constructiveness of play. All four measures produced significant effects for the group variable, with pair-wise comparisons consistent with the familiarity analyses presented above that included all measures and playmates. Therefore, details of the findings for the group variable are not presented.

With respect to analyses involving the friendship variable, a significant effect was obtained for the group-play measure, $F(1, 74) = 6.66$, $p < .05$, partial $\eta^2 = .08$, but the Group × Friendship interaction was not statistically significant ($p > .05$). For this measure, children across groups engaged in group play more often when interacting with friends ($M = 22.4$, $SD = 20.7$) than with unfamiliar playmates ($M = 17.2$, $SD = 17.7$). Similarly, a significant friendship effect was obtained for the constructiveness of play composite, $F(1, 74) = 4.20$, $p < .05$, partial $\eta^2 = .05$. Again, children played more constructively with friends ($M = 3.64$, $SD = 0.28$) than with unfamiliar playmates ($M = 3.59$, $SD = 0.28$). In contrast, no effects for friendship were found for the peer conversation or onlooker measures ($p > .05$). However, a significant Group × Playmate familiarity interaction was obtained for onlooker behavior, $F(2, 74) = 6.18$, $p < .01$, partial $\eta^2 = .14$. This interaction was a result primarily of the fact that children with Down syndrome engaged in more onlooker behavior with friends compared with unfamiliar playmates, whereas the two typically developing groups had lower levels of onlooker behavior with their friends than with unfamiliar playmates.

Characteristics of children's friends. It should be noted that the majority of identified friends for all three focal groups were typically developing children (percentage with developmental delay or disability: Down syndrome = 17.39; MA match = 3.7, CA match = 0). As indicated by an ANOVA, approximately equal numbers of boys and girls were selected in all three groups ($p > .05$), and the majority (85.3%) were Caucasian. A significant ANOVA, however, was obtained for the family status measure, $F(2, 74) = 5.64$, $p < .001$, partial $\eta^2 = .13$. Pair-wise comparisons revealed that the only significant difference was between the Down syndrome ($M = 46.5$, $SD = 14.3$) and the MA-match ($M = 56.7$, $SD = 8.5$) groups, $t(48) = 3.1$, $p < .01$, $d = 0.89$, with family social status lower for friends of the children with Down syndrome. Last, the CA of identified friends differed significantly across groups, $F(2, 74) = 50.68$, $p < .001$, partial $\eta^2 = .58$, as expected. CA of friends (years) was highest for the CA-match group ($M = 5.54$, $SD = 0.93$), followed by the Down syndrome group ($M = 4.81$, $SD = 1.02$), and the MA-match group ($M = 3.34$, $SD = 0.40$). All three pair-wise comparisons were significant: Down syndrome/MA match, $t(48) = 6.9$, $p < .001$, $d = 1.99$; Down syndrome/CA match, $t(48) = 2.65$, $p < .05$, $d = 0.77$; and MA match/CA match, $t(52) = 11.33$, $p < .001$, $d = 3.14$.

Effects of Playmate's Social Skills

In the previous analyses, children in all three focal groups were compared when engaged with same-gender and similar CA, typically developing children or with similar age friends, the vast majority also being typically developing children. The findings that more advanced peer interactions of children with Down syndrome, such as group play, were not significantly different from that of the MA-match group within the overall peer interaction analysis may, however, be specific to this type of dyad. That is, when children with Down syndrome are paired with similar CA but far more developmentally advanced playmates, it is the playmates who may have scaffolded the social interactions of the children with Down syndrome to achieve a level similar to that of focal children in the MA-match group. To examine this hypothesis, comparisons were made between children with Down syndrome interacting with CA, typically developing playmates and the additional pairing in which the same children with Down syndrome interacted with younger, less socially skillful playmates matched on MA. Separate analyses for each of the four key measures (group play, onlooker behavior, peer conversation, constructiveness of play) at the second time period were conducted for this comparison to allow time for any scaffolding to develop. Findings indicated that, despite differences in the CAs of the typically developing playmates and their corresponding play skills, none of the separate, repeated measures analyses were significant for any of the four measures ($p > .05$). It should be noted that children with Down syndrome engaged in approximately 40% more group play with older playmates and that there was considerable interindividual variability. Nevertheless, the overall absence of differences found

in this comparison suggests that other factors, such as the social orientation of children with Down syndrome and their ability to engage in representational play may have enabled younger, less skillful, playmates to scaffold social play adequately.

Comparisons With Equivalent MA Dyads

Despite this apparent receptivity to social scaffolding, even when interacting with younger typically developing children similar in MA, children with Down syndrome may nevertheless exhibit levels of peer competence that are not commensurate with their developmental levels. An important reference group to evaluate this possibility consists of dyads of typically developing children in which both focal children and playmates have MAs similar to those to the children with Down syndrome and their playmates. Accordingly, we compared dyads containing the children with Down syndrome (the focal child) interacting with typically developing (younger) playmates matched on MA (Down syndrome/MA-playmate dyads; Cell G in Table 1) with the group of typically developing children also interacting with typically developing playmates matched on chronological (and mental) age (i.e., the MA-match/CA-playmate dyads; Cell B in Table 1). Therefore, all children in this comparison (focal children and playmates) were similar in MA, the key difference being that one set of dyads contained a child with Down syndrome. However, the children with Down syndrome were, of course, older than their MA playmates as well as the children in the typically developing comparison group.

Between-groups comparisons were carried out again for the four key outcome measures during the second time period. Findings produced significant effects for group play (square-root transformations were used to minimize variance differences), $t(1,52) = 4.7$, $p < .05$, partial $\eta^2 = .08$, and peer conversation $t(1, 52) = 4.8$, $p < .05$, partial $\eta^2 = .09$, only. Specifically, younger, typically developing children paired with same MA- (and CA-) matched playmates engaged in higher levels of group play ($M = 14.8$, $SD = 14.2$) than did the children with Down syndrome also interacting with similar-MA, typically developing (younger) children ($M = 7.5$, $SD = 7.8$). Similarly, focal children in dyads containing only typically developing children engaged in more conversation with their playmates ($M = 3.3$, $SD = 2.5$) than did the children with Down syndrome paired with younger, typically developing children of the same MA ($M = 1.8$, $SD = 2.5$). Accordingly, even for dyads matched in MA, typically developing children paired with other typically developing children exhibited more advanced forms of peer interactions than did children with Down syndrome who were also interacting with typically developing playmates. Although alternative interpretations exist, this finding is consistent with the hypothesis that, in this interpersonal context, children with Down syndrome exhibit peer competence problems that extend beyond those which might be expected based on their developmental level.

Discussion

In this study, we investigated one important aspect of the social development of children with Down syndrome: their peer-related social competence. As noted, young children with Down syndrome present a complex picture with respect to their expected levels of peer competence. In particular, well-established protective factors, such as a pronounced social orientation and well-developed representational skills, compete with risk factors, such as limited expressive language and concerns regarding overarching social–cognitive abilities. As elaborated on below, two important findings emerged with respect to the influence of these factors on the dyadic play of children with Down syndrome. The first finding appears to represent the influence of protective factors capable of facilitating dyadic interactions with typically developing as well as with familiar playmates. The second finding likely represents the influence of risk factors that contribute to peer competence problems that may be most evident when more challenging social circumstances are encountered.

Specifically, comparisons with MA- and CA–matched, typically developing focal groups provided a developmental framework within which to interpret the strengths and vulnerabilities of children with Down syndrome with respect to key measures of peer interactions. Initial analyses centered on comparisons among the three focal groups of children paired with typically developing playmates matched on CA and gender. Comparisons with playmates with these characteristics represent normative peer relationships for

young children. This is the case even for children with Down syndrome, as the vast majority of their playmates in home and neighborhood settings are typically developing children, although somewhat younger (Freeman & Kasari, 2002; Guralnick et al., 2009).

Under these circumstances, as expected, comparisons among the three focal groups indicated that the peer interactions of older, typically developing children were more advanced in virtually every respect compared with both younger, typically developing children and children with Down syndrome. Of importance, and relevant to the possible influence of protective factors, the peer interactions of children with Down syndrome did not differ in any substantial manner from the MA matched group of (younger) typically developing children, except for lower levels of peer conversation. This finding for children with Down syndrome contrasts with results for heterogeneous groups of children with developmental delays who exhibit unusual peer interaction problems in small playgroup settings in comparison to mental-age matched playmates (Guralnick & Groom, 1987b). In addition, children with Down syndrome (as well as the other two focal groups) had higher levels of play when paired with friends compared with unfamiliar playmates. This result also contrasts with results for heterogeneous groups of children with delays in which no advantage has been found (Guralnick et al., 1996). The finding of a positive effect of friendship for children with Down syndrome is, however, consistent with that of Freeman and Kasari (2002). Accordingly, this pattern of results supports the hypothesis that protective factors, presumably including high levels of representational play and a strong interest in interacting socially, may have been sufficient to compensate for risk factors, such as limited language, to enable children with Down syndrome to at least display levels of peer interaction commensurate with their developmental levels. These findings, based on social interactions occurring with typically developing playmates similar in CA, are also consistent with a behavioral phenotype in which the overall social development of children with Down syndrome is considered to be a relative strength (see Kasari & Hodapp, 1996).

One reason for this outcome may be related to the ability of typically developing playmates, including identified friends, to capitalize on the protective factors associated with children with Down syndrome to support and scaffold dyadic play. Even younger, less socially skillful, typically developing playmates matched on MA to children with Down syndrome appeared to be able to provide adequate support, although there was a tendency for levels of group play to be lower for this pairing. Related evidence for this sample supports the hypothesis that social scaffolding by playmates commonly occurs. Specifically, during dyadic play in home settings, typically developing playmates similar in CA were found to exert control of play more often than children with Down syndrome (Guralnick et al., 2009).

In contrast, the influence of risk factors emerged in a comparison between groups in which focal children and playmates had similar MA but one group consisted of focal children with Down syndrome. In this comparison, sustained interactive (group) play in particular, an important index of a more general construct of peer-related social competence (Provost & LaFreniere, 1991), occurred less often for children with Down syndrome despite the similar MAs of all the participants. A lack of common interests may be partly responsible for this finding in view of the CA differences in the dyads that contained children with Down syndrome. At the same time, it would be reasonable to expect that the greater experience with peers (that likely was the case for children with Down syndrome given their CAs) would have conferred some advantage in this comparison.

Accordingly, the finding of lower levels of group play for children with Down syndrome in this comparison is consistent with the hypothesis that these children exhibit peer competence difficulties that extend beyond those expected on the basis of their developmental levels. As suggested above, these difficulties can be masked by a supportive partner–child or adult–capitalizing on protective factors. However, when a partner's scaffolding is less skillful, such as when interacting with much younger, typically developing children, as in this comparison, sustained interactive play becomes more difficult to achieve in relation to dyads composed of similar-MA, typically developing children. Consequently, in this interpersonal context, the relative strength of the peer interaction component of children's social development is not apparent, as children with Down syndrome display unusual problems in peer competence similar to those identified for children with other developmental delays.

This interpretation also suggests that the influence of risk factors are more likely to be evident for children with Down syndrome when social situations become more complex, such as during unstructured or semistructured play activities common to preschool programs. Part of the complexity lies in the fact that these settings involve numerous peers and mostly unknown expectations as to the pattern of play and social interaction. In this study involving only dyads, expectations for play and the structure provided by the context were clear, with few distractions for either child in the dyad. Of note, based on teacher reports, available evidence has suggested that unusual peer interaction problems are apparent compared with MA-matched, typically developing children when children with Down syndrome participate in these types of less structured and more complex preschool contexts (Guralnick, Connor, & Johnson, in press). Peer competence difficulties also likely account for much of the peer social network concerns noted earlier that have been regularly reported for young children with Down syndrome (e.g., Carr, 1995; Guralnick et al., 2009; Howell et al., 2007).

Consequently, carefully programmed transitions to larger groups from the more highly structured and less complex dyadic context may provide the most ideal conditions to implement systematic intervention programs to promote the peer-related social competence for this group of children. Indeed, a less complex initial structure may be needed for children with Down syndrome, in particular to facilitate their problem-solving strategies, including social strategies (see Landry, Miller-Loncar, & Swank, 1998). Moreover, the involvement of typically developing children who are capable of taking advantage of protective factors should also be an important consideration and is feasible in the context of inclusion programs in which children with and without disabilities are enrolled (Guralnick, 2005).

Last, the pattern of results in this study clearly suggests that future research examining the social development of etiologic-specific subgroups, such as children with Down syndrome or other well-defined subgroups, can benefit from a framework that considers possible risk and protective factors relevant to this domain of development. This can be accomplished in studies of larger groups of children by directly measuring various risk and protective factors, including those relevant to social information processing. Moreover, by examining children's social development in various interpersonal contexts, a more complex behavioral profile relevant to these risk and protective factors may emerge, as occurred in this investigation. Equally important is the potential for these factors, as they interact with one another in different contexts, to inform intervention efforts. Contemporary approaches to the study of peer-related social competence focusing on children with developmental delays and related disabilities now include many of these risk and protective factors in their models (Guralnick, 1999; Yeates et al., 2007). Together, the outcome of this process may be a more precise understanding of the behavioral phenotype for the domain of social development for children with Down syndrome as well as for other defined subgroups, a better grasp of the social development of these children and the mechanisms involved, and a more effective set of interventions.

References

Abbeduto, L., Warren, S. F., & Connors, F. A. (2007). Language development in Down syndrome: From the prelinguistic period to the acquisition of literacy. Mental Retardation and Developmental Disabilities Research Reviews, *13*, 247–261.

Achenbach, T. M., & Rescorla, L. A. (2000). *Manual for ASEBA preschool forms & profiles*. Burlington: Research Center for Children, Youth, and Families, University of Vermont.

Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA school-age forms & profiles*. Burlington: Research Center for Children, Youth, and Families, University of Vermont.

Brownell, C. A. (1986). Convergent developments: Cognitive-developmental correlates of growth in infant/toddler peer skills. *Child Development, 57*, 275–286.

Byrne, E. A., Cunningham, C. C., & Sloper, P. (1988). The children: Their activities, friends, sisters and brothers. In E. A. Byrne, C. C. Cunningham, & P. Sloper (Eds.), *Families and their children with Down's syndrome: One feature in common* (pp. 25–47). London: Routledge.

Carr, J. H. (1995). *Down's syndrome: Children growing up*. New York: Cambridge University Press.

Cebula, K. R., & Wishart, J. G. (2008). Social cognition in children with Down syndrome.

In L. Glidden (Ed.), *International review of research in mental retardation* (Vol. 35, pp. 43–86). New York: Academic Press.

Chapman, R. S. (2003). Language and communication in individuals with Down syndrome. In L. Abbeduto (Ed.), *International review of research in mental retardation* (Vol. 27, pp. 1–34). San Diego, CA: Academic Press.

Chapman, R. S., & Hesketh, L. J. (2000). Behavioral phenotype of individuals with Down syndrome. *Mental Retardation and Developmental Disabilities Research Reviews, 6*, 84–95.

Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin, 115*, 74–101.

Diamond, K. E. (2002). The development of social competence in children with disabilities. In P. K. Smith & C. H. Hart (Eds.), *Blackwell handbook of childhood social development* (pp. 571–587). Oxford, UK: Blackwell.

Doyle, A., Connolly, J., & Rivest, L. (1980). The effect of playmate familiarity on the social interactions of young children. *Child Development, 51*, 217–223.

Fidler, D. J., Hepburn, S., & Rogers, S. (2006). Early learning and adaptive behaviour in toddlers with Down syndrome: Evidence for an emerging behavioural phenotype? *Down Syndrome Research and Practice, 9*, 37–44.

Fidler, D. J., & Nadel, L. (2007). Education and children with Down syndrome: Neuroscience, development, and intervention. *Mental Retardation and Developmental Disabilities Research Reviews*, *13*, 262–271.

Freeman, S. F., Alkin, M. C., & Kasari, C. L. (1999). Satisfaction and desire for change in educational placement for children with Down syndrome: Perceptions of parents. *Remedial and Special Education, 20*, 143–151.

Freeman, S. F., & Kasari, C. (2002). Characteristics and qualities of the play dates of children with Down syndrome: Emerging or true friendships? *American Journal on Mental Retardation, 107*, 16–31.

Frick, R. W. (1995). Accepting the null hypothesis. *Memory & Cognition, 23*, 132–138.

Gilmore, L., Campbell, J., & Cuskelly, M. (2003). Developmental expectations, personality stereotypes, and attitudes towards inclusive education: Community and teacher views of Down syndrome. *International Journal of Disability, Development and Education, 50*, 65–76.

Guralnick, M. J. (1999). Family and child influences on the peer-related social competence of young children with developmental delays. *Mental Retardation and Developmental Disabilities Research Reviews*, *5*, 21–29.

Guralnick, M. J. (2002). Involvement with peers: Comparisons between young children with and without Down syndrome. *Journal of Intellectual Disability Research*, *46*, 379–393.

Guralnick, M. J. (2005). Inclusion as a core principle in the early intervention system. In M. J. Guralnick (Ed.), *The developmental systems approach to early intervention* (pp. 59–69). Baltimore: Brookes

Guralnick, M. J., Connor, R. T., & Johnson, L. C. (2009). Home-based peer social networks of young children with Down syndrome: A developmental perspective. *American Journal on Intellectual and Developmental Disabilities, 114*, 340–355.

Guralnick, M. J., Connor, R. T., & Johnson, L. C. (in press). The peer social networks of young children with Down syndrome in classroom programmes. *Journal of Applied Research in Intellectual Disabilities*.

Guralnick, M. J., Gottman, J. M., & Hammond, M. A. (1996). Effects of social setting on the friendship formation of young children differing in developmental status. *Journal of Applied Developmental Psychology*, *17*, 625–651.

Guralnick, M. J., & Groom, J. M. (1987a). Dyadic peer interactions of mildly delayed and nonhandicapped preschool children. *American Journal of Mental Deficiency, 92*, 178–193.

Guralnick, M. J., & Groom, J. M. (1987b). The peer relations of mildly delayed and nonhandicapped preschool children in mainstreamed playgroups. *Child Development, 58*, 1556–1572.

Guralnick, M. J., & Groom, J. M. (1988). Friendships of preschool children in mainstreamed playgroups. *Developmental Psychology*, *24*, 595–604.

Guralnick, M. J., Hammond, M. A., Connor, R. T., & Neville, B. (2006). Stability, change, and correlates of the peer relationships of young children with mild developmental delays. *Child Development, 77*, 312–324.

Guralnick, M. J., Neville, B., Hammond, M. A., & Connor, R. T. (2007). The friendships of young children with developmental delays: A longitudinal analysis. *Journal of Applied Developmental Psychology*, *28*, 64–79.

Hartup, W. W., Laursen, B., Stewart, M. I., & Eastonson, A. (1988). Conflict and the friendship relations of young children. *Child Development, 59*, 1590–1600.

Hartup, W. W., & Stevens, N. (1997). Friendships and adaptation in the life course. *Psychological Bulletin, 121*, 355–370.

Hinde, R. A., Titmus, G., Easton, D., & Tamplin, A. (1985). Incidence of "friendship" and behavior toward strong associates versus nonassociates in preschoolers. *Child Development, 56*, 234–245.

Hollingshead, A. B. (1975). *Four factor index of social status*. Unpublished manuscript, Department of Sociology, Yale University, New Haven, CT.

Hornby, G. (1995). Fathers' views of the effects on their families of children with Down syndrome. *Journal of Child and Family Studies, 4*, 103–117.

Howell, A., Hauser-Cram, P., & Kersh, J. E. (2007). Setting the stage: Early child and family characteristics as predictors of later loneliness in children with developmental disabilities. *American Journal on Mental Retardation, 112*, 18–30.

Howes, C. (1987). Social competence with peers in young children. *Developmental Review, 7*, 252–272.

Howes, C. (1990). Social status and friendship from kindergarten to third grade. *Journal of Applied Developmental Psychology, 11*, 321–330.

Iarocci, G., Yager, J., Rombough, A., & McLaughlin, J. (2008). The development of social competence among persons with Down syndrome: From survival to social inclusion. *International Review of Research in Mental Retardation, 35*, 87–119.

Jahromi, L. B., Gulsrud, A., & Kasari, C. (2008). Emotional competence in children with Down syndrome: Negativity and regulation. *American Journal on Mental Retardation, 113*, 32–43.

Kasari, C., & Hodapp, R. M. (1996). Is Down syndrome different? Evidence from social and family studies. *Down Syndrome Quarterly, 1*, 1–8.

Landry, S. H., Miller-Loncar, C. L., & Swank, P. R. (1998). Goal-directed behavior in children with Down syndrome: The role of joint play situations. *Early Education and Development, 9*, 375–392.

Lenhard, W., Breitenbach, E., Ebert, H., Schindelhauer-Deutscher, H. J., Zang, K. D., & Henn, W. (2007). Attitudes of mothers towards their child with Down syndrome before and after the introduction of prenatal diagnosis. *Intellectual and Developmental Disabilities, 45*, 98–102.

Loveland, K. A., & Kelley, M. L. (1991). Development of adaptive behavior in preschoolers with autism or Down syndrome. *American Journal on Mental Retardation, 96*, 13–20.

Malone, F. D., Canick, J. A., Ball, R. H., Nyberg, D. A., Comstock, C. H., Bukowski, R., et al. (2005). First-trimester or second-trimester screening, or both, for Down's syndrome. *New England Journal of Medicine, 353*, 2001–2011.

Mervis, C. B. (2004). Cross-etiology comparisons of cognitive and language development. In M. L. Rice & S. F. Warren (Eds.), *Developmental language disorders: From phenotypes to etiologies* (pp. 153–186). Mahwah, NJ: Erlbaum.

Newcomb, A. F., & Bagwell, C. L. (1995). Children's friendship relations: A meta-analytic review. *Psychological Bulletin, 117*, 306–347.

Newcomb, A. F., & Bagwell, C. L. (1996). The developmental significance of children's friendship relations. In W. M. Bukowski, A. F. Newcomb, & W. W. Hartup (Eds.), *The company they keep* (pp. 289–321). San Diego, CA: Cambridge University Press.

Parten, M. B. (1932). Social participation among preschool children. *Journal of Abnormal Social Psychology, 27*, 243–269.

Patterson, D. (2007). Genetic mechanisms involved in the phenotype of Down syndrome. *Mental Retardation and Developmental Disabilities Research Reviews, 13*, 199–206.

Patterson, D., & Costa, A. C. (2005). Down syndrome and genetics–A case of linked histories. *Nature Reviews, Genetics, 6*, 137–147.

Porter, M. A., Coltheart, M., & Langdon, R. (2007). The neuropsychological basis of hypersociability in Williams and Down syndrome. *Neuropsychologia, 45*, 2839–2849.

Provost, M. A., & LaFreniere, P. J. (1991). Social participation and peer competence in preschool children: Evidence for discriminate and convergent validity. *Child Study Journal, 21*, 57–72.

Putallaz, M., & Wasserman, A. (1990). Children's entry behavior. In S. R. Asher & J. D. Coie (Eds.), *Peer rejection in childhood* (pp. 60–89). Cambridge, UK: Cambridge University Press.

Roberts, J. E., Price, J., & Malkin, C. (2007). Language and communication development in Down syndrome. *Mental Retardation and Developmental Disabilities Research Reviews, 13*, 26–35.

Roid, G. H. (2003). *Stanford-Binet Intelligence Scales* (5th ed.). Itasca, IL: Riverside.

Rubin, K. H. (2000). *The Play Observation Scale*. Unpublished manuscript, University of Maryland, College Park.

Rubin, K. H., Coplan, R. J., Chen, X., Buskirk, A., & Wojslawowicz, J. (2005). Peer relationships in childhood. In M. Bornstein & M. Lamb (Eds.), *Developmental science: An advanced textbook* (5th ed., pp. 469–512). Hillsdale, NJ: Erlbaum.

Seltzer, M. M., & Ryff, C. D. (1994). Parenting across the life span: The normative and nonnormative cases. *Life Span Development and Behavior, 12*, 1–40.

Shea, J. D. C. (1981). Changes in interpersonal distances and categories of play behavior in the early weeks of preschool. *Developmental Psychology, 17*, 417–425.

Sherman, S. L., Allen, E. G., Bean, L. H., & Freeman, S. B. (2007). Epidemiology of Down syndrome. *Mental Retardation and Developmental Disabilities Research Reviews, 13*, 221–227.

Sigman, M., & Ruskin, E. (1999). Continuity and change in the social competence of children with autism, Down syndrome, and developmental delays. *Monographs of the Society for Research in Child Development, 64*.

Silverman, W. (2007). Down syndrome: Cognitive phenotype. *Mental Retardation and Developmental Disabilities Research Reviews, 13*, 228–236.

Skinner, M. L., Buysse, V., & Bailey, D. B. (2004). Effects of age and developmental status of partners on play of preschoolers with disabilities. *Journal of Early Intervention, 26*, 194–203.

Sloper, P., Turner, S., Knussen, C., & Cunningham, C. (1990). Social life of school children with Down's syndrome. *Child: Care, Health and Development, 16*, 235–251.

Smilansky, S. (1968). *The effects of sociodramatic play on disadvantaged preschool children*. New York: Wiley.

Sparrow, S. S., Balla, D. A., & Cicchetti, D. V. (1984). *Vineland Adaptive Behavior Scales*. Circle Pines, MN: American Guidance Service.

Vaughn, B. E., Colvin, T. N., Azria, M. R., Caya, L., & Krzysik, L. (2001). Dyadic analyses of friendship in a sample of preschool-age children attending Head Start: Correspondence between measures and implications for social competence. *Child Development, 72*, 862–878.

Wishart, J. G. (1996). Avoidant learning styles and cognitive development in young children. In B. Stratford & P. Gunn (Eds.), *New approaches to Down syndrome* (pp. 173–205). London: Cassell.

Wishart, J. G. (2007). Socio-cognitive understanding: A strength or weakness in Down's syndrome? *Journal of Intellectual Disability Research, 51*, 996–1005.

Wishart, J. G., Cebula, K. R., Willis, D. S., & Pitcairn, T. K. (2007). Understanding of facial expressions of emotion by children with intellectual disabilities of differing etiology. *Journal of Intellectual Disability Research, 51*, 551–563.

Yeates, K. O., Bigler, E. D., Dennis, M., Gerhardt, C. A., Rubin, K. H., Stancin, T., et al. (2007). Social outcomes in childhood brain disorder: A heuristic integration of social neuroscience and developmental psychology. *Psychological Bulletin, 133*, 535–556.

Yugar, J. M., & Shapiro, E. S. (2001). Elementary children's school friendship: A comparison of peer assessment methodologies. *School Psychology Review, 30*, 568–585.

Zimmerman, I. L., Steiner, V. G., & Pond, R. E. (2002). *Preschool Language Scale 4*. San Antonio, TX: Psychological Corporation.

Received 11/3/2009, accepted 5/21/2010.
Editor-in-charge: Leonard Abbeduto

This research was facilitated by resources provided by Grant P30 HD02274 from the National Institute of Child Health and Human Development. We wish to thank the children and families who participated to help us better understand the social development of children with Down syndrome. Correspondence regarding this article should be sent to Michael J. Guralnick, Center on Human Development and Disability, University of Washington, Seattle, WA 98195-7920. E-mail: mjgural@u.washington.edu

