

Mother–Child Play: Children With Down Syndrome and Typical Development

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Abstract

Child solitary and collaborative mother–child play with 21 children with Down syndrome and 33 mental-age-matched typically developing children were compared. In solitary play, children with Down syndrome showed less exploratory but similar symbolic play compared to typically developing children. From solitary to collaborative play, children with Down syndrome increased their exploratory play, attaining the same level as typically developing children. Pretense significantly increased from solitary to collaborative play only in typically developing children. Differences between mothers' play in the two groups mirrored those between their children. Both groups showed similar attunement and synchrony. Mothers contribute to the play development of children with Down syndrome through their own adaptation to their children's limitations and potentialities.

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Play has strong social and emotional overtones, but is demonstratively cognitive in nature as well. Through their play, children explore, manipulate, understand, and modify their environment (Bornstein, 2007). Moreover, as they grow, more mature cognitive skills emerge and motivate more sophisticated play. Since Piaget (1962), it is widely recognized that children typically move in development from sensorimotor exploration to symbolic pretense in their play. When mothers are in collaborative play, they adjust their behaviors to assist their child's progress. Collaborative play of children who are developing typically is generally more sustained and complex than is their solitary play (e.g., Bornstein et al., 1996; Fiese, 1990; Slade, 1987a, 1987b; Užgiris & Raeff, 1995; Vibbert & Bornstein, 1989; Vygotsky, 1978). Despite the fact that play is integral to child development, to date specific contributions of maternal play to the play of children with intellectual disabilities have not been adequately explored. Our main purpose in

the present study is to contribute to the literature on the development of play in children with Down syndrome, which is the most common genetic cause of intellectual disability. To do so, we compared child solitary and collaborative play with mother as well as mothers' collaborative play in dyads with Down syndrome and typically developing mental-age (MA) matched children.

The cognitive development of play follows a universal progression, as extensively documented in the literature both for typically developing children and for children with Down syndrome (Beeghly & Cicchetti, 1987; Belsky & Most, 1981; Cunningham, Glenn, Wilkinson, & Sloper, 1985; Hill & McCune-Nicolich, 1981; McCune-Nicolich, 1981; Mundy, Sigman, Ungerer, & Sherman, 1987; Sigman & Ruskin, 1999; Tamis-LeMonda & Bornstein, 1996). In summary, children first play in modes geared to explore (i.e., in ways tied directly to concrete features of objects); later, children play symbolically (i.e., in ways that incorporate representation and pretense). In

specific, children's object play initially consists of exploratory sensorimotor manipulation whose main purpose is garnering information about objects, their properties, and their functions. Steadily, more sophisticated and hierarchically integrated forms of combinatorial play emerge. Eventually, children play symbolically and begin to represent their experiences. Symbolic play includes pretense about the self and about others, sequences of pretense, and substitutions in pretense. This universal trajectory of play development is associated with the emergence of new cognitive skills in the child, a principal reason why maturity in play is often considered to reflect children's cognitive level. Indeed, child play and MA tend to be strongly associated in typically and atypically developing children alike (Beeghly & Cicchetti, 1987; Cunningham et al., 1985; Hill & McCune-Nicolich, 1981). The affective dimension of play is also fundamental: Symbolizing by children correlates with both mental and interpersonal development (Beeghly, Weiss-Perry, & Cicchetti, 1989; Noll & Harding, 2003; Venuti et al., 2008; De Falco, Esposito, Venuti, & Bornstein, 2008).

Empirical comparisons between children with Down syndrome and typically developing children have identified both similarities and differences in the developmental progression of play. Specifically, both the course and content of symbolic play appear to be similar in children with Down syndrome and those who are typically developing and are at the same cognitive level (Beeghly et al., 1989; Cielinski, Vaughn, Seifer, & Contreras, 1995; Cunningham et al., 1985). However, children with Down syndrome tend to repeat the same play schemes (Sigman & Sena, 1993; Weiss, Beeghly, & Cicchetti, 1985). They also appear to be somewhat impaired in exploratory play (Brooks-Gunn & Lewis, 1984; Krakow & Kopp, 1982; Sigman & Sena, 1993), typically spending less time in manual exploration than visual exploration (Vietze, 1983), a deficit that has been explained by their lack of object mastery (Ruskin, Mundy, Kasari, & Sigman, 1994). Other possible explanations for the deficit in exploratory play relate to other compromised areas that characterize the Down syndrome phenotype, such as sustained attention (Brown et al., 2003; Landry & Chapieski, 1989), motor development (Vicari, 2006), initiation (Schaefer & Armentrout, 2002), and instrumental thinking (Fidler, 2006).

Despite these broadly regular developmental processes, some variability characterizes play, even in children of the same MA and developmental level (e.g., Bornstein et al., 1996; Tamis-LeMonda, Uzgiris, & Bornstein, 2002), and one principal source of this variability derives from interactions children have with adult partners. Although cognitive abilities are requisite to play structure, motivation and involvement in play emerge in interactive settings (Piaget, 1962; Werner & Kaplan, 1963). For this reason, the role of parents in the development of play in typically developing children is a recurrent topic in the developmental science literature (Bornstein et al., 1996; Fiese 1990; Howes, Ungerer, & Matheson, 1992; Noll & Harding, 2003). Specifically, there is strong evidence that an adult partner's participation in child play enhances the complexity, duration, and frequency of child play (Bornstein, Venuti, & Hahn, 2002; Bornstein et al., 1996; Venuti, Rossi, Spagnoletti, Famulare, & Bornstein, 1997); children learn from and model the play they see (Uzgiris, Benson, Kruper, & Vasek, 1989); and they finish play scenarios that others begin (Dunn & Wooding, 1977). Against a backdrop of individual developmental tendencies in children's play, then, are strong dyadic effects. For example, Venuti and colleagues (1997) collected data on solitary and collaborative play (using the same observation procedure we adopted in this study) from 89 typically developing dyads when children were 20 months of age. The authors found that the amount of child symbolic play in a collaborative situation almost doubled the amount of child symbolic play when alone.

Concerning children with Down syndrome, few researchers have investigated specific differences between child solitary and collaborative play with an adult (Cielinski et al., 1995; Venuti, de Falco, Guisti, & Bornstein, 2008). In their study of mother-child play in children with and without Down syndrome, Cielinski and colleagues (1995) found that child play sophistication in both groups was higher during collaborative play with mother than during solitary play, but the authors did not distinguish the quantity of exploratory and symbolic play activities as we specifically do here. Venuti and colleagues, who considered the amounts of both exploratory and symbolic play in children with Down syndrome, found that the presence of the mother during play resulted in more child exploratory, but not symbolic, activity compared to solitary play. More

generally, Feuerstein, Rand, and Rynders (1988) showed that by engaging children with Down syndrome in a carefully graduated series of learning activities in a supportive relationship, adults enable children to master more cognitive regulatory functions than they could previously accomplish.

Starting from general evidence of positive maternal influences on child play, the particular behaviors mothers use to exert constructive influences on their children's play still need to be specified. Mothers of children who are developing typically play in ways that children observe and learn from, they induce play, and they provide supports for play (Tamis-LeMonda, Katz, & Bornstein, 2002). Specifically, mothers engage in the same or similar activity as the child by mirroring and/or modeling child play. In typical development, a concurrent association often results between the sophistication levels of the child and the mother playing together, and sequential analysis shows that mothers also adjust their play to advance their children's activities (Bornstein et al., 2002; Damast, Tamis-LeMonda, & Bornstein, 1996). In the few existing studies with children who have Down syndrome, researchers have reported that mothers of these children tend to be more directive and intrusive in play than are mothers of typically developing children (Cielinski et al., 1995, Beeghly et al., 1989).

Our overall goal in the present study was to look more closely at several features of child solitary and mother–child collaborative play in children with Down syndrome compared to a group of MA-matched typically developing children. Related to this comparison, we had the following aims and expectations. (a) We compared the structure of play in the two groups to determine whether one type of activity (exploratory vs. symbolic) predominates in child play. Considering the MA of our sample, we expected that both groups of children would engage more in exploratory than symbolic play. (b) We compared play in the two groups and expected that relative to MA-matched typically developing children, those with Down syndrome would display less exploratory play, but similar symbolic play, as reported in other studies. (c) We compared the effects of mothers' participation on child play in the two groups. Our expectation was that both groups of children would benefit from their mothers' participation in play by

increasing symbolic play from solitary to collaborative play situations. (d) We compared children with Down syndrome and typically developing children for their relative order between solitary to collaborative play situations, with the expectation of stability in both groups (i.e., children would maintain their relative order) across the two play situations. (e) We compared maternal play in the two groups during collaborative play in terms of mothers' play behaviors and in terms of the strategies they use to support their child's play. We expected that mothers of children with Down syndrome would show similar symbolic play, but possibly lesser exploratory play, than would mothers of typically developing children. Moreover, we expected that mothers of children with Down syndrome would use more controlling and restrictive strategies during collaborative play compared to mothers of typically developing children. (f) We compared children and mothers in the two groups in terms of their attunement and synchrony during play. We expected mother–child dyads in both groups would be attuned and able to synchronize to their children's play, but because mothers of children with Down syndrome are often reported to be directive, these dyads might show diminished attunement or synchrony relative to typically developing dyads.

Method

Participants

A total of 54 children and their mothers participated. The index group consisted of 21 children with Down syndrome (M MA = 19.96 months, SD = 5.52; M chronological age [CA] = 34.81 months, SD = 10.48) and their mothers (M age = 35.23 years, SD = 6.34). All children with Down syndrome had the trisomy 21 type, confirmed by chromosomal analysis. The control group consisted of 33 MA-matched typically developing children (M CA = 20.01 months, SD = .21) and their mothers (M age = 25.48 years, SD = 5.42). Children with Down syndrome were recruited from an early intervention center and typically developing children, from public daycare centers. The Bayley Scales of Infant and Toddler Development (2nd ed., Bayley, 1993) was used to determine the developmental age of children with Down syndrome. No MA data were available for the control group, but interviews with parents, examination of health records, and

observations during the study all indicated that they were developing typically. Participants were ethnically homogeneous and of European heritage. The socioeconomic status (SES) of the families, calculated with the Four-Factor Index of Social Status (Hollingshead, 1975), indicated a middle-low status in the Italian population (Down syndrome: $M = 25.48$, $SD = 14.11$; typically developing: $M = 21.58$, $SD = 5.87$), a nonsignificant result.

Procedure

We followed a standardized protocol: Data were collected during two consecutive 10-min play sessions videorecorded continuously by a female observer. The findings of previous investigators who used 10-min play sessions lend credence to the validity of the temporal parameters (see Bornstein et al., 1996), and we note that play in children and parents is also robust to context between home and laboratory (Bornstein et al., 1997). During the first session, the child played with the toy set on his or her own, while the mother filled out a questionnaire. During the second session, the mother was asked to play with her child as she typically would and to disregard the observer's presence as much as possible. A set of standard, age-appropriate toys (doll, blanket, tea set, toy telephone, toy train, two small picture books, foam ball, and set of nesting barrels) was used that represented feminine, masculine, and gender-neutral categories (Caldera, Huston, & O'Brien, 1989) and allowed for different play behaviors, ranging from exploration to pretense (see Bornstein et al., 1996; Bornstein & O'Reilly, 1993). Mothers and children could use any or all of the toys provided; none of the child's own toys were available. The same play code was applied to the child's play in solitary and collaborative sessions as well as to the mother's play. In addition, a code for supportive maternal behaviors was applied to the collaborative sessions.

Play code. As described in Table 1, the play code consisted of a mutually exclusive and exhaustive category system that included eight levels and a default (no play) category (see Bornstein & O'Reilly, 1993; Bornstein et al., 1996; Tamis-LeMonda & Bornstein, 1996); these play levels were derived from previous research on the progressive nature of play across the first years of life. Observers coded play continuously by

noting play level as well as start times and end times (accurate to 1 s). Levels 1 through 4 constituted the macrocategory for exploratory play and Levels 5 through 8, the macrocategory for symbolic play. For each level, four measures were calculated: the absolute frequency, the proportion frequency, the absolute duration, and the proportion duration. Because in previous studies these measures were consistently highly correlated (see Bornstein et al., 1996) and showed high correlations in our sample (r s range = .48 to .86), their mean standard score was used as a summary index representing the amount of each play level and each macrocategory. The summary indexes, in which we considered frequencies and duration at the same time, control the risk of misinterpretation of results due to repetitive behaviors (high frequencies and short duration) or perseverative behaviors (low frequency and long duration) known to occur in children with intellectual disability. Moreover, the summary index, with which we accounted for the proportion of exploratory/symbolic play of the total duration of the session, controls any differences in the time children with Down syndrome versus typically developing children spent engaged in play during the observed 600 s. Children with Down syndrome spent significantly more time not engaged in play than did typically developing children, both in the solitary, $t(53) = 6.62$, $p < .01$, and the collaborative play sessions, $t(53) = 5.23$, $p < .01$ (Table 2).

Maternal supportive behaviors. This exclusive and exhaustive coding scheme, described in Table 3, was applied continuously (accurate to 1 s) to maternal behavior during collaborative sessions. It includes five categories of maternal behaviors aimed at supporting child play and a default category. The coding scheme was derived from a wider coding system on mother-child turn-taking during joint play (Venuti, 2001). The absolute frequencies observed during the whole session were calculated.

Interobserver agreement. Two professional research assistants who were blind to the hypotheses and purposes of the study as well as additional information about the dyads conducted each of the two codes. Average kappas between each pair of coders were calculated on 40% of the sessions and ranged from .75 to .82 for the play code and from .74 to .81 for the maternal supportive behaviors code. In case of disagreement, the two research assistants jointly watched the video

Table 1. Play-Coding Scheme

Play level	Description	Kappa
Exploratory play		
Unitary functional activity	Production of effects that were unique to a single object (e.g., dialing a telephone)	.77
Inappropriate combinatorial activity	Inappropriate juxtaposition of two or more objects (e.g., putting the ball on the telephone)	.79
Appropriate combinatorial activity	Appropriate juxtaposition of two or more objects (e.g., putting the handset on the telephone base)	.82
Transitional play	Approximated pretense but without confirmatory evidence (e.g., putting the telephone handset to ear without vocalization)	.75
Symbolic play		
Self-directed pretense	Pretense activity directed toward self (drinking from an empty cup)	.80
Other-directed pretense	Pretense activity directed towards someone or something else (e.g., putting a doll to sleep)	.81
Sequential pretense	Linking two or more pretense actions (e.g., pouring into an empty cup from the teapot and then drinking)	.82
Substitution pretense	One or more object substitutions (e.g., pretending a cup is a telephone and talking into it)	.79
Default	Not engaged in any of the above behaviors	

record again and recoded; when necessary, disagreements were resolved with a third researcher who was trained and reliable on the same coding system.

Results

Analytic Plan

We first conducted preliminary analyses of the data and reported descriptive statistics for (a) child solitary and collaborative play and (b) mother play and supportive behaviors in the two groups. To test our hypotheses about child play, we conducted an analysis of covariance (ANCOVA) with group (Down syndrome, typically developing) as the between-subjects factor and play situation (solitary, collaborative), and type of play (exploratory, symbolic) as within-subjects factors on the summary indexes of child play; maternal age was a covariate. We used *t* tests, where appropriate, as post-hoc tests and as follow-up analyses on the eight separate play levels with Bonferroni *p*-value adjustment. To assess child stability in play from solitary to collaborative

sessions, we used correlation analyses and the Fisher's *z* (1921; see Howell, 2001, p. 278) to compare the two groups.

To assess degrees of dyadic attunement (the probability that mother and child were focused on the same play level), we used Fisher's *z* to measure correlations between mother and child play in the two groups. Also, to measure degrees of synchrony (associations between mother and child exploratory or symbolic play) in the dyads, we compared the conditional probability that both mother and child were engaged on the same macrocategory of play in the two groups through separate *t* tests, using Bonferroni *p*-value adjustment. Conditional probability is the probability of some event (e.g., a specific level of child play) given the occurrence of some other event (e.g., a specific level of mother play). It ranges between 0 and 1.

To test our hypotheses concerning maternal behaviors, we performed *t* tests, using Bonferroni *p*-value adjustment, on maternal play. Moreover, we conducted separate *t* tests, using Bonferroni *p*-value adjustment, to compare the two groups of mothers in terms of the frequencies of supportive

Table 2 Descriptive Statistics of Child and Mother Play

Play	Child solitary play				Child collaborative play				Maternal play			
	Down syndrome		Typical development		Down syndrome		Typical development		Down syndrome		Typical development	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Exploratory	30.43	41.32	104.93	80.19	54.57	49.42	82.72	58.58	52.29	40.80	80.05	49.13
Unitary functional activity	9.76	18.67	38.14	37.08	27.57	25.75	27.34	25.34	37.43	27.30	32.25	31.39
Inappropriate combinatorial activity	2.14	5.17	9.59	15.75	3.24	10.50	4.16	9.27	0.14	0.65	3.65	10.88
Appropriate combinatorial activity	3.95	11.63	42.70	75.00	16.14	33.90	35.68	50.17	14.62	29.11	42.91	44.52
Transitional play	14.57	25.93	14.50	22.56	7.62	17.11	12.14	23.39	0.10	0.44	1.24	4.37
Symbolic	29.67	32.22	29.75	35.00	43.86	56.76	59.41	44.38	50.86	57.03	30.87	35.21
Self-directed pretense	15.76	23.93	14.25	17.10	18.33	47.97	21.36	27.31	2.95	6.02	2.31	5.72
Other-directed pretense	7.52	18.00	7.84	17.05	4.52	9.15	9.25	11.80	23.81	46.37	14.35	19.36
Sequential pretense	6.19	14.56	7.66	22.13	20.52	30.79	28.57	38.13	22.38	35.45	13.56	23.63
Substitution pretense	.19	0.87	.00	.00	0.48	1.54	0.25	1.20	1.71	4.31	.65	3.70
Unengagement (default)	539.89	83.11	456.36	98.14	501.63	87.41	457.81	87.26	496.84	76.35	489.06	73.08

Note. Duration in seconds.

Table 3. Maternal Supportive Behaviors Coding Scheme

Type of behavior	Description	Kappa
Widening	Description of the features of the toys and demonstration of how they work while increasing play sophistication	.76
Control of attention	Attempt to direct child attention	.74
Control of action	Attempt to direct child action	.78
Restriction	Attempt to prevent the child from completing an action towards himself/herself or the environment	.79
Proposition	Proposing a new play action	.80
Default	Not engaged in any of the above behaviors	

behaviors they used during the whole play session, and the conditional probabilities that their supportive behaviors co-occurred during child exploratory or symbolic play.

Preliminary Analyses

Prior to data analysis, we examined all dependent variables and potential covariates for normalcy, homogeneity of variance, outliers, correlations among variables, and influential cases (Fox, 1997). Transformations were applied to resolve problems of nonnormalcy, and residuals were examined for influential points. The distance of each case to the centroid was evaluated to screen for multivariate outliers (see Bollen, 1987; Tabachnick & Fidell, 1996). A significant correlation between maternal age and the summary index of child symbolic play in the collaborative session was found, $r(54) = .55, p < .001$; therefore, where appropriate, we used maternal age as a covariate or residuals standardized for maternal age.

Descriptive Statistics

Table 2 presents descriptive statistics for child solitary and collaborative play and mother play by group. For purposes of clarity, descriptive statistics and figures report durations (in s); durations correlated highly with the summary score, $r(52) = .86, p < .001$, used in further analyses.

Child Play

A significant 3-way interaction of Group \times Situation \times Type of Play emerged, $F(1, 215) = 13.74, p < .001$. Furthermore, we found significant interactions for Group \times Situation, $F(1, 215) = 7.45, p < .005$, and Group \times Type of Play, $F(1, 215) = 24.07, p < .001$. Main effects were found for group (the amount of play was higher for

typically developing children, $F(1, 215) = 9.47, p < .005$), and type of play (the amount of exploratory play was higher than symbolic play, $F(1, 215) = 44.18, p < .001$). Neither a Situation \times Type of Play interaction nor a situation main effect was found.

In consideration of the interactions, we used separate paired-sample *t* tests to evaluate the effect of type of play for each condition and for each group, the effect of group in each situation and level of play, and the effect of situation in each group and type of play.

Type of play. In the solitary play session, we found no significant statistical differences between the amounts of exploratory and symbolic play in children with Down syndrome ($M_s = -.29$ and $-.33$, respectively), but exploratory play of typically developing children exceeded their symbolic play ($M_s = .99$ and $.52$, respectively), $t(32) = 7.06, p < .001$. In the collaborative play session, exploratory play exceeded symbolic play for both children with Down syndrome ($M_s = .19$ and $-.28$), $t(20) = 1.96, p = .05$, and typically developing children ($M_s = .29$ and $-.30$, respectively), $t(32) = 3.39, p < .01$.

Group. In the solitary play situation, children with Down syndrome showed less exploratory play than did typically developing children ($M_s = -.29$ and $.99$, respectively), $t(52) = 5.27, p < .01$, but we did not find a significant statistical difference between the two groups in symbolic play ($M_s = -.33$ and $-.52$, respectively). In the collaborative play situation, the two groups did not show significant statistical differences either in exploratory ($M_s = -.19$ and $-.29$, respectively) or symbolic play ($M_s = -.30$ and $.28$, respectively). However, follow-up analysis on the eight individual play levels showed that in solitary play, typically developing children were higher in

unitary functional activity ($M_s = .03$ and 1.09 , respectively), $t(52) = 3.98, p < .01$, inappropriate combinatorial activity ($M_s = -.37$ and $.01$, respectively), $t(52) = 2.12, p < .05$, and appropriate combinatorial activity ($M_s = -.40$ and $.82$, respectively), $t(52) = 3.12, p < .01$; in collaborative play, typically developing children were higher only in appropriate combinatorial activity ($M = .78$), $t(52) = 2.24, p < .01$.

Situation. Figure 1 shows that children with Down syndrome explored more during collaborative than solitary play ($M_s = .19$ and $-.29$, respectively), $t(20) = 2.32, p < .05$, whereas typically developing children explored more in solitary than in collaborative play ($M_s = .99$ and $.29$, respectively), $t(32) = 3.53, p < .01$. Figure 2 shows that children in both groups increased their symbolic play activity from the solitary to the collaborative situation, but this difference reached statistical significance only for typically developing children ($M_s = -.52$ and $-.30$, respectively), $t(32) = 2.59, p < .05$, and not for children with Down syndrome ($M_s = -.33$ and $-.28$, respectively). Moreover, follow-up analysis on the eight individual play levels showed that for exploratory play, children with Down syndrome specifically increased in unitary functional activity (solitary and collaborative $M_s = .03$ and $.89$, respectively), $t(20) = -3.15, p < .01$, whereas typically developing children specifically decreased their inappropriate combinatorial activity (solitary and collaborative $M_s = .01$ and $-.29$, respectively), $t(32) = 2.14, p < .05$, and increased in sequential

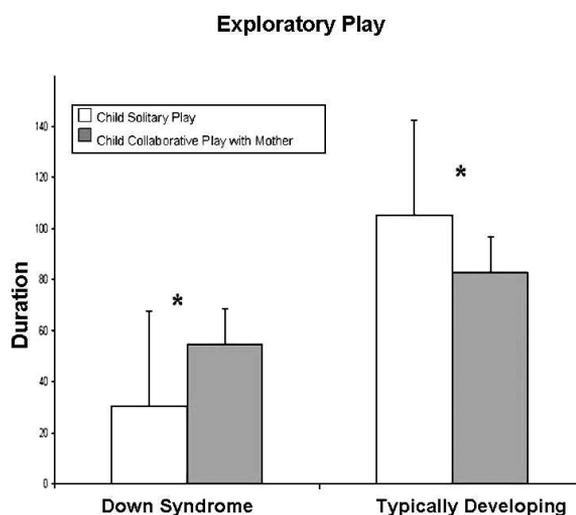


Figure 1. Child exploratory play across situations by group. Paired t test significant for $p < .05$.

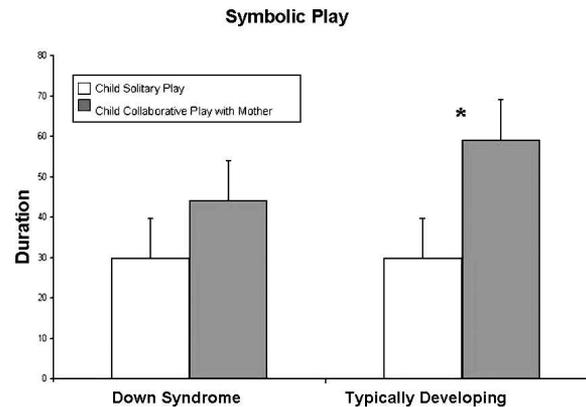


Figure 2. Child symbolic play across situations by group. Paired t test significant for $p < .05$.

pretense play (solitary and collaborative $M_s = -.37$ and $.19$, respectively), $t(32) = -3.44, p < .01$.

Child Play Stability

Children in the two groups did not show significant stability in the amount of exploratory play from solitary to collaborative play session. By contrast, strong positive correlations for Down syndrome and typically developing children emerged from the solitary to the collaborative play situations for symbolic play, Down syndrome $r(19) = .51, p < .001$, and typically developing $r(32) = .52, p < .001$.

Maternal Play and Supportive Behaviors During Collaborative Session

With regard to maternal play behaviors, independent t tests showed that mothers of typically developing children explored more than did mothers of children with Down syndrome ($M_s = -.07$ and $-.45$, respectively), $t(52) = 2.86, p < .01$. In particular, mothers of typically developing children used appropriate combinatorial activity more than did mothers of children with Down syndrome ($M_s = 1.25$ and $.11$, respectively), $t(52) = 3.45, p < .01$. By contrast, no significant statistical differences were found between the two groups in maternal symbolic play ($M_s = -.24$ and $-.44$, respectively).

Using independent t tests, we found no significant differences for maternal supportive behaviors between mothers of the two groups in the total frequencies of widening, proposing, controlling of attention, controlling of action, or restriction. Moreover, no significant differences between the two groups of mothers emerged in

the conditional probabilities of their showing supportive behaviors while their children were in exploratory or symbolic play (see Table 4).

Mother-Child Attunement and Synchrony

Correlational analysis showed strong positive associations between children and their mothers for exploratory play in the Down syndrome and typically developing groups, $r(19) = .48, p < .001$ and $r(32) = .61, p < .001$, respectively. More specifically, in the Down syndrome group, a significant positive association emerged for unitary functional activity, $r(19) = .38, p < .01$, and in the typically developing group, a significant positive correlation emerged for appropriate combinatorial activity, $r(32) = .62, p < .001$. No significant statistical associations were found between mother and child symbolic play, although in both Down syndrome and typically developing groups significant positive correlations emerged for one level of the symbolic macrocategory, namely, sequential pretense, $r(19) = .32, p < .01$, and $r(32) = .43, p < .01$, respectively. We compared correlation coefficients for child collaborative play with mother and mother collaborative play with child in typically developing versus dyads with Down syndrome using Fisher’s z . A significant difference emerged only for unitary functional activity, Fisher’s $z = 1.98, p < .05$. Specifically, there was more congruence in mother-child with Down syndrome dyads than in mother-child with typically developing dyads at the lowest level of play.

We used conditional probability to assess the degree of synchrony between mother and child play. We found that the mean conditional probability for dyads to be contemporaneously focused on exploratory play was .25 ($SD = .30$) for children with Down syndrome and .22 ($SD = .18$) for typically developing children. Similarly, the mean conditional probability that mothers and children were simultaneously playing symbolically was .20 ($SD = .29$) for children with Down syndrome and .23 ($SD = .27$) for typically developing children. T tests did not reveal significant differences between the two groups in either exploratory or symbolic play.

Discussion

Play is universally a prevalent and perhaps essential activity for the developing child.

Table 4. Descriptive Statistics of Maternal Supportive Behaviors

Behavior	Absolute frequency				Conditional probability of co-occurrence during child exploratory play				Conditional probability of co-occurrence during child symbolic play			
	Down syndrome		Typical development		Down syndrome		Typical development		Down syndrome		Typical development	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Widening	4.30	4.52	2.67	4.23	.04	.04	.02	.03	.07	.13	.04	.07
Proposition	7.33	6.64	4.71	6.41	.05	.04	.02	.07	.04	.08	.03	.10
Control of attention	2.70	5.08	3.62	5.92	.10	.17	.09	.18	.07	.16	.05	.11
Control of action	15.26	13.21	15.67	21.54	.09	.07	.14	.14	.11	.15	.09	.17
Restriction	3.37	3.72	3.05	5.05	.02	.02	.02	.05	.02	.04	.04	.12
Unengagement (default)					.71	.26	.65	.38	.66	.35	.60	.40

Through play the child explores the physical characteristics of the objects in the world and develops his or her cognitive skills (Bornstein & O'Reilly, 1993). With cognitive maturation, play activities of greater sophistication are gradually achieved in accordance with a normative developmental path that proceeds from exploration of objects to pretense with them (Belsky & Most, 1981; Tamis-LeMonda & Bornstein, 1996). Cognitive abilities are requisite for play, but the potential to reach higher levels of sophistication is also activated by partners' participation. Several researchers have demonstrated that typically developing children's play with mother is more sustained and complex than is children's solitary play (e.g., Bornstein et al., 1996; Fiese, 1990; Slade, 1987a, 1987b; Užgiris & Raeff, 1995; Vibbert & Bornstein, 1989; Vygotsky, 1978). Moreover, parents of typically developing children usually adapt their play to match their children's developmental level and interests (Damast et al., 1996; Venuti et al., 1997). Our purpose in the present study was to investigate solitary child play and mother-child collaborative play in children with Down syndrome by comparing them with MA-matched typically developing peers. Specifically, we compared the two groups of dyads in terms of (a) the structure of child play; the effects of mothers' participation on child play, (b) the structure and the amount of maternal play and maternal supportive behaviors during collaborative play, and (c) the level of attunement and synchrony between children and mothers while at play.

Considering our first aim concerning the structure of child play, we found, as expected of 20-month-old toddlers, a general prevalence of exploratory activity for both groups of children. This result is consistent with the literature about play development in typically developing children (Belsky & Most, 1981; Bornstein & O'Reilly, 1993). Both of our groups had a mean MA of approximately 20 months, which means they should have already achieved some symbolic play, which they had; but they were still very much engaged in exploration of the environment. However, different from our expectations, during the solitary play session, the prevalence of exploration was evident only among typically developing children. This result may be explained by the specific deficit in exploratory competence that has previously been reported in children with Down syndrome and discussed below (Brooks-

Gunn & Lewis, 1984; Krakow & Kopp, 1982; Sigman & Sena, 1993; Vietze, 1983).

Regarding our second aim, as expected and consistent with the assumption of a specific deficit in children with Down syndrome that goes beyond their MA (Sigman & Sena, 1993), we found that children with Down syndrome explored less compared with typically developing children. This deficit has been attributed to a lack of object mastery (Ruskin et al., 1994) in children with Down syndrome, but it might also be a function of difficulties in sustained attention (Brown et al., 2003; Landry & Chapieski, 1989), motor development (Vicari, 2006), initiation (Schaefer & Armentrout, 2002), and instrumental thinking (Fidler, 2006) that characterize the Down syndrome phenotype. The results also confirmed our expectation that children with Down syndrome would show the same amount of symbolic play as did typically developing children of the same MA. This result would be consistent with other studies in which researchers have indicated a strong association between symbolic ability in play and MA in both typically and atypically developing children (Beeghly & Cicchetti, 1987; Cunningham et al., 1985; Hill & McCune-Nicolich, 1981). Moreover, this finding is consistent with the literature reporting that representational abilities in Down syndrome seem to be relatively preserved (Venuti, 2007).

Our third hypothesis that there would be a beneficial effect of maternal participation to child play was confirmed, but, contrary to our expectations, the results revealed a different pattern of how maternal play influences children's play in the two groups. In exploratory play, children with Down syndrome increased from solitary to collaborative play, which means that these children, benefiting from their mothers' play, could engage more in what they specifically lack, namely, exploratory play. It appears that when mothers participate in child play in an interactional context, children with Down syndrome are able, to a certain extent, to overcome deficits in exploratory play and reach the same level as do typically developing children matched on MA. In contrast, typically developing children decreased in their exploratory play from when they played alone to when they played with their mothers. For symbolic play, we did not find a significant positive effect of maternal play on the play of children with Down syndrome, who remained at the same level, whereas we found an increase in

typically developing children's symbolic play between the two sessions. In short, for typically developing children, the pattern of maternal influence we found was consistent with the literature, highlighting a positive effect in promoting increases of more sophisticated levels of play while reducing more elementary activities (Bornstein et al., 1996; Fiese, 1990; Slade, 1987a, 1987b; Užgiris & Raeff, 1995; Vygotsky, 1978). This pattern was almost reversed for children with Down syndrome. One possible interpretation of these findings is that mothers of children with Down syndrome compensate for their child's specific deficits in exploratory ability by promoting mastery motivation and attention, but they do not influence representational abilities that underlie symbolic play and are linked to the child's developmental level.

Concerning the fourth aim, our expectations of child play stability across situations was confirmed, but only for symbolic play. Correlational analysis demonstrated that children in the two groups were not stable between the solitary and collaborative play situations with respect to exploratory play. For symbolic activity, although comparing mean levels, the two groups differed between situations (typically developing children increased their symbolic play, whereas children with Down syndrome did not). At an individual level children in the two groups were similarly stable (i.e., they maintained their relative order from solitary to collaborative play). Those children who were at a high level when they played by themselves were also at a high level when playing with their mothers. One possible interpretation of these findings is, again, that besides the potential influence of the mother, symbolic activity, as demonstrated by a plethora of studies, is more directly linked to child developmental level (Beeghly & Cicchetti, 1987; Cunningham et al., 1985; Hill & McCune-Nicolich, 1981) and, therefore, tends to be more stable compared to exploratory play.

Mothers of typically developing children are able to scaffold their children's symbolic play, whereas mothers of children with Down syndrome appear less successful but can help them with exploratory play. Mothers of children with Down syndrome, compared to those of typically developing children, may concentrate more on a kind of activity that requires a lower cognitive level and focus less on more sophisticated activities. This possibility, however, was not

supported by our results; mothers did not predominately display more exploratory than symbolic play. Our results, linked to the fifth aim of this study, indicate, as expected, that mothers of children with Down syndrome play less at exploration than do mothers of typically developing children, whereas the two groups of mothers do not differ in terms of symbolic play. Therefore, differences between mothers in the two groups appear to mirror patterns of differences between their children. With regard to maternal supportive behaviors, we did not find the expected results concerning the higher directiveness of mothers of children with Down syndrome compared to those of typically developing children that other researchers have reported (e.g., Beeghly & Cicchetti, 1987; Cielinski et al., 1995; Landry & Chapieski, 1989) has been found in previous studies.

In the present investigation, mothers in the two groups did not differ in the number of attempts to restrict and control their child's behavior and attention. One possible interpretation may be related to cultural issues. We know from cross-cultural studies of mother-child interaction in typical development that Italian mothers tend to display higher levels of sensitivity and sociability toward their young child (Bornstein et al., 2008; Hsu & Lavelli, 2005); this cultural proclivity could explain why we did not find maternal directiveness and intrusiveness in our sample, as has been reported in studies carried out in other countries, such as the United States (Beeghly et al., 1989, 1996; Cielinski et al., 1995, Roach et al., 1998). Also, the mothers in our two groups displayed similar numbers of attempts to initiate new play activities as well as to increase their child's play complexity.

Last, contrary to our expectation for dyadic attunement in play, we found similar patterns in the two groups. Specifically, both groups showed significant positive associations between play behaviors of mothers and children at the exploratory play level. Concerning symbolic play in general, we did not find significant associations between partners' play in the two groups. However, in both groups significant positive associations emerged in sequential pretense, which includes linking different acts together and may include symbolic behaviors towards the partner. Thus, generally, we observed good congruence in the play levels that children displayed most and in a specific symbolic activity

that may include dyadic exchanges. In addition, conditional probability analyses yielded specific information about mother-child synchrony within play exchanges. We found that in both groups the chance that mothers and children contemporaneously focused on the same type of play hovered around 40%, and no differences were found between exploratory and symbolic play.

Taken together, these results may have relevance for clinical practice. Similar to mothers of typically developing children, during a joint play session mothers of children with Down syndrome were able to attune to their child's play level and to synchronize with the child in a common play activity without being controlling or restrictive. Through this scaffolding, mothers were able to help their child concentrate more in play, facilitating an increase of a kind of play that otherwise has been found to be specifically challenging for these children (Sigman & Sena, 1993). This result is consistent with the idea that early intervention programs for children with Down syndrome, and perhaps children with other intellectual disabilities, should support the natural strengths of mothers (and fathers) in terms of parenting their special needs child. Moreover, these results suggest that mother-child play could be a powerful therapeutic context for young children with Down syndrome and should, therefore, be systematically encouraged by clinicians. Consistent with contemporary opinion on developmental psychopathology (Greenspan, 1997), our results provide some evidence that while engaged in natural and relaxing play activities, children can be helped by a supportive parent to successfully face their developmental challenges.

Alongside the several strengths in this study, some limitations should be noted. First, as is common in studies of clinical populations, the sample was relatively small and unbalanced in terms of child gender. Second, our sample came from a homogeneously middle-to-low socioeconomic status. Third, the inclusion of other variables, such as the function of maternal play (beyond level), might enrich future understanding of child-mother play in children with Down syndrome and those who are typically developing. Fourth, we did not consider developmental age of the typically developing children; although we deduced from clinical reports, interviews from the parents, and our own observations that these children were not delayed or atypical in their

general development, controlling for their actual developmental age would have augmented the validity of our findings. Fifth, the findings reported here might apply uniquely to mother-child play; we have to consider that studies of father- or caregiver-child dyads might yield different patterns of results. Finally, the inclusion of children with intellectual disabilities with mixed etiology would enable future researchers to draw conclusions more specific to the population of children with Down syndrome or to draw general conclusions about children with intellectual disabilities. The behavioral phenotype associated with Down syndrome, which has been thoroughly investigated, includes a mixed profile of strengths and weaknesses. Thus, it is inappropriate to reach conclusions regarding intellectual disability in general based on a study of play that includes only children with Down syndrome. Without a comparison group of children with intellectual disabilities of different etiology, we cannot tell whether our findings are more generally a function of intellectual disabilities or a specific result of Down syndrome.

In conclusion, we observed essential maternal contributions to child play development in children with Down syndrome that seemed to be achieved through mothers' adaptation to their child's limitations and potentialities alike. Results offer some evidence that mothers of children with Down syndrome, like those of typically developing children, adequately scaffold their child's play without being overly intrusive. For their part, children with Down syndrome during collaborative play with their mother seem to master activities that are specifically demanding when they are playing on their own. Taken together, our findings identify important strengths in mother-child play that could represent areas of potential remediation through intervention for children with Down syndrome.

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