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Relationship dimensions of the ‘Down syndrome advantage’

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Abstract

Background—Some researchers have proposed an ‘advantage’ for parents of children with Down syndrome over parents of children with other intellectual disabilities, especially in relation to experiencing less parenting stress. Others have maintained that these differences are an artefact of demographic and related differences. This study extends the investigation of possible differences in dimensions of parenting stress and also examines whether differences exist in maternal and child contingent responsiveness during mother–child interaction in these two groups.

Method—Mothers of children with Down syndrome ($n = 43$) and undifferentiated developmental disabilities ($n = 54$) completed measures of children's adaptive functioning and behaviour problems, parenting stress and maternal social support. Observers rated the contingent interactions between mothers and children using the Nursing Child Assessment Teaching Scale.

Results—Once mother's age, education and social support as well as child adaptive functioning and behaviour problems were considered, neither parent nor child related parenting stress demonstrated an advantage for parents of children with Down syndrome. However, a ‘Down syndrome advantage’ was apparent for both maternal and child contingent responsiveness after accounting for maternal demographic and contextual variables and child attributes.

Conclusions—Children with Down syndrome and their mothers have more positive interactions than children with other developmental disabilities, both in terms of the responsiveness of mothers and of child responses contingent on maternal behaviour. These findings suggest that both children with Down syndrome themselves and their mothers are contributing to a Down syndrome advantage.

Keywords

behavioural phenotypes; Down syndrome; intellectual disability; parents

Within discussions about the challenges and rewards associated with parenting a child with a developmental disability, some researchers have proposed that parenting children with Down syndrome, in comparison with parenting children with other types of developmental disabilities, is associated with certain 'advantages'. The line of reasoning behind this proposal suggests that certain genetic disorders predispose children to specific aetiology-related behaviours, which result in relative ease or difficulty in parenting a child with that disability. The proposed 'Down syndrome advantage', described by Hodapp *et al.* (2001), indicates that parents of children with Down syndrome experience less parenting stress and enjoy greater parenting rewards than parents of children with other developmental disabilities. The researchers reason that children with Down syndrome are easier to parent than children with other types of developmental disabilities largely because of their behavioural phenotype, including an easy-going temperament, fewer problem behaviours, more compliant responses to others and more cheerful, outgoing and generally positive personality traits (Wishart & Johnston 1990; Hodapp *et al.* 2001; Fidler *et al.* 2008; Adamson *et al.* 2010). From this perspective, the 'Down syndrome advantage' is related to characteristics of children themselves.

Counterarguments to the proposed 'Down syndrome advantage' have also emerged. The main argument is that sample confounds explain the advantages found in studies. From this perspective, demographic differences rather than child distinctions benefit parents of children with Down syndrome. One such difference is parental age. As many parents of children with Down syndrome are older than other parents, this confers a range of other benefits such as higher income, longer stable marriages and more parenting experience (Cahill & Glidden 1996; Stoneman 2007; Corrice & Glidden 2009). Another demographic difference is maternal education (Stoneman 2007). Mothers of children with Down syndrome tend to have higher levels of education than mothers of children with undifferentiated delays (Cahill & Glidden 1996; Hodapp 2007; Stoneman 2007). Higher levels of maternal education likely confer an advantage on parents of children with Down syndrome as greater maternal education is associated with less parenting stress and more positive parenting behaviours among parents of children with disabilities (Abbeduto *et al.* 2004; Blacher *et al.* 2013).

A second counterargument to the phenotypic basis of the 'Down syndrome advantage' resides less in discussions of parental demographic differences and more in analysing features in the ecosystem that provide support to parents. Extensive knowledge is available about Down syndrome. Parents can access that knowledge both online and through medical practices, early intervention and other service structures early in their children's lives. Also, parent support organisations often provide a vital source of information and support. According to this view, parents of children with Down syndrome utilise social support more than do parents of children with other disabilities (Seltzer *et al.* 1993; Hodapp *et al.* 2001; Stoneman 2007). Such information and support can guide the parenting experience, making it less stressful (Al-Yagon & Margalit 2012).

In general, parents of children with Down syndrome report experiencing less stress than parents of children with other types of developmental disabilities (Marcovitch *et al.* 1986; Shonkoff *et al.* 1992; Dykens & Kasari 1997; Fidler *et al.* 2000; Hodapp *et al.* 2003;

Eisenhower *et al.* 2005), although some exceptions exist (e.g. Hanson & Hanline 1990; Griffith *et al.* 2010).

One important consideration in reviewing the literature base on the 'Down syndrome advantage' involves a consideration of the comparison group. In several studies, children with autism spectrum disorder are compared with those with Down syndrome (Kasari & Sigman 1997; Olsson & Hwang 2001; Abbeduto *et al.* 2004; Eisenhower *et al.* 2005; Dabrowska & Pisula 2010; Griffith *et al.* 2010). Children with autism spectrum disorder often exhibit higher levels of behaviour problems than children with other developmental disabilities (Blacher & McIntyre 2006; Griffith *et al.* 2010), and numerous studies on children with behaviour problems indicate that such problems result in parenting challenges (Hastings 2002; Abbeduto *et al.* 2004; Estes *et al.* 2009). Therefore, it is not surprising that many studies comparing children with Down syndrome and those with autism spectrum disorder report more positive outcomes for parents of Down syndrome. Fewer studies have included children with undifferentiated delays in their comparisons, but those, too, have found parent outcomes of children with Down syndrome to be more positive (Eisenhower *et al.* 2005; Blacher & McIntyre 2006; Most *et al.* 2006).

Although the bulk of evidence regarding disability-related differences in parenting have favoured families of children with Down syndrome, most studies have focused on parent reported parenting stress (Krauss 1993; Hauser-Cram *et al.* 2001; Baker *et al.* 2002, 2003; Eisenhower *et al.* 2005). Recently, researchers have considered whether parenting behaviours also differ. The reasoning undergirding such investigations is that if parents find children with Down syndrome to have more positive, or at least fewer negative, behaviours than children with other types of developmental disabilities, parents may demonstrate more positive perceptions of and interactions with their children. In a recent study, Blacher *et al.* (2013) compared ratings of parent-child interactions among young children developing typically and those with a range of disabilities in structured and unstructured settings. They found that mothers of children with Down syndrome showed more positive interactions (warmth, affection, sensitivity and positive regard) than mothers of other children in the study, especially in unstructured activities such as play. They suggest that children with Down syndrome may elicit positive behaviours from parents because of their general compliance, relative self-regulation and interest in people (Blacher *et al.* 2013). Although provocative, their findings are based on a relatively small sample of children with Down syndrome ($n = 10$), suggesting the need for further examination of both maternal and child behaviours.

One way to consider the question of the controversial 'Down syndrome advantage' is to examine the behaviours of both mothers and children during joint interaction. From developmental perspectives, such interactions are central to children's optimal functioning. When maternal interactions are both contingent on the child's behaviour and sensitive to the child's needs, children are more likely to display positive development (Shonkoff & Phillips 2000; Sameroff 2009). The results of many prior studies suggest that mothers of children with Down syndrome, like mothers of children with other forms of intellectual disability (ID), tend to be highly directive in their interactions (Crawley & Spiker 1983; Mahoney 1988; Mahoney *et al.* 1990; Roach *et al.* 1998). Although initially directiveness was viewed

as a negative feature, more currently it is seen as potentially supportive of a child with an ID, especially when directives are not intrusive and are embedded within a series of supportive behaviours (Crawley & Spiker 1983; Marfo 1990; Roach *et al.* 1998; Adenzato *et al.* 2006; Hauser-Cram *et al.* 2012).

Rather than focusing on directives, some researchers of mother–child interactions have considered the role of maternal-contingent responsiveness and sensitivity. Contingent responsiveness occurs during an interaction when a caregiver responds promptly, appropriately and contingently to a child to match, complement or slightly expand a child's behavioural repertoire (Bornstein *et al.* 2008; Schueler & Prinz 2013). Similarly, a child can respond to a caregiver in a contingently responsive way by attempting to match the caregiver's actions, although less has been studied about children's responses. Contingent responsiveness on the part of caregivers requires a level of sensitivity to the child's signals and an ability to interpret those signals correctly and respond to them promptly. There is evidence suggesting that higher levels of maternal sensitivity in such interactions are related to greater levels of maternal education, possibly even more so than to parental income (Berlin *et al.* 2002).

In the present study, we compared two groups of 3-year-old children, one with Down syndrome and another with a range of undifferentiated developmental disabilities. We extended prior examinations of the topic of the 'Down syndrome advantage' in several ways. We studied mothers' contributions to these interactions and the stress mothers report related to the parenting role. We also considered the child's contribution to the parenting context by examining child behaviour problems as well as children's contingent interactions during an observed teaching task with their mothers. In relation to an examination of potential group differences in parenting stress, our aim was to determine if our findings replicated prior work. By considering mother–child interaction, our aim was to extend prior investigations by examining observed behaviours exhibited by mothers and children rather than focusing only on outcomes that rely on parent reports.

We hypothesised that these two groups would differ, with more positive outcomes for families of children with Down syndrome than those with other developmental disabilities after controlling for those constructs proposed in prior studies to 'explain' the Down syndrome advantage. Such constructs include the maternal variables of mother's age, education and helpfulness of parent support, and the child variables of adaptive functioning and behaviour problems. Specifically, the following hypotheses were tested: After controlling for maternal and child characteristics, (1) mothers of children with Down syndrome would report less parent and child related parenting stress than mothers of children with undifferentiated developmental disabilities; and (2) mother–child contingent interactions would be more positive for families of children with Down syndrome than those of children with undifferentiated developmental disabilities.

Method

Participants

The children and families represented in this study were enrolled in the Early Intervention Collaborative Study, a longitudinal investigation of 190 children with disabilities and their mothers (Shonkoff *et al.* 1992; Hauser-Cram *et al.* 2001). These families were recruited when they entered early intervention services in the North-east. The current investigation focused on data collected when the children were 3 years old. As some children in the original study did not have ID, only those children with cognitive performance scores that were at least two standard deviations below the mean were included in this investigation. Of these, 97 families completed all measures used in this study. These families do not differ significantly from the larger group of parents who participated at the age 3 data collection point in relation to years of education, race/ethnicity of children or parents and maternal age. Cognitive performance was measured utilising either the McCarthy Scales of Children's Abilities (McCarthy 1972) or the Mental Scale of the Bayley Scales of Infant Development (Bayley 1969) depending on the child's level of skill. As the sample was limited, the mean cognitive performance score of 48.0 (SD = 14.1) was lower than in the original study sample (M = 62.3, SD = 23.6). Adaptive scores as measured by the Vineland Adaptive Standard Score (Sparrow *et al.* 1984) also were lower than the original sample, with a mean of 59.35 (SD = 9.3) compared with the mean of 65.9 (SD = 13.5) for the larger sample, $t(96) = -7.0$, $P < 0.001$. As adaptive scores focus on skills that children engage in routinely rather than those they have the capacity to use but may only rarely employ (Widaman & McGrew 1996), these were utilised in analyses rather than measures of intelligence. Children's routine skills may be ones that are particularly salient to parents as they relate to their children.

The sample of children with developmental disabilities included 43 children with diagnoses of Down syndrome and 54 children with a range of non-specific developmental disabilities. The latter group had significant delays but no specific diagnoses by age 3 years. The sample was predominantly European-American (87%). Approximately half (50.5%) of the children were male. Mothers had completed an average of 14.0 years of education (SD = 2.4), and their age when children were born averaged 29.0 (SD = 4.9). Descriptive statistics by disability type are shown in Table 1.

Procedure

Families were contacted prior to the children's third birthday and asked for their continued participation in the study. Interview dates typically were scheduled with parents within a month. Data were collected through home visits by trained staff members who were blind to our hypotheses. During home visits, one staff member conducted interviews with mothers while another one completed multidimensional and structured child assessments. Mothers also completed self-administered questionnaires. Visits ranged from 2 to 3 h in length. If children were ill or their mothers determined that their children's behaviour was not typical during the initial home visits, second visits were conducted.

Measures

Mother–child interaction—The Nursing Child Assessment Teaching Scale (NCAT) (Barnard 1978) is an observation measure of the contingent interaction between mothers and their children. The 73-item scale includes two contingency sub-scales: one measuring mother-contingent interactions and the other measuring child-contingent interactions. This is an observational rating scale designed to analyse mother–child interactions during a teaching task which is determined to be slightly in advance of the child's current skills. The measure is designed for children from the ages of 1 to 36 months. The observer selects a task from a developmentally sequenced list of possible teaching items (e.g. putting three blocks in a box, building a three-block tower). In the current investigation, teaching tasks were selected after observers conducted a structured play episode with the child. Twenty-four items (12 in maternal and 12 in child contingency) were used to measure contingent responsiveness in this study. These sub-scales were developed as a means of measuring the contribution of both the child and the mother to promoting reciprocal interaction (Barnard *et al.* 1989). For example, an item on the maternal responsiveness scale is, 'parent pauses when child initiates behaviours during the teaching episode'. An example of an item on the child contingency scale is 'child vocalises or babbles within 5 s after parent's verbalisation'. Based on 20% of observations after training to criterion inter-rater reliability, the per cent agreement on child and mother contingency was 0.91 and 0.92 (respectively), and Cohen's kappa was 0.80 and 0.82. Cronbach's alphas were 0.75 for child-contingent interactions and 0.65 for mother-contingent interactions.

Maternal stress—The Parenting Stress Index (PSI) (Abidin 1983), a 97-item self-administered Likert scale, was completed by mothers. Responses range from strongly agree to strongly disagree, with higher scores indicating greater stress in the parent–child system. This index consists of two domains: parent and child stress. The Parent Domain score is composed of seven sub-scales that measure parent attachment, sense of competence, depressive symptomatology, health, social isolation, role restriction and relations with spouse. The Child Domain sub-scales are distractibility/hyperactivity, adaptability, reinforces parent, demandingness, mood and acceptability. Cronbach's alpha on the Parent Domain score for the PSI for this sample was 0.93 and for Child Domain was 0.90.

Maternal social support—Social support was measured using the Family Social Support scale (FSS) (Dunst *et al.* 1988), a self-report measure designed to assess the degree to which potential sources of support have been helpful to families rearing children. Higher scores indicate higher perceived support. The FSS has demonstrated satisfactory reliability and validity among parents of children with developmental disabilities (Dunst *et al.* 1994). Internal consistency across all measures of support was $\alpha = 0.65$ for this sample.

Child behaviour—At age 3, we administered the Child Behaviour Checklist for Ages 2–3 (CBCL/2–3) (Achenbach & Edelbrock 1983) which is a 100-item measure of young children's behavioural problems. Items were scored 0 to 2, depending on the degree to which each statement about children's behaviour characterised the child being assessed. The CBCL is comprised of two dimensions of problem behaviours: externalising and internalising. *T-*

scores for total behaviour problems were used in this analysis, and Cronbach's alpha was 0.93.

Child disability—We established participants' type of disability from their initial information at the time of their enrolment in the study and again at age 3 years. In the current analyses, the children were categorised into two disability groups: (a) Down syndrome and (b) developmental delay of unknown aetiology. Diagnoses of Down syndrome were confirmed through medical record reviews.

Adaptive functioning—Child adaptive skills were used as a measure of child adaptive functioning. Adaptive skills were measured by the Vineland Adaptive Behaviour Score (Sparrow *et al.* 1984), completed by mothers via interview by trained field staff during a home visit. Cronbach's alpha for the Vineland Adaptive Behaviour scale for this sample was 0.97.

Mother's years of education—The mother's years of education were used as a measure of family socioeconomic status. We selected this measure because of the strong relation between mother's education and positive measures of parenting found in prior studies (e.g. Berlin *et al.* 2002; Blacher *et al.* 2013).

Descriptive statistics

We performed descriptive statistics and one-tailed independent samples *t*-tests on all variables of interest (see Table 1). Clinical cut-offs for child behaviour problems (i.e. scores above which one recommends referrals) were not used in these analyses but are reported here for descriptive purposes. A total of 9.3% of children with Down syndrome and 16.7% of children with undifferentiated delays scored at or above the clinical cut-off of 60. The mean total score of behaviour problems on the CBCL was 49.9 (SD = 9.6).

Statistical analyses

Preliminary analyses included group comparisons using analysis of variance (*ANOVA*) to determine if outcomes varied by the child's gender. As gender was not found to be a significant factor in any of the outcome variables, it was not included in final analyses. To elucidate intercorrelations of all variables, correlations were performed separately for each group: Down syndrome and undifferentiated developmental disabilities (Table 2). We then conducted hierarchical regression analyses (Table 3) to test for differences between families of children with Down syndrome and those with other developmental disabilities in the domains of parenting stress and the measures of mother and child contingent interactions, after controlling for mother's age, education and social support, as well as child adaptive functioning and behaviour problems. Results are shown in Table 3. We selected the order of variables in the equations based on the theoretical model proposed, with maternal variables entered first and child variables entered next, followed by the main variable of interest, disability group (Pedhazur 1997).

Results

Children with Down syndrome and their mothers differed in several ways from families of children with undifferentiated developmental delays, all favouring the Down syndrome group. Preliminary analyses indicated that mothers of children with Down syndrome reported higher levels of helpful social support and were slightly older (trend level). Children with Down syndrome had fewer behaviour problems but did not differ from the children in the undifferentiated delay group in terms of adaptive functioning. In relation to the criterion variables, child-related stress was lower in parents of children with Down syndrome whereas parent-related stress did not differ between the two groups. Both children with Down syndrome and their mothers displayed higher levels of contingent interaction. Results are shown in Table 1.

For the outcomes in this investigation, parenting stress and mother–child interaction, hierarchical regression models were utilised to gain a better understanding of these differences. Mother and child related demographics and characteristics were included as predictors.

Maternal stress

Parent-related parenting stress was predicted by the helpfulness of social support ($\beta = -0.21$, $F_{1,93} = 4.58$, $P = 0.035$) and by child behaviour problems ($\beta = 0.53$, $F_{1,91} = 34.28$, $P < 0.001$), but did not relate to type of disability. Child-related parenting stress was predicted by the level of child behaviour problems ($\beta = 0.64$, $F_{1,91} = 70.78$, $P < 0.001$). No other control variable was significant. Once behaviour problems were included in the regression equation, diagnostic group was no longer a predictor of child-related stress.

Mother–child interactions

After inclusion of all control variables, diagnostic group continued to predict both mother-contingent and child-contingent mother–child interactions. Both were greater for families of children with Down syndrome than for those with undifferentiated delays (Table 3). Mother-contingent interactions were predicted by diagnostic group ($\beta = 0.21$, $F_{1,90} = 4.57$, $P = 0.035$) and by maternal age ($\beta = 0.10$, $F_{1,95} = 5.55$, $P = 0.021$), maternal education ($\beta = 0.21$, $F_{1,94} = 5.31$, $P = 0.023$), and at the trend level by social support ($\beta = 0.14$, $F_{1,93} = 3.20$, $P = 0.077$). Greater age and education and more helpful social support related to more contingent interactions by mothers with their 3-year-old children. In contrast to mother-contingent interactions, child-contingent interactions were predicted only by diagnostic group ($\beta = 0.23$, $F_{1,90} = 4.67$, $P = 0.033$) and not by adaptive functioning, child behaviour problems or any parenting variable. Children with Down syndrome participated in more contingent interactions than did children with undifferentiated developmental disabilities.

Discussion

Our goal in this investigation was to add to our understandings of the ‘Down syndrome advantage’ by including demographic and contextual variables that have been suggested as important in previous studies and to add to the literature on this elusive concept by examining actual maternal and child behaviours within mother–child interactions. We

hypothesised that parents of children with Down syndrome would demonstrate less parenting stress and more positive mother–child interactions than parents of children with other developmental disabilities after all controls were included.

Our results uphold the notion that an ‘advantage’ does exist for parents of children with Down syndrome over that of parents of children with undifferentiated developmental disabilities. Contrary to many studies, we did not observe differences in the parent-related parenting stress reported by mothers related to their parenting roles. Hodapp *et al.* (2003) similarly found that mothers of children with and without Down syndrome experienced similar levels of parenting stress. Our results also parallel those of Corrice & Glidden (2009), who found that differences in parent well-being disappeared after controlling for maternal age and child adaptive skills. Although lower levels of behaviour problems in children with Down syndrome did not appear in our investigation to ‘explain’ the differences that mothers reported in their levels of parent-related parenting stress, as proposed by others (Hodapp *et al.* 2001), it is important to note that mothers of children with greater behaviour problems did report higher levels of stress and mothers with more social support reported less parenting stress overall in our sample. As has been noted in other investigations (Baker *et al.* 2003), these relations between parenting stress and child behaviour are likely to be transactional, yet the potential role of social support in reducing escalating transactions deserves further investigation. We did find a difference between disability types in the levels of child-related parenting stress reported by mothers, favouring mothers of children with Down syndrome, but this difference did not remain when controls were included. This may be due to the conceptual overlap of the measure of child behaviour problems and the child domain sub-scale of the Parenting Stress Index as the correlations between these measures for both groups were relatively high ($r > 0.60$) and items on the two measures appear to be tapping similar constructs related to children's self-regulation.

New to the discussion of the ‘Down syndrome advantage’ has been the investigation of interactions between mothers and children. We found both greater mother-contingent and child-contingent interactions in our Down syndrome group, even after consideration of all controls. Mothers who were older, had more education and reported greater social support were more responsive and communicative with their children. These interactions were not, however, related to any child variable except type of disability. For child-contingent interactions, the only significant predictor of more positive interactions was the diagnosis of Down syndrome. Children with Down syndrome were rated as contributing more contingent responsiveness in parent–child interactions than were children with undifferentiated developmental disabilities. These findings complement those of Blacher *et al.* (2013), who observed more positive parenting behaviours and affect in parents of children age 3 with Down syndrome over other diagnostic groups. The work of Fidler (2003) may also shed light on these interactions. Fidler found that during the middle childhood years, parents of children with Down syndrome varied the pitch and register with which they spoke to their children more than did parents of children with other developmental disabilities. She proposed that these changes might indicate a more positive state of mind in these parents, leading ultimately to reduced levels of stress. Although we did not find reduced stress in our sample, perhaps accumulative effects of parental resources over time change the nature of

this relation. The possibility that the Down syndrome advantage may vary by the age of the child is suggested by Glidden *et al.* (in press), who found variations of advantage at different measurement times. Their work also provides a context for further thought, as they postulate that the advantage may exist primarily with respect to child-related variables rather than those focusing on parental well-being. It is likely that this extends to child-related interactions during the early childhood years. Our findings add the important consideration of the behaviours of children themselves in these interactions, a factor that could be useful in understanding changes in mother well-being as well as understanding the role of children in their own development. The interactions of mothers and their children have long been believed to be important in children's development (e.g. Shonkoff & Phillips 2000; Bornstein *et al.* 2008) and have been studied uniquely in children with developmental disabilities (Slonims & McConachie 2006; Baker *et al.* 2010). The intersubjectivity of parent and child is critical to development of cognition and language in young children (Newson & Newson 1975; Warren & Brady 2007) and plays a key role in the development of the self and in social interactions (Trevvarthen & Aitken 2001). The role of these interactions in parental functioning, particularly as it relates to the contingent responsiveness of both mothers and children, is less well understood. However, development is known to involve a complex interaction of person and environment, and this development is both interactive and bi-directional (Bronfenbrenner 1994). We thus expect that both children and their mothers will be positively influenced by responsive interactions intimately tied to the feelings and behaviours of the other.

Study limitations and future research

Our investigation has several limitations worth noting. First, the sample was restrictive in terms of ethnicity and average maternal education and lacks the diversity among families seen in many early intervention programmes. Second, the sample did not include the full range of developmental difficulties, particularly of children with autism spectrum disorder, although it is fairly representative of children with developmental delays of unknown aetiology and of children with Down syndrome who have entered early intervention services before the age of 24 months (Scarborough *et al.* 2004). Third, the sample size was modest and restricted power to test for potential moderation effects. Finally, this analysis addresses only one time point, that of the early childhood years, yet the nature of parent-child interactions change over time (Bornstein 2006).

Despite these limitations, we believe that important implications may be derived from our findings. First, we were able to add to the literature with respect to the parenting stress reported by parents of children developmental disabilities, with the important inclusion of a number of factors thought to be vital to parent well-being. It is clear that service providers should continue to focus on children's behaviour problems in all children with developmental disabilities to improve family functioning. Next, we were able to bring an important addition to the literature on the 'Down syndrome advantage', that of observed interactions not only of mothers with their children, but also the reciprocal interactions of the children themselves. More positive interactions between mothers and their children are likely to have long-term effects and may advantage both children with Down syndrome and their mothers as they develop through other life phases. We hope this investigation will

stimulate future research into investigating the differences in functioning in families of children with different developmental delays with an eye to improving the lives of children and families.

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Table 1

Descriptive statistics

	Down syndrome <i>N</i> = 43		Other developmental disabilities <i>N</i> = 54		Difference
	Mean	SD	Mean	SD	
Outcome variables					
Mother-child interactions – mother contingent	10.2	1.7	8.8	2.6	3.31**
Mother-child interactions – child contingent	9.3	1.6	8.3	2.4	2.47*
Parenting stress – parent related	118.0	24.9	122.3	27.0	-0.81
Parenting stress – child related	102.2	22.0	113.5	21.2	-2.56*
Predictor variables					
Maternal social support	30.9	8.8	27.4	8.8	1.94*
Child behaviour problems	47.9	9.4	51.6	9.5	-1.94*
Adaptive functioning	60.7	5.4	58.3	11.4	1.33
Mother's years of education	14.3	2.1	13.7	2.6	1.25
Mother's age at child birth	30.0	4.8	28.2	4.4	1.92 [†]

[†] $P < 0.10$;* $P < 0.05$;** $P < 0.01$.

Table 2
Intercorrelations among predictor and outcome variables: Down syndrome ($N = 43$) above the diagonal and undifferentiated developmental disabilities ($N = 54$) below the diagonal

Predictor	1	2	3	4	5	6	7	8	9
1. Parenting stress: parent related	–	0.70***	0.23	0.15	0.06	0.05	–0.12	0.02	0.52***
2. Parenting stress: child related	0.64***	–	0.06	0.24	–0.06	–0.15	0.00	–0.06	0.66***
3. Mother–child contingent interactions: mother	–0.07	–0.17	–	0.18	0.35*	0.15	0.11	0.13	–0.11
4. Mother–child contingent interactions: child	–0.11	–0.32**	0.44***	–	–0.08	0.04	0.12	–0.15	0.25
5. Mother's age	–0.06	–0.10	0.11	–0.02	–	0.12	0.01	0.01	–0.23
6. Mother's years of education	–0.19	0.01	0.32**	0.09	0.47***	–	–0.08	0.13	–0.37**
7. Maternal social support	–0.29*	0.00	0.23*	–0.15	0.26*	0.26*	–	–0.17	–0.00
8. Adaptive functioning	0.01	–0.14	0.05	0.12	–0.12	–0.18	0.02	–	–0.16
9. Child behaviour problems	0.52***	0.62***	–0.09	–0.20	0.12	–0.05	–0.03	0.12	–

* $P < 0.05$;

** $P < 0.01$;

*** $P < 0.001$.

Table 3
Differences in relationship dimensions between families of children with Down syndrome and families of children with other developmental delay, controlling for maternal age, maternal education, social support, adaptive behaviour and child behaviour problems

Model	β entry	β final	R^2	R^2	F	P
Parenting stress: parent related						
Mother's age	-0.03	0.04	0.00	0.00	0.07	0.795
Mother's years of education	-0.11	0.00	0.01	0.01	1.10	0.298
Maternal social support	-0.22	-0.21	0.06	0.05	4.58*	0.035
Adaptive functioning	-0.01	-0.01	0.06	0.00	0.00	0.957
Child behaviour problems	0.52	0.53	0.32	0.26	34.28***	<0.001
Down syndrome (1), Other developmental disabilities (0)	0.06	0.06	0.32	0.00	0.36	0.548
Parenting stress: child related						
Mother's age	-0.02	0.02	0.00	0.00	0.06	0.812
Mother's years of education	-0.09	0.03	0.01	0.01	0.62	0.434
Maternal social support	-0.04	0.00	0.01	0.00	0.12	0.732
Adaptive functioning	-0.15	-0.13	0.03	0.02	2.06	0.155
Child behaviour problems	0.66	0.64	0.45	0.42	70.78***	<0.001
Down syndrome (1), Other developmental disabilities (0)	-0.12	-0.12	0.47	0.01	2.23	0.139
Mother-child contingent interactions: mother						
Mother's age	0.24	0.10	0.06	0.06	5.55*	0.021
Mother's years of education	0.24	0.21	0.11	0.05	5.31*	0.023
Maternal social support	0.18	0.14	0.14	0.03	3.20 [†]	0.077
Adaptive functioning	0.13	0.10	0.15	0.02	1.80	0.184
Child behaviour problems	-0.09	-0.06	0.16	0.01	0.88	0.350
Down syndrome (1), Other developmental disabilities (0)	0.21	0.21	0.20	0.04	4.57*	0.035
Mother-child contingent interactions: child						
Mother's age	0.01	-0.06	0.00	0.00	0.00	0.952
Mother's years of education	0.11	0.10	0.01	0.01	1.04	0.311
Maternal social support	-0.02	-0.06	0.01	0.00	0.02	0.882
Adaptive functioning	0.10	0.07	0.02	0.01	0.96	0.330

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Model	β entry	β final	R^2	R^2	F	P
Child behaviour problems	-0.07	-0.03	0.03	0.00	0.39	0.536
Down syndrome (1), Other developmental disabilities (0)	0.23	0.23	0.07	0.05	4.67*	0.033

[†] $P < 0.10$;
* $P < 0.05$;
*** $P < 0.001$.