

# Longitudinal Relationships Between Sibling Behavioral Adjustment and Behavior Problems of Children with Developmental Disabilities

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**Abstract** Siblings of children with developmental disabilities were assessed twice, 2 years apart ( $N = 75$  at Time 1,  $N = 56$  at Time 2). Behavioral adjustment of the siblings and their brother or sister with developmental disability was assessed. Comparisons of adjustment for siblings of children with autism, Down syndrome, and mixed etiology mental retardation failed to identify group differences. Regression analysis showed that the behavior problems of the child with developmental disability at Time 1, but not the change in their behavior over time, predicted sibling adjustment over 2 years. There was no evidence that this putative temporal relationship operated bidirectionally: sibling adjustment did not appear to be related to the behavior problems of the children with developmental disabilities over time.

**Keywords** Siblings · Behavioral adjustment · Longitudinal design · Autism · Down syndrome

## Introduction

Research studies focused on families of children with developmental disabilities have often been designed to consider evidence that parents and siblings might be at increased risk for psychological problems as a result of the presence of a child with disabilities. Thus, many group-design studies have shown that parents of children with mental retardation, autism, and other

disorders report more stress and mental health problems than parents of typically developing children (e.g., Baker, Blacher, Crnic, & Edelbrock, 2002; Beckman, 1991; Dumas, Wolf, Fisman, & Culligan, 1991; Dyson, 1991; Emerson, 2003a; Friedrich & Friedrich, 1981). However, a significant problem exists when we come to ask whether such research studies constitute causal evidence for the negative impact of children with developmental disabilities on their parents. Within the context of group design research, the gold standard method for establishing causality is the true experimental design—where participants are allocated randomly to experimental conditions. It is often not appreciated that group comparisons in developmental disabilities family research do not meet this standard. Specifically, family members cannot be allocated randomly to the developmental disabilities group in the design. Therefore, there will be a number of variables associated with group membership that may explain the apparent causal effect of the child with disability on family members' well-being (cf. Stoneman, 2005). For example, children with developmental disabilities also appear to have more behavior problems and mental health difficulties than typically developing children (Dekker & Koot, 2003; Dykens, 2000; Emerson, 2003b; Strømme & Diseth, 2000). Thus, it could be these problems and not disability per se that affects family members' well-being.

True experimental designs are not the only method of generating evidence for the causal status of one variable on another in psychological research. Longitudinal designs can be used to establish temporal precedence—that is, to show that changes in a putative causal variable precede in time changes in a second variable (Haynes, 1992; Kazdin, Kraemer, Kessler,

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Kupfer, & Offord, 1997). Researchers studying the relationship between child behavior problems and parental psychological well-being have adopted such designs in the developmental disabilities field. Almost without exception, the results of these studies are consistent with a bidirectional temporal relationship such that parental stress is related to increases in child behavior problems over time and vice versa (Baker et al., 2003; Hastings, Daley, Burns, & Beck, 2006; Nihira, Mink, & Meyers, 1985; Orsmond, Seltzer, Krauss, & Hong, 2003). Thus, one characteristic of children with developmental disabilities does appear to be temporally related to family members' well-being. There is also recent evidence to show that these bidirectional relationships are present for parents of children with autism (Lecavalier, Leone, & Wiltz, 2006) just as they are in mixed samples of children with developmental disabilities.

The preceding conclusion of bidirectional temporal relationships can be drawn with respect to parental psychological well-being. However, the same problems with evidence supporting causality emerge in the literature on sibling adjustment. Although group differences are typically not found as reliably for siblings as for parents, there is some evidence that typically developing siblings of children with developmental disabilities have more psychological problems than comparison groups, including more behavior problems, poor self-esteem, and symptoms of depression (Boyce & Barnett, 1993; Hannah & Midlarsky, 1999; Nixon & Cummings, 1999; Summers, White, & Summers, 1994). In particular, siblings of children with autism may have additional problems when compared with normative samples, control groups, or other groups of siblings of children with disabilities (Bägenholm & Gillberg, 1991; Fisman et al., 1996; Gold, 1993; Hastings, 2003a; Howlin, 1988; Rodrigue, Geffken, & Morgan, 1993; Roeyers & Mycke, 1995).

Adding to the case that siblings of children with developmental disabilities may be at risk for various psychological adjustment problems is evidence from meta-analysis. Rossiter and Sharpe (2001) showed evidence of a small negative meta-analytic effect of a child with mental retardation on his or her siblings. Despite the advantages of meta-analysis in reviewing an evidence base, the lack of true experimental designs makes the conclusions meaningless as far as establishing causality is concerned. Longitudinal research designs may help to provide some answers. However, studies utilizing repeated measurements of siblings of children or adults with developmental disabilities over time are rare (Carr, 1988; Dyson, 1999; Fisman, Wolf, Ellison, & Freeman, 2000; Orsmond & Seltzer, 2000).

Furthermore, unlike in studies of parent well-being, researchers have not carried out analyses of the relationships between characteristics of the child with developmental disabilities and their siblings over time. There is evidence from cross-sectional analyses that behavior problems of the child with developmental disabilities are associated with sibling adjustment (e.g., Gath & Gumley, 1986; Hastings, 2003b). Thus, a longitudinal study is clearly warranted.

In the present research, a 2-year longitudinal study was conducted that focused on behavioral adjustment in children with developmental disabilities and their sibling closest in age. We expected to find associations between behavior problems in the child with developmental disabilities and sibling behavioral adjustment. In the absence of previous research findings, it was not clear whether we would expect a bidirectional temporal relationship to be established (as for parents). Also following previous research findings, an initial research question was whether siblings of children with autism were apparently at greater risk for behavioral adjustment problems than siblings of children with Down syndrome or with mixed etiologies of developmental disabilities.

## Method

### Participants

Participants were 75 siblings of children with mental retardation and other diagnoses. At the time of the first data collection point, the children with developmental disabilities were 50 boys and 25 girls with a mean age of 9.75 years ( $SD = 4.04$  years, range = 3–19 years). Based on parent report only, 24 of these children had a diagnosis of Autism and 26 had a diagnosis of Down syndrome. The remaining children either had no diagnosis in addition to their mental retardation or a diagnosis relevant to no other child in the sample. Based on the Vineland Adaptive Behavior Scale (VABS: Sparrow, Balla, & Cicchetti, 1984) completed with their mother, 31% of the children had severe to profound developmental delay and the remainder had mild or moderate developmental delay. Of the 75 siblings, 37 were boys and 38 girls, 30 were younger than the child with developmental disabilities, 43 were older, and two were twins. Forty of the siblings were the same sex as their brother or sister with developmental disabilities, and the siblings' mean age was 10.33 years ( $SD = 4.32$  years, range 3–18 years). The siblings had no reported developmental disabilities.

This sample was followed up 2 years after the first data collection. On this occasion, data were gathered from 56 families. The remaining children with developmental disabilities there were 35 boys and 21 girls, 20 children with autism and 20 with Down syndrome, with a mean age at Time 2 of 11.72 years ( $SD = 3.92$  years, range 6–20 years). The remaining siblings were 12.21 years of age on average ( $SD = 4.09$  years, range 5–18 years). There were 28 boys and 28 girls, 31 same sex pairs and 25 different sex pairs, 24 siblings younger than the child with developmental disabilities, 30 older, and two sets of twins.

Given a potential bias may have emerged due to sample attrition over time, the children for whom there were data at both time points were compared with those whose mothers only participated at Time 1. These comparisons were made using all study variables as measured at Time 1. No significant differences between the groups were found, suggesting that the sample for whom there was longitudinal data was reasonably representative of the initial study sample.

## Measures

Four measures were included in the present research with data collected using maternal reports about both children. A brief demographic questionnaire was used to record basic background information about the children with developmental disabilities and their sibling closest in age. In addition, UK government neighborhood deprivation scores were obtained for each family using a zip code search. This was because we had not collected data on socio-economic circumstances of the families, and so these neighborhood deprivation data provided an opportunity to examine potential effects that would not otherwise have been available. The neighborhood deprivation data are derived from a measure called the Index of Multiple Deprivation (Noble et al., 2004). This index combines national data on 37 separate indicators in seven domains: income; employment; health and disability; education, skills, and training; barriers to housing and services; living environment; and crime. Data are available for the whole of England using neighborhood areas that contain an average population of 1,500 people and are based on the 2001 national census.

The Vineland Adaptive Behavior Scale (VABS)—Survey Form (Sparrow et al., 1984) was used as a measure of adaptive behavior for the child with developmental disabilities. This semi-structured interview measure, conducted with the child's mother in this research, contains a range of 297 items that provide an assessment of adaptive behavior across four

domains: Socialization, Communication, Daily Living Skills, and Motor Skills. These adaptive skills items are arranged in developmental sequence and not all 297 questions are asked in an interview. Rather, the standard administration procedure is that the interviewer estimates an adaptive level and asks in detail about skill items in this range to arrive at an accurate estimate of a child's abilities. An overall composite score can be derived with reference to age during typical development during which children can perform the task items. This VABS composite score was used in the present analysis as an overall index of the child's adaptive skills.

Mothers completed the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) as a measure of problem behavior of the child with developmental disabilities and also their sibling. This is a brief 25 item behavioral screening questionnaire that can be completed in about 5 min by parents. The SDQ has four problem behavior sub-scales assessing Conduct disorder (e.g., “often has temper tantrums”), Emotional symptoms (e.g., “many worries, often seems worried”, “often unhappy, downhearted or tearful”, “nervous or clingy in new situations”), Hyperactivity (e.g., “easily distracted”), and Peer relationships (e.g., “has at least one good friend”). These problem scores are summed to obtain a total behavior problems score. For all scales, high scores indicate more problems. The SDQ is a well-validated instrument and has been proven to be as effective as both the Child Behavior Checklist (Achenbach, 1991) and the Rutter Scales (Elander & Rutter, 1996) in identifying clinically significant levels of behavioral disturbance in children (Goodman, 1997; Goodman & Scott, 1999). Research with children with developmental disabilities suggests that good levels of reliability are maintained in this population (Beck, Daley, Hastings, & Stevenson, 2004; Emerson, 2003a).

## Procedure

After receiving ethics approval from the University ethics committee, mothers were recruited for the research using an advertisement distributed through local special schools and parent groups. At Time 1, 94 mothers responded and were sent questionnaires through the mail, and after one written reminder 75 mothers returned the measures and completed the VABS (80%). The questionnaire contained the demographic questions, and copies of the SDQ for the child with developmental disabilities and the sibling. After returning the questionnaires, the mothers were telephoned and interviewed to complete the VABS. At Time 2, 2 years after the initial data collection, we

wrote to mothers to ask if they would be willing to participate in a follow-up study. After one reminder, 56 mothers (75% of the original sample), responded positively. The same data collection procedure was used as at Time 1.

## Results

Before the main statistical analysis was conducted, all of the continuous variables (demographic variables, behavior problems for both children and adaptive skills for the child with developmental disabilities) were examined for normality using Kolmogorov–Smirnov tests. All of these tests were non-significant, indicating that all variables were reasonably normally distributed and suitable for parametric analysis.

### Sibling Behavioral Adjustment and Disability Etiology

Using data at Time 1, the putative effects on siblings of having a brother or sister with autism as compared to other developmental disabilities were explored using one way between subjects Analysis of Variance of sibling SDQ scores. Sibling behavioral adjustment across all three disability groups was also compared with normative data for the SDQ generated for 10,298 children as a part of a large scale study of mental health in British children (Meltzer, Gatward, Goodman, & Ford, 2000). One-sample *t*-tests were used to compare mean scores from the present groups with those from the normative sample. The mean scores on the four problem domains of the SDQ, and the total behavior problems score for siblings in the three disability groups and the normative sample are shown in Table 1.

The analyses of variance failed to show any significant group effects for the SDQ scales (SDQ Total Problems  $F(2,74) = .51$ , ns; Conduct Problems  $F = 1.12$ ; Emotional Symptoms  $F = .17$ ; Hyperactivity  $F = 1.14$ ; Peer Problems  $F = .30$ ). The one sample *t*-tests showed that the present sample of siblings of

children with Down syndrome were rated as better adjusted than a normative sample. Specifically, siblings of children with Down syndrome had fewer conduct problems ( $t(23) = 3.15$ ,  $P = .005$ ), hyperactivity behaviors ( $t(23) = 5.47$ ,  $P < .001$ ), and total behavior problems ( $t(23) = 3.62$ ,  $P = .001$ ). Furthermore, siblings of children with autism ( $t(26) = 2.92$ ,  $P = .007$ ) and mixed etiology mental retardation ( $t(24) = 2.57$ ,  $P = .017$ ) were also rated as having fewer hyperactivity problems than children from the normative sample.

### Predicting Sibling Adjustment

To examine the predictors of sibling behavior problems, the univariate associations between sibling total SDQ scores and all demographic variables (see Participants for all variables included in the analysis) were explored using correlations (for continuous variables) and *t*-tests (for dichotomous variables). Similar analyses were carried out for the total SDQ scores of the children with developmental disabilities. Siblings who had a brother with developmental disabilities were rated as having more behavior problems than those with a sister with developmental disabilities ( $t(69) = 3.28$ ,  $P = .002$ ). For the children with developmental disabilities, a diagnosis of Down syndrome was associated with fewer behavior problems ( $t(73) = 2.71$ ,  $P = .008$ ), and Autism with more behavior problems ( $t(73) = 3.52$ ,  $P = .001$ ). Finally, sibling behavior problems and the behavior problems of the child with developmental disabilities were correlated significantly ( $r(75) = .24$ ,  $P = .043$ ). There were no other significant associations between the demographic variables described under Participants and Measures and the behavior problems of the siblings or the children with developmental disabilities.

The main analyses focused on the longitudinal prediction of behavior problems for both children in the family. The focus of the regression analyses is on establishing temporal precedence (i.e., that changes in one variable precede in time changes in another). Following the analysis strategy of recent studies of parental well-being (Baker et al., 2003; Hastings et al.,

**Table 1** Time 1 mean and SD for SDQ scores of siblings in three disability groups and a normative sample

SDQ scale	Autism	Down syndrome	Mixed etiology	Normative
Emotional	1.77 (2.07)	1.79 (1.72)	1.56 (1.85)	1.90 (2.00)
Conduct	1.54 (1.70)	.96* (.99)	1.32 (1.31)	1.60 (1.70)
Hyperactivity	2.19* (2.28)	1.58* (1.72)	2.44* (2.06)	3.50 (2.60)
Peer problems	1.38 (1.79)	1.17 (1.37)	1.52 (1.61)	1.50 (1.70)
Total behavior	6.88 (6.73)	5.50* (3.92)	6.84 (5.22)	8.40 (5.80)

\* = mean different from normative sample at  $P < .05$

2006; Lecavalier et al., 2006), we entered Time 2 sibling behavior problems and Time 2 behavior problems of the child with developmental disabilities as criterion variables in regression analyses. As predictor variables, we included the Time 1 score for the criterion variable, and the initial level and change over time separately for the other child’s behavior problems. We also included demographic variables significantly associated with Time 1 behavior problems for each child as described above (i.e., gender of child with disability for sibling behavior problems; Down syndrome and autism diagnoses—both dummy coded—for behavior problems of the child with disability). Change scores for problem behavior were derived by subtracting Time 1 total SDQ scores from Time 2 scores (thus, positive scores on these new variables indicated increasing problems over time). The results of these two regression analyses are displayed in Tables 2 and 3.

After controlling for salient demographic factors and Time 1 scores for sibling behavior problems, the level of behavior problems of the child with developmental disabilities 2 years previously was a significant positive predictor of sibling behavior problems at Time 2. Thus, there was evidence that a higher level of behavior problems for the child with developmental disabilities was a risk factor for sibling behavior problems over time. After controlling for salient demographic factors and Time 1 scores for the behavior problems of the child with developmental disabilities, neither the level of sibling behavior problems 2 years previously nor the change of sibling behavior problems over time were predictors of the behavior problems of the child with developmental disabilities at Time 2. These results are consistent with a unidirectional

temporal model in that the behavior problems of children with developmental disabilities may negatively affect sibling adjustment but not vice versa.

### Discussion

Based on maternal reports, there were no significant differences in the behavioral adjustment of siblings of children with disabilities across three different etiology groups: autism, Down syndrome, and mixed etiology mental retardation. Furthermore, compared with data from a national UK normative sample, siblings of children with Down syndrome were reported as better adjusted than children generally. Siblings of children with autism and mixed etiology mental retardation were also reported as having fewer hyperactive behaviors than expected from normative data. Given the number of tests conducted for these comparisons with normative data, these results should be interpreted with caution. However, it is reasonable to conclude that the findings from these analyses lend no support to a hypothesis that siblings of children with developmental disabilities are at increased risk for behavioral adjustment problems (cf. Pilowsky, Yirmiya, Doppelt, Gross-Tsur & Shalev, 2004). In contrast, longitudinal data analyses showed that behavioral adjustment problems in siblings were temporally related to the extent of behavior problems in their brothers or sisters with developmental disabilities. There was no evidence of a bidirectional temporal relationship here. Thus, children with developmental disabilities did not in turn seem to be affected by the behavioral adjustment of their siblings.

The group-based analyses of sibling behavioral adjustment are not particularly informative in the present research. There was no replication of earlier research findings suggesting that siblings of children with autism are at increased risk for adjustment problems. In fact, mothers reported that the siblings of children with developmental disabilities were relatively well-adjusted when compared with a representative national population normative sample. Following the earlier discussion about the lack of ability to draw causal conclusions from group comparison studies in developmental disabilities family research, a wide variety of explanations for a lack of group differences could be discussed. For example, one could speculate that mothers want to avoid suggesting that their children without disabilities suffer in any way as a result of having a brother or sister with developmental disabilities. Thus, they may fail to report problems with behavioral adjustment. One could also argue that these

**Table 2** Longitudinal analysis of sibling behavior problems

Predictor	Beta	<i>P</i>
Gender of DD child	-.028	.772
Sibling behavior problems Time 1	.638	.000
DD child behavior problems Time 1	.249	.014
DD child behavior problems change	-.018	.986

$R^2 = .60, F(4, 51) = 19.13, P < .001$

**Table 3** Longitudinal analysis of behavior problems of the children with developmental disabilities

Predictor	Beta	<i>P</i>
Diagnosis of autism	-.132	.232
Down syndrome	.065	.570
DD Child behavior problems Time 1	.686	.000
Sibling behavior problems Time 1	-.047	.610
Sibling behavior problems change	.006	.955

$R^2 = .60, F(5, 50) = 14.77, P < .001$

mothers' tolerance for behavior problems is much higher because of their experience of the behavior of their child with developmental disabilities. Thus, the siblings may have more problems than children in families without children with developmental disabilities but these are under-reported because they are perceived as unproblematic relative to more extreme behavior.

Although these and other general biases could well be at work within the present study, there may be an argument for exploring mothers' reports in more detail in future research. Specifically, there was some consistency in the way that siblings were rated as having fewer adjustment problems than a normative sample. First, siblings of children with Down syndrome were rated more positively than the UK national sample. Although mothers could be responding on the basis of a potential positive bias about the impact of positive personality characteristics of children with Down syndrome on their siblings, there could be an effect worth of future study. The second consistent pattern was that all three sibling groups were rated as having fewer hyperactive behaviors. There could be a specific bias here related to expectations especially of activity levels. Because children with developmental disabilities are rated as having more ADHD/hyperactivity symptoms (Hastings, Beck, Daley, & Hill, 2005), the activity of their siblings may seem much lower resulting in a perception that these behaviors are less problematic in siblings. Essentially, these results require further attention and replication.

Potentially more informative in the present study are the analyses that consider within-group variability. In previous research, factors that increase or decrease sibling problems have been explored (e.g., sibling sex, match between the sex of the two children, whether the sibling is younger or older than the child with a disability, the age of the sibling, and whether the child with disability resides in the home or is placed outside of the family). These static risk variables typically explain little variance in sibling adjustment (Eisenberg, Baker, & Blacher, 1998; Gold, 1993; Hannah & Midlarsky, 1999; Mates, 1990; McHale, Sloan, & Simeonsson, 1986; Roeyers & Mycke, 1995). Within the present study, these static variables also failed to explain variance in sibling behavioral adjustment.

Most informative in the present research is the analysis of sibling adjustment over time and the potential to explore temporal aspects of causality. There was evidence that children with developmental disabilities with more behavior problems themselves may place their siblings at risk of increased behavior problems. This is a very important finding that requires

replication in further studies. There is also a range of other questions that should be asked about the limits of such a relationship between children's well-being. First, there is a broader family system to consider. In two recent family studies, it has been shown that mothers' adjustment is affected by the behavior problems of their child with autism and their partner's mental health, whereas fathers' adjustment is related only to their partner's mental health (Hastings, 2003c; Hastings, Kovshoff et al., 2005). These studies did not include a longitudinal design and so temporal relationships are not clear. Future studies should address these inter-relationships over time and include non-affected siblings in the analysis. Second, the impact of siblings on each other may or may not be specific to families of children with developmental disabilities. It may be that siblings affect each other in many families, or that such relationships emerge only in extreme circumstances such as where one child has severe problems or disabilities. Third, to consider the range of sibling adjustment it may be worthwhile exploring their perceptions of the positive contributions their brothers or sisters with developmental disabilities make to their lives. Parents report a number of potential positive contributions for siblings including increased sensitivity, opportunities to learn about difference, and developing an attitude about not taking life for granted (Taunt & Hastings, 2002). However, there is a need for research to address siblings' own perceptions of positive contributions and also investigation of the functional significance of these perceptions for adjustment if they do indeed exist (cf. Hastings & Taunt, 2002).

In discussing the present results, it is also important to consider a number of methodological points. First, mothers were the source of the rating data for both the siblings and the children with developmental disabilities. There is the possibility of rating bias (see above). This could be problematic for the longitudinal analyses in that mothers may have held a belief that the behavior problems of their child with developmental disabilities caused problems for the sibling. A second methodological point is that it would be helpful in future research to include several perspectives on the adjustment of the siblings and the child with disability including paternal ratings, teacher ratings, and also self-ratings. This will be important not least in testing the limits of the putative temporal relationship. Finally, the SDQ seems to maintain reliability for samples of children with developmental disabilities but its validity is not independently established for this group. Thus, replication of this research is important with a measure developed specifically for the assessment of behavior problems in children with developmental disabilities.

Turning finally to practical implications, the identification of a robust relationship between the behavior of children with developmental disabilities and their siblings' adjustment will still tell us little about how best to offer supports to siblings. Additional research studies are needed that identify the processes or mechanisms by which these temporal relationships come about. At present, one might speculate that these processes could involve family relationships or internal psychological mechanisms, and there may also be other alternatives. In terms of the former, parental attention might be drawn to the behavior problems of the child with developmental disabilities. Alternatively, behavior problems may disrupt the sibling relationship that might normally protect children against some negative adjustment outcomes. In terms of internal psychological mechanisms, sibling self-esteem could perhaps be affected by the public presentation of unusual behaviors from their sibling and lowered self-esteem could place them at risk for other problems. The preceding examples are just that, but the brief discussion serves to illustrate that we know very little about how or why some siblings of children with developmental disabilities adjust perfectly well and others seem to struggle (cf. Hodapp, Glidden, & Kaiser, 2005; Stoneman, 2005).

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