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Impact on Siblings of Children With Intellectual Disability: The Role of Child Behavior Problems

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Abstract

The impact on everyday life for siblings of children with intellectual disability or typical development was examined. Participants were families of children with intellectual disability ($n = 39$) or typical development ($n = 75$). Child behavior problems and sibling impact were assessed at child ages 5, 6, 7, and 8. Results indicate that siblings of children with intellectual disability were consistently reported by mothers and fathers to be more negatively impacted compared to siblings of typically developing children. When child behavior problems were accounted for, however, there was no longer a significant relationship between child intellectual status and sibling impact. For both intellectual disability and typical development groups, cross-lagged panel analyses indicate that early child behavior problems lead to increased sibling negative impact over time.

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Many researchers investigating siblings of children with intellectual disability examined whether these siblings are at risk for negative psychological effects, such as diminished self-concept (Dyson, Edgar, & Crnic, 1989; Singhi, Malhi, & Pershad, 2002; Wolf, Fisman, Ellison, & Freeman, 1998), poor psychological adjustment (Hannah & Midlarsky, 1985; Seltzer, Greenberg, Krauss, Gordon, & Judge, 1997; Singhi et al., 2002), and increased psychopathology (Bågenholm & Gillberg, 1991; Bischoff & Tingstrom, 1991; Del Rosario & Keefe, 2003; Hastings, 2007). This perspective assumes that having a child with an intellectual disability has a negative impact on other children in the family. More recently, researchers have found that siblings of people with intellectual disability to be well-adjusted and generally indistinguishable from their peers (Dyson, 1999; Eisenberg, Baker, & Blacher, 1998; Levy-Wasser & Katz, 2004; Stoneman, 2005). In a meta-analysis, Rossiter and Sharpe (2001) found that the difference between siblings of children with intellectual disability and comparison siblings in terms of general psychological adjustment was "small at best" (mean effect size $= -.03$, p nonsignificant). However, growing up with a child who has intellectual disability may impact siblings in more subtle ways than having major negative mental health consequences. Few researchers have examined siblings' everyday feelings and experiences, which may be more relevant for siblings of individuals with intellectual disability (i.e., extra caregiving responsibilities, stress, shame, annoyance, less parental

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attention) (Hannah & Midlarsky, 2005; Mulroy, Robertson, Aiberti, Leonard, & Bower, 2008). Moreover, to the extent that there are negative impacts on everyday life for these siblings, little is known about causal mechanisms.

Multiple studies of parent and family well-being have shown that child behavior problems are a key explanatory variable. Children with intellectual disabilities exhibit behavior problems more often compared with typically developing children (Baker, Blacher, Crnic, & Edelbrock, 2002; Baker et al., 2003; Einfeld & Tonge, 1996; Emerson, 2003). Furthermore, child behavior problems appear to mediate the relationship between child intellectual status and parenting stress (Baker et al., 2002, 2003; Hauser-Cram, Warfield, Shonkoff, & Krauss, 2001; Herring et al., 2006; Stores, Stores, Fellows, & Buckley, 1998); when child behavior problems are accounted for, there is no longer a significant relationship between child intellectual status and parenting stress. This finding suggests that behavior problems are a more salient predictor of parenting stress than is child intellectual disability. In addition, longitudinal analyses suggest that the relationship between child behavior problems and parenting stress may be bidirectional (Baker et al., 2003; Orsmond, Seltzer, Krauss, & Hong, 2003). These findings indicate that early child behavior problems are associated with increased parental negative impact over time and that early parental negative impact is associated with increased child behavior problems over time, indicating a possible reciprocal relationship between these two variables. A logical extension of these findings is to examine this bidirectional model in siblings of children with intellectual disability. Surprisingly, despite the strong association between child behavior problems and parental impact, little is known about the role of child behavior problems in relation to how siblings are impacted by having a brother or sister with intellectual disability. Even less is known about the opposite direction of effects (i.e., how the sibling relationship influences behavior problems in the child with intellectual disability). With typically developing children, however, there is evidence that an adverse sibling relationship affects the development of psychopathology or self-regulation (Dunn, 1999), whereas a positive sibling relationship is a protective factor (Brody, Kim, Murry, & Brown, 2003; Deater-Deckard, Deckard, Dunn, & Lussier, 2002).

Hastings (2007) examined the relationship between behavior problems of 75 children with intellectual disability 3 to 19 years of age and behavior problems of their siblings. Although there was no control group of typical sibling pairs, results revealed that behavior problems of children with intellectual disability were predictive of behavior problems in siblings of children with intellectual disability 2 years later. Results of this study suggest that an elevated level of behavior problems for a child with intellectual disability may be a risk factor for sibling behavior problems across time, highlighting the importance of examining the role of child behavior problems in relation to siblings of children with intellectual disability. Furthermore, child behavior problems may be especially important to consider in studying how siblings are impacted in that these behavior problems likely interfere with the development of sibling relationships which, in turn, are likely associated with adjustment in both the sibling and the target child (McHale & Gamble, 1989). In the present study we sought to build upon the Hastings study by (a) assessing a same-age sample of target children (5 years), (b) including a control group of families of children who did not have intellectual disabilities, (c) examining other ways in which child behavior problems impact siblings, and (d) investigating the temporal relationship between child behavior problems and sibling impact across a 3-year period (5 to 8 years).

We sought to extend the literature on siblings of children with intellectual disability first by examining additional ways in which siblings may be impacted beyond the general measures of mental health and overall adjustment used in previous research. We employed a measure of sibling impact to assesses the day-to-day ways in which siblings may be affected (e.g., having more caretaking responsibilities, more limited participation in activities because of target child, feelings of embarrassment having friends over). We hypothesized that siblings of children with intellectual disability would be more impacted on this measure of every day feelings and experiences compared with siblings of children without intellectual disability. Second, if differences were found in sibling impact among siblings of children with and without intellectual disability, we wanted to examine the mechanisms, or variables, that explained why some siblings were more or less negatively impacted. As such, we

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hypothesized that child behavior problems would mediate the relationship between child intellectual status and sibling impact; when child behavior problems were accounted for, there would no longer be a significant relationship between the child's cognitive status and sibling impact. For the purposes of this study, we defined *behavior problems* primarily as the congregate of internalizing and externalizing behaviors. Finally, we examined the temporal relationship between these variables. Here, given earlier findings that behavior in children with intellectual disability is predictive of later behavior by their siblings (Hastings, 2007), we hypothesized that the strongest association would be from early child behavior problems to later sibling impact.

Method

Participants

Participants were 114 families who were drawn from a larger sample that was recruited at target child age 3 years to participate in a longitudinal study of young children with and without developmental delays. Thus, in this study, *sibling* refers to the brother or sister of the target child. Samples were drawn from Southern California (80% of the present sample) and Central Pennsylvania (20%), The present sample was comprised of all families who met inclusion criteria (described below), had multiple children (i.e., target child had at least one sibling), and for whom data were available on the primary measures at target child ages 5, 6, 7, and 8 years. Of the total sample at age 5, about 76% of families were included in this study because they had more than one child who was between the ages of 1 and 16 years as well as complete data. The families with multiple children did not differ from the families with a single child on any of the demographic variables at age 5 listed in Table 1.

Children were classified as having intellectual disability (n = 39) or typical development (n = 75). Children in the intellectual disability group had been recruited through agencies that provided services for people with developmental disabilities. In California these agencies are a state-wide network of regional centers; almost all families with a child who has intellectual disability in the state are enrolled in such an agency. Children in the typical development group had been recruited primarily though preschools and day-care programs. School and agency personnel mailed brochures describing the study to families who met selection criteria; interested parents phoned the research center to obtain more information about the study and, if still interested, to set up an initial home visit.

At age 5, research staff administered two measures to confirm group membership. For the intellectual disability group, criteria were (a) a score of 40 to 84 on the Stanford-Binet Intelligence Scale-Fourth Edition–Stanford-Binet (Thorndike, Hagen, & Sattler, 1986) and (b) a score of 40 to 84 on the Vineland Adaptive Behavior Scales–VABS (Sparrow, Balla, & Cicchetti, 1984). The children with intellectual disability met criteria for either borderline (IQ = 71–84, n = 9), mild (IQ = 55–70, n = 21), or moderate intellectual disability (IQ = 35–54, n = 10). This definition of intellectual disability is consistent with the *Diagnostic and Statistical Manual of Mental Disorders*-Fourth Edition (American Psychiatric Association, 2000), which includes these three diagnoses. Children who had a diagnosis of autism at the initial evaluation were excluded from the larger longitudinal study. The children in the typical development group received a score of 85 or above on the Stanford-Binet and did not have a developmental disability nor were they premature.

At age 5, in the combined sample, 56.10% of the target children were boys. The race/ethnicity distribution of the sample was 64.9% White, nonHispanic, 4.4% African American, 0.9% Asian American, 14.9% Hispanic, and 14.9% "other." For our purposes in this study, we compared Whites, nonHispanics to Hispanics due to the heterogeneity of the "other" group and the small cell sizes in the remaining racial/ethnic groups. Sibling demographics were confined to the sibling closest in age to the target child. These siblings were 6.10 years old on average (SD = 3.67) and ranged in age from about 1 to 16 years. In 54.40% of cases, the sibling was older than the target child. The age spacing between child and sibling was 3 years on average (SD = 2.12) and ranged from 0 to 11 years. Two of the 114 sibling pairs were twins. Slightly more than half of these siblings (57.3%) were male. The number of children in the family ranged from 2 to 6, with a mean of 2.73 children (SD = 1.02). Recruitment initially focused on intact families, so most participants (83.30%) were married (defined here as legally married or living together for at least

Table 1. Demographics by Delay Status Group at Child Age 5

	Intellectual disability (n = 39)		Typical development (n = 75)		
Characteristic	Mean/%	*SD*	Mean/%	*SD*	χ^2/ t^a
Children					
Gender (% boys)	53.8		57.3		**0.13**
Ethnicity (%)					
White, nonHispanic	51.3		72.0		**8.74****
Hispanic	28.2		8.0		
Health (mean)	3.1	0.7	3.6	0.5	4.78***
Stanford Binet IQ (mean)	60.1	12.5	104.7	12.5	18.09***
Vineland Adaptive Behavior Composite (mean)	60.9	9.5	104.5	15.7	15.91***
CBCL[b] Total T-score (mean)	46.2	10.4	59.6	13.7	5.81***
Siblings[c]					
Age (mean)	5.6	3.7	6.3	3.6	0.96
Birth order (%)[d]	47.1		58.0		**2.15**
Gender (% boys)	70.6		50.7		**3.67**
Parent and family					
Marital status (% married)	76.9		86.7		**1.75**
Mother's education (mean years)	14.3	1.9	15.7	2.3	3.40***
Mothers' mean age in years (age 5)	33.9	5.4	36.2	5.1	2.17*
Father's education (mean years)	14.6	2.6	15.7	3.0	1.70
Fathers' mean age in years (age 5)	38.4	5.6	38.2	6.3	0.14
Family annual income (% > $50K)	46.2		68.0		**5.13***
No. of children in family (mean)	2.5	0.8	2.83	1.1	1.39

[a]Chi squares in boldface. [b]Child Behavior Checklist. [c]Sibling closest in age to target child. [d]Percentage older than target child.
*$p < .05$. **$p < .01$. ***$p < .001$.

6 months). Most of the families were middle-class; approximately 60% had an annual income of $50,000 or more (in 2001–2002). The average years of schooling was about 3 years of college for mothers (M = 15.20 years), SD = 2.24) and fathers (M = 15.31, SD = 2.94).

Table 1 shows the demographic characteristics at age 5 by group status (intellectual disability, typical development). Two demographic variables were significantly related to both child intellectual status (independent variable) and mother reports of sibling negative impact (dependent variable) and, thus, we covaried these variables in all pertinent analyses. These covariates were child health and mother years of education. Only child health was significantly related to child behavior problems; therefore, in analyses in which child behavior problems were included in the model but the child intellectual status was not included, we only controlled for child health. For father report data, no demographic variables were significantly related both to child intellectual status and reports of sibling negative impact; thus, we did not enter covariates into analyses using father report data.

Procedure

All procedures were approved by the Institutional Review Boards at the three collaborating universities. We obtained the Stanford-Binet IQ and the VABS score during a center visit at child age 5 and family demographics during an in-home interview with parent(s) at child age 5. The measures of child behavior problems and sibling impact were part of a questionnaire battery completed separately by both parents at child ages 5, 6, 7, and 8 years. Parents completed these questionnaires about the target child. Assessments

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were almost always completed within a month of the child's birthday.

Measures

Stanford-Binet. We evaluated children's cognitive ability using with the Stanford-Binet, a widely used assessment instrument that has sound psychometric properties. This measure is particularly well-suited to the evaluation of children with delays because the examiner adapts starting points according to the child's developmental level. The Composite IQ, used in the present study, is standardized with the mean = 100 and *SD* = 15. Table 1 shows these standard scores for each status group.

Vineland Adaptive Behavior Scales. Child adaptive behavior was examined using the VABS for the intellectual disability group only. This semi-structured interview is used to assess the adaptive behavior of individuals with or without disabilities. In the present study mothers were informants and reported on their child's usual behaviors. Three subscales were used (Communication, Daily Living Skills, and Socialization), which were combined to form an Adaptive Behavior Composite score, $\alpha = .93$ for current sample, with a mean of 100 and *SD* of 15. In the intellectual disability sample, the mean VABS was 61.14 with an *SD* of 12.95.

Child Behavior Checklist (CBCL). We assessed child behavior problems using mother and father independent reports on two versions of the CBCL, depending on the target child's age. The CBCL for ages 1.5 to 5 years (Achenbach, 2000) was used for the 5-year assessment and the CBCL for ages 6 to 18 years (Achenbach & Rescorla, 2001), when the children were 6, 7, and 8 years old. The CBCL is the most widely used parent-report measure of child socioemotional and behavioral functioning and has sound reliability and validity. The 1.5 to 5 version lists 100 behaviors and the 6 to 18 version, 113 behaviors. The items in the two versions are similar. Each behavior is rated on a 3-point scale from 0 (*not true*) to 2 (*very true or often true*); scores are summed for a total score, which is converted to a T score (where the normative mean is set at 50 and *SD* at 10). We used the total T score in the present study. The two versions, at target child ages 5 and 6, had alphas of .95 for mother and .95 for father total scores.

Family Impact Questionnaire (*Donenberg & Baker, 1993*). Both mothers and fathers completed this questionnaire regarding the target child. This measure is not disability-specific. It contains 50 items on, for example, assessing the child's impact on the family compared to the impact other children his or her age have on their families. Parents endorse items on a 4-point scale ranging from 0 (*not at all*) to 3 (*very much*). Five scales measure negative impact and one scale measures impact on positive feelings about parenting. We utilized the seven-item Sibling Negative Impact Scale-Revised to assess the child's impact on all siblings in the household. The items are "My child prevents his/her siblings from participating in activities more," "The other children in the family complain about his/her behavior more," "The other children in the family feel more embarrassed by his/her behavior, " "My child is rejected by his/her siblings," "The other children in the family invite friends over to the house less often because of his/her behavior," "My child uses his/her siblings' toys without asking permission," and "My child breaks or loses his/her siblings' toys more." Alphas in the present sample for sibling negative impact ranged from .70 to .81 for mothers and from .70 to .82 for fathers.

Results

We examined the distributions of the primary variables (child behavior problems and sibling negative impact) at each of the four time points (ages 5–8). Data points that were more than 3 *SD*s above or below the mean of a variable were considered to be outliers. Outlying data points were present on both measures. Thirteen data points were determined to be outliers; all were extreme in the high direction. As suggested by Cohen, Cohen, West, and Aiken (2002), all outliers were set equal to plus 3 *SD*s from the mean in order to reduce the influence of extreme data points. Analyses included univariate analyses of variance, independent sample *t* tests, linear regressions, and cross-lagged panel analyses.

Preliminary Analyses

We used both mother and father reports of child behavior problems and sibling negative impact. Correlations between mother and father reports at each age ranged from .56 to .69, all $ps < .001$. Within the typical development group, these same correlations ranged from .40 to .62, $ps < .01$, and within the intellectual disability

group, they ranged from .63 to .77, *p*s < .001. Correlations between mother and father reports of sibling impact ranged from .40 to .61, and all were significant at the .001 level. Within the typical development group, these same correlations ranged from .33 to .62, all *p*s < .01; and within the intellectual disability group, they ranged from .36 to .51, all but one $p < .05$.

We used a repeated measures analysis of variance to examine the stability of sibling impact over time. The within-subjects factor was time, which included the sibling negative impact score at the four time points (ages 5, 6, 7, and 8). The between-subjects factor was child intellectual status. There was no significant change in sibling impact over time according to mother report and a marginally significant change over time using father report data, $F(3) = 2.21$, $p = .051$. Interaction between child intellectual status and time was not significant according to mother reports and was marginally significant according to father reports, $F(3) = 2.22$, $p = .086$. In general, these results suggest that sibling impact was relatively stable across middle childhood and even across mother–father ratings for both the intellectual disability and typical development groups.

Group Differences in Sibling Negative Impact

We conducted four univariate analyses of covariance, one at each time point, to determine whether there were significant status group (intellectual disability, typical development) differences in mother reports of sibling impact, after controlling for covariates. Table 2 shows that in all four analyses, siblings of children with intellectual disability were reported by mothers to be more negatively impacted compared to siblings of children with typical development. No covariate was significant in any analysis. Analyses of father reports of sibling negative impact showed very similar results. Because it was not necessary to control for any variables in father analyses (see *Method*), group differences were analyzed with independent sample *t* tests. At all three of the four time points, fathers of siblings of children with intellectual disability reported that these siblings were more negatively impacted compared to siblings of typically developing children.

Despite consistent group differences, there was considerable overlap in the distributions of sibling negative impact scores in the two status groups. According to mother report at age 5, 38.5% of the siblings in the intellectual disability group had lower negative impact scores than the mean scores of the typical development group. Fathers reported that 54.8% of siblings of children with intellectual disabilities had lower negative impact scores than the mean scores of siblings of typical developing children. Thus, depending on the reporter, between one third and one half of siblings of children with intellectual disability had negative impact scores equal to or below the mean negative impact score for siblings of typically developing children. These findings suggest that although siblings of children with intellectual disability had higher negative impact scores on average, many siblings of children with intellectual disability are similarly or less negatively impacted than are siblings with typical development.

Table 2. Mean Differences in Sibling Negative Impact by Group

Respondent/ Time point	Intellectual disability ($n = 39$)	Typical development ($n = 75$)	F/t[a]
Mother report[b]			
Age 5	5.90	4.23	5.31*
Age 6	5.90	3.93	11.81**
Age 7	6.19	4.31	7.18**
Age 8	6.58	3.99	12.73**
Father report			
Age 5	5.35	3.93	1.95†
Age 6	5.47	3.86	2.36*
Age 7	6.28	4.38	2.62*
Age 8	6.93	3.69	4.25***

[a]Mother reports are *F*s; fathers, *t*s. [b]Covariates: maternal education and child health.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Mediation Analyses

In the second set of analyses, we further examined the significant relationship between child intellectual status and sibling negative impact to determine whether this relationship was mediated by child behavior problems. First, univariate relationships between the three variables were examined to verify whether the conditions for mediation were met. There were significant status group differences across the four

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time points in the level of behavior problems according to both mother reports, F values all $ps < .01$, and father reports, t values all $ps < .01$. There were significant bivariate correlations at each time point between mother reports of child behavior problems and sibling negative impact, rs ranged from .46 to .64, all $ps < .001$, and father reports, rs ranged from .51 to .65, all $ps < .001$. Given that the hypothesized mediator (child behavior problems) had a significant univariate relationship with both the independent variable (child intellectual status) and the dependent variable (sibling negative impact), and given that there was a significant relationship between the independent and dependent variables, the conditions for mediation were met and tests of mediation were conducted.

Table 3 shows four hierarchical multiple regressions using mother reports of sibling negative impact at child ages 5 through 8 years. The covariates were entered in Step 1, group status in Step 2, and total behavior problems score in Step 3. These variables explained from 26% to 42% of the variance in sibling negative impact at the ages assessed. At child ages 5, 7, and 8 years, child intellectual status no longer accounted for significant variance in sibling impact once behavior problems were accounted for, suggesting that child behavior problems fully mediated the relationship between child intellectual status and sibling impact at these ages. In addition, the Sobel test for mediation, which tests whether a mediator carries the influence of an independent variable to a dependent variable, was significant at all four time points.

Table 4 shows the results of parallel analyses conducted using father reports of sibling impact ($N = 98$, typical development $n = 67$, intellectual disability $n = 31$). These analyses were identical to the regressions conducted with mother reports of sibling impact, with the exception that covariates were not included in analyses using father report data. Group status was entered in Step 1 and the total behavior problems score in Step 2. In all four analyses of father measures, child intellectual status no longer accounted for significant variance in sibling impact once behavior problems were accounted for. Similar to analyses using mother report data, these variables also explained from 26% to 44% of the variance in father reports of sibling negative impact at the various ages assessed. Furthermore, the Sobel mediation test was significant at each of the four time points. These analyses indicate that with father reports, child behavior problems fully mediated the relationship between intellectual status and sibling impact.

Table 3. Cross-Sectional Regression Analyses With Mother Reports of Sibling Impact

	Age 5			Age 6			Age 7			Age 8		
Step/Variable	*B*	*SE B*[a]	β	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
Step 1												
Mother education	−.19	.15	−.12	−.16	.13	−.13	−.05	.15	−.04	.02	.16	.01
Child health	−1.31	.56	−.23*	−.58	.45	−.13	−.94	.54	−.18†	−1.30	.58	−.23*
Step 2												
Mother education	−.12	.15	−.08	−.09	.12	−.07	.01	.15	.01	.11	.15	.07
Child health	−.87	.58	−.15	−.06	.46	−.01	−.44	.56	−.08	−.62	.58	−.12
Status	1.65	.73	.25*	1.97	.57	.34**	1.88	.70	.27**	2.59	.73	.35**
Step 3												
Mother education	−.19	.14	−.12	−.11	.11	−.09	−.05	.12	−.03	−.01	.13	−.01
Child health	−.29	.53	−.05	.30	.43	.07	.06	.47	−.01	−.13	.48	−.02
Status	.13	.72	.02	1.25	.56	.22*	.77	.61	.11	1.05	.64	.14
Child BP[a]	.07	.01	.49***	.06	.01	.38***	.09	.01	.56***	.10	.01	.58***
Total R^2	.31			.26			.38			.42		
Sobel test	4.34***			3.47***			3.21**			3.92***		

[a]Standard error of raw beta weight. [b]Behavior problems.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 4. Cross-Sectional Regression Analyses With Father Reports of Sibling Impact

	Age 5			Age 6			Age 7			Age 8		
Step/Variable	*B*	*SE B*[a]	β	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
Step 1												
Status	1.42	.59	.24*	1.61	.68	.24*	1.89	.72	.26*	3.24	.76	.42***
Step 2												
Status	.21	.58	.04	.12	.60	.02	.51	.64	.07	1.23	.71	.16
Child BP[b]	.05	.01	.49***	.08	.01	.60***	.09	.01	.58***	.11	.02	.58***
Total R^2		.26			.36			.37			.44	
Sobel test		3.58***			3.33***			3.06**			4.02***	

[a]Standard error of raw beta weight. [b]Behavior problems.
*$p < .05$. **$p < .01$. ***$p < .001$.

Longitudinal Analyses Predicting Change Over Time

Given that child behavior problems primarily accounted for the relationship between child intellectual status and sibling impact, longitudinal analyses did not include child intellectual status as a predictor variable, and all analyses were conducted within the two groups (typical development and intellectual disability). Two directions of influence involving child behavior problems and sibling impact were examined using ordinary least squares regression analyses. Table 5 shows the first regression with mother reports of sibling negative impact at age 8 as the dependent variable. Child health was entered as a covariate along with early sibling negative impact (Family Impact Questionnaire at age 5); initial level of behavior problems (CBCL total score at age 5), and the change in behavior problems (CBCL change score from ages 5 to 8) into the model. Change scores were created for behavior problems and sibling impact by subtracting the score of the variable at age 5 from the score of the variable at age 8. This model explained 60% of the variance in the intellectual disability group and 53% in the typical development group using mother reports at age 8 and 62% (intellectual disability group) and 50% (typical development group) using father reports.

In the intellectual disability group, after accounting for initial (age 5) levels of sibling impact, initial levels of child behavior problems as

Table 5. Final Model of Longitudinal Regression Analyses Predicting Sibling Impact at Age 8 by Group

	Intellectual disability			Typical development		
Respondent/Variable[a]	*B*	*SE B*[b]	β	*B*	*SE B*	β
Mother report						
Child health	.31	.59	.06	.11	.53	.01
Family Impact Questionnaire sib impact (5)	.55	.16	.58***	.50	.10	.49***
Child BP[c] (5)	.08	.02	.64***	.06	.02	.36**
Change in BP (5 to 8)	.11	.03	.57**	.04	.02	.13
Total R^2		.60			.53	
Father report						
Family Impact Questionnaire sib impact (5)	.32	.16	.32	.64	.17	.38***
Child BP (5)	.07	.03	.51*	.10	.02	.71***
Change in BP (5 to 8)	−.02	.05	−.07	.11	.03	.59***
Total R^2		.62			.50	

[a]Numbers in parentheses are child age. [b]Standard error of raw beta weight. [c]Behavior problems.
*$p < .05$. **$p < .01$. ***$p < .001$.

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well as changes in behavior problems explained unique variance in mother reports of sibling impact at age 8. Higher levels of child behavior problems at age 5 as well as increases in behavior problems from age 5 to 8 were associated with higher levels of sibling negative impact at age 8, even after controlling for sibling impact at age 5. For fathers, initial levels of behavior problems predicted sibling impact at age 8. In the typical development group, after accounting for initial (age 5) levels of sibling impact, initial levels of child behavior problems alone accounted for unique variance in mother reports of sibling impact at age 8. After accounting for initial (age 5) levels of sibling impact, results from fathers of typically developing children were similar to those of mothers, except that in addition to initial levels of child behavior problems, changes in behavior problems from 5 to 8 also explained unique variance in sibling impact at age 8. These findings were especially interesting given the stability of child behavior problems from age 5 to 8 (mother report $r = .81$, $p < .001$; father report $r = .77$, $p < .001$) as well as sibling impact (mother report $r = .69$, $p < .001$; father report $r = .63$, $p < .001$).

An alternative explanation for the relationship between child behavior problems and sibling impact is that sibling impact contributes to the development and exacerbation of the target child's behavior problems. To examine this hypothesis, we conducted a second set of ordinary least squares regression analyses (see Table 6). The dependent variable was children's behavior problems at age 8 (CBCL total score at age 8). We entered child health as a covariate (for mother analyses), initial behavior problems (CBCL total score at age 5), initial level of sibling impact (Family Impact Questionnaire at age 5), and change in sibling impact (Family Impact Questionnaire change score from 5 to 8) into the model. This model explained 71% of the variance in child behavior problems in the intellectual disability group and 66% of the variance in the typical development group at age 8 using mother reports and 66% (intellectual disability group) and 52% (typical development group) using father reports. In the analysis of mother reports from the intellectual disability group, changes in sibling impact from 5 to 8 (but not initial levels) predicted child behavior problems at age 8 in that increases in sibling negative impact from age 5 to 8 were associated with higher levels of behavior problems at age 8, after controlling for behavior problems at age 5. Using father reports, neither sibling impact variable predicted later behavior problems at age 8. According to mother reports in the typical development group, there was a trend, $p = .057$, for initial levels of sibling impact predicting later behavior problems at age 8. Using father reports, initial levels of sibling

Table 6. Final Model of Longitudinal Regression Analyses Predicting Child Behavior Problems at Age 8 by Group

	Intellectual disability			Typical development		
Respondent/Variable[a]	*B*	*SE B*[b]	β	*B*	*SE B*	β
Mother report						
Child health	.05	2.99	.00	.65	2.68	.02
Child BP[c] (5)	.49	.08	.69***	.70	.09	.70***
Family Impact Questionnaire sib impact (5)	.90	.68	.16	1.11	.57	.18†
Change in Family Impact Questionnaire (5 to 8)	2.72	.73	.42**	.92	.60	.12
Total R^2		.71			.66	
Father report						
Child BP (5)	.65	.11	.97***	.31	.07	.46***
Family Impact Questionnaire sib Impact (5)	−1.40	.93	−.27	1.75	.79	.21*
Change in Family Impact Questionnaire (5 to 8)	−.33	.95	−.06	2.25	.54	.39***
Total R^2		.66			.52	

[a]Numbers in parentheses are child age.. [b]Standard error of raw beta weight. [c]Behavior problem.
†$p < .10$. *$p < .05$. **$p < .001$.

impact and changes in sibling impact from 5 to 8 predicted child behavior problems at age 8. Thus, there was some support for negative sibling impact relating to subsequent child behavior problems, though the relationships were not as consistent as those in the reverse direction, and they were slightly more prominent in the typical development group. Again, these findings were notable given the stability of both child behavior problems and sibling impact.

We used a cross-lagged panel design to examine the bidirectional effects of sibling impact and child behavior problems over time. This approach allowed simultaneous examination of the two pathways of interest (early child behavior problems to later sibling impact, and early sibling impact to later child behavior problems). It differs from a regression analysis in that both dependent variables (behavior problems and sibling impact) are entered into the model and allowed to correlate. This is a more conservative analysis that accounts for the multicollinearity between the two dependent variables, leaving less variance in the dependent variables to be explained by the independent variables. Two of the four models that were tested are shown in Figures 1 and 2. Models were run separately for mother report and father report data and within the two groups (intellectual disability and typical development). Cross-lagged models are often utilized in social science research and have been used in previous research with families of children with intellectual disabilities (Greenberg, Seltzer, Hong, & Orsmond, 2006; Neece & Baker, 2008).

We used Mplus to test four two-wave cross-lagged models. The dependent variables, sibling negative impact and children's behavior problems, were measured at child age 8. Predictor variables included initial levels (age 5) of sibling impact and behavior problems. As with the previous regression analyses, we included child health and child race as covariates in the cross-lagged model using data collected from mothers. No covariates were included in the cross-lagged model with data from fathers. All measures taken at the same time point were permitted to correlate, which resulted in a fully saturated model with zero degrees of freedom. In other words, there were as many parameters estimated as there were degrees of freedom, which prevented us from generating indices of fit. The cross-lagged results described below and reflected in Figures 1 and 2 for mothers were generated from the complete model, which was the model of interest. However, in order to ensure that the model tested had appropriate fit indices, we trimmed the model by eliminating the nonsignificant paths, thereby creating a degree of freedom permitting the analysis of fit indices.

Four criteria were used to evaluate overall model fit: chi-square to degrees of freedom ratio under 3 (Carmines & McIver, 1981), Comparative Fit Index (CFI) above .90 (Tanaka, 1987), root mean square error of approximation (RMSEA) under .05, and standardized root mean square residual (RMSR) under .09 (Brown & Cudeck, 1993). According to these standards, the models tested using mother reports provided a good fit to the data. Models using father reports satisfied the majority of these criteria and still provided adequate fit to the data.

Figure 1 shows the results of the cross-lagged panel analysis for mothers in the intellectual disability group. Both sibling impact and child behavior problems demonstrated significant stability across the two time points. The stability

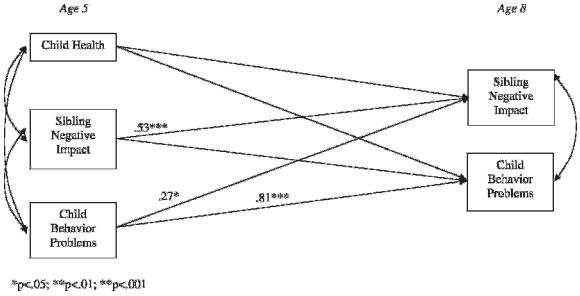

Figure 1. Cross-lagged panel analysis model predicting child behavior problems and sibling impact at child age 8 in the intellectual disability group. Data are from mother reports.

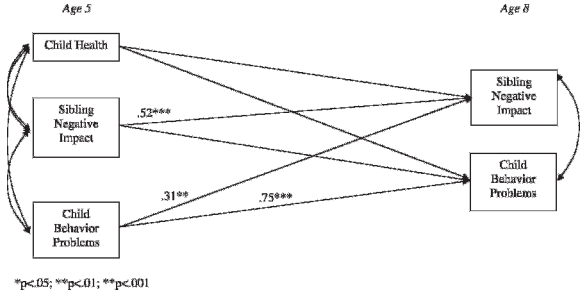

Figure 2. Cross-lagged panel analysis model predicting child behavior problems and sibling impact at child age 8 in the typical development group. Data from mother reports.

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coefficients were .53 for sibling impact and .81 for child behavior problems, $ps < .001$. There was a significant cross-lagged effect between early child behavior and later sibling impact, $B = .27$, $p < .05$, indicating that early child behavior problems were a significant predictor of sibling negative impact over time. However, the cross-lagged effect from early sibling negative impact to later child behavior problems was not significant. The results were similar using father reports of sibling impact and child behavior problems (not shown).

Figure 2 shows the results of the cross-lagged analyses for mothers of children with typical development. Again, both sibling impact and child behavior problems demonstrated significant stability effects across the two time points, $Bs = .52$ and .75, respectively, $ps < .001$. Similar to the intellectual disability group, there was a significant cross-lagged effect between children's early behavior and later sibling impact, $B = .31$, $p < .01$, indicating that early child behavior problems were a significant predictor of sibling negative impact over time. There was not a significant cross-lagged effect from early sibling impact to later behavior problems. The cross-lagged analysis using father reports of child behavior problems and sibling negative impact was similar to the model using mother report data. Again, there were significant stability effects for child behavior problems and sibling impact, $Bs = .56$ and .49, respectively, $ps < .001$. There was also a significant cross-lagged effect where early child behavior problems significantly predicted later sibling impact, $B = .24$, $p < .05$, but there was no significant cross-lagged effect of early sibling impact predicting later child behavior problems. In sum, behavior problems may matter most in predicting sibling negative impact, regardless of whether or not the target child has intellectual disability.

Discussion

We examined alternative ways in which siblings might be impacted by growing up with a child who has intellectual disability as well as the role of child behavior problems in explaining how siblings are more subtly impacted. The first question was, Are there group differences in sibling negative impact between siblings of children with and without intellectual disability? We found consistent group differences across mother and father reports of sibling negative impact: Siblings of children with intellectual disability were reported to be more negatively impacted than were siblings of typically developing children. However, there was considerable overlap in the distributions of sibling impact across the two status groups. At age 5, by mother report, over one third of the siblings in the intellectual disability group had equal or lower negative impact scores compared with the mean of the typical development group.

Our second question was, Do child behavior problems account for the relationship between child intellectual status and sibling negative impact? Child behavior problems were positively correlated with sibling negative impact in that higher levels of behavior problems in the child were associated with increased negative impact in siblings. Also, consistent with previous research, children with intellectual disability were reported to have more behavior problems than were typically developing children. We found that child behavior problems were a full mediator of the relationship between child intellectual status and sibling negative impact. With the exception of one analysis using mother reports at age 6, all other analyses showed that when child behavior problems were accounted for, there was no longer a significant relationship between child intellectual status and sibling impact, indicating that behavior problems were a likely mechanism through which siblings of children with intellectual disability were negatively impacted. However, even the analysis at age 6 supported partial mediation. What initially appears to be evidence for a child with cognitive limitations having an adverse impact on siblings, which is consistent with traditional views in the literature, may be a misdirected notion. In these analyses, we found that the child's behavior problems had an adverse impact on siblings, regardless of whether the child had intellectual disability. One aim for future researchers would be to discern how protective factors can operate to mitigate the presence of child behavior problems on siblings.

Our last research question was, What is the direction of the relationship between child behavior problems and sibling negative impact? Ordinary least squares regression analyses supported a bi-directional effect across a 3-year period. It is possible that (a) the child's behavioral difficulties may require more family help from the unaffected sibling and/or lead the sibling to be embarrassed by his or her brother's or sister's behavior, and/or (b) result in the sibling being less likely to enjoy

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spending time with the target child, all of which could result in higher levels of negative impact for the sibling. However, it is less clear how higher levels of negative impact would lead directly to increased behavior problems. High negative impact may be associated with influences such as sibling–child relationship conflict, decreased sibling engagement, or decreased family cohesion. Yet, one should be cautious in interpreting the path from early sibling impact to later behavior problems because the more conservative cross-lagged panel analysis only provided support for the path from early behavior problems to later sibling negative impact.

These findings were consistent across middle childhood as well as across mother and father reports. Also, the stability in results and correspondence between parents strengthens our confidence in these findings, which build upon the current literature through examination of alternative ways in which siblings of children with intellectual disability may be impacted. Previous studies suggest that siblings of children with intellectual disability do not have elevated levels of psychopathology compared to siblings of typical developing children. Our results, as well as those from other studies, suggest that due to the elevated level of behavior problems among children with intellectual disability, siblings of these children may experience more mild levels of stress that are persistent. However, it would be useful to know whether or how such negative impact changes across the life span of those siblings. For example, at a young age siblings may experience increased stress due to the elevated behavior problems of the child with intellectual disability, whereas later in life they may experience increased stress from the greater demands from, and responsibility for, sibling care as their parents enter later life stages (e.g., Greenberg, Seltzer, Orsmond, & Krauss, 1999; Seltzer, Greenberg, Orsmond, & Lounds, 2005; Seltzer et al., 1997). What remains unclear are the broader outcomes associated with increased negative impact among siblings of children with intellectual disability. Elevated levels of negative impact might be associated with other negative outcomes for siblings (e.g., more conflicted sibling–child relationships, reduced social interactions).

Future researchers might examine a broader range of sibling impacts across ages or periods of development. Notably, the positive impact of a child with intellectual disability on his or her siblings was not examined. It could be that elevated levels of what we are calling "negative impact" may, in fact, be associated with positive outcomes, such as increased opportunities for maturity, empathy, and growth (Dykens, 2005; Grossman, 1972, Hannah & Midlarsky, 2005; Taunt & Hastings, 2002). Certainly, the experience of positive impact can potentially buffer any severe negative impact or can exist alongside negative impact. Positivity, in the form of optimism and positive impact, has also been shown to moderate the relationship between child behavior problems and stress in mothers of children with and those without intellectual disability (Baker, Blacher, & Olson, 2005; Blacher & Baker, 2007). Positivity in the siblings of children with disabilities and/or in their parents could serve as a protective factor that, on a broader scale, promotes family resilience. To the extent that siblings might be able to buffer or deflect negative impact of their brother or sister with intellectual disability, there is likely a salutary effect on overall family stress.

One limitation of the current study is that the main predictor and outcome measures are based on parent report questionnaires and, thus, may be subject to response bias. Direct measures from siblings were difficult to obtain in the current study given the age of the siblings. The majority of siblings (83.5%) were 10 years old or younger, even at the final assessment. Although mother and father reports of sibling impact and child behavior problems were highly correlated, providing some support that parents are observing a similar process and similar behaviors, future investigators should examine these questions using sibling self-report data. Also, because we recruited participants through community programs, we cannot know how representative our sample was of all families with a child who has intellectual disability. Although the sample was diverse, socioeconomic indicators tended to be higher than in the general population, perhaps in part because families were required to visit the university centers for some assessments. Finally, future researchers should consider mediators of the relationship between target child behavior problems and sibling stress; parenting style may be one mediator of this relationship, given that parenting style has been found to be associated with child behavior problems (Bronte-Tinkew, Moore, & Carrano, 2006; Galboda-Liyanage, Prince, & Scott, 2003; Lindahl & Malik, 1999;

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Patterson, DeBaryshe, & Ramsey, 1989; Patterson & Reid, 1984; Paulussen-Hoogeboom et al., 2008; Steinberg, Lamborn, Darling, & Mounts, 1994). Other potential mediators one might examine (in other samples) would include culture as well as sibling personality characteristics.

Our findings in this study should be encouraging for service providers. They suggest that positive outcomes are more likely for siblings of children with intellectual disability who do not also have clinically significant behavior problems, rather than for siblings of children without intellectual disability per se. Fortunately, there is considerable evidence that behavior problems can be significantly reduced through effective interventions (Chronis, Chacko, Fabiano, Wymbs, & Pelham, 2004; Feinfield & Baker, 2004; Horner, Carr, Strain, Todd, & Reed, 2002; Webster-Stratton, Reid, & Hammond, 2004). Such a reduction in behavior problems should result in a decrease in the heightened negative impact experienced by some siblings of children with intellectual disability.

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