Research in Developmental Disabilities 36 (2015) 264–276

Contents lists available at ScienceDirect

Research in Developmental Disabilities

Parenting stress and child behavior problems within families of children with developmental disabilities: Transactional relations across 15 years

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ARTICLE INFO

Article history:
Received 13 July 2014
Accepted 6 October 2014
Available online 8 November 2014

Keywords:
Stress
Internalizing behavior
Externalizing behavior
Developmental disabilities
Longitudinal

ABSTRACT

Parents of children with developmental disabilities (DD) are at increased risk of experiencing psychological stress compared to other parents. Children's high levels of internalizing and externalizing problems have been found to contribute to this elevated level of stress. Few studies have considered the reverse direction of effects, however, in families where a child has a DD. The present study investigated transactional relations between child behavior problems and maternal stress within 176 families raising a child with early diagnosed DD. There was evidence of both child-driven and parent-driven effects over the 15-year study period, spanning from early childhood (age 3) to adolescence (age 18), consistent with transactional models of development. Parent–child transactions were found to vary across different life phases and with different domains of behavior problems.

1. Introduction

Both case studies (e.g., Solomon, 2012; Zuckoff, 2002) and empirically constituted investigations (Fidler, Hodapp, & Dykens, 2000; Hastings, 2002; Hauser-Cram, Cannarella, Tillinger, & Woodman, 2013; Hayes & Watson, 2013; Lee, 2013) indicate that parents of children with developmental disabilities (DD) are at an increased risk of experiencing psychological stress compared to other parents. Although many facets of family life might contribute to such stress, children's problem behaviors have often been selected as a critical contributor (Azad, Blacher, & Marcoulides, 2013; Beck, Hastings, Daley, & Stevenson, 2004; Woodman, 2014). Children with DD often display more problematic behaviors than their typically developing peers (Baker, Blacher, Crnic, & Edelbrock, 2002; Baker et al., 2003; Deb, Thomas, & Bright, 2001; Dekker & Koot, 2003; de Ruiter, Dekker, Verhulst, & Koot, 2007; Green, O'Reilly, Itchon, & Sigafoos, 2005; Herring et al., 2006) and behavior problems often lead to multiple adaptations on the part of parents (Keogh, Garnier, Bernheimer, & Gallimore, 2000).

Few studies to date have considered the reverse direction of effects, however, in families where a child has a DD. In families raising typically developing children, parenting stress has been found to contribute to child behavior problems (Anthony et al., 2005; Benzies, Harrison, & Magill-Evans, 2004; Morgan, Robinson, & Aldridge, 2002). There is growing empirical consensus that

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http://dx.doi.org/10.1016/j.ridd.2014.10.011
0891-4222/

the same pathway of influence holds within families raising children with DD (Neece, Green, & Baker, 2012). Indeed, much research on typically developing children and their parents indicates that transactional models, rather than models composed of unidirectional effects, often capture the complexity of children's developmental course (Sameroff, 2009). According to transactional models, development is the result of on-going reciprocal interactions between the child and his or her environment (Sameroff & Chandler, 1975), where the child is both the product and producer of his or her environment. A central component of transactional models of development is the equal emphasis placed on the influence of the child on the environment and the influence of the environment on the child (Sameroff & Mackenzie, 2003). Obtaining evidence of the multidirectional chaining of such influences requires longitudinal data that captures attributes of the individual and the environment over time (Hastings, 2002; Sameroff & Mackenzie, 2003). The present study examines transactional relations between psychological processes in the family environment, namely, maternal stress related to parenting, and children's self-regulatory development, namely, behavior problems, over the course of 15 years, using data from a longitudinal study of children with DD and their families (Hauser-Cram, Warfield, Shonkoff, & Krauss, 2001; Shonkoff, Hauser-Cram, Krauss, & Upshur, 1992).

1.1. Parenting stress

Stress has been defined as "an individual's emotional and behavioral response to some unpleasant event" (Crnic & Low, 2002, p. 243), where the level of stress negatively affects the individual's behavior and functioning. Within Abidin's (1995) theoretical framework, parent-related stress represents the level of dysfunction in the parent–child system related to the parent's functioning in particular. Parent-related stress includes components of personality and pathology, such as the parent's subjective feelings of emotional availability to the child, parenting confidence, and investment in parenting (Abidin, 1995). Stressors related to situational factors also contribute to parent-related stress in this framework, such as spousal or partner relationships, perceptions of social isolation, parental health, and feelings of restriction in the parenting role.

A substantial body of literature has examined parent-related stress among mothers and fathers of children with and without DD. Some level of stress is considered normative and adaptive for all parents (Crnic, Gaze, & Hoffman, 2005), but parents of children with DD tend to report greater than average levels of stress during their child's infancy (Scott, Atkinson, Minton, & Bowman, 1997), early childhood (Baker et al., 2003; Britner, Morog, Pianta, & Marvin, 2003; Jeans, Santos, Laxman, McBride, & Dyer, 2013; Lopez, Clifford, Minnes, & Ouellette-Kuntz, 2008) and adolescence (Emerson, 2003). High levels of stress have been found to remain stable (Hanson & Hanline, 1990) or to increase over time for parents of children with DD (Gerstein, Crnic, Blacher, & Baker, 2009; Hauser-Cram et al., 2001; Neece et al., 2012). Parenting stress continues to be the focus of much research since it is associated with other aspects of parent well-being, including depression (Olsson & Hwang, 2001), marital conflict (Kersh, Hedvat, Hauser-Cram, & Warfield, 2006; Norlin & Broberg, 2013), and poor physical health (Oelofsen & Richardson, 2006).

In the broader child development literature, parenting stress has been associated with child adjustment (Deater-Deckard, 1998) and is suggested to exert its impact on child adjustment through parenting behavior. Parents high in stress may be less responsive, more authoritarian, and more neglectful in their parenting behavior (Deater-Deckard & Scarr, 1996; Ponnet et al., 2013; Rousseau et al., 2013). Studies have also linked parenting stress to inconsistent discipline, lack of appropriate structure and guidance, and unrealistic expectations for children (Crawford & Manassis, 2011; Rodgers, 1998). As a result, these parenting behaviors may not support the development of children's self-regulation and coping strategies, which, in turn, have implications for their social and behavioral competence (Baumrind, 2013; Carver & Scheier, 2001). Although there is empirical evidence to support the impact of parenting stress on typically developing children's behavior (Anthony et al., 2005; Benzies et al., 2004; Morgan et al., 2002), this direction of effect has been understudied within families raising children with DD (Hastings, 2002).

1.2. Child behavior problems

Child problematic behavior can be distinguished along two major dimensions: internalizing behaviors, which include behaviors such as anxiety, sadness, social withdrawal, and fearfulness, and externalizing behaviors, which include behaviors such as over activity, poor impulse control, non-compliance, aggression toward others, and tantrums (Achenbach & Edelbrock, 1981; Werry & Quay, 1971). These categories were initially based on clinical classification systems but were later validated empirically as distinct dimensions of behavior (Cicchetti & Toth, 1991). Although there is a moderate degree of concordance between internalizing and externalizing problems (Kraatz Keiley, Bates, Dodge, & Pettit, 2000), they have unique antecedents and consequences (Ormel et al., 2005; Williams et al., 2009). Each dimension of problematic behavior may have a distinct transactional relationship with parenting stress across childhood and adolescence, although this possible distinction has rarely been examined within families raising a child with DD.

As previously noted, children with DD display heightened levels of behavior problems compared to their gender- and age-matched peers (Baker et al., 2003; Deb et al., 2001; de Ruiter et al., 2007; Dekker & Koot, 2003; Green et al., 2005; Herring et al., 2006). The prevalence of emotional and behavioral problems is estimated to be 3–7 times higher in children with intellectual disabilities than typically developing youth (Dekker, Koot, van der Ende, & Verhulst, 2002; Dykens, 2000). Internalizing and externalizing behaviors remain highly persistent from childhood through adolescence in individuals with DD (Einfeld, Tonge, Turner, Parmenter, & Smith, 1999; Hauser-Cram & Woodman, under review; Totsika & Hastings, 2009; Tonge & Einfeld, 2000, 2003).

There is some evidence of developmental change in behavior problems. Studies with typically developing children have identified patterns of trajectories in behavior problems, with decreases in average levels of externalizing behaviors coupled with stability or slight increases in internalizing behaviors (Fanti, Panayiotou, & Fanti, 2013; NICHD Early Child Care Research Network [ECCRN], 2005; Rescorla et al., 2007). A similar pattern has been reported in studies of children with DD, as internalizing behaviors have been observed to increase while externalizing behaviors have been reported to decrease from childhood through adolescence (Chadwick, Kusel, Cuddy, & Taylor, 2005; de Ruiter et al., 2007). Children who exhibit high levels of either domain of behavior problems may be at increased risk for poor social, emotional, and academic outcomes (Farmer, 2000; Dekker et al., 2002; Stein, Blum, & Barbaresi, 2011). Moreover, behavior problems may affect opportunities for education, work, and independent living (Administration on Developmental Disabilities, 2011; Lowe et al., 2007).

A wealth of research has documented the detrimental impacts of child behavior problems on the well-being of mothers and fathers raising children with DD (Hastings, 2002). Early studies focused on type of disability (Minnes, 1988) and cognitive skills (Beckman, 1993; Frey, Greenberg, & Fewell, 1989) as stressful child attributes, but recent research has highlighted the number and severity of problematic behaviors as salient child characteristics to parent well-being. Child behavior problems have been found to relate to parenting stress above and beyond the child's level of adaptive behavior (Blacher, Shapiro, Lopez, & Diaz, 1997; Hodapp, Dykens, & Masino, 1997; Sloper, Knussen, Tuner, & Cunningham, 1991; Woodman, 2014) and parent and family resources, such as socioeconomic status, family size, and social support (Quine & Pahl, 1991; Sloper et al., 1991; Woodman, 2014). Many of these studies were correlational in nature, however. Longitudinal designs are necessary to test the temporal precedence of child behavior problems.

1.3. Testing transactional relations: Parenting stress and child behavior problems

Over the last decade, several studies have attempted to quantify the reciprocal relations between parenting well-being and child behavior within families of children with DD. In a sample of mothers and fathers of preschool children with and without developmental delay, Baker et al. (2003) found that child problem behavior explained additional variance in parenting stress one year later, controlling for earlier parenting stress. Subsequent regression analyses indicated that parenting stress predicted later child problem behavior, after controlling for earlier problem behavior. Lecavalier, Leone, and Wiltz (2006) examined bidirectional effects within a sample of youth with autism spectrum disorders. Over a one year period, child problem behavior was found to exacerbate maternal parenting stress and maternal parenting stress likewise exacerbated child problem behavior. These two studies examined bidirectional effects across two time points over a one year span. Support was found for both child-driven and parent-driven effects, but these findings tell us little about transactional processes across multiple periods of development within families raising children with DD.

Orsmond, Seltzer, Krauss, and Hong (2003) examined bidirectional effects between problem behavior and parent well-being among mothers and their adult children with intellectual disability, extending the study period to six years. Increases in the adult's level of internalizing and asocial behaviors from the start to the end of the study related to higher levels of maternal burden, pessimism, and depressive symptoms at the end of the study. Increases in maternal burden and pessimism over the course of the study also predicted higher ending levels of adult internalizing and asocial behaviors. Although this study, compared to other investigations, lengthened the period of observation to 6 years, it did not use longitudinal methods to examine transactional relations between behavior problems and parenting stress throughout the 6-year period. Moreover, Orsmond et al. (2003) focused on one specific developmental period, adulthood, thereby limiting our understanding of similar bidirectional processes during childhood and adolescence, life phases recognized for much developmental change.

More recently, Neece et al. (2012) described transactional relations between parenting stress and child behavior problems within families raising children with and without developmental delays. A cross-lagged panel design was used to assess the direction of effects across seven time points, occurring annually from age 3 to age 9. Their findings suggested that parenting stress served as both an antecedent and a consequence of child behavior problems while child behavior problems simultaneously served as an antecedent and a consequence of parenting stress. Thus both parenting stress and child behavior problems appeared to have mutually escalating, or deescalating, effects on each other over time. The pattern of effects was similar for families of children with and without developmental delays. Yet, Neece et al. (2012), limited their focus to early and middle childhood and therefore reciprocal relations during adolescence remain to be explored. In addition, this study measured total child behavior problems, rather than analyzing internalizing and externalizing behavior problem domains separately. Research on typically developing children has revealed different developmental pathways within these two behavioral domains (Fanti et al., 2013). Thus, it is valuable to consider both domains in relation to parenting stress in families with a child with DD.

1.4. The present study

The current study aims to further the existing literature on transactional relations between parenting stress and child behavior problems within families of children with DD. First, we expanded the period of inquiry across several developmental periods, from early childhood (age 3) through late adolescence (age 18). To our knowledge, the current study is the first to examine transactional processes across 15 years. Adolescence may represent a uniquely stressful time for these families. Similar to families of adolescents without DD, parents of adolescents with DD may experience "the 'push and pull' of

relinquishing parental roles of protectiveness, close supervision, and authority while adopting parenting styles that respect the adolescent's emerging needs for autonomy and independence, . . ." (Hauser-Cram, Krauss, & Kersh, 2004, p. 604). Additionally, these parents continue to face challenges related to their adolescent's continued need for support and supervision, potential peer rejection and social isolation, development through puberty, and transition to adult services (Baine, McDonald, Wilgosh, & Mellon, 1993).

Second, we analyzed the unique associations of internalizing behaviors and externalizing behaviors with parenting stress. Internalizing and externalizing behaviors represent distinct components of problematic behavior that are likely to respond differentially to aspects of parent well-being and likewise affect parenting stress in different ways. Moreover, these behaviors in childhood and adolescence have differential implications for the development of internalizing and externalizing disorders later in adulthood (Hofstra, van der Ende, & Verhulst, 2000).

2. Methods

2.1. Participants

Data for the present study were drawn from the Early Intervention Collaborative Study (EICS), a longitudinal investigation of children with developmental disabilities and their families (Hauser-Cram et al., 2001; Shonkoff et al., 1992). This study focused on data collected when the child with DD was age 3, age 5, age 10, age 15, and age 18. Participants were initially recruited at the time of their children's enrollment in 29 publicly funded early intervention (EI) programs in the Northeast. Families were invited to participate if their child was less than 24 months old with a diagnosis of Down syndrome, motor impairment, or developmental disabilities of unknown etiology. These diagnostic categories were selected to represent the most common types of disability served by EI at that time. Medical records for each enrolled child were reviewed by research staff to confirm type of disability.

Analyses for the present study focus on 176 mothers and their children. At age 3, type of disability was roughly distributed across the three diagnostic categories: 29% with Down syndrome, 39% with motor impairment, and 32% with developmental disabilities of unknown etiology. Slightly more than half of the children were male (55%). The majority of children were of European American descent (90%). At the start of the study, most children (83%) were living with both parents. Less than half (39%) of the children were first born. The majority of mothers (82%) were married. Less than half (48%) were employed part- or full-time. Mothers had on average 13.81 years of education ($SD = 2.40$), roughly equivalent to an associate's degree. Mothers were 29.45 years of age on average ($SD = 4.90$). The median household income was $30,000–35,000, reflecting the median household income in the region at the time when data were collected (1989–1991).

Families included in the sample for the present study ($N = 176$) differed from those in the larger EICS project that dropped out before age 3 ($N = 37$) on several characteristics measured at the start of the project. Families included in the study were more likely to have daughters with DD, $t(211) = 2.97$, $p < .01$, have higher levels of maternal education, $t(211) = -2.08$, $p = .04$, and have mothers and fathers who were married, $t(210) = -2.08$, $p = .04$. Families in the present analyses did not differ from families in the larger EICS project with respect to the child's type of diagnosis during EI.

2.2. Procedure

Six months prior to their child's third, fifth, tenth, fifteenth and eighteenth birthdays, parents were contacted to request their continued participation in EICS. Participating families were visited in their homes by two field staff members blind to the study's hypotheses and trained to be reliable for all measures. While one staff member conducted a multidimensional, structured evaluation of the child, the other staff member interviewed the mother. Mothers also completed questionnaire packets, which were collected during home visits or returned by mail to the project office. Home visits lasted approximately 2–3 h.

2.3. Measures

2.3.1. Maternal education

Maternal education in years was recorded on a family information questionnaire administered at the first time point (age 3).

2.3.2. Child behavior problems

At each time point, mothers completed the Child Behavior Checklist (CBC-L). Two versions of the CBC-L were administered over the course of the study to be appropriate to the developmental age of the child with DD. At age 3 and age 5, mothers completed the Child Behavior Checklist/2-3 (CBC-L/2-3; Achenbach, Edlebrock, & Howell, 1987). The CBC-L/2-3 version continued to be used at age 5 since the average developmental age of the children in the study was closer to 2- to 3-year-olds than 4- to 18-year-olds. On the CBC-L 2/3, mothers were asked if 100 statements regarding behavior were 0 = *not true*, 1 = *sometimes/somewhat true*, or 2 = *very true/often true* for their child enrolled in the study. Syndrome scales are grouped together to form the internalizing behavior scale (anxious/depressed, withdrawn) and the externalizing behavior scale (aggressive behavior, destructive behavior). The CBC-L/2-3 demonstrates strong reliability and validity (Achenbach, 1992).

At ages 10, 15 and 18, the Child Behavior Checklist/4-18 was administered (CBC-L/4-18; Achenbach & Edelbrock, 1983; Achenbach, 1991). This version of the CBC-L has 112 items. Syndrome scales are grouped together to form the internalizing behavior scale (anxious/depressed, withdrawn, somatic complaints) and the externalizing behavior scale (aggressive behavior, destructive behavior). The CBC-L/4-18 demonstrates strong reliability and validity (Achenbach, 1991).

T-scores for internalizing and externalizing behavior scales were used in analyses, since *t*-scores are recommended when comparing scales across age groups and CBC-L measures (Achenbach, 1992). These *t*-scores reflect each child's deviation from the mean of his/her normative group, based on gender and age. Because the *t*-scores for the internalizing and externalizing behavior scales are not truncated, statistical analyses using the *t*-scores yield similar results to those using the raw scores (Achenbach, 1992). Internal consistency ranged from $\alpha = 0.74$ to $\alpha = 0.99$ for internalizing behaviors and from $\alpha = 0.89$ to $\alpha = 0.99$ for externalizing behaviors across time points in this sample. Descriptive statistics are reported in Table 1.

2.3.3. Parenting stress

Two measures were used to assess mothers' level of parenting stress in this study. Mothers completed the Parenting Stress Index (PSI; Abidin, 1995) at ages 3, 5, 10, and 15. The Parent Domain of the PSI was used as the outcome variable since the validity of the Child Domain has been questioned for parents of children with DD (Baker et al., 2003; Innocenti, Huh, & Boyce, 1992). Mothers were asked to indicate on a 5-point Likert scale the extent to which they agreed with 54 statements regarding their reactions to the parenting experience and their sense of emotional equilibrium associated with the parenting experience. The Parent Domain score consists of items across seven subscales: depression, attachment, restrictions in role, sense of competence, social isolation, relations with spouse (when applicable), and health. Higher scores reflect perceptions of higher parent-related stress. The PSI has demonstrated strong reliability (Abidin, 1995) and validity among parents of children with DD (Hanson & Hanline, 1990).

At age 18, mothers completed the Stress Index for Parents of Adolescents (SIPA; Sheras & Abidin, 1995). The SIPA is an upward extension of the PSI, designed to be developmentally appropriate for parents of adolescents. The SIPA also included a Parent Domain, which consisted of 34 statements regarding their reactions to the parenting experience. The Parent Domain score consists of items across four subscales: life restrictions, relationship with spouse or partner, social alienation, and parenting incompetence or guilt. Higher scores reflect higher perceptions of parent-related stress. The SIPA has demonstrated good internal consistency and strong validity as an upward extension of the PSI (Wheatley & Wille, 2009). Internal consistency for the Parent Domain ranged from $\alpha = 0.92$ to $\alpha = 0.93$ across time points in the present sample. Descriptive statistics are reported in Table 1.

2.4. Analytic plan

Distributions of parenting stress, internalizing behavior, and externalizing behavior were approximately normal, based on visual inspection of the distributions as well as descriptive statistics (skewness, kurtosis). The main path analyses were conducted using structural equation modeling (SEM) in MPlus version 7 (Muthén & Muthén, 2012), with full information maximum likelihood (FIML) to account for missing data (Enders, 2010). A series of nested models were conducted and compared on model fit. Maternal education (in years) was included as an auxiliary variable in all models. Parallel sets of models were conducted for internalizing and externalizing behavior with parenting stress.

Model 1 represents a stability model, with paths from early child behavior problems to later child behavior problems as well as from early parenting stress to later parenting stress (e.g., age 3-5, age 5-10). Scores on child behavior problems and parenting stress were allowed to correlate cross-sectionally at each time point. Model 2 represents the cross-lagged model. Additional paths were added for cross-effects from early child behavior problems to later parenting stress as well as from early parenting stress to later child behavior problems. There were four sets of cross-effects (e.g., age 3–5, age 5–10, age 10–15, and age 15–18). Cross-lagged models have been previously used to examine transactional effects within families of children with DD (Greenberg, Seltzer, Hong, & Orsmond, 2006; Neece et al., 2012). Scores on child behavior problems and parenting stress were again allowed to correlate cross-sectionally at each time point, resulting in a conservative estimate of cross-effects. The fit of Model 2 was compared to Model 1 by a chi-square difference test using the Satorra–Bentler scaled chi-square (Satorra & Bentler, 2001). The final model, Model 3, represents the cross-lagged model with additional lagged paths suggested by modification indices to improve model fit (e.g., age 3–10). Scores on child behavior problems and

Table 1
Descriptive statistics for child behavior problems and parenting stress.

Child age	Internalizing behaviors[a]		Externalizing behaviors[a]		Parenting stress[b]	
	M	SD	M	SD	M	SD
3	55.15	7.66	48.39	9.66	121.93	24.78
5	54.69	9.09	48.08	11.05	122.91	24.62
10	52.64	10.37	51.00	11.33	122.33	24.66
15	53.71	11.68	49.81	11.50	112.09	25.82
18	52.85	10.89	49.94	10.59	66.56	18.13

[a] CBC-L/2-3 used at ages 3 and 5; CBC-L/4-18 used at ages 10, 15 and 18.
[b] PSI used at ages 3, 5, 10, and 15; SIPA used at age 18.

parenting stress were again allowed to correlate cross-sectionally at each time point. The fit of Model 3 was compared to Model 2 by a chi-square difference test using the Satorra–Bentler scaled chi-square (Satorra & Bentler, 2001).

3. Results

3.1. Internalizing behaviors

Table 2 displays the standardized estimates for path analyses with parenting stress and internalizing behavior. As seen in Model 1, parenting stress and internalizing behaviors showed high stability across time points. Scores on internalizing behaviors and parenting stress were significantly correlated cross-sectionally at each time point, with the exception of age 5 (age 3: $\beta = 0.40$, $p < 0.001$; age 10: $\beta = 0.36$, $p < 0.001$; age 15: $\beta = 0.25$, $p < 0.01$; age 18: $\beta = 0.25$, $p = 0.01$). Model 1 fit the data significantly better than alternative models where stability paths for internalizing behavior were constrained to be equal to one another and stability paths for parenting stress were constrained to be equal to one another ($\Delta\chi^2 = 40.69$, $df = 6$, $p < 0.001$). The stability paths were therefore allowed to vary across time points.

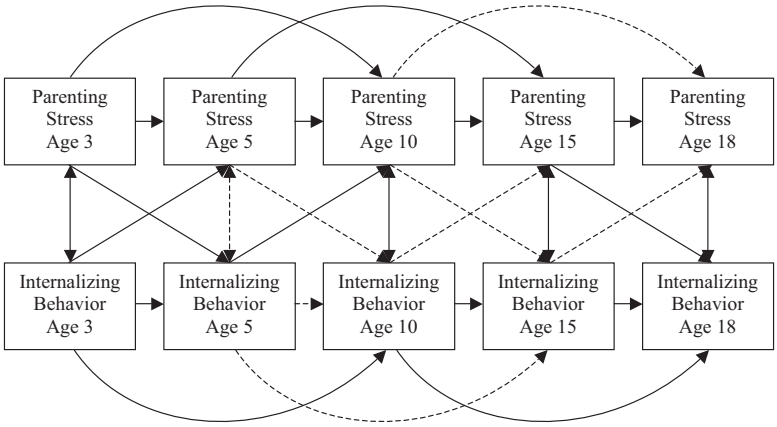
As seen in Model 2, significant cross-effects were observed for internalizing behavior and parenting stress. From age 3 to age 5, significant cross-effects were observed in both directions. In other words, internalizing behavior at age 3 predicted parenting stress at age 5 and parenting stress at age 3 predicted internalizing behavior at age 5. A similar pattern was found from age 5 to age 10. Internalizing behavior at age 5 predicted parenting stress at age 10 while parenting stress at age 5 also predicted internalizing behavior at age 10. There were no significant cross-effects from age 10 to age 15. From age 15 to age 18, there were again significant cross-effects in both directions. Internalizing behavior at age 15 predicted parenting stress at age 18 and parenting stress at age 15 predicted internalizing behavior at age 18. Scores on internalizing behaviors and parenting stress were significantly correlated cross-sectionally at each time point, with the exception of age 5 (age 3: $\beta = 0.39$, $p < 0.001$; age 10: $\beta = 0.32$, $p < 0.001$; age 15: $\beta = 0.23$, $p = 0.01$; age 18: $\beta = 0.24$, $p < 0.01$). Model 2 fit the data significantly better than Model 1 ($\Delta\chi^2 = 31.36$, $df = 8$, $p < 0.001$).

Table 2
Panel analyses of parenting stress and internalizing behavior (standardized estimates).

Path	Time points	Model 1 β	Model 2 β	Model 3 β
Stability effects				
Parenting stress	Age 3–5	0.74***	0.69***	0.68***
	Age 5–10	0.62***	0.57***	0.23*
	Age 10–15	0.79***	0.79***	0.64***
	Age 15–18	0.66***	0.62***	0.43***
Internalizing behavior	Age 3–5	0.52***	0.48***	0.47***
	Age 5–10	0.23***	0.23**	0.13
	Age 10–15	0.72***	0.73***	0.71***
	Age 15–18	0.59***	0.54***	0.29**
Cross-effects				
Parenting stress → Internalizing behavior	Age 3–5	–	0.16*	0.16*
	Age 5–10	–	0.19*	0.11
	Age 10–15	–	0.01	−0.03
	Age 15–18	–	0.19*	0.15†
Internalizing behavior → Parenting stress	Age 3–5	–	0.14*	0.15*
	Age 5–10	–	0.20**	0.18*
	Age 10–15	–	0.02	0.02
	Age 15–18	–	0.18**	0.17*
Lagged effects				
Parenting stress	Age 3–10	–	–	0.44***
	Age 5–15	–	–	0.25***
	Age 10–18	–	–	0.24†
Internalizing behavior	Age 3–10	–	–	0.23**
	Age 5–15	–	–	0.10
	Age 10–18	–	–	0.35***

Model fit	Model 1	Model 2	Model 3
RMSEA	0.11	0.10	0.03
SRMR	0.16	0.08	0.04
TLI	0.85	0.88	0.99
CFI	0.89	0.94	0.99
χ^2	104.00***	66.64***	21.24
df	32	24	18

† $p < .10$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.



Note: —— *significant effect (p < .05),* ----- *non-significant effect (p > .05)*

Fig. 1. Cross-lagged model of parenting stress and internalizing behavior.

Based on suggestions from modification indices for Model 2, additional lagged paths were added to Model 3. Specifically, paths for age 3 predicting age 10, age 5 predicting age 15, and age 10 predicting age 18 were added for both parenting stress and internalizing behavior. As seen in Table 2, there were significant lagged effects for parenting stress from age 3 to age 10 and from age 5 to age 15. Significant lagged effects were also found for internalizing behavior, from age 3 to age 10 and from age 10 to age 18.

The addition of these lagged paths resulted in several cross-effects becoming non-significant. Parenting stress at age 5 no longer predicted internalizing behavior at age 10. The impact of parenting stress at age 15 on internalizing behavior at age 18 was reduced to trend level ($p = .07$). Scores on internalizing behaviors and parenting stress remained significantly correlated cross-sectionally at each time point, with the same exception of age 5 (age 3: $\beta = 0.39$, $p < 0.001$; age 10: $\beta = 0.36$, $p < 0.001$; age 15: $\beta = 0.21$, $p = 0.01$; age 18: $\beta = 0.24$, $p < 0.01$). The fit of Model 3 was significantly better than Model 2 ($\Delta\chi^2 = 45.40$, $df = 6$, $p < 0.001$). Fig. 1 displays the final cross-lagged model for internalizing behavior and parenting stress, based on standardized estimates from Model 3.

3.2. Externalizing behaviors

Table 3 displays the standardized estimates for path analyses with parenting stress and externalizing behavior. There was high stability in parenting stress and externalizing behavior across time points. Scores on externalizing behaviors and parenting stress were significantly correlated cross-sectionally at each time point (age 3: $\beta = 0.45$, $p < 0.001$; age 5: $\beta = 0.37$, $p < 0.001$; age 10: $\beta = 0.31$, $p < 0.001$; age 15: $\beta = 0.34$, $p < 0.001$; age 18: $\beta = 0.36$, $p < 0.001$). Model 1 fit the data significantly better than alternative models where stability paths for externalizing behavior were constrained to be equal to one another and stability paths for parenting stress were constrained to be equal to one another ($\Delta\chi^2 = 20.75$, $df = 6$, $p < 0.01$). The stability paths were therefore allowed to vary across time points.

As seen in Model 2, significant cross-effects were observed for externalizing behavior and parenting stress. From age 3 to age 5, significant cross-effects were observed in both directions. Externalizing behavior at age 5 predicted parenting stress at age 10. Similarly, externalizing behavior at age 10 predicted parenting stress at age 15. In the reverse direction, parenting stress at age 15 predicted externalizing behavior at age 18. Scores on externalizing behaviors and parenting stress remained significantly correlated cross-sectionally at each time point (age 3: $\beta = 0.45$, $p < 0.001$; age 5: $\beta = 0.34$, $p < 0.01$; age 10: $\beta = 0.28$, $p < 0.001$; age 15: $\beta = 0.33$, $p < 0.001$; age 18: $\beta = 0.34$, $p < 0.001$). Model 2 fit the data significantly better than Model 1 ($\Delta\chi^2 = 23.09$, $df = 8$, $p < 0.01$).

Based on suggestions from modification indices for Model 2, additional lagged paths were added to Model 3. In parallel with the models for internalizing behavior, paths for age 3 predicting age 10, age 5 predicting age 15, and age 10 predicting age 18 were added for both parenting stress and externalizing behavior. As seen in Table 3, there were significant lagged effects for parenting stress from age 3 to age 10 and from age 5 to age 15. Significant lagged effects were also found for externalizing behavior, from age 3 to age 10 and from age 10 to age 18.

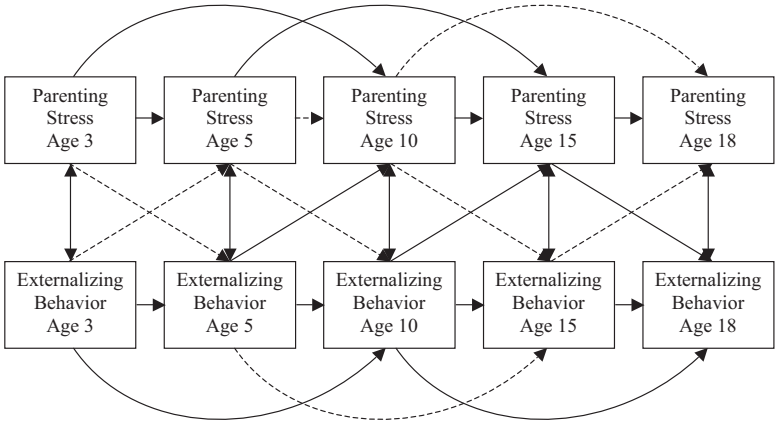
The cross-effects remained significant despite the addition of these lagged paths. Scores on externalizing behaviors and parenting stress remained significantly correlated cross-sectionally at each time point (age 3: $\beta = 0.45$, $p < 0.001$; age 5: $\beta = 0.35$, $p < 0.001$; age 10: $\beta = 0.23$, $p < 0.01$; age 15: $\beta = 0.35$, $p = 0.01$; age 18: $\beta = 0.31$, $p < 0.01$). The fit of Model 3 was significantly better than Model 2 ($\Delta\chi^2 = 71.22$, $df = 6$, $p < 0.001$). Fig. 2 displays the final cross-lagged model for externalizing behavior and parenting stress, based on estimates from Model 3.

Table 3
Panel analyses of parenting stress and externalizing behavior (standardized estimates).

Path	Time Points	Model 1 β	Model 2 β	Model 3 β
Stability effects				
Parenting stress	Age 3–5	0.74***	0.75***	0.74***
	Age 5–10	0.65***	0.56***	0.13
	Age 10–15	0.80***	0.74***	0.59***
	Age 15–18	0.66***	0.72***	0.54***
Externalizing behavior	Age 3–5	0.59***	0.55***	0.54***
	Age 5–10	0.64***	0.68***	0.48***
	Age 10–15	0.73***	0.78***	0.71***
	Age 15–18	0.67***	0.59***	0.37***
Cross-effects				
Parenting stress → Externalizing behavior	Age 3–5	–	0.10	0.10
	Age 5–10	–	−0.03	−0.04
	Age 10–15	–	−0.05	−0.09
	Age 15–18	–	0.23***	0.19**
Externalizing behavior → Parenting stress	Age 3–5	–	0.02	0.02
	Age 5–10	–	0.20*	0.21**
	Age 10–15	–	0.13*	0.14*
	Age 15–18	–	−0.04	−0.02
Lagged effects				
Parenting stress	Age 3–10	–	–	0.53***
	Age 5–15	–	–	0.23***
	Age 10–18	–	–	0.21†
Externalizing behavior	Age 3–10	–	–	0.34***
	Age 5–15	–	–	0.13†
	Age 10–18	–	–	0.32***

Model fit	Model 1	Model 2	Model 3
RMSEA	0.12	0.13	0.03
SRMR	0.15	0.09	0.03
TLI	0.85	0.84	0.99
CFI	0.90	0.92	0.99
χ^2	114.43***	91.34***	21.12
df	32	24	18

† $p < .10$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.



Note: —— *significant effect (p < .05),* ----- *non-significant effect (p > .05)*

Fig. 2. Cross-lagged model of parenting stress and externalizing behavior.

4. Discussion

By employing a transactional perspective, we were able to examine both the stability and reciprocal relations between maternal parenting stress and children's behavior problems in this sample of children with early diagnosed developmental disabilities. The results of this investigation indicate the importance of examining these transactional relations longitudinally, extending from early childhood through adolescence. In addition, the findings suggest the value of considering the two domains of behavior problems, internalizing and externalizing, separately in relation to maternal stress. Although both domains demonstrate relatively high degrees of stability across these developmental periods, the patterns of cross-over effects differed. These patterns have implications for both developmental theory and for service provision for individuals with DD and their families.

In relation to internalizing behaviors, bidirectional relations with parenting stress are apparent in the early childhood years. At age 3, internalizing behavior problems and parenting stress are related to each other and each predicts the other at age 5. Children with higher levels of internalizing behaviors at age 3 have parents with higher levels of parenting stress at age 5, controlling for levels of parenting stress at age 3. Conversely, parents with higher levels of parenting stress at age 3 have children with higher levels of internalizing behaviors at age 5, controlling for levels of internalizing behaviors at age 3. This suggests that bidirectional reciprocal relations occur during the early childhood period in consideration of children's internalizing behavior problems and maternal parenting stress. This pattern is consistent with the developmental systems model proposed by Guralnick (2011) in which the patterns of interactions between parents and young children with disabilities assume mutually reciprocal influences. Early childhood is the only time point, however, in which we note such reciprocal relations.

From early to middle childhood (ages 5–10) we found that children's internalizing behavior problems predicted later parenting stress. This pattern of findings suggests a child-driven model during the early to middle childhood phase, as was also reported by Keogh et al. (2000) for participants in a study of children with DD. Our investigation indicates the value of extending the question of transactional models beyond the middle childhood phase into the adolescent period, however. We found that parenting stress at age 15 predicted adolescent internalizing behavior problems at age 18, suggesting a parent-driven model during mid- to late-adolescence. In addition, the results of the analyses presented here suggest the need for further exploration of children's and mothers' lives when children move from middle childhood to adolescence (at ages 10–15); although child behavior and parenting stress appear to be related at those time points, neither predicts the other at the subsequent time. The absence of parent-driven effects may be due in part to high stability in internalizing behaviors across this period. The stability coefficient for internalizing behaviors was strongest from middle childhood to adolescence, leaving little variability in internalizing behaviors in adolescence to be explained by parenting stress in middle childhood. This suggests that internalizing behaviors for individuals with DD may become increasingly intransigent during adolescence. If so, this indicates a compelling need for intervention for internalizing behavior problems before the adolescent period.

In contrast to internalizing behavior problems, the findings for the transactional relations between maternal parenting stress and children's externalizing behavior problems reveal a somewhat different pattern. At no single age during the life phases investigated here do reciprocal bidirectional relations occur. Instead, children's externalizing behavior problems predicted subsequent parenting stress at ages 5–10 and ages 10–15. This suggests a child-driven model from early to middle childhood, as was noted by Keogh et al. (2000). Our results add to those of Keogh et al. by indicating that this child-driven model continues in relation to externalizing behavior problems and parenting stress from middle childhood to early adolescence. However, similar to the findings for internalizing behavior problems, parenting stress at age 15 predicted subsequent behavior problems at age 18. Therefore, parenting stress appears to exert its greatest subsequent effects on both domains of behavior problems during the middle to late adolescent period. This suggests that this life phase is one in which adolescents are particularly vulnerable to the stress experienced by their mothers. This may be the result of developmental processes of adolescents as they become increasingly aware of the emotional cues of others, including their parents (Olson & Dweck, 2009). It is also possible that parents, not only adolescents, are making developmental changes during this life phase and may experience a pile-up of stressors, such as care for elderly parents (Miller, 2010), which may not be reflected in parenting stress per se but still may affect parent-adolescent relationships.

Although externalizing behaviors were predictive of subsequent parenting stress during later childhood, they were not predictive during the early childhood period (ages 3–5 years). The reverse direction of effects was also not observed. This pattern stands in sharp contrast to the one observed for internalizing behaviors during early childhood, where both cross-lagged effects were significant. It may be the case that the externalizing behaviors displayed by these children with DD are viewed by parents as more normative during this period, while internalizing behaviors at this age may highlight developmental differences between their children and other children. Indeed, the children in this sample showed a greater departure from their typically developing peers in internalizing behaviors at age 3 and age 5 than in externalizing behaviors, as evidenced by differences in mean t-scores at these time points. In addition, all families in this study participated in early intervention services (i.e., Individuals with Disabilities Education Act [IDEA] Part C), and it is also possible that such services assist mothers in managing externalizing behavior problems (IDEA, 2004). Yet, in contrast, the hidden nature of internalizing behaviors (e.g. withdrawal) may not have elicited the same type of attention from EI providers.

This study has potential contributions in advancing an understanding of the transactional relations between children with DD and their mothers. Nevertheless, the findings need to be considered in relation to study limitations. The participants were largely Euro-American and moderately well educated and thus do not reflect the full demographic range of families who have children with DD. Also, mothers completed measures of children's behavior problems and assessments of their own parenting stress, making the results sensitive to potential problems with self-report and with shared measure variance. Finally, the families participated in early intervention services and the effects of such participation on transactional relations are not fully known. Indeed, early intervention services aim to provide a system of supports that increase positive family patterns of interaction as well as assist children in their self-regulatory organizational processes (Guralnick, 2011).

Despite the limitations of this investigation, the findings have important implications for interventions. In particular, the findings suggest that interventions may be most successful if they are targeted during specific life phases. During the early childhood period, the time in which reciprocal bidirectional relations between mothers and children appear to be strongest, interventions should simultaneously address reducing parenting stress and children's behavior problems. Several interventions for reducing behavior problems in typically developing children have shown positive and long-term effects (Bond, Woods, Humphrey, Symes, & Green, 2013; Rapee, 2013). Although interventions to reduce behavior problems in children with DD are less studied, they also have yielded positive effects (Heyvaert, Maes, & Onghena, 2010; Walker & Snell, 2013; Whittingham, Sanders, McKinlay, & Boyd, 2014). If both maternal stress and child behaviors are addressed during the early childhood period, the future trajectories and relations among these constructs are likely to change in the direction of greater child self-regulation and more adaptive maternal well-being. Beyond early childhood, interventions with children to reduce their levels of externalizing and internalizing behavior problems are likely to relate to less subsequent parenting stress for mothers. During adolescence, interventions to reduce parenting stress are critical both to the well-being of mothers and to assist in the reduction of levels of both internalizing and externalizing behavior problems in adolescents themselves (Connell, Dishion, Yasui, & Kavanagh, 2007; Singer, Ethridge, & Aldana, 2007).

In conclusion, the transactional relations between parenting stress and children's behavior problems in children with DD are complex. This current study demonstrates the advantage of longitudinal analyses and of considering the two domains of behavior problems separately in examining transactional relations. We found that the parent–child transactions vary with different life phases and with different domains of behavior problems. Indeed, the complexity of parent–child transactions was anticipated by Sameroff and Chandler (1975) in their initial presentation of this perspective. An understanding of this transactional complexity is central to future work with children with DD and their families.

Acknowledgements

The Early Intervention Collaborative Study (EICS) is funded by the U.S. Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Research Program (R40 MC08956, P. Hauser-Cram, principal investigator). This manuscript was prepared with support from the National Institute on Child Health and Human Development (P30 HD03352, M.R. Mailick, principal investigator) and from an Institute of Education Sciences research fellowship training grant (R324B12002, P. Synder, principal investigator) to the University of Florida. We would like to thank the families who participated in this research.

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