

An Exploratory Investigation of the Role of Parenting Stress in Relationship Focused Intervention

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Background Mothers of young children with Pervasive Developmental Disorders (PDD) and other disabilities (DD) have been reported to experience high levels of stress. This investigation examined the effects of parental stress on mothers' participation in a Relationship Focused intervention (RFI).

Methods Mothers and young children who had either PDD (n = 18) or DD (n = 26) received weekly RF intervention for one year.

Results Pre-post comparisons indicated significant increases in mothers' responsiveness and children's development and social emotional functioning. Intervention effects were greater for mothers of children

with PDD than for mothers of children with DD. There were three findings related to the role parenting stress. First, high levels of parenting stress did not interfere with mothers' ability to learn RFI strategies; second, there were non-significant decreases in parenting stress during intervention; third, parenting stress enhanced the effects of mothers' responsiveness on children.

Conclusion High levels of parenting stress does not appear to interfere with parent participation in RFI.

Keywords: autism, parenting stress, relationship focused intervention, responsive, teaching

Relationship Focused Intervention (RFI) attempts to enhance the developmental functioning of young children by encouraging parents to engage in highly responsive interactions. RFI was derived from research examining parental influences on the development of young children which has consistently indicated that parental responsiveness is associated with children's cognitive (Landry *et al.* 2001), communication (Tamis-LeMonda *et al.* 2001) and social-emotional functioning (Smeekens *et al.* 2008). While much of this research has been reported with typically developing children, similar findings have also been reported for children with disabilities (Brooks-Gunn & Lewis 1984; Siller & Sigman 2002). As a result, RFI encourages parental responsiveness by teaching parents to use responsive interaction (RI) strategies that emphasize five components of responsive behaviour: Contingency, Reciprocity, Non-Directiveness, Affect and Quality of Stimulation (Mahoney & Nam 2011).

Studies have evaluated RFIs with a range of children with developmental risks and disabilities. These include children with autism, Down syndrome, and other

developmental delays, as well as adopted, premature and other at-risk children (See Mahoney & Nam 2011 for reviews of these studies). While most evaluations have used quasi-experimental research designs, a number of recent evaluations have used randomized control group designs which have provided increasing support for the effectiveness of RFIs at enhancing children's developmental and social-emotional functioning.

One issue that has received little attention in the RFI literature is related to the factors that either influence the ability of parents to participate in RFIs or moderate the effectiveness of RFI strategies. Mahoney & Nam (2011) reported that as many as 50% of the parents who have participated in RFI studies have not been successful at learning RI strategies and/or have failed to use them. Although such failures could result from ineffective intervention techniques, these problems might also be attributed to characteristics of parents themselves.

In this study, we examine the role of parenting stress in RFI. Parenting stress is one of the primary psychosocial consequences of having a child with disabilities. Numerous studies have documented the

high levels of parenting stress associated with raising a child with disabilities (c.f., Watson *et al.* 2011). The stress experienced by these parents does not appear to be associated with family relationship problems, but more with the unique factors associated with raising children with disabilities. Among others, these include increased child care burdens (Hauser-Cram *et al.* 2001) as well as parents' concerns about their children's future which are compounded by the severity of their children's disability (Innocenti & Kwisun 1992).

Several investigations have also examined the stress experienced by parents of children with autism (ASD). Without exception these studies have reported that these parents experience higher levels of stress than parents of children with other disabilities (e.g. Estes *et al.* 2009) and that the stress experienced by these parents is often in the clinical range (Dale *et al.* 2006). In addition to the factors identified for parents of children with disabilities, the stress experienced by these parents has been reported to be associated with the processes associated with their children's diagnoses (Taylor & Warren 2012), as well as with the difficulties parents encounter in interacting with their children (Davis & Carter 2008) and managing their children's behaviour problems (Beck, Hastings & Daley, 2004).

To the extent that RFIs enhance parent-child interaction and result in decreases in children's challenging behaviours (e.g. Mahoney & Perales 2005), RFIs have the potential to reduce parenting stress, particularly with parents of children with autism because of their difficulties in engaging in interaction and managing their children's behaviour problems. However, reductions in parenting stress may be difficult to attain whether parent's level of stress at the onset of intervention interferes with their ability to participate in RFIs. Indeed, there is some evidence that high levels of parenting stress impede parents from participating in parent-mediated interventions (Osborne *et al.* 2008). In addition, even if parents are able to learn RI strategies, high levels of parenting stress may either interfere with their ability to implement these strategies, or limit the amount of time they use these strategies while playing or communicating with their children (e.g. Neece & Baker 2008; Noel *et al.* 2008). To the extent these situations occur, they might either decrease the likelihood of RI strategies reducing parental stress or moderate the effects of RI strategies on children's developmental functioning.

This study is a secondary analysis of an investigation that compared the effects of RFI curriculum called Responsive Teaching [RT (Mahoney & Perales 2005)] with parents and preschool-aged children who were

diagnosed either with pervasive developmental disorders (PDD) or some other type of developmental disability (DD). In the original study, RT was provided to parents and children during weekly intervention sessions for one year. Results indicated that mothers of children with both PDD and DD increased their responsiveness and affect and decreased their directiveness. In addition, both groups of children made substantial improvements in their cognitive, communication and social-emotional functioning. While children with PDD made greater developmental improvements than children with DD, these differences were associated with their mothers' changes in responsiveness and could not be attributed to children's diagnoses. In addition, the study reported considerable variability in the changes in responsiveness for both groups of mothers, with one-third of the mothers making no improvements during intervention.

This study was designed to explore how parenting stress contributed to the intervention changes observed in the original study (Mahoney & Perales 2005). In particular, there were three issues we attempted to investigate: (i) whether there was a relationship between the level of stress mothers were experiencing with their ability to learn and use RI strategies; (ii) whether mothers who were successful at using RI strategies experienced decreases in parenting stress during intervention; and (iii) whether parenting stress moderated the effects of responsiveness on the developmental changes their children made during intervention. We hypothesized that (i) mothers' ability to use RI strategies would be negatively associated with the amount of stress they were experiencing; (ii) parents who became more responsive during intervention would experience decreased levels of parenting stress; and (iii) high levels of parenting stress would mitigate the effects of mother's changes in responsiveness on their children development and social-emotional functioning.

Methods

Subjects

The sample included 44 of the 50 mothers and children who participated in the original study. Six subjects from the original sample were excluded because of incomplete data on parenting stress. All of the children were under 5 years of age and either had PDD ($n = 18$) or DD ($n = 26$). Demographic information for these mothers and children are reported on Table 1. The majority of mothers were Caucasian; ages ranged from 24 to 43 years;

Table 1 Demographic characteristics of mothers and children

Variable	PDD (<i>n</i> = 18)		DD (<i>n</i> = 26)		Statistics
	%	<i>M</i> (SD)	%	<i>M</i> (SD)	
Characteristics of mothers					
Age (years)		32.5 (7.7)		40.5 (5.2)	0.53 ⁴
Marital status (% married)	100%		88.5%		2.23 ⁵
Race					
White	100%		80.8%		3.90 ⁵
Other	0%		19.2%		
Education (years)		15.4 (2.6)		14.2 (1.9)	1.80 ⁴
Employed	55.5%		34.6%		2.37 ⁵
Full time	33.3%		15.4%		
Part time	22.2%		19.2%		
Characteristics of children					
Age at onset (months)		32.2 (7.7)		23.5 (6.1)	4.30 ^{4***}
Gender (% males)	55%		69%		0.35 ⁵
Transdisciplinary play-based assessment					
Object play ¹		16.1 (6.2)		18.0 (6.5)	0.97 ⁴
Symbolic play ¹		15.0 (5.5)		15.4 (5.5)	0.26 ⁴
Expressive language ¹		13.8 (7.1)		12.9 (5.8)	0.47 ⁴
Receptive language ¹		11.4 (7.3)		15.8 (6.0)	2.17 ^{4*}
Temperament and atypical behavior scale					
Detached ²		18.4 (19.7)		47.3 (11.6)	6.11 ^{4***}
Hypersensitive/active ²		41.5 (14.5)		46.3 (16.6)	0.98 ⁴
Underreactive ²		32.0 (10.9)		48.3 (12.2)	4.53 ^{4***}
Dysregulated ²		34.5 (16.3)		47.4 (10.1)	3.22 ^{4**}
Total ³		54.6 (37.1)		91.7 (25.0)	3.97 ^{4***}

PDD, pervasive developmental disorder; DD, developmental disability.

¹Developmental age in months at time 1.

²*T* score (mean = 50, SD = 10).

³Standard score (mean = 100; SD = 15).

⁴*t*-test.

⁵Chi-square.

**P* < 0.05.

***P* < 0.01.

****P* < 0.001.

education ranged from 12 to 22 years; almost one half worked; family income levels were in the middle- to upper-middle-class range; and most were married. Children's chronological ages ranged from 11 to 54 months (*M* = 27.0, *SD* = 8.0), and almost two thirds were boys.

Children with PDD had been diagnosed as having autism (*n* = 8); autism with intellectual disabilities (*n* = 3); or pervasive developmental disorders (*n* = 7) by their physicians. All of these diagnoses can be classified under the general category of Pervasive Developmental Disorders (PDD) according to the DSM-IV (American Psychiatric Association 2000). These children had developmental scores as assessed by the

Transdisciplinary Play-Based Assessment [TPBA (Linder 1993)] and socio-emotional scores as assessed by the Temperament and Atypical Behavior Rating Scale [TABS, (Bagnato *et al.* 1999)] that met DSM-IV criteria for ASD at the onset of the study.

All children with DD had significant delays in cognition and/or communication as measured by the TPBA. One child with DD had a diagnosed medical condition (neurofibromatosis (*n* = 1), while the rest were identified with speech/language problems (*n* = 13) or developmental delays (*n* = 12). While children with PDD were older than children with DD [*t* (42) = 4.30, *P* < 0.000], group differences in children's estimated

developmental ages (DA) for three TPBA subscales (object play, symbolic play and expressive communication) were not significant.

The two groups of children differed in their socio-emotional functioning as indicated by scores on the TABS. Children with PDD exhibited significantly more problems in detachment, underreactivity and dysregulation than children with DD. The average Total TABS scores for children with PDD was more than 3 standard deviations below the mean which is the cut-off score used to classify children as regulatory disordered.

Procedures

Subjects received RT during weekly 1-h parent-child sessions that were conducted either at a centre-based facility or at their homes by one of six early intervention specialists following the intervention procedures outlined in the RT manual (see Mahoney & Perales 2005 for more details). Subjects participated in this study for approximately 1 year (mean = 11.3 months, SD = 2.1). While subjects were scheduled for one session each week, they received an average of 32.6 (SD = 12.9) sessions. At the completion of intervention, parents reported spending an average of 15.1 (SD = 2.4) hours each week carrying out intervention activities with their children at home.

Data collection

Child and family assessment data were collected at the beginning and end of intervention. The following describes the instruments that were used to address the research questions.

Mothers' interactive style

Each mother-child dyad was video recorded while playing together for seven minutes with a set of developmentally appropriate toys. Toys included stacking rings, nesting blocks, picture books as well as a toy car, toy airplane and toy train. Mothers were instructed to play with their children as they normally do.

Mothers' style of interaction was assessed with the Maternal Behavior Rating Scale [MBRS (Mahoney 1992)]. The MBRS is a 12-item scale that assesses four interactive dimensions: responsiveness, affect, achievement orientation and directiveness. Research indicates that the MBRS assesses parenting characteristics associated with children's developmental growth and is sensitive to changes in interaction promoted through parent-mediated interventions (Mahoney & Powell 1988; Mahoney *et al.* 1998).

Observations of mother-child interaction were coded by raters who had received at least 40 h of training and who had attained at least 80% agreement within 1 point on a 5-point Likert scale. To minimize rater bias, observations were randomly sorted so that before and after observations were counterbalanced and were not coded consecutively for any subject.

A second rater coded a random selection of 30% of the observations to assess reliability. Raters attained 60% exact agreement and 99% agreement within one scale point. Inter-rater reliability using Cohen's kappa was 0.43 ($P < 0.000$). This level of reliability is consistent with reliabilities reported for previous MBRS studies.

Child development

The Transdisciplinary Play-Based Assessment (Linder 1993) is a child development observational protocol for children up to 6 years of age. The TPBA meets the developmental assessment criteria recommended by Zero to Three (Greenspan & Meisels 1994). It is most useful for children who are underrepresented in normative test samples, such as children with DD and PDD, because it provides these children opportunities to engage in play activities in a manner that is compatible with their behavioural style and developmental level.

Each of the play and social behaviours children produced during a 30- to 45-min play observation were transcribed from video recordings and coded according to their developmental age (DA) level as reported in the Developmental Rainbow (Mahoney & Perales 1996). The Developmental Rainbow is a child development profile that was designed to be used for early childhood developmental observations and play-based assessments. It includes a detailed list of the skills and behaviours young children manifest across five developmental domains (cognition, communication, socio-emotional functioning, motor development and self-help) and are organized according to reported DA ranges. Items included in this profile were compiled from several standardized developmental assessments and pre-school curricula.

DAs were computed for child development domains specified in the Developmental Rainbow. These included two cognitive domains: object play and symbolic play; and two language domains: expressive and receptive language. DAs were estimated by independent raters based upon the highest age level developmental behaviours that children consistently demonstrated (i.e. more than ten times) during the observation for each developmental domains. Inter-rater reliability was calculated on 20% of the observations. A

t-test indicated no significant differences between the DA ratings for the two observers ($t = 0.84, P > 0.05$), and Pearson's correlation indicated that their ratings were highly correlated ($r = 0.92, P < 0.001$).

Socio-emotional functioning

The Temperament and Atypical Behavior Scale [TABS (Bagnato *et al.* 1999)] is a standardized instrument for assessing problem behaviour of children from 1 to 6 years of age. The TABS is a parent respondent instrument that includes 55 items which assess four factors: detached, hypersensitive/active, underreactive and dysregulated.

Parenting stress

The Parenting Stress Inventory-Short Form [PSI (Abidin 1995 – 3rd Ed.)] was administered to assess the psychological status of mothers. The PSI is a 36-item self-report questionnaire that has three subscales (parental distress, dysfunctional parent-child interaction and difficult child) and a Total Stress Index. Internal consistency as assessed with Cronbach's alpha was 0.91 for the Total Stress Index, and for the subscales were as follows: (i) 0.78 for parental distress; (ii) 0.82 for dysfunctional parent-child dysfunctional interaction; and (iii) 0.83 for difficult child.

Results

Preliminary analyses

As the sample excluded six subjects from the original study (Mahoney & Perales 2005), analyses were conducted to re-examine intervention effects. In general,

pre- and post-comparisons indicated that the results were comparable with those reported in the original study. Consistent with the focus of RT, mothers of children with both PDD and DD increased their responsiveness and affect, but did not decrease their directiveness as originally reported. In addition, both groups of children made significant improvements on most measures of cognitive, communication and social-emotional functioning comparable to those reported in the original analyses.

Intervention changes in parenting stress

PSI-SF scores are reported on Table 2. For mothers of children with PDD, average Total Stress scores were above the clinical cut-off, while for mothers of children with DD Total Stress scores were 10 points below the clinical cut-off. Fifty-six per cent of the mothers of children with PDD and 23% of the mothers of children with DD had Total Stress scores in the clinical range (e.g. PSI Total > 89). A between subjects MANOVA indicated that there were significant group differences in parenting stress at Time 1 ($F [3, 40] = 6.06, P < 0.01$). Mothers of children with PDD experienced higher levels of stress associated with Dysfunctional Parent-Child Interaction ($F [3, 40] = 12.69, P < 0.01$) and Difficult Child ($F [1, 42] = 4.57, P < 0.05$). As indicated on Figure 1, the percentage of mothers exhibiting clinical levels of stress at post-intervention declined to 33% for mothers of children with PDD but remained stable for mothers of children with DD.

A repeated measures MANOVA of parenting stress scores (Table 2) indicated that neither the effects of Time nor Time \times Group were significant ($P_s > 0.05$). However, repeated measures ANOVAS indicated that both

Table 2 Before and after data for parenting stress

Variable	Pre-intervention				Post-intervention				<i>F</i> (intervention)	<i>F</i> (intervention \times group)
	DD		PDD		DD		PDD			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Parenting stress ¹									1.70	0.91
Personal distress	29.6	8.7	29.4	7.9	25.9	7.1	28.1	7.7	5.19*	1.15
Parent child interaction	21.5	6.6	28.5	6.0	20.9	4.9	27.0	8.1	1.06	0.22
Difficult child	28.8	6.9	34.3	10.4	28.0	7.0	31.8	8.8	1.61	0.46
Total stress	79.9	18.9	92.2	20.7	74.9	15.3	86.9	21.4	3.80*	0.01

¹Parenting stress index-short form.

* $P < 0.05$.

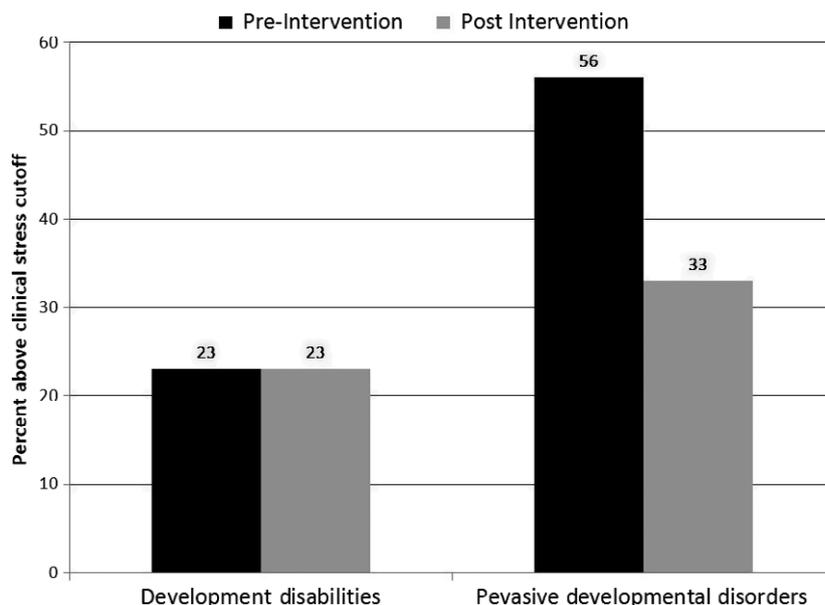


Figure 1 Percentage of mothers with clinical levels of parenting stress.

groups of mothers made significant decreases in Personal Distress and Total Stress during intervention ($P_s < 0.05$).

Relationship of parenting stress to mothers' responsiveness

Because there were no overall significant changes in maternal stress during intervention, bivariate correlations were computed to examine relationships between mothers' parenting stress at T1 with their level of responsiveness at the beginning and end of intervention as well as with the magnitude of their change in responsiveness during intervention. As reported in Table 3, all correlations between parenting stress and various measures of responsiveness were non-significant. There were no significant associations between mothers' Total Stress as well as each of their PSI subscale scores with the changes in responsiveness they attained during intervention.

Relationship of changes in maternal responsiveness and parenting stress to child intervention outcomes

Multiple regressions were used to explore associations between intervention changes in mothers' responsiveness and their total parenting stress at T1 with intervention changes in children's development and social-emotional functioning. While there are no

Table 3 Correlations of parenting stress with maternal responsiveness

Variable	Parenting stress index-SF ¹			
	Parental distress time 1	Dysfunctional P-C interaction time 1	Difficult child time 1	PSI total time 1
Responsiveness time 1	-0.09	-0.10	0.01	-0.07
Responsiveness time 2	0.07	0.19	0.17	0.17
Responsiveness change	-0.10	0.21	0.10	0.17

¹Parenting stress index-short form scores.

fixed rules for the lowest subjects to independent variable ratios that should be used in regression analyses for small samples, Tabachnick & Fidell (2001) propose an absolute minimum of five subjects to one independent variable. For the following analyses, four independent variables were used to explore the effects of responsiveness change and parenting stress on children's intervention outcomes, resulting in 11 subjects per independent variable.

In addition, because these analyses investigated how parental stress might impact the effects of responsiveness change on children's development, only child outcomes that were significantly correlated with

responsiveness change were examined. These included two of the four TPBA subscales, object play and receptive language, and two of the four TABS subscales, detached and dysregulated as well as the Total TABS score.

Child development outcomes

Proportional change indices [PCI (Wolery 1983)] were used as the index for the developmental improvements that children made during intervention. PCI's compare children's rate of development during intervention to their rate of development prior to intervention as indicated by their developmental quotients at T1. PCIs that are higher than 1.0 indicate that developmental rate during intervention was greater than prior to intervention; while PCIs <1.0 indicate that rate of development was lower during intervention. To examine children's developmental outcomes responsiveness at T1 was entered in the first step as a control variable, 'responsiveness change' was entered in the

second step; Total Stress at T1 was entered in the third step; and the interaction of responsiveness change with Total Stress at T1 was entered in the fourth step.

PCI results are reported on Table 4. For object play, responsiveness change was significant in the second step of the model accounting for 5% of the variability. The addition of parenting stress in the third step resulted in a 9% increase in variability, but the addition of this variable to the model was associated with a decrease in the significance of responsiveness change. In the third step, the addition of the interactive term resulted in an 8% increase in variability. However, the effects of responsiveness change and parenting stress on object play were no longer significant, and the interactive term was the only significant variable.

A similar pattern was observed for receptive communication. Responsiveness change was significantly associated with receptive language change accounting for approximately 8% of the variability. When PSI was added to the equation variability increased modestly, but neither 'responsiveness change'

Table 4 Relationship of maternal responsiveness and parenting stress to developmental outcomes

Dependent variable	Model	Beta	T value	Significance	R ²	R ² change
Object play PCI ¹	Responsiveness T1	-0.123	0.800	0.425	-0.001	
	Responsive T1	0.220	0.929	0.358	0.048	0.049
	Responsiveness change	0.441	2.011	0.051		
	Responsive T1	0.170	0.751	0.457	0.136*	0.088
	Responsiveness change	0.348	1.520	0.136		
	PSI total T1	0.328	2.271	0.029		
	Responsive T1	0.159	0.739	0.465	0.220**	0.084
	Responsiveness change PSI	0.388	1.779	0.083		
	Total T1 PSI total T1*	0.258	1.839	0.074		
Receptive language PCI ¹	Responsiveness change	0.323	2.323	0.025		
	Responsiveness T1	-0.328	-2.250	0.030	0.086*	
	Responsive T1	-0.053	0.240	0.811	0.164**	0.078
	Responsiveness change	0.490	2.212	0.033		
	Responsive T1 Responsiveness	0.014	0.063	0.950	0.214**	0.050
	change PSI Total T1	0.416	1.905	0.064		
		0.263	1.907	0.064		
	Responsive T1				0.280***	0.066
	Responsiveness	0.003	0.017	0.987		
change PSI total T1	0.451	2.152	0.038			
PSI total T1*	0.200	1.484	0.146			
Responsiveness change	0.287	2.153	0.030			

¹Transdisciplinary play-based assessment proportional change index.

* $P < 0.1$.

** $P < 0.05$.

*** $P < 0.01$.

nor PSI were significant. In the full model, variability increased by almost 7%, and both 'responsiveness change' and the interactive term were significant.

In general, these results suggest that the effects responsiveness change on intervention changes in child development were moderated by mother's parenting stress, with high levels of parenting stress seeming to accentuate the effects of responsiveness change on children's development.

Social-emotional outcomes

Regression analyses of social-emotional outcomes are reported on Table 5. For these analyses, change scores for Total TABS and the detached and dysregulated subscales were computed. The same regression models used for developmental outcomes were also used to examine intervention changes in children's social-emotional functioning.

Table 5 Relationship of maternal responsiveness and parenting stress and to socio-emotional outcomes

Dependent variable	Model	Beta	T value	Significance	R ²	R ² change
Detached change ¹	Responsiveness T1	0.050	-0.316	0.753	-0.022	
	Responsive T1	0.368	1.624	0.112	0.091*	0.093
	Responsiveness change	0.554	2.451	0.016		
	Responsive T1	0.336	1.507	0.140	0.127*	0.034
	Responsiveness change	0.480	2.122	0.040		
	PSI total T1	0.241	1.612	0.115		
	Responsive T1				0.140*	0.013
	Responsiveness change	0.330	1.494	0.144		
	PSI total T1	0.496	2.206	0.034		
	PSI total T1*	0.203	1.343	0.188		
Dysregulated change ¹	Responsiveness change	0.190	1.283	0.207		
	Responsiveness T1	-0.082	0.523	0.604	-0.018	
	Responsive T1	0.552	2.495	0.017	0.133*	0.151
	Responsiveness change	0.623	2.818	0.008		
	Responsive T1	0.492	2.499	0.017	0.318**	0.185
	Responsiveness change	0.485	2.422	0.020		
	PSI total T1	0.451	3.404	0.002		
	Responsive T				0.359***	0.041
	Responsiveness change	0.485	2.540	0.015		
	PSI total T1	0.505	2.596	0.013		
Total TABS change ¹	PSI total T1*	0.403	3.081	0.004		
	Responsiveness change	0.237	1.854	0.072		
	Responsiveness T1	-0.139	-0.890	0.379	-0.005	
	Responsive T1	0.229	1.003	0.322	0.078*	0.083
	Responsiveness change	0.489	2.144	0.038		
	Responsive T1	0.189	0.858	0.396	0.145*	0.077
	Responsiveness change	0.397	1.772	0.084		
	PSI Total T1	0.298	2.014	0.051		
	Responsive T1				0.184*	0.039
	Responsiveness change	0.182	0.844	0.404		
PSI total T1	0.417	1.903	0.065			
PSI total T1*	0.250	1.693	0.099			
Responsiveness change	0.242	1.677	0.102			

¹Temperament and atypical behavior scale.

* $P < 0.1$

** $P < 0.05$.

*** $P < 0.01$.

For all three social-emotional measures, responsiveness change was significantly associated with changes in children's TABS scores, accounting for an average of 11% of the variability. When PSI was added to the equation, this resulted in significant increases in the variability for both the dysregulation and Total TABS scores, but not for the detached scores.

For the full model, there were only modest increases in variability across each of the three models, but the interactive term was not significant in any of the three models. Responsiveness change was significantly associated with intervention changes for all three measures, while PSI Total T1 was significantly associated with only dysregulation.

In general, these results indicate that to the extent that parenting stress had an impact on children's social-emotional outcomes as measured by the TABS, it was a positive rather than a negative effect. However, PSI did not moderate the effects of responsiveness change on children's social-emotional outcomes; and only contributed independently to intervention improvements in children's dysregulation.

Discussion

The purpose of this study was to examine the role of parenting stress on mothers' participation in RF intervention. Consistent with the research literature, many of the mothers in this sample exhibited high levels of parenting stress at the onset of intervention. This was indicated by the finding that 36% of these mothers had Total Stress scores that were above the clinical cut-off at the onset of intervention. Furthermore, as has also been reported in the literature, mothers of children with PDD exhibited significantly higher levels of stress than mothers of children with DD. The prevalence of clinical levels of parenting stress was nearly 2½ times greater for these mothers than for mothers of children with DD.

Three research questions related to parenting stress were examined. First, we were interested in determining whether parenting stress was associated with increases in mothers' responsiveness. There are a number of factors that could interfere with parents learning RI strategies including the effectiveness of interventionist at teaching strategies as well as parents' failure to understand how strategies might be beneficial to their children. However, as nearly one-third of the mothers who participated in this study did not increase their responsiveness during intervention, we expected that the extremely high levels of stress experienced by many

mothers in this sample might also be contributing to this problem. We found no evidence to support this expectation. In general, the magnitude of changes in responsiveness that mothers made with their children was not associated with their level of parenting stress as measured both at the beginning and end of intervention. Highly stressed parents, including parents reporting clinical levels of stress, were as successful at increasing their responsiveness with their children as were mothers with low, non-clinical levels of parenting stress.

Second, we investigated whether participation in RT would reduce mothers' level of stress. While there were modest improvements in mothers' Total Stress scores, this was primarily associated with decreases in their personal distress, a factor not addressed directly by RT. We had expected that there might be decreases in parenting stress associated with dysfunctional parent-child interaction and difficult child, especially to the extent that RT was successful at both enhancing parental responsiveness and children's social-emotional functioning. However, despite intervention improvements in mothers' responsiveness and children's social-emotional functioning, neither of these parental stress factors decreased during intervention.

There are at least two explanations for these results. First, the modest decreases in parenting stress observed in this study, especially related to those made by parents who had clinical levels of stress, might have been significant had the sample been larger. Second, changes in parenting stress may not have been significant because mothers continued to have serious concerns for their children. Despite improvements in their interactions, mothers may have found that interacting with their children still required a great deal of effort, and despite the developmental and social-emotional improvements their children made during intervention many of their children continued to have significant developmental and behavioural problems.

Third, we were interested examining whether mothers' parenting stress might moderate the effects of their changes in responsiveness on children's development and social-emotional functioning. The original evaluation of Responsive Teaching reported that many of the child development and social-emotional improvements that were observed were associated with the changes mothers made in responsiveness. Because these findings supported the logic model of RT (i.e. enhance children's functioning by encouraging parents to become more responsive), they provided support for the notion that RT was causally related to the child improvements that occurred during

intervention. Nonetheless, the relationships between responsiveness change and child development were in the small to moderate effect size range, raising the question as to whether there might have been factors that moderated or depressed the effects of responsiveness on children's development.

We had expected that if parents were experiencing high levels of stress, but were still successful at learning RI strategies, the effects of their enhanced responsiveness might be mitigated by the negative impact that stress is thought to have on the frequency parents interact with their children (e.g. Hastings *et al.* 2006; Neece & Baker 2008; Noel *et al.* 2008). Surprisingly, results from this study indicated a very different picture. They suggested that parenting stress moderated the effects of responsiveness on developmental outcomes; but that it enhanced rather than diminished the effects of responsiveness. That is, responsiveness had a more robust impact on children's development when mothers had higher as versus lower levels of parenting stress. For social-emotional outcomes, stress did not moderate the effects of responsiveness, but rather appeared to contribute independently to improvements in social-emotional functioning at least as measured by dysregulation and Total TABS scores. Thus, for these measures, parenting stress appeared to contribute independently to the positive effects of responsiveness change on children's social-emotional outcomes. In general, there at least two important implications of the findings of this investigation.

First, these results indicate that parents of children with disabilities, including those who are experiencing high levels of parenting stress, can participate successfully in RFI and we suspect other parent-mediated interventions as well. For years, there has been a reluctance to involve parents in their children's intervention for fear that they would have difficulty both learning intervention strategies and following-through with these strategies. In addition, many believed that parents' involvement in intervention would increase their burdens of caring for their children, resulting in increased levels of parenting stress. Although several parents in this study were not successful at learning RI strategies, this intervention appeared to have positive effects on the majority of subjects, and the success of the intervention was not associated with parents' level of stress. More importantly, participation in this intervention did not appear to increase parenting stress regardless of how stressed parents were at the onset of intervention.

Second, findings from this study call to question some of the assumptions commonly made about parenting stress. There has been considerable focus in the disability literature on parenting stress because of the fairly consistent findings that it is high among parents of children with disabilities (e.g. Watson *et al.* 2011) and even higher among parents of children with ASD (e.g., Estes *et al.* 2009). There is ample evidence that high levels of parenting stress can take a personal toll on parents and contribute to a deterioration of their relationships with their spouse, children and friends (Mitchell & Hauser-Cram 2010; Thompson *et al.* 2013). In addition, parenting stress is clearly a concern because of its potential to contribute to parental depression (Farmer & Lee 2011). Yet, while parenting stress clearly needs to be addressed in early intervention, contrary to the negative assumptions about the effects of stress on parents' ability to care their children (Guralnick 2005), it may actually motivate parents to be assertive in doing what they can to address their children's developmental and social-emotional needs.

Limitations and need for future research

Findings from this study are important, particularly, as they have practical implications for involving parents with high levels of stress in their children's intervention. Yet, given the surprising pattern of findings, there needs to be a replication of this study that addresses many or all of its limitations.

First, the sample for this study was small and relatively homogeneous in terms of those social demographic characteristics that may play have a critical influence on the ability of mothers to cope with parenting stress. Future samples must be more representative of single parents and families that have limited access to the resources and social supports that are thought to be necessary for adequate family functioning.

Second, the sample for this study was not sufficiently large to disentangle the effects of having a child with autism/PDD from the effects of parenting stress, as parenting stress was higher among parents of children with autism/PDD than parents of children with other disabilities. Future studies must have sufficiently large samples of both groups of parents to determine whether parenting stress might have different consequences for parents of children with autism/PDD versus parents of children with other disabilities.

Third, this was a descriptive *post hoc* investigation which is highly susceptible to multiple internal validity threats. Stronger research designs are needed in which

dyads are randomly assigned to two or more parent-mediated interventions based upon parents' level of stress at the outset. This would provide a much more reliable estimate of how parenting stress affects the success of parents at participating in their children's intervention. Such studies would also benefit from the use of standardized tests of child development a measures of social-emotional functioning that are less dependent on parent report, as well as assessments of parent-child interaction that are more representative of interactions that take place during daily routines and activities.

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