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Parenting Stress and Emotion Dysregulation in Children with DD: The Role of Parenting Behaviors

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by

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A Thesis submitted in partial satisfaction of
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Each person whose signature appears below certifies that this thesis in his/her opinion is adequate, in scope and quality, as a thesis for the degree Doctor of Philosophy.

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To my wonderful wife, Elena Chan: thank you for believing in me, for making me smile, and for your love and patience throughout this process. To my Mom and Dad: thank you for your sacrifices that have allowed me to pursue my dreams.

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ABBREVIATIONS

DD   Developmental Delay

MBSR   Mindfulness-Based Stress Reduction

ASD   Autism Spectrum Disorder

MAPS   Mindful Awareness for Parenting Stress

PCIRS   Parent Child Interaction Rating System

PSI-SF   Parenting Stress Index – Short Form

ITT   Intent-to-Treat

LOCF   Last Observation Carried Forward

ABSTRACT OF THE THESIS

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Behaviors

by

Neilson Chan

Master of Arts, Graduate Program in Clinical Psychology
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Dr. Cameron L. Neece, Chairperson

Parents of children with developmental delays (DD) report higher levels of parenting

stress compared to parents of typically developing children. High levels of parenting

stress have been associated with negative outcomes for their children, including higher

levels of emotion dysregulation. However, this relationship between parenting stress and

child emotion dysregulation has rarely been examined in families of children with DD.

Additionally, the mechanisms through which parenting stress influences child emotion

dysregulation remain unclear; it may be that parenting stress impacts parenting behaviors

(i.e., sensitive and intrusive parenting), which in turn influence the development of the

child's emotion regulatory abilities. In the current study, we employed a waitlist-control

design to examine whether changes in parenting stress through Mindfulness-Based Stress

Reduction (MBSR) predict changes in emotion dysregulation among children with DD,

as well as examine parenting behaviors that may mediate the impact of parenting stress

on child emotion dysregulation. Eighty parents of children with DD between the ages of

2½ and 5 ($M = 4.18$, $SD = 1.01$) were randomly assigned to an immediate treatment or

waitlist-control group. Results indicated that reductions in parenting stress through

MBSR significantly predicted reductions in child emotion dysregulation. Regarding

mechanisms, only intrusive parenting was found to significantly mediate the relationship between parenting stress and child emotion dysregulation. These findings suggest that by intervening with parents of children with DD early on, there may be a spillover effect on their children, reducing the rates of emotion dysregulation that are common in this population.

CHAPTER ONE

INTRODUCTION

Parents of children with developmental delays (DD) experience significantly higher levels of stress compared to parents of typically developing children (Baker, Blacher, Crnic, & Edelbrock, 2002). This is concerning, because parents who are highly stressed tend to exhibit more intrusive parenting and less sensitivity to their children's needs, which can negatively impact their children's development (Anthony et al., 2005; Crnic, Gaze, & Hoffman, 2005). In particular, parenting behaviors that are more intrusive and less sensitive are highly predictive of greater child emotion dysregulation, which places these children at a higher risk for developing behavioral and social problems (Morris et al., 2007; NICHD Early Child Care Research Network, 2004). Despite the findings that parents of children with DD consistently report higher levels of parenting stress, few studies have explored the relationship between parenting stress and child emotion dysregulation in this population. In the current study, we sought to better understand the relationship between parenting stress and child emotion dysregulation among families with children with DD by examining how changes in parenting stress through a stress-reduction intervention predicted changes in child emotion dysregulation. Further, we tested a mediational model by which parenting stress predicts child emotion dysregulation through the effects of sensitive and intrusive parenting behaviors.

Parenting Stress among Parents of Children with Developmental Delay

Parents of children with DD typically report higher levels of parenting stress compared to parents of children with typical development (Baker et al., 2002; Gong et al.,

2015). Among parents of children with DD, those who have a child with autism spectrum disorder consistently report the highest levels of parenting stress compared to children with other diagnoses, including ADHD, cerebral palsy, and other undifferentiated DD (Dabrowska & Pisula, 2010; Eisenhower, Baker, & Blacher, 2005; Estes et al., 2013). Although parenting a child with any kind of disability can be stressful, Gupta (2007) found that parenting a child with DD is associated with significantly higher levels of parenting stress compared to parenting a child with medical disabilities (e.g., asthma and HIV) but no DD.

However, the degree of parenting stress experienced by parents of children with DD may vary depending on the type of parenting stress. For instance, while parents of children with DD and typical development report no significant differences in stress with regard to the daily hassles of parenting (Crnic, Arbona, Baker, & Blacher, 2009), those with children with DD report higher levels of stress with regard to the impact of the child on the family (Baker et al., 2003). Despite the variability, multiple studies have shown that more than 40% of both mothers and fathers of children with DD report levels of parenting stress at clinically significant levels, highlighting a serious need for research and intervention for this population (Davis & Carter, 2008; Webster, Majnemer, Platt, & Shevell, 2008).

The high levels of parenting stress in parents of children with DD is concerning given the associated negative outcomes for both parents and their children. Research has indicated that highly stressed parents are particularly prone not only to compromised physical health (Eisenhower, Baker, & Blacher, 2009; Gallagher, Phillips, & Carroll, 2010), but also to significantly poorer mental health and subsequent risk for

psychopathology, including depression (Hastings, Daley, Burns, & Beck, 2006) and anxiety (Firth & Dryer, 2013). Moreover, parents who experience higher levels of stress typically report family problems, including marital conflict (Kersh, Hedvat, Warfield, Hauser-Cram, & Warfield, 2006), lower parental satisfaction and well-being, less parental competence and social support (Pisula, 2007; Sanders & Morgan, 1997), as well as less effective parenting (Crnic, Gaze, & Hoffman, 2005). Their children are also at increased risk for elevated behavior problems (Baker et al., 2002; Hastings et al., 2006; Neece, Green, & Baker, 2012), later psychopathology (Baker, Neece, Fenning, Crnic, & Blacher, 2010), depression (Anthony, Bromberg, Gil, & Schanberg, 2011), poor overall quality of life (Moreira, Gouveia, Carona, Silva, & Canavarro, 2014), and of most importance to the proposed study, increased child emotion dysregulation (Chazan-Cohen, 2009; Mathis & Bierman, 2015). These studies emphasize parenting stress as an important environmental risk factor in the development and health of families with children with DD.

Emotion Dysregulation among Children with Developmental Delay

While the conceptualization of emotion regulation has been widely debated in the literature (Cole, Michel, & Teti, 1994; Cole, Marin, & Dennis, 2004), emotion regulation is commonly defined as the "extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, to accomplish one's goals" (Thompson, 1994, pp. 27-28), with deficits or dysfunction in regulatory abilities commonly referred to as emotion dysregulation (Cole et al., 1994). Although researchers have shown that children with DD present significantly higher levels of emotion dysregulation compared

to their typically developing peers (Baker, Fenning, Crnic, Baker, & Blacher, 2007; Yates, Obradović, & Egeland, 2010), there is a shortage of studies examining the emergence and function of emotion regulatory abilities in children with DD (Crnic & Neece, 2015; Mazefsky, Pelphrey, & Dahl, 2012). This lack of attention is concerning, given the host of negative outcomes associated with poor regulatory abilities documented among typically developing children, including an increased risk of psychopathology (Cole et al., 1994), elevated behavior problems (Cole et al., 2004), social skills problems, worse physical health, and lower academic and work performance (Aldao, Nolen-Hoeksema, & Schweizer, 2010). Considering that the development of emotion regulatory abilities depends heavily on a child's cognitive executive functioning (Posne & Rothbart, 2000), which is impaired in children with DD (Japundža-Milisavljevic & Macešic-Petrovic, 2008), children with DD may be placed at an increased risk for these negative outcomes.

It is only in the past decade that researchers have begun to study emotion regulatory abilities in children with DD. For instance, Morris and colleagues (Morris, Silk, Steinberg, Myers, & Robinson, 2007) reported that children with DD had more difficulties adapting to the demands of emotionally challenging events because of their limited cognitive capabilities, thus increasing their risk for behavior problems. Similarly, repetitive and restricted behavior patterns, characteristic of children with autism spectrum disorder (ASD), make children with ASD less flexible in modulating their own emotions (Mazefsky, 2015). Moreover, Gerstein and colleagues (Gerstein et al., 2011) conducted a longitudinal study examining the extent to which children with DD employ emotion regulatory strategies across the preschool period, and found that children with DD used

more maladaptive regulatory strategies over time when engaged in a mildly frustrating task. In the same vein, Jahromi, Gulsrud, and Kasari (2008) reported that children with Down syndrome exhibited more limited regulatory strategies during frustrating tasks compared to their typically developing peers.

While it may be expected that children with DD have lower regulatory capabilities compared to children with typical development, it appears that the child's emotion regulatory abilities may mediate the relationship between developmental status and child social skills and behavior problems (Baker et al., 2007; Gerstein et al., 2011). In study by Baker et al. (2007), global dysregulation at age four not only significantly predicted children's social skills at age six, but it also partially mediated the relationship between children's developmental risk and later social skills. Similarly, Gerstein et al. (2011) reported that children's emotion regulatory abilities mediated the relationship between children's developmental risk and later behavior problems. These studies suggest that the elevated rates of behavior and social skills problems observed in children with DD may not simply be a byproduct of the developmental delay itself, but may instead reflect indirect effects that are at work through emergent emotion regulatory capabilities (Crnic & Neece, 2015), highlighting the need to study the development of emotion regulation in children with DD.

Parenting Stress and the Development of Child Emotion Regulation

The literature on typically developing children provides many insights into the development of emotion regulatory abilities in children. In particular, we see that the development of regulatory abilities in children is socially mediated, from early co-

regulated states to the later emergence of individual self-regulatory abilities (Cole & Deater-Deckard, 2009; Crnic & Neece, 2015). In fact, starting even at infancy, the ability to regulate one's own emotions develops both as a function of the infant's self-regulatory abilities as well as the caregiver's abilities to assist in modulating the child's emotion regulation (Calkins, 1994; Crnic, Hoffman, Gaze, & Edelbrock, 2004). Indeed, infants are highly dependent on adults to help regulate their emotions, with the caregiver typically soothing and comforting the infant during period of emotion dysregulation (Cole et al., 1994). Moreover, as the child develops from infancy into childhood and adolescence, researchers have emphasized the interaction of family and parenting processes in the development of a child's emotion regulatory abilities. For instance, Morris et al. (2007) summarized three main ways in which the family context influences child emotion regulation development: (1) child emotion regulation is socialized through parenting practices and behavior through observational learning, modeling and social referencing; (2) parenting practices specifically related to emotion management affect the child's emotion regulation; and (3) emotion regulation is affected by the family emotional environment including the quality of attachment relationship, family expressiveness and the emotional quality of the marital relationship, and parenting styles.

The transactional model of development suggests that the development of emotion regulation is not simply the sum of individual mechanisms, but rather the product of ongoing interactions between the individual and the environment, with an emphasis on bidirectional effects (Sameroff, 2009). Considering the family environment, parenting stress has long been implicated as a salient player in the development of regulatory abilities among typically developing children (Anthony et al., 2005; Crnic et

al., 2002; Crnic et al., 2004). In a longitudinal study, Chazan-Cohen et al. (2009) reported

that higher levels of parenting stress when children were 14 months old predicted higher

levels of emotional dysregulation in children when they were five years old. These effects

may also be bidirectional, such that elevated parenting stress may increase levels of child

emotion dysregulation, which may subsequently exacerbate further the stress that parents

experience. Williford, Calkins, and Keane (2007), for example, found that parents who

had children who were more dysregulated at age two also reported subsequent increases

in parenting stress.

These processes, however, remain under-studied among families with children

with DD (Crnic & Neece, 2015). As discussed earlier, this is especially problematic,

considering that parents of children with DD are particularly susceptible to higher levels

of parenting stress, and their children have also been found to have higher rates of

emotion dysregulation compared to typically developing children. Moreover, to the

author's knowledge, none of the studies in the literature examining the relationship

between parenting stress and child emotion dysregulation have employed an experimental

design. As a result, while causality has been assumed between parenting stress and child

emotion dysregulation, the causal relationship has not yet been empirically tested.

Parenting Behavior as a Potential Mediator

Although associations between parenting stress and child emotion dysregulation

have been found, the mechanisms through which parenting stress may impact child

emotion dysregulation remain unclear. Deater-Deckard (1998) hypothesized that the link

between parenting stress and child dysregulation is mediated by parenting behavior.

Accordingly, researchers have found that elevated levels of parenting stress can interfere with the parenting practices that help regulate children's emotions. Crnic et al. (2005) reported that higher levels of parenting stress were predictive not only of lower levels of positive parenting (i.e., warmth, spontaneous smiles and laughter), but also of lower levels of dyadic pleasure in the parent-child interaction. Further, Pianta and Egeland (1990) demonstrated that parents who reported higher levels of stress were also more intrusive in their parenting. Similarly, Anthony et al. (2005) found that parents who were more stressed tended to have lower expectations of their children and demonstrated less nurturing parenting.

Regarding the relationship between parenting behavior and emerging emotion regulatory abilities, researchers have consistently found that warm and sensitive parenting promotes better emotion regulatory abilities in children (Gable & Isabella, 1992; von Suchodoletz, Trommsdorff, & Heikamp, 2011). Sensitive parents are nurturing and child-centered, and are thus more likely to respond to their child's emotional cues in a way that promotes their child's use of regulatory abilities (Morris et al., 2007). Besides sensitive parenting, researchers have also noted the association between intrusive parenting and greater levels of subsequent child emotion dysregulation (Egeland, Pianta, & O'Brien, 1993; NICHD Early Child Care Research Network, 2004). Intrusive parents impose their agenda on the child despite signals from the child that a different pace is needed in the interaction, which may make them less likely to model and teach their children appropriate means of regulating their emotions during challenging situations (Morris et al., 2007). These findings suggest a promising mechanism by which parenting

behavior mediates the relationship between parenting stress and child emotion

dysregulation.

The Current Study

Aim 1

As noted, the relationship between parenting stress and emotion dysregulation

among children with DD remains an understudied area. Thus, in the current study, we

sought to contribute to the literature by employing an experimental design in order to

determine whether a causal relationship exists between parenting stress and emotion

dysregulation among children with DD. The current study took place in the context of a

larger study in which parents of children with DD received Mindfulness-Based Stress

Reduction training (MBSR; Kabat-Zinn, 1990). MBSR is an empirically-supported

stress-reduction intervention that has undergone over three decades of extensive research

showing its effectiveness in reducing stress and anxiety, as well as promoting overall

well-being in a variety of populations (Grossman, Niemann, Schmidt, & Walach, 2004;

Kabat-Zinn, 2009). Recent studies have shown that MBSR is not only a feasible

intervention to implement among families with children with DD (Roberts & Neece,

2015), but it is also effective in reducing parenting stress in this population (Bazzano et

al., 2015; Dykens, Fisher, & Taylor, 2014; Hastings & Beck, 2004; Minor, Carlson,

Mackenzie, Zernicke, & Jones, 2006; Neece, 2014), as well as within the sample used for

this study (Chan & Neece, in press). Accordingly, using MBSR in the current study

allowed us to experimentally manipulate parenting stress and examine its subsequent

effects on child emotion dysregulation. We expected that reductions in parenting stress would lead to reductions in emotion dysregulation among children with DD.

Aim 2

We also examined sensitive and intrusive parenting behaviors as potential mediators of the relationship between parenting stress and emotion dysregulation. This mediational model has not yet been tested among families with children with DD. With over 40% of parents of children with DD reporting clinically significant levels of parenting stress (Davis & Carter, 2008; Webster et al., 2008), there is a great need for stress-reduction interventions for this population. Researchers have argued that the best short-term and long-term investment for improving clinical practice and patient care is the study of mechanisms of treatment, because understanding why a given treatment works serves as a basis for maximizing its effects and ensuring that the critical features of treatment are generalized to clinical practice (Kazdin & Nock, 2003). Accordingly, we hypothesized that sensitive and intrusive parenting behavior would mediate the relationship between parenting stress and emotion dysregulation among children with DD. Specifically, we expected that reductions in parenting stress through MBSR would lead to more sensitive and less intrusive parenting, which would subsequently lead to lower levels of child emotion dysregulation.

CHAPTER TWO

METHODS

Participants

In the current study, we used data from two cohorts of the Mindful Awareness for Parenting Stress (MAPS) Project at Loma Linda University. Eligibility criteria for the study included: (a) having a child ages 2.5 to 5 years, (b) child had been determined by the Regional Center (or by an independent assessment) to have a developmental delay, (c) parent reported more than ten child behavior problems on the Eyberg Child Behavior Inventory (Robinson, Eyberg, & Ross, 1980), (d) parent was not receiving any form of psychological or behavioral treatment at the time of the referral, and (e) parent spoke and understood English (for the first cohort only).

Our sample included a total of 80 parent-child dyads; 41 were part of an immediate treatment group, and 39 were in a waitlist-control group. The majority of the children were boys (71.3%), and the mean age of the children was 4.18 years ($SD = 1.01$ years). We had a diverse sample, with parents reporting 47.5% of the children to be Latino, 25.0% Caucasian, 21.3% Other, 3.8% Asian, and 2.5% African American. Among the parents sampled, the majority were mothers (96.3%) and married (75.0%), and the mean age of the parents was 37.21 years ($SD = 7.22$ years). Parents' family income ranged from $0 to $95,000, with 53.8% of parents reporting annual family income to be less than $50,000 and 46.3% reporting annual family income to be above $50,000. In terms of language, 17.5% of the parents were monolingual Spanish speakers. Demographic data are summarized in Table 1.

Table 1. Demographic Characteristics of Participants (N = 80)

	n (%)	*M (SD)*
Child Characteristics		
Gender		
Boy	57 (71.25)	
Girl	23 (28.25)	
Ethnicity		
Latino	38 (47.50)	
Caucasian	20 (25.00)	
Other	17 (21.25)	
Asian	3 (3.75)	
African American	2 (2.50)	
Age		4.18 (1.01)
Parent Characteristics		
Age		37.21 (7.22)
Grade in School		14.43 (2.89)
% Mom	77 (96.30)	
Marital Status		
Married	60 (75.00)	
Not Married	20 (25.00)	
Family Income		
<$50,000	43 (53.75)	
>$50,000	37 (46.25)	

Regarding the child's diagnosis, the majority of the children (63.6%) were reported to have a diagnosis on the autism spectrum. At the time of the baseline assessment, 47.5% of the children were receiving in-home behavioral services, 88.2% of the children were reported to receive special education services in school, and 79.4% of the children were enrolled in a special education classroom. Although not formally

assessed, the majority of children were estimated to have intellectual functioning in the mild to moderate range given the demands of the laboratory assessment. Children had to understand and follow directions in a structured play task in order to be eligible for the study.

Procedures

We recruited most of the participants through the Inland Empire Regional Center, which is a government agency that provides services for individuals with developmental delays; additional recruitment was done through the local newspaper, local elementary schools, and community disability groups. Research staff first did a phone screening with all parents who had contacted the MAPS Laboratory and expressed interest in participating in the study, in order to ensure that these families met the specified eligibility criteria. Eligible families were then scheduled for an intake assessment, and received in the mail a packet containing measures for the study's outcome variables, along with instructions to complete the packet before their intake assessment.

At the intake assessment, parents turned in the completed packet of questionnaires and participated in a 15-minute play assessment in the lab with their child, which was videotaped for later coding. The play assessment included three parts: (1) a five-minute child-led play, in which the parent was instructed to allow the child to choose any activity and to play along with the child; (2) a five-minute parent-led play, in which the parent was instructed to select an activity and to keep the child playing according to the parent's rules; and (3) a five-minute clean-up activity, in which the parent was instructed to give the child a command to clean up. The play assessment was used as an observational

measure of child emotion dysregulation and parenting behavior. After the observation

task, parents were interviewed by research staff to gather demographic data, and were

then randomly assigned to an immediate treatment or waitlist-control group.

The mindfulness-based stress reduction (MBSR) intervention followed the

manual outlined by Dr. Jon Kabat-Zinn at the University of Massachusetts Medical

Center (Kabat-Zinn, 1990). Parents assigned to the immediate treatment group received

the eight-week long intervention following the intake assessment. The procedures for the

MBSR intervention used in this study are detailed in a pilot study for the MAPS Project

conducted by Neece (2014). As part of the waitlist-control design, parents from both the

immediate treatment and waitlist group returned for a second assessment, during which

only the immediate treatment group had received MBSR, and completed the same

questionnaire and observational measures collected at the intake assessment. After the

second assessment, parents in the waitlist group received MBSR and returned to the

MAPS laboratory for a post-treatment assessment.

Video Coding

Video recordings of each play assessment from intake and post-treatment were

randomized in order to ensure coder blindness to the assessment time points and parent

group assignment. During the training phase for each coding system (see Measures

section), a senior graduate student who was an expert on the coding system served as the

"master coder" for reliability monitoring. Two graduate students were trained using a

consensus rating procedure in which their ratings were discussed in a group format with

the master coder, until their independent ratings agreed with the master coder's above the

specified reliability criterion level. To establish and maintain the reliability of the observational coding systems, we used a minimum reliability criterion of an intra-class correlation (ICC) = 0.60, which has been widely recommended as a minimum level of inter-rater reliability for ordinal level data (Cicchetti, 1994). Once the specified training reliability was achieved, the two coders coded in pairs, first coding independently and then coming to a consensus. Twenty percent of the pair's codes were compared against the codes of a master coder to ensure that inter-rater reliability was maintained above the specified criterion. Thirty-one videos from the second cohort included Spanish-speaking parent-child dyads. For these videos, a linguistically and culturally competent translator provided in-vivo translation for the coders.

Measures

Demographics

Demographic variables were collected during an interview with the parent during the intake assessment.

Parenting Stress

The Parenting Stress Index – Short Form (PSI-SF; Abidin, 1990) is a standardized self-report questionnaire designed to measure the extent to which parents are experiencing stress. Parents rate 36 items on a five-point Likert scale that ranges from 1 (*strongly agree*) to 5 (*strongly disagree*). In this study, we used only the Parental Distress subscale, which measures the extent to which the parent is experiencing stress in his or her role as a parent. This subscale was chosen because it assesses parenting stress

independent of child variables, including child emotion dysregulation, which was a key outcome variable of the current study. Some example items include: "I often have the feeling that I cannot handle things very well," "Since having this child, I have been unable to do new and different things," and "I feel trapped by my responsibility as a parent." In the current study, internal consistency for the Parental Distress subscale was good, with Cronbach's alphas of .84 and .87 for the intake and second assessments, respectively.

The PSI-SF also has a validity index that measures the extent to which the parents are answering in a way that they think will make them look best. A score of 10 or less on this index suggests responding in a defensive manner and indicates that caution should be used in interpreting any of the scores. Three participants had a defensive responding score of 10 or less at the post-treatment assessment; accordingly, these scores were removed from the analysis.

Emotion Dysregulation

The Dysregulation Coding System (DCS; Hoffman, Crnic, & Baker, 2006) is an observational coding system that measures child emotion dysregulation by determining the appropriateness of the type, duration, and intensity of emotional expressions, as well as the lability and the extent to which the child can be soothed. Emotion dysregulation is coded on a five-point Likert scale from 0 (*no evidence of dysregulation*) to 4 (*very high degree of dysregulation*; see Appendix A). We used this coding system to measure child dysregulation only during the clean-up task in the parent-child interaction, which was intended to facilitate the need for the child to regulate his or her emotions in the face of

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an undesirable situation (i.e., being told to clean up). Data from this coding system were collected from all assessment time points. There was excellent inter-rater reliability on this coding system, with ICC = .96. Inter-rater reliability for Spanish videos from the second cohort was maintained above ICC = .60.

Parenting Behavior

The Parent-Child Interaction Rating System (PCIRS; Belsky, Crnic, & Woodworth, 1995) is an observational coding system that measures parent and child behavior within a parent-child dyadic activity. Although the PCIRS includes different categories of parent qualities, the parent ratings of interest include indices of Sensitive Parenting and Intrusive Parenting, which are rated on a five-point Likert scale from 1 (*not at all present*) to 5 (*highly characteristic*; see Appendix B and C). The sensitive parent is attuned to the child and manifests awareness of the child's needs, moods, interests, and capabilities, and allows this awareness to guide his or her interaction with the child. Intrusive parents impose their agenda on the child despite signals from the child that a different activity, level, or pace of interaction is needed. These data were rated by two sets of coders, one for each cohort of participants. For the first cohort, inter-rater reliability was variable across the three parent-child interaction activities. Inter-rater reliability was good for on the child-led and clean-up tasks for both sensitive parenting (ICC = .60 and .76, respectively) and intrusive parenting (ICC = .64 and .80, respectively); however, there was poor inter-rater reliability on the parent-led task (ICC = .39 and .40 for sensitive and intrusive parenting, respectively). For the second cohort, inter-rater reliability was high across child-led, parent-led, and clean-up tasks for both

sensitive (ICC = .87, .88, and .89, respectively) and intrusive parenting (ICC = .97, .93, and .96, respectively). Inter-rater reliability for Spanish videos from the second cohort was maintained above ICC = .60. Due to the poor inter-rater reliability on the parent-led task for the first cohort of participants, we excluded data from the parent-led task, and used an average of the codes from the child-led and clean-up tasks for analysis.

Statistical Analysis

Aim 1

Due to the longitudinal nature of our study, missing data was an issue, such that 37.5% ($n = 30$) of cases had missing data at post-treatment. The majority of these missing cases were due to attrition from treatment ($n = 17$, 21.25% of the entire sample). Besides attrition, four cases had missing PSI-SF data, six cases had missing emotion dysregulation data due to missing or faulty video (e.g., no audio for coding), and three cases were excluded due to a violation of the PSI-SF validity index criterion. Independent sample t-tests indicated that there were no significant differences in outcome and demographic variables at baseline between those with and without data at post-treatment ($p > .05$). Because missing data was an issue, we used an Intent-to-Treat analysis (ITT; Chakraborty & Gu, 2009) by using the Last Observation Carried Forward (LOCF, Shao & Zhong, 2003) strategy to impute missing data, such that scores from baseline were used at post-treatment for cases with missing data. This strategy produces a more conservative estimate of treatment effects.

Using ITT with LOCF, we conducted a hierarchical linear regression analysis to examine whether changes in parenting stress through MBSR would predict changes in

emotion dysregulation among children with DD. Baseline scores for child emotion

dysregulation were entered in the first step of the regression, followed by baseline scores

for parenting stress entered in the second step of the regression. Post-treatment scores for

parenting stress were entered in the final step of the regression. By controlling for

baseline levels of each variable, we were able to examine how changes in parenting stress

were related to child emotion dysregulation.

Aim 2

In the current study, we tested both sensitive parenting and intrusive parenting as

possible mediators in the relationship between parenting stress and child emotion

dysregulation at baseline. While researchers have used the causal steps strategy to

analyze mediation models (Baron & Kenny, 1986), this strategy is prone to Type 1 error

and relies on null hypothesis significance testing, which does not actually test the

significance of the mediation effect. More recent literature suggests that a multiple

mediation analysis using bootstrapping is the most effective method of evaluating the

significance of multiple mediators simultaneously (Preacher & Hayes, 2008), and was

therefore the analysis of choice in our study.

In the bootstrapping procedure, a sample of size n is taken with replacement from

our sample, from which regression coefficients a and b are estimated and used to

calculate the indirect effect ab. This process is repeated k times, producing an

empirically-derived sampling distribution of ab, with the mean of this sampling

distribution serving as our point estimate of the indirect effect. The bootstrapping

procedure provides the total indirect effect, the specific indirect effect for each mediating

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variable, as well as all pairwise comparisons among the mediating variables.

Additionally, standard errors and 95% confidence intervals are provided for each statistic.

The confidence intervals (CIs) can be used to assess significance for the indirect effects

of interest.

In our study, we used the statistical software SPSS 22 to conduct our analysis

with the "INDIRECT" macro for bootstrapping in multiple mediation (Preacher & Hayes,

2008). Using this macro, we included parenting stress as the x-variable, child emotion

dysregulation as the y-variable, and sensitive parenting as well as intrusive parenting as

the mediating variables. Estimates of the total indirect effect, specific indirect effects for

each mediating variable, pairwise contrast among mediators, standard errors, and 95%

CIs were calculated from 5,000 randomly sampled bootstraps. We set the macro to

calculate bias-corrected (BC) 95% CIs, because they are considered to be the most

accurate (Preacher & Hayes, 2008). Indirect effects for each mediator were considered to

be significant at $\alpha = .05$ if the BC 95% CI does not contain zero.

CHAPTER THREE

RESULTS

Preliminary Data Analyses

Distributions for each variable were screened for univariate outliers with z scores greater than 3 and multivariate outliers with Mahalanobis distances exceeding the critical value for $\alpha = .001$ (Tabachnick & Fidell, 2013). One univariate outlier was found in the PCIRS Intrusive Parenting code at baseline ($z = 4.05$). Following the recommendations by Cohen et al. (2002), all univariate outliers were set equal to plus or minus three standard deviations from the mean in order to reduce the influence of extreme data points on the results. No multivariate outliers were detected. Further, demographic variables that had a significant relationship with one or more of the independent variables and one or more of the dependent variables would have been tested as covariates in the analyses. No demographic variables were identified as necessary covariates. Finally, our data did not violate the assumptions of linear regression. Descriptive statistics of key study variables are presented in Table 2.

Table 2. Mean and Standard Deviation for Key Variables at Baseline and Post-Treatment for Intent to Treat Analyses

Variable	Baseline		Post-Treatment	
	M	*SD*	*M*	*SD*
Parenting Stress	37.41	8.59	32.84	7.73
Emotion Dysregulation	1.00	1.12	0.74	1.09
Sensitive Parenting	3.76	0.78	--	--
Intrusive Parenting	1.37	0.51	--	--

Aim 1

Using Intent-to-Treat Analysis with the Last Observation Carried Forward strategy, we conducted a hierarchical linear regression to determine whether post-treatment levels of parenting stress predicted post-treatment child emotion dysregulation, after controlling for the effects of baseline levels of child emotion dysregulation and parenting stress. Results indicated that after controlling for baseline child emotion dysregulation and parenting stress, post-treatment parenting stress significantly predicted post-treatment child emotion dysregulation, such that a one standard deviation increase in post-treatment parenting stress was associated with a 0.27 standard deviation increase in post-treatment child emotion dysregulation ($\beta = 0.27$, $sr^2 = .06$, $p < .05$). Adding post-treatment levels of parenting stress to our model explained approximately 6% of the variance in post-treatment child emotion dysregulation above and beyond the contributions of baseline child emotion dysregulation and parenting stress ($p < .05$). Results are summarized in Table 3.

Table 3. Results of Hierarchical Linear Regression Predicting Post-Treatment Child Emotion Dysregulation from Post-Treatment Parenting Stress after Controlling for Baseline Child Emotion Dysregulation and Baseline Parenting Stress

	β	b (SE)	95% CI	sr^2	ΔR^2	p
Model 1					.14	.001
Baseline Child ED	0.38	0.37 (0.11)	[0.15, 0.58]	.14		
Model 2					.00	.74
Baseline Child ED	0.37	0.37 (0.11)	[0.15, 0.58]	.14		
Baseline Parenting Stress	-0.04	-0.005 (0.01)	[-0.03, 0.02]	.00		
Model 3					.06	.03
Baseline Child ED	0.37	0.37 (0.11)	[0.16, 0.58]	.14		
Baseline Parenting Stress	-0.15	-0.02 (0.02)	[-0.05, 0.01]	.02		
Post-Tx Parenting Stress	0.27	0.04 (0.02)	[0.004, 0.07]	.06		

Note. CI = confidence interval. ED = emotion dysregulation.

Aim 2

We conducted a multiple mediation analysis using bootstrapping to determine whether sensitive and intrusive parenting mediated the relationship between parenting stress and child emotion dysregulation at baseline (See Table 4 and Figure 1). Results indicated that only intrusive parenting significantly mediated the relationship between parenting stress and child emotion dysregulation. Specifically, as parenting stress increased by one-point, child emotion dysregulation increased by 0.01 points via the effect of intrusive parenting, BC 95% CI [0.0004, 0.0328]. Sensitive parenting did not significantly mediate the relationship between parenting stress and child emotion dysregulation, BC 95% CI [-0.0040, 0.0056]. A pairwise comparison of the specific indirect effects showed that the relative strengths of the two mediators were not significantly different from each other, BC 95% CI [-0.0356, 0.00043].

Table 4. Results of Multiple Mediation Analysis

Mediated Effect	*ab*	SE	BC 95% CI
Sensitive Parenting	0.0001	0.0022	[-0.0040, 0.0056]
Intrusive Parenting	**0.0118**	**0.0079**	**[0.0004, 0.0328]**
Total Indirect Effect	0.0117	0.0079	[-0.0004, 0.0310]
Sensitive Parenting vs. Intrusive Parenting	-0.0116	0.0086	[-0.0356, 0.0003]

Note. BC 95% CI = bias-corrected 95% confidence interval. Bolded effects are significant at $\alpha = .05$.
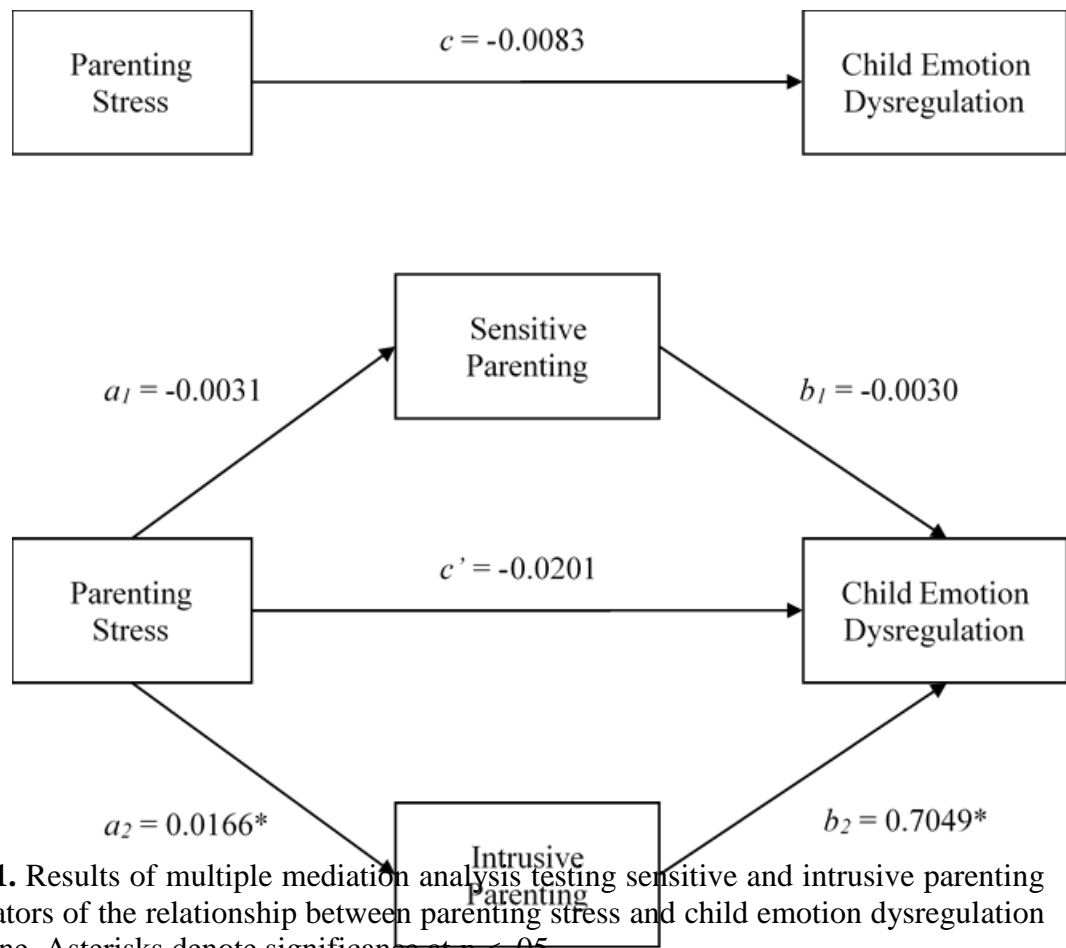
Figure 1. Results of multiple mediation analysis testing sensitive and intrusive parenting as mediators of the relationship between parenting stress and child emotion dysregulation at baseline. Asterisks denote significance at $p < .05$.

CHAPTER FOUR

DISCUSSION

A growing body of research suggests that family processes and parental well-being play key roles in a child's emotional and behavioral development (Crnic & Neece, 2015; Woodman, Mawdsley, & Hauser-Cram, 2015). In particular, researchers have recognized parenting stress as a salient risk factor in the development of children with developmental delay (DD). However, few studies have examined the relationship between parenting stress and emotion dysregulation among children with DD. In the current study, we investigated the extent to which parenting stress influences emotion dysregulation in a sample of children with DD. Our results suggest that a significant relationship exists between parenting stress and child emotion dysregulation, such that reductions in parenting stress through an empirically-based stress reduction intervention, Mindfulness-Based Stress Reduction (MBSR), predicted reductions in emotion dysregulation among children with DD. It should be noted our results demonstrate that baseline levels of parenting stress did not significantly predict post-treatment child emotion dysregulation (Model 2 in Table 3), suggesting that changes in child emotion dysregulation did not depend on parents' initial stress levels prior to intervention; instead, it was *changes* in parenting stress through MBSR that significantly predicted changes in child emotion dysregulation. Results from our study are consistent with those in the extant literature, which suggest that higher levels of parenting stress are associated with higher levels of child emotion dysregulation among typically-developing children (Mathis & Bierman, 2015; Samuelson, Wilson, Padrón, Lee, & Gavron, 2017). Moreover, our study extends these findings by employing a more rigorous

methodological approach in examining the relationship between parenting stress and child emotion dysregulation. Previous studies relied on cross-sectional data, limiting the extent to which we can make conclusions regarding causal mechanisms and directionality of effects. In our study, we experimentally manipulated parenting stress using MBSR, and observed subsequent changes in the child emotion dysregulation over time.

In addition to examining the effect of parenting stress on child emotion dysregulation, we also examined parenting behaviors (i.e., sensitive and intrusive parenting) as potential mediators in this relationship. Results from our study suggest that intrusive parenting, but not sensitive parenting, significantly mediated the relationship between parenting stress and child emotion dysregulation at baseline. It should be noted that the effect size for intrusive parenting as a mediator was relatively small ($ab = 0.01$). This may be explained by the floor effect seen in our observational measure for intrusive parenting, in which intrusive parenting was a relatively low frequency behavior ($M = 1.37$, $SD = 0.51$). Yet, despite the small effect size and low frequency of intrusive parenting behaviors observed, researchers have attested to the strengths of utilizing observational measures of parenting behaviors in increasing objectivity and reducing the risk of biases inherent in self-report measures of parenting behaviors (Burbach & Bourduin, 1986; Krain & Kendall, 2000).

In our study, we conceptualized intrusive parents as those who impose their will on their child during interactions, overwhelming their child with excessive stimulation, and leaving little to no room for their child to dictate the pace of the play or interaction. Indeed, when parents are highly stressed, they may have less cognitive resources to attend to their child's pace and interests, and may be more likely to impose their own

agenda over their child's during play. This is consistent with previous research conducted

among parents of children with typical development, which showed that both

physiological (i.e., cortisol; Mills-Koonce et al., 2009; Tarullo, John, & Meyer, 2017) and

parent-report (Pianta & Egeland, 1990) measures of stress were associated with intrusive

parenting. Furthermore, it is possible that when parents engage in more intrusive

parenting, they may overwhelm their child with constant stimulation, making it difficult

for the child to have an opportunity to regulate his or her own emotions during

challenging situations, resulting in increased emotional dysregulation. A previous

longitudinal study demonstrated that intrusive parenting during infancy led to higher

levels of child emotion dysregulation in the first grade (Egeland, Pianta, & O'Brien,

1993). While the associations between these variables have been explored in the

typically-developing children literature, our study is the first to test the full mediational

model among families of children with DD.

Inconsistent with our hypothesis, however, our results suggested that sensitive

parenting did not significantly mediate the relationship between parenting stress and

emotion dysregulation among children with DD at baseline. In our study, we

conceptualized the sensitive parent as one who is attuned to the child and manifests

awareness of the child's needs, moods, interests, and capabilities, and allows this

awareness to guide his or her interaction with the child. It is possible that the role of

sensitive parenting in child development may differ depending on the age of the child. It

may be that sensitive parenting is necessary for providing support to the child while the

child is still dependent on the parent to help with emotion regulation, but becomes less

important as the child becomes more autonomous. For instance, in a study conducted

among parents of infants, parents who experienced higher levels of daily parenting stresses exhibited less sensitivity in their parenting, which was subsequently associated with higher levels of oppositional and emotionally dysregulated child behavior (Patterson & Fisher, 2002). On the other hand, in a study conducted among parents of children transitioning from preschool to kindergarten, warm-sensitive parenting was not found to significantly mediate the relationship between parenting stress and child emotion regulation (Mathis & Bierman, 2015). This is consistent with results from our study, in which sensitive parenting did not mediate the relationship between parenting stress and emotion dysregulation among children between the ages of 2½ and 5 years old. Future studies would benefit from using longitudinal data to examine the extent to which the relationship between sensitive parenting and child emotion dysregulation changes across the trajectory of a child's development.

Besides the age of the child, it is possible that negative parenting behaviors (e.g., intrusive parenting) may have a greater influence on child emotion dysregulation than positive parenting behaviors (e.g., sensitive parenting) among families of children with DD. In our sample, parents displayed relatively high levels of sensitivity ($M = 3.76$, $SD = 0.78$), suggesting that, on average, parents were characterized as between "moderately sensitive" and "mostly sensitive." As noted, there was no significant association between sensitive parenting and child emotion dysregulation or parenting stress in our sample. The role of sensitive parenting in relation to parenting stress and child outcomes may be more pertinent in populations in which sensitive parenting is a bigger concern and has been shown to have more variability (e.g., in the foster system; Gabler et al., 2014). On the other hand, although parents in our sample exhibited relatively lower levels of

intrusive parenting ($M = 1.37$, $SD = 0.51$), our results showed significant associations between intrusive parenting and parenting stress as well as child emotion dysregulation. Whereas sensitive parenting has been found to promote more positive child outcomes among children with DD (i.e., cognitive development, social skills, attachment security; see Guralnick, 2017 for a review), it is possible that the presence of negative parenting behaviors (e.g., intrusive parenting)—even when occurring infrequently or at low levels—may play a bigger role in the development of problematic child outcomes than positive parenting behaviors (e.g., sensitive parenting). This is consistent with recent studies, which have highlighted the role of negative parenting behaviors (such as criticism and harsh discipline) as mediators in the relationship between parenting stress and child behavior problems among children with autism spectrum disorders (Shawler & Sullivan, 2017).

The study of the mechanisms through which parenting stress influences child emotion dysregulation may also have clinical implications. Researchers have suggested that by understanding the processes through which therapeutic change occurs, clinicians can optimize treatment outcomes by focusing on key pathways of change (Kazdin, 2000; Kazdin & Nock, 2003). Our findings that parenting behaviors (i.e., intrusive parenting) may mediate the relationship between parenting stress and emotion dysregulation among young children with DD may be particularly relevant for interventions that target child emotion dysregulation via parent-training in this highly stressed population (e.g., The Incredible Years Preschool Basic Parent Program; Dababnah & Parish, 2016; Webster-Stratton, 2007). Because our findings suggest that parenting stress may influence child emotion dysregulation through the effects of parenting behaviors, it may be important to

monitor and intervene with parents' stress levels as they go through these parent-training interventions in order to optimize child outcomes. This is consistent with previous research which suggests that high levels of parenting stress decrease the efficacy of parent-training interventions, resulting in poorer child outcomes (Osborne, McHugh, Saunders, & Reed, 2008). It may be beneficial for future studies to examine whether augmenting existing behavioral parent training programs (e.g., The Incredible Years; Webster-Stratton, 2007) with a stress-reduction component would improve the efficacy of these interventions by reducing the parents' intrusive parenting behaviors, and subsequently their child's emotion dysregulation.

Although our findings were promising, these results must be considered within the context of several study limitations. First, because missing data was an issue in our longitudinal analysis, we imputed data using the Last Observation Carried Forward strategy (Shao & Zhong, 2003). However, the LOCF strategy may have the potential to bias estimates of treatment effects and associated standard errors (Mallinckrodt et al., 2003). Thus, we also conducted the analysis using multiple imputation (Enders, 2010) to address missing data, and found the same results, increasing our confidence in our findings. Second, in order to optimize our sample size, the mediation analysis relied on cross-sectional data at baseline; as a result, we cannot draw firm conclusions regarding directionality of effects. It may also be possible that child emotion dysregulation predicts parenting stress through the effects of parenting behaviors. Future studies may benefit from employing longitudinal data to examine the mechanisms through which parenting stress influence child emotion dysregulation. Third, our sample was heterogeneous in terms of child diagnoses. While the majority of children in our study were reported to

have a diagnosis of Autism Spectrum Disorder (ASD), other child diagnoses reported in our sample include Down's Syndrome, Intellectual Disability, Learning Disability, Prader-Willi Syndrome, Speech Delay, Cerebral Palsy, Fragile X, and Microcephaly. Considering that families of children with ASD tend to exhibit higher levels of parenting stress as well as more difficulties with emotion dysregulation compared to both typically developing and developmentally delayed children (Davis & Carter, 2008; Mazefsky, Pelphrey, & Dahl, 2012), future studies should consider examining an ASD diagnosis as a moderator in the relationship between parenting stress and child emotion dysregulation.

Despite these limitations, the implications of these results are significant. To the author's knowledge, this study was the first to explore not only the impact of parenting stress on emotion dysregulation among children with DD using an experimental design, but also the mechanisms through which these processes occur. Our results suggest that parenting behaviors (i.e., intrusive parenting) may mediate the relationship between parenting stress and emotion dysregulation among children with DD. With a growing body of research suggesting that the family context plays an integral role in a child's development (Crnic & Neece, 2015; Woodman, Mawdsley, & Hauser-Cram, 2015), this study reiterates the finding that parenting stress remains a salient risk factor in the development of emotional and behavioral difficulties in children with DD. As a highly vulnerable population in great need of intervention, this study suggests that early intervention with parents of children with DD may have a spillover effect for the child. In particular, by intervening with parents' stress, we may be able to reduce the likelihood of intrusive parenting behaviors, and thereby reduce the rates of emotion dysregulation and subsequent psychopathology that are common among children with DD.

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EMOTION DYSREGULATION SCALE

This scale is intended to capture emotion *dysregulation*.

Note: Keep in mind emotional expressions that are inappropriate to the situation and/or interfere with the task are considered dysregulated, however not all emotional expressions are dysregulated.

0. None present
This rating describes individuals who do not display emotion dysregulation during the segment.

1. Low degree
This rating describes individuals who exhibit some combination of the following traits:
(a) display only one or two brief emotional expressions that are inappropriate to the situation. There are no instances of strong or intense displays of emotional expression.
(b) for the most part, can regroup on his/her own
(c) display one or two brief instances of emotional lability and/or variability in intensity of emotional expression. Individual recovers quickly from emotional experiences.

2. Moderate degree
This rating describes individuals who exhibit some combination of the following traits:
(a) have at least one occurrence of emotional expression that is NOT mild or low-key
(b) multiple brief, low-key emotional expressions
(c) sometimes can regroup on their own, but other times needs the help of the parent
(d) may exhibit some emotional lability OR some variability in intensity of emotional expressions OR slower recovery time from emotional experiences.

3. Moderate to high degree
This rating describes individuals who exhibit some combination of the following traits:
(a) display a few occurrences of intense emotional expression
(b) display less intense but frequent emotional expressions, at a higher frequency and/or intensity than a child at level 2
(c) for the most part, are unable to regroup without the help of the parent
(c) exhibit any combination of emotional lability, variability in intensity of emotional expressions or slower recovery time from emotional experiences

4. **Very high degree**
   This rating describes individuals who exhibit some combination of the following traits:
   (a) display several intense, frequent emotional expressions
   (b) display less intense but frequent emotional expressions throughout the segment, at a higher frequency and/or intensity than a child at level 3
   (c) virtually unable to regroup without the help of the parent
   (d) very labile, extreme variability in intensity of emotion, and/or very slow recovery from emotional experiences.

APPENDIX B

PCIRS SENSITIVE PARENTING CODES

Sensitivity Ratings

1 = Not all characteristic-- There are almost no signs of parent sensitivity. The parent rarely responds appropriately to the child's cues.

2 = Minimally sensitive/responsive-- Parent is occasionally sensitive; maybe 1 or 2 instances of sensitivity.

3 = Parent is moderately sensitive and responsive to child; Inconsistently sensitive, hard to categorize.

4 = Mostly sensitive/responsive-- Here the balance shifts to the parent being more often sensitive than not.

5 = Highly sensitive/responsive-- The parent displays consistent sensitivity to the child throughout the rating period.

APPENDIX C

PCIRS INTRUSIVE PARENTING CODES

1 = Not all intrusive-- There are almost no signs of parent intrusive behavior; no sense.

2 = Minimally intrusive-- While the parent shows evidence of intrusiveness, it is of non-insistent or non-directive quality. Parent may initiate interactions with and offer suggestions to the child that occasionally are not welcomed by the child. If the child engages in defensive behavior, the parent persists for no more than a brief time, and then changes to a different activity. The parent continues his/her activity after the child engages in defensive behavior but she does not escalate her activity.

3 = Inconsistently intrusive-- Parent is characteristically incoherent in this regard; periods of blatant intrusiveness are intermixed with periods of sensitive, responsive interaction.

4 = Moderately intrusive-- Parent intrusiveness occurs with moderate frequency. The parent is more intrusive than not.

5 = Highly intrusive-- Parent is consistently intrusive. Most of the observation period is marked by the parent completely controlling the interaction, allowing the child little lee-way in his/her play. The parent allows the child little autonomy; parent essentially negates the child's experience.